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INTELLECTUAL PROPERTY AND TECHNOLOGY TRANSFER PERFORMANCE IN BRAZILIAN UNIVERSITY: A STUDY OF UFMG AND ITS PHARMACEUTICAL TECHNOLOGY

A PROPRIEDADE INTELECTUAL E DESEMPENHO DA TRANSFERÊNCIA DE TECNOLOGIA NA UNIVERSIDADE BRASILEIRA: UM ESTUDO DE CASO DA UFMG E SUAS TECNOLOGIAS FARMACEUTICAS

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Belo Horizonte
May, 2014

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Dissertação de mestrado apresentada ao Programa de Pós-Graduação em Fisiologia e Farmacologia da Universidade Federal de Minas Gerais, como parte dos requisitos para obtenção do título de Mestre em Inovação Biofarmacêutica, área de concentração Propriedade Intelectual.

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“Eni ó máa je oyin inú àpáta, Kò gbodò wo enu okó.”

“He who longs to reach the sweet honey within a rock
is never bothered by the twisted axe blade”.

(Ancient Yorùbá Proverb).

Abstract

In an environment of fierce competition and trade liberalization, where innovation processes are based on the appropriation of knowledge, scientific and technological progress, the protection of Intellectual Property increasingly integrates the strategy adopted by the leading organizations and governments of countries. In Brazil, there is a high level of production of scientific researches, theses, papers for scientific journals – accounting for 2.12% of global production – and making the country rise in the world rankings to 13th position on the list of the highest publishing countries of the world. Therefore, Brazil has developed competitive academic skills and significantly advanced the training of qualified human resources. Nevertheless, one can say that it is a contradiction when it comes to intellectual property protection of generated and published knowledge. In other words, Brazil is among the countries that publish scientific papers in the world, but on the other hand, it is among those who least recorded patents. At the same time, Brazil has been in a favorably stable economic phase, which causes the broadening of many international interests in its industries which are tending towards expansion and to increase in demand for both skilled human resource and advanced technologies. This research relates intellectual property with regard to the pharmaceutical and technology transfer to economic growth and development. Thus, it is a study of the Triple Helix components, analyzing the interactions and cooperation between institutions as research centers and universities, the pharmaceutical industry and the government of Brazil in terms of creating new points of convergence and strategies for technology transfer in Brazil and the state of Minas Gerais. We hereby inquire into the Brazilian universities' patents performance, as well as the rate of patenting and technology transfer of pharmaceutical patents at the Federal University of Minas Gerais (UFMG) which exercises its patent activities through its innovation and technology transfer office (Coordenadoria de Transferência e Inovação Tecnologica – CTIT) and its it was found that a lot still needs to be done to improve the applicability of produced and patented technologies in the university to the pharmaceutical industry's production processes.

Key Words: Intellectual Property, Triple Helix, Technology and Innovation, Brazilian Pharmaceutical Industry, Technology Transfer, CTIT – UFMG.

Resumo

Em um ambiente de concorrência acirrada e de liberalização comercial, onde os processos de inovação baseiam-se na apropriação do conhecimento e no progresso científico e tecnológico, a proteção da Propriedade Intelectual integra cada vez mais a estratégia adotada pelas organizações vencedoras e governos dos países. No Brasil, há um alto nível de produção de estudos científicos, teses, papers para publicações científicas – contabilizando 2,12% da produção global –, e fazendo com que o país suba no ranking mundial para a 13ª posição na lista dos maiores países publicadores do mundo. Portanto, o Brasil desenvolveu habilidades acadêmicas competitivas e avançou significativamente na formação de recursos humanos qualificados. Mesmo assim, pode-se dizer que é uma contradição quando se trata de proteção da propriedade intelectual dos conhecimentos gerados e publicados. Ou seja, o Brasil figura entre os países que mais publicam trabalhos científicos no mundo, mas, por outro lado, é um dos que menos registram patentes. Ao mesmo tempo, o Brasil está em uma fase econômica favorávelmente estável, o que provoca a ampliação de muitos interesses internacionais sob as suas indústrias que estão com a tendência de expanção e aumento em demanda tanto por recursos humanos qualificado quanto em tecnologias avançadas. A pesquisa apresentada neste trabalho se relaciona ao diagnóstico da propriedade intelectual no tocante à área farmacêutica e transferência tecnológica. Assim, trata-se de um estudo dos componentes do Triple Helix analisando as interações e coopreações entre instituições como centros de pesquisas e universidades, a indústria farmacêutica e o governo do Brasil em função de criar novos pontos de convergência e estratégias para o desenvolvimento da transferência tecnológica no estado de Minas Gerais. Pelo presente trabalho, investiga-se o desempenho das patentes nas universidades brasileiras, especialmente a transferência de tecnologia das patentes farmacêuticas da Universidade Federal de Minas Gerais (UFMG), que exerce suas atividades desta natureza por meio de seu escritório de transferência de inovação e tecnologia (Coordenadoria de Transferência e Inovação Tecnológica – CTIT). Constatou-se que muito ainda necessita ser feito para melhorar a aplicabilidade das tecnologias produzidas e patenteadas na Universidade para os processos de produção da indústria farmacêutica.

Palavras-chave: Propriedade Intelectual, Triple Helix, Tecnologia e Inovação, Indústria Farmacêutica Brasileira, Transferência Tecnológica, CTIT – UFMG.

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List of Abbreviations

ABDI – Agência Brasileira de Desenvolvimento Industrial
AGU – Attorney General of the Union
AIPPI – Association Internationale pour La Proctetion de la Propriéte Intellectuelle
ANVISA – Agência Nacional de Vigilância Sanitária
BIRPI – Bureaux Internationaux Reunis pour la Protection de la Propiete Intellectuelle
BNDES – Banco Nacional de Desenvolvimento Econômico e Social
CCT – Conselho Nacional de Ciência e Tecnologia
CGEE – Centro de Gestão e Estudos Estratégicos
CMED – Câmara de Regulação do Mercado de Medicamentos
CNDI – Conselho Nacional de Desenvolvimento Industrial
CNPq – Conselho Nacional de Desenvolvimento Científico e Tecnológico
CTIT – Coordenadoria de Transferência e Inovação Tecnológica
DNPI – Departamento Nacional da Propriedade Industrial
DOU – Diário Oficial da União
EPO – European Patent Office
FICPI – Féderation des Ingenieurs Conseils em Propriété Industrielle
FINEP – A Financiadora de Estudos e Projetos
FIOCRUZ – Fundação Oswaldo Cruz
GATT – General Agreement on Tariffs and Trade
GDP – Gross Domestic Product
ICT – Instituição de Ciência e Tecnologia
ICTSD – International Centre For Trade And Sustainable Development
IP – Intellectual Property
INCTs – Institutos Nacionais de Ciência e Tecnologia
INPI – Instituto Nacional de Propriedade Industrial
IPC – International Patent Classification
IPL – Intellectual Property Law
LIT – Lei da Inovação Tecnológica
LPI – Lei da Propriedade Industrial
MCTI – Ministério da Ciência, Tecnologia e Inovação
MDIC – Ministério do Desenvolvimento, Indústria e Comércio Exterior
MEC – Ministério da Educação
MS – Ministério da Saúde
PCT – Patent Cooperation Treaty

PETROBRAS – Petróleo Brasileiro S.A.
PITCE – Política Industrial, Tecnológica e de Comércio
PROMINP – Programa de Mobilização da Indústria Nacional de Petróleo e Gás Natural
PROSOFT – Programa BNDES para o Desenvolvimento da Indústria Nacional de Software e Serviços de Tecnologia da Informação
R & D – Research and Development
S & T – Science and Technology
SIBRATEC – Sistema Brasileiro de Tecnologia
SINPI – Sistema Integrado de Propriedade Industrial
STI – Science, Technology and Innovation
SUS – Sistema Único de Saúde
TH – Triple Helix
UNCTAD – United Nations Conference On Trade And Development
TOT Code – Code of Conduct on Transfer of Technology
TRIPS – Trade Related Aspects of Intellectual Property Rights
UNICAMP – Universidade Estadual de Campinas
UFMG – Universidade Federal de Minas Gerais
UFRJ – Universidade Federal do Rio de Janeiro
UFRGS – Universidade Federal do Rio Grande do Sul
UFPR – Universidade Federal do Paraná
UMG – Universidade de Minas Gerais
USPTO – United States Patent and Trademark Office
WIPO – World Intellectual Property Organization
WTO – World Trade Organization
WHO – World Health Organization

Chapter 1.0 – Introduction

1.1 Overview

This chapter presents an overview of the research, the Background to the Study, Problem Statement and Purpose of the Study and Research Question , Objective of the Study, Justification, Significance of the Study, and Structure of Thesis.

1.2 Background to the Study

Research centers in Brazil are formed by both private and public organizations though uneven. There are several public private research projects which are considered to be objective to few specific goals of private companies. Notwithstanding, the public sector has been the cornerstone of knowledge generation and impart. In other words, the government is responsible for the highest amount of direct investment in scientific researches either through infrastructural facilities mostly in public universities or through short and long term research sponsorship programs of the Ministry of science and technological Innovation – Ministério da Ciência, Tecnologia e Inovação (MCTI) through its research finance mechanism like Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Financiadora de Estudos e Projetos (FINEP), and indirect investment through subsidiary or tax holidays whereby the government incentivizes private companies to invest their taxes in scientific researches and sometimes through rules of law mandating companies to invest stipulated amount of their profit in researches.

Thus, it is shown in this study that despite the huge amount of government investment in scientific researches, the yardstick for its investments success has, for decades until recently, been publishing of scientific articles, manuscripts etc. which makes Brazil soar – 13th position – amongst the highest producers of basic scientific researches in the world, however, paying a prize to the innumerous publication, which is less interest in patenting of new processes, that further entangles with less applicability or transfer of the generated knowledge to production processes in the industries and extensive gap between the universities / research centers, the Industries and the government who is the highest risk bearer, and as such the famous Triple Helix Model ceases to ideally hold in this context.

In order to better understand how technological transfer works between the pharmaceutical industry and research centers like the university, it is important to define and explore the concepts sphere of several fields and realms in relation to this study. In this research, we shall trace through overview of few interwoven variables, which are strongly pertinent to this research, focusing on Brazil and Minas Gerais state. These include a succinct look into Innovation and the structure of Brazilian Science, Technology and

Innovation deliberated toward identifying the scope of the Triple Helix concept, Technology Development, Technology Transfer, and the evolution of Intellectual Property in Brazil. Patenting as well as Technology Licensing/Transfer and Innovation are important elements as “tripod” of economic growth and development.

To ensure efficiency in government investments result, as well as national economic development, it is necessary to bring about tangential points between universities/research centers’ generated knowledge, and the industries’ production process thereby bridging the gap between them. Better put, there should be a good level of technology transfer between universities / research centers and the Industry, the pharmaceutical Industry in our sample, to achieve national developmental goals. The process of technology transfer crucially demands valorization of knowledge and new processes through the use of Intellectual property rights of the same. In this study, technology transfer is defined as the commercial exchange of technology which includes knowledge or know-how, new processes, invention etc. between entities of common interests.

1.3 Problem Statement

Brazil despite being one of the highest producers of basic scientific researches still crawls amongst countries with the least amount of patents production in the world. This situation further leads to failure in its economy industries’ competitiveness and transferability of technologies between the Brazilian research centers and the industries. As such, most technologies used in the process of production are either licensed by foreign companies or imported from multinational companies’ home offices and adapted to the Brazilian production system, thereby causing capital flight and a slow growth in the applicability of its huge amount of basic scientific researches. Despite recent attempts through some public-private initiatives to revert the case, there still exist an enormous gap between the industries and the university / research centers as to choices of adopted technology and choices of production technology. There is the need to increase understanding of the real situation and performance of the Brazilian universities in relation to technology invention, transfer and managent.

Research Question: Drawing from the literature review and case study, the leading research question investigated in this thesis, which have not yet been dealt with in the existing literature is **What is UFMG's situation and performance in patenting, technology transfer and licensing of its invented Pharmaceutical technology?**

1.4 Objectives of Study

General Objectives:

For the above identified research problems, the main purpose of this study is to assess and analyse the growth process of both drug technology and technology transfer in the Brazilian Universities using UFMG as a case study. This present work has the general objective of researching and identifying the drug Patent and transfer performance of UFMG within the limits of the existing relations between the government, universities and the pharmaceutical industry. Therefore, the ultimate aim is exploring available data on the drug technology productivity of the Brazilian leading universities in patenting as well as the technological transfer rate in UFMG as an enabling factor for local and national technology and economic development, while interests and rights protection are guaranteed by the use of intellectual property.

Specific Objectives:

To achieve the general objective, we intend to obtain the following specific objectives:

1 describe using historical data, documents and laws relating to intellectual property law and policies related to the local technological advancement;
2 Identify the national position of UFMG's drug patents amongst the 6 leading University patent depositors in Brazil, as shown in 4.0 – Result and discussion Part 1 using the available data.
3 Obtain a general overview of the evolution of invention and protection of drug patent in Universidade Federal de Minas Gerais, seeking to extract relevant data relating to the flow of corresponding information to this research;
4 Give a summarized description of the Federal University of Minas Gerais (Universidade Federal de Minas Gerais) and its Center for Innovation and Technology Transfer (Coordenadoria de Transferência e Inovação Tecnológica – CTIT) identify the progress of Patenting in the University, also focusing on its drug patents;
5 Search the database and documents of CTIT for related data to UFMG's patents including the drug patents;
6 Search the database and documents of the Brazilian patent office – INPI (Instituto Nacional de Propriedade Industrial) for related data to UFMG's patents including the drug patents;
7 Create awareness of existing UFMG's patented technologies.

1.5 Justification

The New International Economic Order, which is a set of proposals put forward during the 1970s by some developing countries (i.e. the "*Declaration for the Establishment of a New International Economic Order*" on 1st of May 1974[1] and "*The Resolution adopted on the Report of the Ad Hoc Committee of the Seventh Special Session*" on 16 September 1975) [2] through the United Nations Conference on Trade and Development to promote their interests by improving their terms of trade, increasing development assistance, developed-country tariff reductions, and other means, was agitated with the belief that that the transfer of technology to developing nations will improve their material circumstances to levels approaching those of the industrialized nations. This gesture proceeds on the assumption that the transfer of technology facilitates the more productive use of resources and provides a technological base for the development of indigenous technology.

However, despite the undeniable role played by technology as a catalyst for economic development, it is not the sole determinant of that growth. The technology available to developing countries has largely been produced for markets in industrialized countries. This technology reflects not only the effective demands, and relative prices, but also the physical, economic, and social environments of those countries. Consequently, the technology that is accessible "off the shelf" to developing countries is likely not to be well suited to their needs. For the fact that most technology originates from developed countries, the international institutions and legal arrangements governing technology dissemination have been designed primarily to serve the particular interests of developed countries.

Thus, the very notion of industrial property rights is said to reflect the concern in market economies with the sanctity of private property.[3] It is observed that demands of developing countries for access to technology is paralleled by their demands for a restructuring of the legal environment that controls such transfers and incentives to developments of indigenous technologies. As such, the developing countries started working towards amendments of the existing, and establishment of new intellectual property laws and national policies as it is the case in Brazil.

Several Brazilian universities already had similar structures to Technological Innovation Centers, even before the requirement set by the Law n° 10.973, of December 2, 2004 known as the "Lei da Inovação Tecnológica or LIT" (Technological Innovation law).

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[1] Declaration for the Establishment of a New International Economic Order. In: *United Nations General Assembly Document*, A/RES/S-6/3201 of 1 May 1974. Available online at: http://www.un-documents.net/s6r3201.htm and http://www.un-documents.net/k-003044.htm. Site visted on 28/03/2014.

[2] Resolution on Development and international economic co-operation. In: *United Nations General Assembly Document*, A/RES/S-7/3362 of September 1975. Available online at: http://www.un-documents.net/s7r3362.htm. Site visted on 28/03/2014.

[3] HELLEINER, G. F. International Technology Issues: Southern Needs and Northern Responses. In [98], p.84-97. BHAGWATI Jagdish N. (editor). *The New International Economic Order*: The North-South Debate, U.N, p.295-297, 1977.

Innovation agencies, technology transfer offices and intellectual property cores can be seen as different versions of the same concern. However, the novelty is that the Law institutionalizes and regulates these activities structuring a scheme to foster researches which bring about productive environment and economy, and expands the scope of work of these institutions.

Therefore, according to Barbosa (2006 *apud* Araújo *et al*, 2010) the Law aims "*the establishment of conducive strategic partnerships between universities, technological institutes and companies*". Standards to encourage the researcher-inventor, as well as the appropriation of ICTs in knowledge formulated in favor of the market are also covered in the LIT. Article 28 of this Law refers to the fiscal incentives granted to companies. By definition of the LIT, the acronym ICT – Instituição de Ciência e Tecnologia (Science and Technology Institution – STI) is known as a university or a research institute that has full dedication to the development of scientific and technological research.[4]

Thus, there is a need for development and transfer of technology among national research centers and local industries. As such, this study seeks to better understand the performance and existing regulations in order to propose an improvement thereof.

1.6 Significance of the Study

The study is significant in various ways to the business practitioners, policy makers and stakeholders.

To the management of pharmaceutic companies, the findings and results that will be reported in this study will provide a more reliable scientific measure and perspective for describing and evaluating the technological capacity of the Brazilian universities. It also serves as a valuable source of information that brings the available drug technologies and their patents to lime light which may influence the production processes in the industry.

It will provide empirical support for management strategic decisions in several critical areas of their operations. To policy makers like government agencies such as Ministry of Education, CNPq, etc, as well as CTIT and UFMG's governing bodies, the finding and results of this study will provide invaluable insights and a more reliable guide to measuring the end products of investment in the university's basic researches and knowledge generation.

[4] BARBOSA, D. B. *Direito da Inovação*. Rio de Janeiro: Lumen Juris, 2006.

To other stakeholders like the university's units/faculty, departments, laboratories, professors, researchers, students, the institutional partners, among others, the study will provide invaluable information that allow them to provide useful schemes towards the improvement of research and technology development as well as the possible application in consumable products.

1.7 Structure of Thesis

The study is organised into six chapters. Chapter one is the introductory chapter that covers the Background to the study, Problem statement, Purpose of the study, Objectives, Research questions, Significance, Limitations, Delimitations, Justification and Structure of thesis.

Chapter two is review of relevant literature. Technology and Innovation, Intellectual Property in Brazil and the Triple Helix Concept. Chapter 2 of this research is based on a very vast literature review which considers a multidisciplinary perception of the Brazilian innovation environment, as such Law – Intellectual property, Economic concepts and Industrial structure including; technological innovation, national system of innovation in Brazil, access to technology, the triple helix theory and its applicability in Brazil, the development of intellectual property in Brazil, the pharmaceutical industry in Brazil and Minas Gerais. Chapter 3 shows the methodology used in the research while Chapter 4 and 5 are results of the our study which is of two parts with respect to patenting and drug patents. The first part (chapter 4) is based on a national perception of UFMG's position among the Brazilian universities in relation to their technology patenting, while the second part (chapter 5) is based on the performance of UFMG and its innovation and technology transfer office – CTIT along the period of its existence up to december 2013.

Chapter 2.0 – Literature Review: Technology and Innovation, Intellectual Property in Brazil and the Triple Helix Concept

Historically, we can observe that the process of economic development of countries were founded on certain bases on their national institutions and public policies. Developing Countries, in their quest for growth, approach the successful Developed Nations and rely on effective government support, represented by incentives to economic activity, sometimes by protectionist measures.

In Brazil, until the 30s of 20th century, the economy was primarily based on agricultural production for export. However, changes in the international scene, due to the effects of the crisis and the end of the Second World War, led the government to introducing a policy of import substitution aimed at strengthening domestic industry. Subsequently, the process of industrialization in Brazil and other Developing countries, was not able to fully breakaway from the past conditions of dependency.[5] The need for funding to support industrialization through import substitution prevented the internalization of all stages of the production chain and required technological accumulation. The economies of developing countries have then also depended on technology being implicitly embedded in equipment and machinery as well as explicitly accessed via patent licensing.

> The assumption of almost all the proponents of the transfer of technology is that such transfer is a prerequisite, even an imperative, for desirable economic and social development. Solow (1957) attributed "87.5% of the growth of per capita income in the United States" in the first half of this century to "technological progress, and the remainder to the use of capital". At the other end of the developmental spectrum, the deprivation and poverty suffered by developing countries has been attributed almost entirely to their technological dependence. In addressing the question of the technological transformation of developing countries, a 1980 UNCTAD report noted that industrialized countries spent between six and seventeen times more of their gross national product on research and development than did developing countries. Further, in developing countries, only one in 10,000 per capita were scientists and engineers, compared with forty-three in market economy countries and eighty-two in socialist countries. The report also noted that developing countries held only 1% of the world total of patents, and that in those developing countries with patent systems 84% were owned by foreigners. Finally, the report observed that 90% of the trade in technology took place among developed nations.[6]

Thus, the issue of access to advanced technologies, produced in developed countries economy gained relevance for the development of developing countries. The transfer of

[5] CAMPOS, Márcia Aparecida Ferreira. *A Politica Econômica do Governo Kubitscek (1956-1961)*: o discurso em ação. Porto Alegre, 2007, p.8-9.
[6] BLAKENEY, Michael. Transfer of Technology and Developing Nations. In: *Fordham International Law Journal*, Berkeley Electronic Press, vol.11, issue 4, p.393-397, 1987. Available online at: http://ir.lawnet.fordham.edu/ilj.

foreign technology was consolidated as a major source of innovation for the peripheral economies. However, generated situations by technical absorptive capacity of the importing institution, the existence or not of appropriate public policies, the international division of labor and the low bargaining power of developing countries in determining conditions for technology transfer, usually involve disadvantageous conditions for developing countries with regard to the commercial terms of technology imports.

In Brazil, the Federal Constitution of 1988 in its Chapter IV – Science and Technology in its Articles 218 and 219, already has an essential role of the state as a promoter of scientific and technological development, and promoting the welfare of the population focusing also on technological autonomy. The lack of government planning in the 1980s and 1990s contributed decisively to the fragility of the national economy as well as in the industrial, scientific and educational policy. Subsequently, the scientific technology delay is more than evident when compared to some countries, mainly because of budget constraints, low investment of national Gross Domestic Product – GDP and a regional imbalance of investment, added to the huge regional disparities, since 50% of these financial contributions is made by the federal government.[7]

With the prospect of recovery of economic growth, based on improved indicators for Science, Technology and Innovation, one of the newer instruments to encourage innovation, scientific and technological research in the Brazilian productive environment is Law n° 10.973, of December 2, 2004 known as the "Lei da Inovação Tecnológica or LIT" (Technological Innovation Law), regulated by Decree n°5.563, of October 11, 2005, and brings important contributions to the national technological development as a new paradigm for the sector in Brazil.

2.1. Technological Innovation

The Innovation theme becomes an increasingly frequent subject in the Brazilian society. The LIT (Lei da Inovação Tecnológica) states in Article 2 paragraph IV that innovation is an "*introduction of novelty or improvement in productive or social environment that results in new products, processes or services*".[8] Tidd, Bessant and Pavitt (2005) argue that innovation is an imperative process, and that this is closely related to technology, market and organization. Furthermore, it was argued that successful innovation is based on strategy,

[7] *Cf*. SILVA, Sérgio Murilo Archanjo da; MOTTA, Ana Lúcia Seroa da. Ciência e Tecnologia no Brasil: a Lei da Inovação. In: *IV Congresso Nacional de Excelência em Gestão*, Niterói/RJ, 31 de julho a 02 de agosto de 2008.
[8] Art. 2 of the Law n°10.973, 2 of December, 2004 (Lei da Inovação Tecnológica).

effective internal and external relationships, facilitating mechanisms of change and a supportive organizational context.[9]

According to Cysne (2005) the social growth and power of nations are directly responsible for the capacity of technological innovation and the transfer and application of technology enterprises in each country.[10] Innovation has become a fierce competition between companies and countries, and handling technological knowledge leads to economic and political domination, in the view of Staub (2001).[11] And, in that scope of intense scientific and technological competition, Technological Innovation Centers are immersed.

Considering the earliest work processes in agriculture and crafts, through the Industrial Revolution, the discovery of oil and commercial use until today, we would be experiencing a Revolution of Knowledge. However, as a reference point and inflection for understanding, the innovative economic-process reflections of Schumpeter (1982) gives profound emphasis on the importance of innovation and technological development of enterprises and the economy advances. In the proposed business cycles analysis in the work of Schumpeter, in close interface with the technological innovation context throughout history, the main characteristics of innovation consequently leads to a better understanding of the recent process of globalization, historically marked by the Industrial Revolution movement, Fordism, and currently the Information Paradigm as shown in Table 1:

Table 1 – The Theories of Firm, Industrial Structure and Regulatory System in Three Techno-economic Paradigms.

	British Industry	Fordism	Information Paradigm
Main theoretical currents Company	Neoclassical	Industrial Economics	Evolutionists and Neo-Institutionalisms
Central concerns	- Balance - Perfect rationality of agents - Emphasis on analysis of exchange relations (trade name black box)	- Market Structure - Economies of scale - Growth Company - Relative rationality - Transaction costs	-Technological change- - Institutions - Cooperation
Industry structure and organization of the firm	- Small business -Vertical Specialization - Dependence of external economies	- Oligopoly Multinational-Enterprises	- Network of firms - Global Oligopoly

[9] TIDD, Joe; BESSANT, John; PAVITT, Keith. *Managing Innovation*: Integrating Technological, Market and Organizational Change. 3ª Ed. East Lothian: John Wiley & Sons Ltd., 2005, p.577.
[10] CYSNE, F. P. Transferência de tecnologia entre a universidade e a indústria. In: *Revista Eletrônica de Bibl. Ci. Inform*, Florianópolis, nº 20, 2º semestre 2005, p.54.
[11] *Cf.* STAUB, E. *Desafios estratégicos em ciência, tecnologia e inovação*. Brasília: IEDI, 2001.

Characteristics of national regulatory systems	- Laissez-faire - State with minimal regulatory functions - Full liability of owners	- state Interventionist	- Deregulation - Globalization

Source: Adapted from TIGRE (2005).[12]

From the description of the Information Paradigm, and in view of the technological change criteria, cooperation, deregulation and globalization, Araújo *et al* (2010) describe the scenario of network building, as something important to the popularization and dissemination of knowledge of Innovation and Technological Innovation Centers for their products and processes:

> In the present scenario, network construction is a fundamental strategy for disseminating and consolidating a culture of intellectual property, technology transfer and innovation in the states and in the country, allowing the exchange of information, experiences, and interactions between institutions compose, aiming the improvement of their shares under the protection and transfer of knowledge [...].[13]

2.1.1. The Neo-Schumpeterian Innovation and Technology Approach

One of the most important theorists of economics, Joseph Alois Schumpeter, noted the critical role of technology in the capitalist economy in one of his most significant works entitled “Theory of Economic Development”. He argue on the central role of technology in economic development based on the concept of temporary monopoly created by the innovator. Schumpeter portrays the function of innovative business as economic agent responsible for introducing new products to the market, whether through more efficient combinations of factors of production, or the practical application of any invention or technological innovation.

The relationship between innovation and creation of new markets, in Schumpeter's view, arises from the action of the entrepreneur producer who initiates economic change and consumers, if necessary, are “taught” to desire new things, different in some ways from those who habitually consume. Thus, the fundamental impulse responsible for propelling the engine of the economy would not originate from natural or social phenomena, such as wars and revolutions, but the innovations that capitalist enterprise creates and destroys, from time to time.[14]

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[12] *Cf*. TIGRE, P. Paradigmas tecnológicos e teorias econômicas da firma. In: *Revista Brasileira de Inovação*, 4:1, p.187-223, 2005.

[13] ARAÚJO, Elza Fernandes *et al*. *Propriedade Intelectual*: proteção e gestão estratégica do conhecimento. Viçosa: R. Bras. Zootec., 2010.

[14] SCHUMPETER, Joseph A. The Theory of Economic Development (An Inquiry into Profits, Capital, Credit, Interest and Business Cycle). Cambridge, 1934.

New consumer goods, new processes and methods of production and transportation, new forms of industrial organization are the propellants of the economy as they create and reflect new needs and habits derived of the offering new products and services, generating economic cycles, more or less long.

Another important contribution of the theory postulated by Schumpeter is in recognition of the importance of the concentration of capital, and therefore the existence of big business, to technical progress. On the role of these large corporations, the theory considers the relation between oligopoly and technical progress as mutual: if on the one hand, the process of product differentiation should lead to the expansion and creation of new oligopolistic markets and, secondly, the high investments in R & D, necessary for survival in dynamic markets, shall require the presence of large companies.

UNCTAD recognizes that transnational corporations play an important role in the generation, transfer and dissemination of technology. About such processes, observes:

> Transnational companies tend to centralize their research and development (R&D) facilities in their home countries and a few other industrially advanced countries. On the whole, developing countries continue to attract only marginal portions of foreign affiliate research, and much of what they get relates to adaption and technical support rather than innovation.[15]

Then it follows, according to the economic thought of Schumpeter, that the motor of the capitalist economy would be driven by the pursuit of extraordinary profits for entrepreneurs, contrary to traditional economic conception that super valued the role played by the variable price.

Paul Tiger (2005) argues that the neo-Schumpeterian or evolutionary theory emerged about the conceptual basis of the business cycle developed by Schumpeter, reflecting the critical role of innovation in the economy, coupled with a line of research that aimed to incorporate technological issue theories of the firm, and this matter is crafted by several authors. We also observed the use of an evolutionary language to describe the structural changes in the economy over time, calling, for example, industries and markets as “youths” and “the most matured”.[16]

The neo-Schumpeterian economics approach differs from the conventional approach by frontally question some of their basic assumptions. Giovanni Dosi, Technological Paradigms in their work and Technological Trajectories, published in the journal Research Policy in 1982, calling into question, for example, pillars of conventional economic thought,

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[15] UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD). *Compendium of International Arrangements on Transfer of Technology*: Selected Instruments. Genebra: United Nations Publication, 2001, p.11-12.

[16] TIGRE, Paulo B. *Gestão da Inovação*: a Economia da Tecnologia no Brasil. Rio de Janeiro: Elsevier, 2006.

as the assumption of the “price mechanism” as the main instrument of competition between firms; and the premise of the market “equilibrium tendency”.[17]

In an attempt to understand the role of technology and technological change in the economic development process, the aforementioned author investigated two major explanations for technical progress used as premises of neoclassical current. The first, known as “demand-pull theory”, put market forces as the main mechanism responsible and supportive of technological change. Therefore, it would be the recognition of the needs of the society by the productive sector, would boost this sector in order to make efforts to meet those needs. However, according to the author, this theory would not have succeeded in producing sufficient evidence to conclude that the needs signaled by the market would be the driving force of innovative activity.

Dosi questioned a number of characteristics of the demand-pull approach, among them, a reactive concept, passive and mechanical, technological change in the face of market conditions, the inability of the theory to define why and when certain technological developments happen instead of others, and the fact that the theory neglects of the inventive capacity changes occurring over time, which showed no relationship in changes in market conditions.[18]

The second neoclassical theory criticized by Dosi and driving force of technological innovation, was known as “technology push theory”. This current delegated to increasingly rapid changes in scientific knowledge, and the consequent search for practical applications for this knowledge, the role of driving force of innovation. However, on this approach, the author drew attention to some aspects: the growing complexity of the innovation process, and the role of science and R & D in this process, and the relative autonomy of the firm, and the inherent uncertainty of innovative activity, one needs to “bet” to a hypothesis, which in turn has a limited and known choices, and set of results.[19]

From these criticisms, Giovanni Dosi formulated the concepts of Technological Paradigm and Technological Trajectory in order to understand the process of technological change, which would lead to innovation and development. In the words of the author, Technological paradigm was defined thus:

> […] we shall define a “technological paradigm” as “model” and a “pattern” of solution of selected technological problems, based on selected principles derived from natural sciences and on selected material technologies.[20]

[17] DOSI, Giovanni. Technological paradigms and technological trajectories. In: *Research Policy 11*, North-Holland Publishing Company, 1982.
[18] *Idem*, p.150.
[19] *Idem*, p.151.
[20] *Idem*, p.152.

And Technological Trajectory had the following definition: "We will define a *technological trajectory* as the pattern of "*'normal' problem solving activity (i.e. of 'progress') on the ground of a technological paradigm*".[21]

Based on the above concepts associated with the theory originally developed by Schumpeter, it is possible to see, in part, characteristics of the evolution of technology and its implications for economic development. A given technological paradigm establishes from its technical and economic aspects, a possible notion of progress. In other words, from the technological trajectory to be covered in search of new solutions to issues associated with that paradigm. And the maintenance or disruption of these paradigms is often related to economic cycles characteristics of the development process.

The concepts developed by Dosi brought about greater clarity in understanding the processes of technological, incremental and radical change. This is more properly understood as a foundation taking the concept of technological paradigm shift. In radical innovations, the generating factor of change is associated mainly to the development of science and to technological and economic difficulties to move forward in a given technological trajectory and, therefore, end up generating a radical break with the existing standard. Otherwise, the gradual technological developments, those that occur along a particular technological trajectory, would be motivated primarily by changes originated in the market, but limited to the dimensions and trade-offs focused on technological and economical given paradigm.

This theoretical approach to innovation and technology considers the increasing complexity of the evolutionary process of technological knowledge, and the influence that this process suffers and carries on the structure and dynamics of economic organization and institutional factors. The theory postulates that, while technological change and innovation are influenced by the economic system configuration, there is a degree of autonomy in relation to such system. This characterizes the dynamic process of economic development according to the neo-Schumpeterian perspective, in longer or shorter cycles, involving incremental improvements in the goods produced and interspersed services, or often replaced by radical innovations usually revolutionize the economy.

2.1.2. Neo-Institutionalist Innovation and Technology Approach

The institutionalist economic theory emerged in the late nineteenth and early twentieth century spearheaded by Thorstein Veblen who, according to Pessali and Fernández (2006), tried to offer an alternative economy that relies on other disciplines that

[21] *Ibidem*.

not only mathematics and physics, but also history, anthropology, psychology and biology. According to these authors, Veblen believed that economic systems were driven by technology, not only the choice of technologies by the firm would constitute an economic decision, as the very design of the technologies would be a process of socioeconomic decision. In this perspective:

> Knowledge is something shaped by values, customs and traditions (including theories) shared by a community – its institutions. The use of knowledge in problem solving is so steeped in this web of institutions.[22]

The neo-insitucionalista approach to innovation and technology base of the institutionalist and understand the contribution made by the neo-Schumpeterian theory, which considers the firm as the protagonist of the innovation process. This gained relevance in historical heritage institutions, as well as the whole environment in which they operate.

Thus, neo-institutionalist theory remained the prospect of seeing the evolutionary nature of technological innovations – subject to several effects such as from the irreversibility of certain cumulative changes and the limitations of a technological trajectory –, aggregating and giving importance to national and sectorial influence in which the firm operates, as noted economist Paulo Tigre.[23] Besides the economic context, the political, social and cultural environment of each country should be considered a critical factor in technological development and innovation process.

In this environment, we highlight the concept of National System of Innovation, institutions and policies that make it. Based on several studies on the determinants of technological progress, Eduardo Albuquerque conceptualizes that:

> National system of innovation is an institutional building, product of a planned and conscious or a sum of unplanned and uncoordinated decisions that drives technological progress in complex capitalist economies.[24]

According to the author, such institutional arrangements involve businesses, government agencies, universities, research institutes, finally, institutional arrangements that reflect the relationship between the educational system, the business and finance sectors, bringing the roster of actors responsible for the creation, implementation and dissemination innovations. In this perspective, we can infer that the main focus of analysis becomes the interaction between economic, social and political actors to strengthen training and the dissemination of innovations in a particular country.

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[22] PESSALI, Huascar F.; FERNÁNDEZ, Ramón G. *A Tecnologia na Perspectiva da Economia Institucional*: Economia da Inovação Tecnológica. São Paulo: Editora Hucitec, 2006, p.90.
[23] TIGRE, 2006, p.61-62.
[24] ALBUQUERQUE, Eduardo da M. Sistema Nacional de Inovação no Brasil: uma análise introdutória a partir de dados disponíveis sobre a ciência e a tecnologia. In: *Revista de Economia Política*, vol.16, nº 3, 1996, p.57.

The neo-institutionalist perspective, therefore, requires an extensive analysis of the institutional environment, considering the distinct roles of companies, universities, financial system, the government, including international institutions directly linked to economic activity, such as the World Trade Organization (WTO), the World Bank, the International Monetary Fund, or indirectly, as the World Health Organization (WHO), among others.

About the evolutionary chain of economic thought, considering Tiger:

> […] the learning process is cumulative and dependent on past history, ie, the evolution of a firm is determined by the accumulated skills and the nature of their specific assets. Skills change as a function of technological opportunities. The diversity of selection environments will explain different trajectories and varieties of market structures.[25]

From the matters dealt with in this chapter, it is observed that both the neo-institutionalist approach as the neo-Schumpeterian approach to innovation and technology highlight the central role of technological progress in economic development, as well as its evolutionary character. They observed technological progress and largely endogenous result which, despite considering the influence of the market and institutions, has its main driving force in the action of the innovative entrepreneur.

The neoinstitutionalists also consider the fundamental role played by the innovative entrepreneur. However, they relativize the determining character of entrepreneurial action as the main driving development towards other exogenous forces that make up the surroundings, the environment in which the institution is immersed. According to this view, the driving force of technological development is the result of the composition of endogenous and exogenous forces arising entrepreneurial action, but also from the accumulated experience of the institution, other institutions that make up the environment in which the institution is located and which invariably influence its decisions and its trajectory.

2.1.3. The Brazilian Structure of Science, Technology and Innovation

Despite the lacks of specific regulations and detailing, Matias-Pereira and Kruglianskas (2005) defines the Brazilian technological innovation law (Lei da Inovação Tecnológica – LIT) as an important institutional tool to leverage and support the Brazilian industrial technology policy.[26] Other documents such as the White Paper on Science, Technology and Innovation Ministry of Science and Technology (2002) had already pointed

[25] TIGRE, 2006, p.63.

[26] MATIAS-PEREIRA, Pereira, J. & KRUGLIANSKAS, I. Gestão de Inovação: a Lei de Inovação Tecnológica como ferramenta de apoio às políticas industrial e tecnológica do Brasil. In: *Revista de Administração de Empresas*, 4 (2), julho/dezembro de 2005, p.01-21.

out the implementation of an effective National System of Science, Technology and Innovation in the country as one of its strategic directives.

The Brazilian structure of Science, Technology and Innovation (STI) is young compared to other developed countries. Matias-Pereira and Kruglianskas (2005) argue that countries should move consistently in scientific and technological knowledge.[27] In the Brazilian case, the Innovation theme is also somehow an issue in the margins of the civil society. Aguiar (1981) described these three components, in this case, STI:

> A key feature of scientific activity is manifested by the dissemination of their results, which legitimizes the intellectual property, while incorporating the knowledge brought by the contribution of this activity. The scientific activity is an interactive and ongoing process in which information is both the basic input as the final product.
> Technology involves the process of generating ideas (invention) and use of these ideas (innovation). Between Invention and innovation, the phases of applied and development and corresponding steps to industrialization, marketing, development and product improvement research are develop. In each of these stages of the technological process, the information, explicitly or implicitly, appears as a key factor.[28]

In Brazil, the responsibility for the formulation and implementation of the National Policy on ST I is the Ministry of Science, Technology and Innovation (Ministério da Ciência, Tecnologia e Inovação – MCTI). Created by Decree nº 91.146 of March 15, 1985, later consolidated in Chapter IV of the Constitution of 1988 and attends a longstanding desire of the Brazilian Academy of having a public agency with direct administration like the central stakeholder structure of the national science and technology. In the Brazilian context, there is a National Council for Science and Technology (Conselho Nacional de Ciência e Tecnologia – CCT), created by Law n° 9.257 of 09 January 1996, formed by representatives of the Government, Industry and Academy, whose skills consulted on industrial policies.

Cysne (2005) in his studies, ratifies the importance of Science & Technology as follows:

> The characteristic of science and technology in the 20th century has been the tremendous expansion and consolidation of property (incubation) of scientific and technological activities in an extensive network of formal organizations, firmly established, and in medium and large scale.[29]

Adding value to the already widely cited law, it is important to mention three strategic policies created by the Federal Government of Brazil in the 2010s, in different years, for better development of the innovation environment in the country, according to Araújo *et al* (2010) emphasizes:

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[27] *Ibidem*.
[28] AGUIAR, A. C. Coordenação de uma rede nacional de informação em Ciência e Tecnologia: um plano prioritário do IBICT. In: *Cien. Informação*, v.9, nº 1/2, p.83-88, 1981.
[29] CYSNE, 2005, p.62.

> [...] in 2004, the Industrial policy, Technological and Foreign Trade, in order to advance economically and promote the development of technologies with potential for competition in the international market, established in 2007, the Action Plan for Science, Technology and Innovation, aiming to make more decisive role of science, technology and innovation in the sustainable development of the country, in 2008, implemented the Productive Development Program, whose goal is to continue the growth of the country in several areas, with emphasis on innovation, competitiveness, supporting the entrepreneurship and increased exports, among other policies.[30]

Rocha and Ferreira (2004) argue that the construction of indicators of Science, Technology and Innovation - STI in Brazil must take into account the priority support from the Government to the subject, stimulus to scientific and technological production, education, qualified HR, amplitude division and business innovations.[31] Arbix and Consoni (2011) report that, with different styles and structures, India, China and most recently Brazil, as major economies:

> [...] revalued industrial and innovation policies, created new institutions and began to be used more intensively for a number of public, developed and implemented from a stronger state presence in the economy and society policies.[32]

Staub (2001) states that "*one of the strategic challenges for Brazil is to rebuild the productive capacity and build more capacity to innovate in technology-intensive sectors*".[33] New legislation for the regulation of Intellectual Property, along with government incentive programs for University Partnership – Company are to Santos (2009), "*a new scenario in the national context of promoting technological innovation*".[34] In Rapini and Righi (2007) there is the firm academic belief that "*University – Industry interaction is specific to each country and is always dependent on national science and technology infrastructure*".[35]

2.2. National System of Innovation in Brazil

When we talk about national innovation system, and understanding its phenomena as complex and systemic, it should be borne in mind that this is an array of organizations, public

[30] ARAÚJO *et al*, 2010, p.8.
[31] ROCHA, Elisa M. P.; FERREIRA, M. A. T. Indicadores de ciência, tecnologia e inovação: mensuração dos sistemas de CT&I nos estados brasileiros. In: *Ciência da Informação*, Brasília, v. 33, nº 3, p.61-68, 2005.
[32] ARBIX, Glauco; CONSONI, Flávia. Inovar para transformar a universidade brasileira. In: *Rev. Bras. Ci. Soc.*, São Paulo, v. 26, nº 77, oct. 2011, p.207.
[33] *Cf.* STAUB, 2001.
[34] SANTOS, Marli Elizabeth Ritter dos; TOLEDO, Patricia Tavares Magalhães de; LOTUFO, Roberto de Alencar (orgs.). *Transferência de Tecnologia*: estratégias para a estruturação e gestão de Núcleos de Inovação Tecnológica. Campinas: Komedi, 2009.
[35] RAPINI, Márcia Siqueira; RIGHI, Hérica Morais. Interação Universidade-Empresa no Brasil em 2002 e 2004: uma aproximação a partir dos Grupos de Pesquisa do CNPq. In: *Economia*, ANPEC – Associação Nacional dos Centros de Pós-graduação em Economia [Brazilian Association of Graduate Programs in Economics], vol. 8(2), 2007, p.250.

and private, who are responsible for the origin and adoption of innovations in a given country. The claim that an innovation system should include technical, productive specialties, formalized technical procedures and converging technological and social systems are found in Cysne (2005).

In the Brazilian case, Villaschi (2005) discusses that a combination of factors, such as low scientific and technological investment, cuts in strategic areas such as education and R & D and the adoption of non-industrial / technology policy and remover of national development, resulted in a national developmental delay in the 1990s, which today is detrimental.[36] These factors, in his view, would be linked to three areas: economic, technological and institutional. The assertion that the process of industrialization in Brazil occurred without connection with a policy of STI is critical in the view of Lotufo (2009). In his view, this gap is responsible for the low rate of innovation in enterprises in the 1990s and 2000s.

As for Vargas and Zawislak (2006) the approach of innovation systems – focusing on Service Innovation – must take spatial dimensions into account, be they local or regional as well as the learning factor as the predominant element of the process, among other considerations.[37] To Hayashi and Silva (2007), it is important that National Innovation Systems can identify and map their own skills so that they subsidize the construction of public policies in the interests of national scientific and technological development.[38] The maintenance of developed countries in the international technological frontier was precisely the option to foment their National Innovation Systems, an important point here to Stal and to Fujino (2005).[39]

Table 2, structured by Arbix and Consoni, illustrates the trajectory of Brazilian STI in two periods, the 1990s and between 2003 and 2009, which helps to understand the legal and institutional framework of Brazil Science, Technology and Innovation, and consequently the Brazilian National Innovation System:

[36] VILLASCHI, Arlindo. Anos 90: uma década perdida para o sistema nacional de inovação brasileiro? In: *São Paulo Perspec.*, vol.19, no.2, jun. 2005, p.3-20.
[37] VARGAS, E. R.; ZAWISLAK, P. A. Inovação em serviços no paradigma da economia do aprendizado: a pertinência de uma dimensão espacial naabordagem dos sistemas de inovação. In: *RAC – Revista de Administração Contemporânea*, Rio de Janeiro, v.10, nº 01, p.139-159, 2006.
[38] HAYASHI, M.; HAYASHI, C.; SILVA, M. Competências em CT&I: um estudo exploratório no Portal Inovação. In: *Informação & Informação*, Londrina, UEL, nº 11, fev. 2007.
[39] STAL, E.; FUJINO, Asa. As Relações Universidade-Empresa no Brasil sob a ótica da Lei de Inovação. In: *Revista de Administração e Inovação – UNINOVE*, São Paulo, v.2, nº 01, p.1-15, 2005.

Table 2 – Legal Guidelines, New Instruments and STI Programs (1994-2009).

	The 1990s	2003 – 2009
Innovation Policy	First steps: **Establishment of Sector Funds** (Cracriação dos Fundos Setoriais)	PITCE – 2004[a] PDP – 2008[b] PAC-C&T – 2008[c]
Creation of a new legal framework	**Law Against Unfair Competition** (1994) - Lei de Proteção da Concorrência (1994); **Information Technology Law** - Lei de Informática (1991); **Double Taxing on Income and investment in R&D** (IR e CSLL dos gastos em P&D)	Innovation Law – Lei de Inovação (2004) Lei do Bem (2005)[d] Biosafety Law – Lei de Biossegurança (2005)
New Institutions	**Regulatory Agencies Initiate the operation of the Sector Funds** (CGEE)[g]	ABDI (2004)[e] CNDI (2004)[f] INCTs (123 no país)
BNDES and Finep	**Privatization Coordination INOVAR** (Risk capital) - Coordenação das Privatizações Projeto INOVAR (capital de risco)	Technology Initiatives Entrepreneurship Criatec Enterprise (Empresarial Criatec) Pro-Innovation Subvention Programme for Venture Capital (Pró-Inovação Subvenção Econômica Programa de *Venture Capital)*
New Sector Instruments	**Automobile Regime** (1995); Information Technology Law - **Regime Automotivo** (1995); Lei da Informática	Prominp (Petrobrás) ProSoft – expanded ProFarma SIBRATEC

Source: Adapted from ARBIX & CONSONI (2011).[40]

[a] Industrial,Technological internation trade policy – Política Industrial, Tecnológica e de Comércio Exterior (PITCE, 2004)
[b] Production Development Prolicy – Política de Desenvolvimento Produtivo.
[c] Science and Technology Plan – Plano de Ciência e Tecnologia.
[d] Tax Incentives for Exporting Companies – Incentivos fiscais para empresas exportadoras (Lei do Bem, 2005).
[e] The Brazilian Industrial Development Agency – Agência Brasileira de Desenvolvimento Industrial (ABDI, 2004).
[f] The National Counsil for Industrial Development – Conselho Nacional de Desenvolvimento Industrial (CNDI, 2004).
[g] Center for Strategic Research Management – Centro de Gestão e Estudos Estratégicos.
[h] The Nationa Institute for Science and Technology –Funtec, Institutos Nacionais de Ciência e Tecnologia (INCT).

From the understanding of the definition of the National Innovation System and its peculiarities, we proceed to the understanding of the issue of the perfect applicability of Technological Innovation in the Public Federal University to the production process as

[40] ARBIX, Glauco; CONSONI, Flávia. Inovar para transformar a universidade brasileira. Rev. bras. Ci. Soc., São Paulo, v. 26, n. 77, Oct. 2011, p.213.

discussed in subsequent chapters. In this context, knowledge and technology is the central element of the new economic structures that emerge and innovation becomes the vehicle for transforming knowledge into wealth and improving the quality of life of societies.

2.3. Access to Technology and Economic Development

After analyzing the critical role of technology in economic development and its evolutionary process, and analyze concepts of technology transfer and trade, the present study addresses the issue of access to technology. Innovative companies seek both internally and externally, different sources of knowledge and technology. The internal sources of technology often encompass R & D activities D, they directly related to the development of new products and services, and activities of staff training, quality programs and organizational learning, which may indirectly contribute to access to new knowledge and technology.

Bernadette Madeuf (1983) notes that, as a set of techniques, technology comprises more or less formalized, written or unwritten information, resulting from the application of scientific principles and / or daily experience.[41] The author classifies the flows of technology based on the way the diffusion process, considering:

i. Capital embodied technology – transmitted via export of equipment, tools and intermediate goods;
ii. Human embodied technology – which circulates through education and training, people, professional mobility, technical assistance, international cooperation, etc. programs;
iii. Disembodied technology – disseminated via patents, designs, operating instructions, etc.

Then observes that external technology sources usually include: built-in machinery and equipment acquired technology, the acquisition of coded information, such as books, manuals, software, etc., hiring experts, and technology transfer via licensing or know-how and technical assistance contracts.

Tiger Paul summarizes the main sources of technology used by businesses: technological development itself; technology transfer contracts; embedded technology; codified knowledge, tacit knowledge, and cumulative learning.[42] With regard to technology

[41] MADEUF, Bernadette. International technology transfers and international technology payments: definitions, measurement and firm's behavior. In: *Research Policy 13*, North-Holland Publishing Company, 1984, p.126.
[42] TIGER, 2006, p.94.

transfer agreements, UNCTAD-ICTSD claim that these contracts are an external source and critical for technological change in most developing countries, as these countries are importers of new technologies and products.[43]

Technology acquisition comes, long time ago, occupying a central role in increasing the productivity and competitiveness of the economies of countries. To generate technological change, industries in developing countries need substantial innovative efforts, as well as the acquisition of foreign technology.[44]

Kartiko Putranto *et al*. affirm:

> Developing countries may consider technology transfer as a base for developing their technology capability implying that the capability required is beyond adapting the technologies to suit the local situation.[45]

Access to technology by enterprises and institutions in developing countries, according to the authors cited above, appears essential for the reduction in the so-called technological gap in these countries compared to enterprises and institutions in developed countries condition.

Slavo Radosevic highlights important changes in the international economy and the environment of processes of technology transfer, of such changes and notes that, compared to the 1960s and 1970s the developing countries are currently in a position far inferior to controlling the interaction between finance, trade and production. The ability to control these interactions through parastatal, banking systems, protectionism in relation to international trade, foreign direct investment and regulation of technology transfer is significantly reduced. the author adds:

> the tightening of intellectual property rights and the harmonization of this aspects of control over technology will undoubtedly reduce possibilities for technology import for developing countries.[46]

In a globalized economy, the way in which developing countries equate the market demand and access to technology, has strong effects on their catching-up opportunities. National companies are crucial part of the transfer process, and how they complement their

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[43] UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD) & INTERNATIONAL CENTRE FOR TRADE AND SUSTAINABLE DEVELOPMENT (ICTSD). *Resource Book on TRIPS and Development*. Cambridge University Press, USA, 2005, p.737.

[44] BELL, Martin; PAVITT, Keith. The Development of Technological Capabilities. In: HAQUE, Irfan ul; in collaboration with Martin Bell *et al*. *Trade, Technologyand International Competitiveness*. Washington D.C.: EDI Development Studies, The World Bank, 1995, p.69-71.

[45] PUTRANTO, Kartiko; STEWART, Don; MOORE, Graham. Internationaltechnology transfer and distribution of technology capabilities: the caseof railway development in Indonesia. In: *Technology in Society*, 25, Elsevier Science Ltd., 2003, p.44.

[46] RADOSEVIC, Slavo. International technology transfer policy: from “contract bargaining” to “sourcing”. In: *Technovation*, 19, Elsevier Science Ltd., 1999, p.435.

external sources of technology with their own technological efforts is crucial with regard to the effectiveness of the technology transfer process, says Radosevic.[47]

Teixeira, while analyzing aspects that strengthen technological dependence of developing countries, adds:

> The way in which the peripheral countries were inserted into the international economy, as well as the organization of institutions and technological markets also reinforce the dependency relationships. Consequently, the supply of technology, as noted, is always performed disadvantageously to the developing countries. Either technology is provided in enclosed, "packages" that exclude local participation in input supply with technological contents, thus limiting local learning, or contractual terms include covenants that prevent innovative efforts in the periphery.[48]

Given the critical role technology transfer plays in the economic development of countries, several authors – Teece (1977),[49] McCulloch (1981),[50] Barbosa (1999),[51] Maskus (2004)[52] – considered it essential to take the complexity of transferring knowledge technology into account, both by the characteristics of the asset transferred, as the different levels of development among the parties involved in the process, directly influencing the absorption and utilization of this knowledge, with consequences in the catching-up process. Hasan Gurak in his thesis "*Transfer of Technology"* considered the transfer of technology in relation to developing countries as a situation whereby the degree of success depends in part on the nature of the transaction, and therefore, partly technical absorptive capacity of the recipient country. He adds saying inappropriate economic policies combined with the international division of labor, and low bargaining power of developing countries in determining conditions for the transfer of technology, appear to be the major causes of inappropriate technology imports for these countries.[53]

Rachel McCulloch reinforces this argument stating that the supposed public property characteristic attributed to technology and known market imperfections, can systematically operate a disadvantage for developing nations with regards to the commercial terms of the technology imports. It is considers that multinational companies from developed countries act legitimately, according to the logic of profit-oriented private enterprise, while buyers of

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[47] *Idem*, p.439.
[48] TEIXEIRA, Francisco L. C. Desenvolvimento Industrial e Tecnologia: Revisão da Literatura e uma Proposta de Abordagem. In: *Cadernos EBAPE.BR*, FGV, Rio de Janeiro, 2005, p.08.
[49] TEECE, David J. Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-How. In: *The Economic Journal*, vol.87, nº 346, 1977.
[50] MC CULLOCH, 1981.
[51] BARBOSA, A. L. Figueira. *Sobre a Propriedade do Trabalho Intelectual*: Uma Perspectiva Crítica. Rio de Janeiro: Editora UFRJ, 1999.
[52] MASKUS, Keith E. *Encouraging International Technology Transfer*. United Nations Conference on Trade and Development (UNCTAD) – International Center for Trade and Sustainable Development (ICTSD), 2004.
[53] GÜRAK, Hasan. *Transfer of Technology*. Lic. Thesis, University of Lund, 1990, p.05-08.

technology eventually even have appropriate skills for the best choice of technology to be acquired.[54]

Therefore it is shown that the distortions mentioned, i.e., the inherent complexity and the distinct bargaining power of the parties and the existence of public policies that support the process of technology transfer, may be reflected in the undesirable effects on the countries' development. Among these effects are; excessive payment made by the acquiree, exercise abusive control by providers, adoption of inappropriate technology to local needs, the inhibition of entrepreneurial activities and R & D sites, continued reliance on technology originating from developed countries.[55]

2.3.1. Technology Transfer Processes

Technological advancement is frequently linked to economic progress and social benefits (DTI, 2000). Advancing technologies also forms much of the business of university scientific research. Frequently, however, university research is not smoothly, or even successfully, transferred to industry (Markham *et al.*, 1999).[56] Wittamore *et al.* (1998) adopted a working definition of technology transfer as: "*The transfer of new knowledge, products or processes from one organization to another for business benefit*".[57]

Other authors emphasize the importance of the ''techniques and skills to operate'' the technology as well as the ''managerial skills'' required to exploit it (Czinkota *et al*., 2002).[58] The need for ''user education'' by the supplier of the technology and ''transfer support'' are also important concerns (Tidd *et al.*, 2001).[59]

Technology transfer is not a new business phenomenon, nevertheless, the emerging considerable literatures on technology transfer over the years agree that defining technology transfer is difficult due to the complexity of the technology transfer process (Robinson, 1991;

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[54] MCCULLOCH, 1981, p.112.
[55] FUNG, Shing Kwong. *The Control of International Technology Transfer by a Developing Country*: an Assessment of the Brazilian System. Massachusetts Institute of Technology – MIT/USA, 1979, p.17-28.
[56] MARKHAM, S.; KINGON, A.; ZAPATA, M.; BAUMER, D., A methodology to find assess and commercialize technologies, civilization, moderntechnology and sustainable development. In: *The Eighth International Conference on Management of Technology*, IAMOT, Cairo, 15–17 March, 1999.
[57] WITTAMORE, K.; BAHNS, R.; BROWN, A.; CARTER, P.; CLEMENTS, G.; YOUNG, C. International technology transfer – a developing empirical model, management of technology, sustainable development and ecoefficiency. In: *The Seventh International Conference on Managementon Managementof Technology*, Orlando, 16-20 February, 1998, p.02.
[58] CZINKOTA, M.; RONKAINEN, I.; MOFFETT, M. *International Business*. 6ª ed. Orlando: Harcourt College Publishers, 2002, p.79-80.
[59] TIDD, J.; BESSANT, J.; PAVITT, K. *Managing Innovation – Integrating Technological, Market and Organizational Change*. 2ª ed. Chichester: Wiley, 2001, p.250.

Spivey *et al*., 1997).[60] The definitions depend on how the user defines technology and in what context (Chen 1996; Bozeman 2000).[61]

The term technology transfer can be defined as the process of movement of technology from one entity to another (Souder *et al*., 1990; Ramanathan, 1994).[62] The transfer may be said to be successful if the receiving entity, the transferee, can effectively utilize the technology transferred and eventually assimilate it (Ramanathan, 1994). The movement may involve physical assets, know-how, and technical knowledge (Bozeman, 2000). Technology transfer in some situations may be confined to relocating and exchanging of personnel (Osman-Gani, 1999)[63] or the movement of a specific set of capabilities (Lundquist, 2003).[64] Technology transfer has also been used to refer to movements of technology from the laboratory to industry, developed to developing countries, or from one application to another domain (Philips, 2002).[65] In a very restrictive sense, where technology is considered as information, technology transfer is sometimes defined as the application of information into use (Gibson & Rogers, 1994).[66] In this sense, economists such as Arrow (1969)[67] and Dosi (1988)[68] have analyzed technology transfer on the basis of the properties of generic knowledge, focusing particularly on variables that relate to product design. Mittleman and Pasha (1997) have attempted a broader definition stating that technology transfer is the movement of knowledge, skill, organisation, values and capital from the point of generation to the site of adaptation and application.[69]

The work of Hayami and Ruttan (1985) and Mansfield (1975) provide some of the earliest insights on the modes of technology transfer which are of relevance even today. Mansfield (1975) classified technology transfer into vertical and horizontal technology

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[60] ROBINSON, R. D. International Technology Communication in the Context of Corporate Strategic Decision-making. In: ROBINSON, R. D. *The International Communication of Technology*. A Book, 1991. SPIVERY, W. A.; MUNSON, J. M.; NELSON, M. A. & DIETRICH, G. B., 1997. Coordinating the technology transfer and transition of information technology: a phenomenological perspective. In: *IEEE Transactions on Engineering Management*, London, 44(4), p.359-366, 1997.

[61] CHEN, M. Managing International Technology Transfer. Thunderbird Series in International Management. In: *International Thompson Press*, London, 1996. BOZEMAN, B. Technology transfer and public policy: a review of research and theory. In: *Research Policy*, 29, p.627-655, 2000.

[62] SOUDER, W. E.; NASHAR, A. S. & PADMANATHAN, V. A guide to the best technology transfer practices. In: *Journal of Technology Transfer*, 15 (1-2), 1990. RAMANATHAN, K. The polytrophic components of manufacturing technology. In: *Technological Forecasting & Social Change*, 46, p.221-258, 1994.

[63] OSMAN-GANI, A. A. M. International technology transfer for competitive advantage: A conceptual analysis of the role of HRD. In: *Competitiveness Review*, 9, 1999, p.9.

[64] LUNDQUIST, G. A rich vision of technology transfer technology value management. In: *Journal of Technology Transfer*, 28 (3-4), 2003, p.284.

[65] PHILLIPS, R. G. Technology business incubators: how effective as technology transfer mechanisms. In: *Technology in Society*, 24, p.299-316, 2002.

[66] GIBSON, D. V. & ROGERS, E. M. *R&D Collaboration on Trial*: The Microelectronics and Computer Technology Consortium. Boston: Harvard Business School Press, 1994.

[67] ARROW, K. Classificatory note on the production and transmission of technological knowledge. In: *American Economic Review, Papers and Proceedings*, p.244-250, may 1969.

[68] DOSI, G. The nature of the innovation process. In: DOSI, G. *Technical Change and Economic Theory*. London: Printer Publications, 1988.

[69] MITTLEMAN, J. H. & PASHA, M. K. *Out from Underdevelopment Revisited*: Changing Global Structures and the Remarking of the Third World. New York: St. Martin's Press, 1997.

transfer. Vertical transfer refers to transfer of technology from basic research to applied research to development and then to production respectively and horizontal technology transfer refers to the movement and use of technology used in one place, organization, or context to another place, organization, or context.[70] Souder (1987) refers to the former as internal technology transfer and the latter as external technology transfer. Souder further elaborates upon vertical technology transfer as a managerial process of passing a technology from one phase of its life cycle to another. This elaboration is valuable because it serves to reinforce the fact that it may be possible to horizontally transfer technology at any stage of the technology life cycle.[71] Hayami and Ruttan (1985) and Mansfield (1975) refer to "*material transfer, design transfer, and capacity transfer*". Material transfer refers to the transfer of a new material or product while design transfer corresponds to the transfer of designs and blueprints that can facilitate the manufacturing of the material or product by the transferee. Capacity transfer involves the transfer of know why and know-how to adapt, and modify the material or product to suit various requirements. While Hayami and Ruttan focused on agricultural technology transfer, Mansfield emphasized manufacturing technology.

In the context of this study, the additional supporting factors are key issues, as the supplier of the technology shall be a university. And an important area to explore in this context is the absorptive capacity of the technology receiver. Absorptive capacity, a concept introduced by Cohen and Levinthal (1990) is the firm's ability to recognize the value of new and external information and its ability to assimilate and exploit it.[72] Thursby and Thursby (2004) discuss the evidence that absorptive capacity is related to the firm's own level of research and to their level of involvement and monitoring of university research. Ironically, companies that may be most able and likely to license university research are those who already have a reasonable level of research capability and contacts with the academic community. This implies that university research cannot best be used to replace in-house abilities in a company, but rather to enhance those abilities. Company culture may affect how well technology is absorbed. In a company which unconsciously encourages the ''*not invented here*'' attitude, may be the culture, rather than the inherent level of expertise, which prevents effective absorption of technology.[73]

University to business technology transfer is classed as ''vertical transfer'', where the technology passes from research through development and to production in the course of the

[70] HAYAMI, Y. & RUTTAN, V. W. *Agricultural Development*: An International Perspective. Baltimore: The Johns Hopkins University Press, 1985.
[71] SOUDER, W. E. *Managing New Product Innovation*. New York: D.C. Heath, 1987.
[72] COHEN, W. M.; LEVINTHAL, D. A. Absorptive capacity: a new perspective on learning and innovation. In: *Administrative Science Quarterly*, 35 (1), p.128-152, 1990.
[73] THURSBY, J.; THURSBY, M. Are faculty critical? their role in university-industry licensing. In: *Contemporary Economic Policy*, 22 April, vol. 2, ABI/INFORM Global, 2004.

transfer. In university to business technology transfer particularly the development stage could take place in either the supplier, i.e. the university; the acquirer, i.e. the industry, or preferably a combination of both (Cardozo, 2001).[74] A key theme emerging here is the location and nature of the interface between the supplier and receiver of the technology (Leonard-Barton, 1990).[75]

The technology transfer concepts were put in perspective by Amsden (1989) [76] and Habibie (1990).[77] Amsden (1989) argued that while in developed countries the technology/product cycle took the route,

{Research to Development to Design to Production}

whereas in technologically less advanced developing countries, it tends to take the route,

{Production to Design to Development to Research}

According to Amsden (1989), learners do not innovate and must compete initially on the basis of low wages, state support, high quality and productivity. The route that must thus be pursued should be based on transfer, absorption, and adaptation of existing technology. This viewpoint fits in with the material, design, and capacity transfer progression. Habibie (1990), states that, "*technology receivers must be prepared to implement manufacturing plans on a step-by-step basis, with the ultimate objective of eventually matching the added-value percentage obtained by the technology transferring firm*". He refers to such an approach as "*progressive manufacturing*" and popularized the slogan, "*begin at the end and end at the beginning*" implying that a transferee firm should start with production and move backwards to research as also pointed out by Amsden.[78]

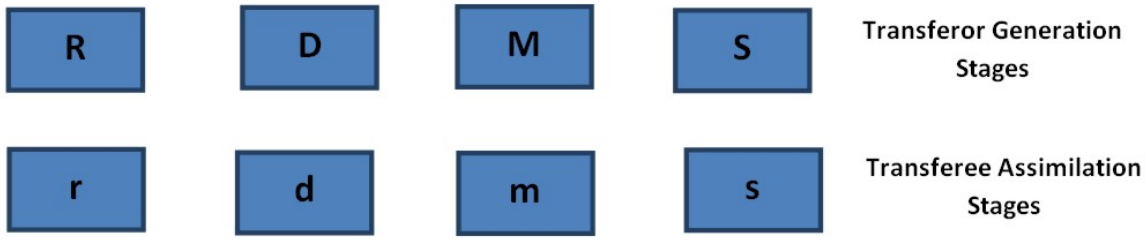
Steenhuis (2000) has combined these ideas and developed the concept of "*the technology building*". The technology building has two wings; the innovation wing consisting of the research, development, production, and distribution stages of the transferor; and the exnovation wing that consists of the distribution, production, development, and research stages of the transferee. The innovation and exnovation wings refer to the technology

[74] CARDOZO, R. Improving the odds of transfer of university technology to the marketplace. In: *The 10th International Conference on Management of Technology*, IAMOT, Lausanne, Switzerland, 19-22 March 2001 (on CD Reference 006RC).
[75] LEONARD-BARTON, D. The inter-organizational environment: point-to-point versus diffusion. In: WILLIAMS, F., GIBSON, D. (Eds.). *Technology Transfer*: a Communication Perspective. Thousand Oaks: Sage Publications Ltd.,1990.
[76] AMSDEN, A.H. *Asia's Next Giant*: South Korea and Late Industrialization. New York: Oxford University Press, 1989.
[77] HABIBIE, B.J. Sophisticated Technologies: Taking root in developing countries. In: International Journal of Technology Management, 10 (1), 1990. p.489-497, 1990.
[78] *Ibidem*.

development stages of the transferor and transferee respectively in accordance with the Amsden and Habibie models of technology development. Steenhuis points out that transfer of technology can take place between the stages of both wings of the technology building in a variety of combinations. The terms innovation and exnovation, as used by Steenhuis, while useful, may cause confusion to practitioners since the term innovation is used in many different contexts. Thus, the technology development stages of the transferor and transferee will be referred to as "*technology generation*" and "*technology assimilation*" respectively.[79]

To avoid looking at technology transfer in a restrictive manner it may thus be useful to view technology transfer possibilities between the "generation" and "assimilation" processes of the transferor and transferee.[80] This is shown schematically in the figure below:

Fig. 1 – The technology development chains of the transferor and transferee.



Using the "technology development chain" concept outlined in Figure 1 above, Ramanathan (2000) points out that the simplest form of technology transfer could be said to take place when an owner of technology (the transferor) transfers the technology needed by a business partner (the transferee) to sell and service a product produced by the owner. This may be depicted as an [S:s] mode of transfer. The representation within parentheses implies that a product at the end of the "generation" stage is simply being sold and serviced by the transferee. The technology likely to be transferred here is that needed by the transferee to sell, repair, and provide other elements of after-sales service to customers buying the product. The objective of the transfer is to effectively maximize the sales of the product in the region managed by the business partner. Another possible variation is [M:s] if the transferee is the sole distributor of the product made by the transferor. These two types of technology transfer arrangements with a predominantly sales focus may be referred to as a "sales intensive mode" of technology transfer.

[79] *Cf*. STEENHUIS, H.J. *International technology transfer*: Building theory from a multiple case-study in the aircraft industry. Doctoral Thesis, University Of Twente, the Netherlands, 2000.
[80] RAMANATHAN, K. A. Taxonomy of International Technology Transfer Modes. In: *Proceedings of the Third International Conference on Operations and Quantitative Management*, Sydney, December 17-20, p.203-209, 2000.

Based on similar considerations of business objectives, Ramanathan (2001) provides a classification of possible modes and possible transfer mechanisms that may be used. These are summarized below.[81]

Table 3 – A Possible Taxonomy of Technology Transfer Modes.

Transfer Mode	Possible Transfer Mechanisms
Sales Intensive [S: s] or [M: s]	Sales and service agreement either as an agent or sole distributor
Manufacturing Intensive [M: m,S] or [M: m,s] or [D:m,S] or [D:m,s]	Subcontracting arrangements, original manufacturing arrangements (OEM), production licensing, and joint ventures
Development Intensive [R:d,M,S]or [R:d,m,S] or [R;d,m,s]	Original design manufacturing (ODM), production licensing, joint ventures
Research Intensive [R:r,D,M,S] [R:r,d,M,S] [R;r,d,m,S] [R: r,d,m,s]	Joint R&D and production, university – industry licensing, Government R&D institute – industry licensing

Source: Adapted from RAMANATHAN (2001).[82]

The term “mode” is used to refer to the transfer links between the phases of the technology development chains of the transferor and transferee while the term “mechanism” is used to describe popular business arrangements that are deployed to transfer technology. The classification does not include the transfer of technology by multinationals to their wholly-owned subsidiaries operating in other locations. The classification proposes that technology transfer arrangements be examined under four main groups namely: sales intensive; manufacturing intensive; development intensive; and research intensive.

Each of these categories involves different strategic issues from a business perspective. Thus, based on the above discussion, the following conclusions may be drawn:

1 Commercial technology transfer may be defined as mutually agreed upon, intentional, goal oriented, and proactive process by which technology flows from an entity that owns

[81] RAMANATHAN, K. E-strategies for technological capability development, Proceedings of the Portland International Conference on Management and Technology, July 29-August 2, Portland, US, 2001.
[82] *Ibidem*.

the technology (the transferor) to an entity seeking the technology (the transferee). The transfer involves cost and expenditure that is negotiated and agreed upon by the transferee and transferor. The transfer may be said to be successful if the transferee can successfully utilize the technology for business gains and eventually assimilate it.

2 Technology transfer can be vertical or horizontal technology transfer. Vertical transfer refers to transfer of technology from basic research to applied research, development, and production respectively and horizontal technology transfer refers to the movement and use of technology used in one place, organization, or context to another place, organization, or context.

3 In today's globalized and liberalized business setting, many technology transfer modes could be deployed depending on how the technology development chains of the transferor and transferee are linked. Technology transfer can commence from a simple level to a much more comprehensive one with time. The mode chosen would depend on the corporate strategies of the transferor and transferee and the technological capability of the transferee.

2.3.2. Technology Processes and Transfer versus Commercialization

In this segment of the study, concepts such as the concept of technology, the distinction between trade and transfer of technology, as well as the issue of access, the value of commercialized technology and their relationship with certain restrictive contractual conditions are treated.

Giovanni Dosi, one of the leading theorists studying technological change, defines technology as:

> […] a set of pieces of knowledge, both directly "practical" (related to concrete problems and devices) and 'theoretical" (but practically applicable although not necessarily already applied), know-how, methods, procedures, experience of successes and failures and also, of course, physical devices and equipment.[83]

UNCTAD conceptualizes technology under the same perspective, but more succinctly, as "*systematic knowledge for the manufacture of a product, for the application of a process or the provision of a service*" (UNCTAD, 2001). Thus:

> Consequently, "technology" includes not only "knowledge" or methods that are necessary to carry on or to improve the existing production and distribution of goods and services or indeed to develop entire new products

[83] DOSI, 1982, p.151-152.

> or process, but also “entrepreneurial expertise and professional know-how”.[84]

Denis Barbosa reports that, in 1978, the U.S. State Department sponsored a survey of 120 U.S. multinational companies to determine the position of the business community regarding the technology transfer process, reaching the following definition:

> Technology is defined for this Project as all the knowledge necessary for the productive functioning of an enterprise. The term can embrace hardware, such as factories, machines, products, and infrastructures (laboratories, roads, water distributions systems, storage facilities) and software, including non-material ingredient such as know-how, experience, organizational forms, knowledge, and education. It is dynamic, continuing, sequential and complex process.[85]

It can be observed from the aforementioned concepts that often technologies are referred to in correspondence to the various process steps that enable the production and marketing of goods and services, such as process technology, operation, etc.

Contemplating many meanings as the systematic application of organized knowledge to practical tasks, the result of human practice of trying to solve problems, or even knowledge shaped by values, customs and traditions shared by a community, the term technology in the economic and industrial world usually used to encompass all that is related to the intangible assets related to the production process of a company. Therefore, this may be considered as a factor of production, capital side, inputs and labor, to work, behaving as a commodity, as a private good, which can be the subject of commercial transactions.

Based on the above considered concepts, one can conclude that technology, being the object of commercialization, is intrinsic to entrepreneurial activity, since it is a body of scientific, empirical or intuitive knowledge, employed in the production and commercialization of goods and services.

Before analyzing marketing terms, we can hereby highlight the relationship between science and technology, which is essential to stick to two fundamental aspects. The first related to the close association between technology and knowledge. In general, knowledge is considered as a set of information about a particular topic, Consolidated and accepted by all, and that, therefore, is the educational and scientific systems of the society (VIANA, 1997). According to this author, either through information, or through the experience, it is clear that the essence of technology is closely related to knowledge.[86]

The second critical aspect of the concept of technology is related to assigning a function to the essence, i.e., the application of this body of knowledge in the creation or

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[84] UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, 2001, p.05-06.
[85] BARBOSA, Denis B. *Uma Introdução à Propriedade Intelectual*. Rio de Janeiro: Lúmen Júris, 2003, p.987.
[86] VIANA, Cassandra L. de M. *O Fluxo de Informações na Transferência de Tecnologia*: estudo dos acordos tecnológicos registrados no INPI – Brasil. Brasília, Dissertação de Mestrado em Biblioteconomia e Documentação/UnB, 1997, p.09-12.

modification of materials, products, processes or services. This concept helps to clarify the difference between technology, knowledge with specific application in the production of goods or services, and science that generates knowledge for many different purposes, including the generation of process technology. This distinction supports the understanding of technology as a commodity, i.e., capable of commercializing, since there is an associated object to the application.

Besides the distinction between science and technology, to better understand the concept of this body of knowledge and their marketability, it is important to emphasize two intrinsic features to the object in question, that approaches the concept of common public good (STIGLITZ, 1999), and which distinguishes it from other tangible goods:

i. The non-rivalry in consumption: which means that the use or consumption of knowledge by one person does not diminish the use or consumption of that knowledge by someone else. The cost for someone else to use knowledge is zero, i.e., its marginal cost is zero.
ii. Non-exclusivity: it considers that once disclosed, it is difficult, if not impossible, to exclude any person who has had access to knowledge to use it. There's only institutional exclusion due to determinations such as monopolistic exploitation rights based on patents.[87]

In spite of nature of these being related to public commodity, it is necessary to recognize the appropriation of technology by the economic society and its use as a private good. It differs then, that science consisting of a public commodity, thus common to all of humanity and decent.

Regarding the concepts of transference and technology trade, Denis Barbosa considers the terms established by the U.S. State Department, which highlights that:

> Transfer occurs when knowledge is conveyed from one person to another. It can occur by means of licenses; direct investment in wholly, majority, or minority foreign owned ventures; technical assistance; management contracts; consulting; trademarks; turn-key contracts; individuals, general education. Technology can be successfully transferred to a variety of users, by a variety of methods, for a multitude of types of activities and reasons. Transfer does not necessarily mean the permanent transfer of ownership of a technology; it often refers to a temporary transfer of the right to use a technology for a limited period under certain conditions but with the technology still under control of the firm that developed it.[88]

[87] STIGLITZ, Joseph E. Knowledge as a Global Public Good. In KAUL, Inge; GRUNBERG, Isabelle; STERN, Marc A. (eds.). *Global Public Goods*: International Cooperation in the 21st Century. New York: United Nations Development Programme; Oxford University Press, 1999, p.308-310.
[88] BARBOSA, 2003, p.988.

By analyzing this concept Denis Barbosa maintains that transfer is seen as mere communication and not as property transfer, and that the transfer can be accomplished through other vehicles in addition to know-how contracts and industrial property licenses such as investment right, the contracts for technical assistance, brands and technical consulting agreements, turnkey contracts and nonspecific education.

Barbosa (2003) considers technology commercialization, to be coupled with the category of technology, specifically the explicit technology which does not refer to implicit technology that is incorporated with other goods. Thus, technology transfer is a process of marketing an asset that constitutes cognitive factor of business activity.[89]

Another point worth mentioning is the recognition of its appropriation by economic society because it is a necessary condition for the marketing of any commodity, and the technology would not be different. However, in this case, our commodity is intellectual property, or more specifically related commodities to the implementation of manufacturing technology, industrial property – invention patents and utility models, trademarks, industrial designs, geographical indications. On these concepts, Bridges de Miranda points out that the rights system that focus on works of literary, artistic and scientific creation, and articles intended to practice in the production and distribution of other goods and services, organization was divided into two parts law: intellectual property (literary, artistic and scientific), and industrial property, with respect to patentable inventions, utility models, industrial designs, trademarks and trade industry, or other distinguishing marks of products.[90]

On technology appropriation, Figueira Barbosa says:

> As technology in its form is unique by intangible or invisible nature, the recognition of ownership and property respect of a technology depend more clearly on the contract terms. The company establishes its rules and conventions in order to qualify technological property, which must be understood within a legal framework determining the differentiating potential use and ownership.[91]

In this scenario, many of the deals involving the exploitation of intellectual property rights, and related, have their roots in technology transfer contracts. This type of contractual relationship presents important feature by the need for local industry to absorb technology to maintain competitiveness through imports of technology knowledge.

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[89] *Idem*, p.990.
[90] PONTES DE MIRANDA, Francisco C. *Tratado de Direito Privado*. Campinas: Bookseller, 2002, p.41-42.
[91] BARBOSA, A. L. Figueira. *Propriedade e Quase-propriedade no Comércio de Tecnologia*. Brasília: CNPq, 1981, p.20.

2.3.3. The Explicit and Implicit Value of Technology and Restrictive Conditions to Technology Transfer Contracts

As earlier mentioned, the price of a technology, unlike what happens with other goods, is not determined objectively. Its determination depends on many reasons, distinct from those that lend themselves to the pricing of tangible goods, eg, intrinsic to knowledge, which is considered as technology has industrial environment. There are reasons that can be set by both the demand side and the supply side.

From the perspective of demand, the following may be observed in determining the price to be paid for a technology: the lack of prices and conditions of other agreements, the absence or lack of legislation, the possibility of transferring costs to technological consumer etc. From the perspective of supply, price determination of technology can take the following into account: the knowledge of the information to be negotiated, the lack of legislation for the applicant, the choice between trading and investing, the existence or absence of government control, etc.. In short, on both sides, the price of technology ends up being defined by the greater or lesser bargaining power, according to Figueira Barbosa:

> By price or explicit value we mean the cost to the applicant company, by implicit or actual value, we mean the explicit terms of increased trading harming the economy and the applicant company.[92]

The main problem of technology transfer is not the feasibility of access to technology, but the price and other terms of the transfer.[93] What is paid for the acquisition of certain technology is beyond stipulated in the contract, explicitly paid as royalties, technical assistance or even fixed value. The consequences imposed by certain terms of negotiation should be considered in the restrictive clauses. The question of economic power is therefore central to this analysis and aspects such as the effects of technology on the economy contracted, on the national technology, or even the environment should be considered.

As the import of key technology for the process of technological pairing of developing countries, the terms under which they formalize this import become critical, including for greater or lesser effectiveness of the technology transfer process. Recognizing the nature of these trade negotiations, Denis Barbosa affirms about technology transfer contracts that:

> Contracts relating to intellectual property and trade in technology often have provisions that deserve objection of several regulatory, national or

[92] *Idem*, p.103.
[93] RADOSEVIC, Slavo. International technology transfer policy: from “contract bargaining” to “sourcing”. In: *Technovation*, 19, Elsevier Science Ltd., 1999, p.434.

> supranational bodies, whether based on competitive criteria, or based on other aspects that overlap the interests of the involved parties.[94]

From the perspective of supply, Madeuf argues that the license agreement provides other payment channels other than payment for the technology. These channels correspond to the supply of goods and associated technology transfer services. The licensor can earn profit by providing services, equipment, components and materials, and the technology grant back clauses developed by the licensee.[95]

Kevin Davis highlights the attempt to establish by UNCTAD, in the 80s, an International Code of Conduct on the Transfer of Technology ("TOT Code") whose focus was a set of provisions in order to ensure the signatory states more discretion to regulate the terms of technology transfer contracts, within a perspective which considered separate bargaining power among suppliers in the developed world and buyers from the developing world. These provisions contemplate the establishment of national administrative agencies empowered to assess and remediate the negotiation of technology transfer agreements. These agencies should have broad authority to review such agreements *ex-ante* and conditions its approval to factors such as the price paid for the technology, duration, conditions, legal form, or effects on competition with domestic firms.

Chapter 4, Section B of the Code of Conduct identifies, including a list of conditions that should be prohibited because they characterize restrictive trade practice if included in technology transfer agreements. These include:

4 "Grant-back provisions" – requiring the acquiring party to transfer or grant back to the supplying party, or to any other enterprise designated by the supplying party, improvements arising from the acquired technology, on an exclusive basis [or] without offsetting consideration or reciprocal obligations from the supplying party, or when the practice will constitute an abuse of a dominant market position of the supplying party;
5 Restriction to the possibility of questioning by the buyer, the validity of the intellectual property right claimed by the supplier of the technology;
6 "Exclusive dealing provisions" – which restricts the ability of the buyer to invest in similar technology or substitute;
7 Restrict the ability of the buyer to research or develop or adapt technology provided;
8 Application for use by the buyer of people, goods or services specified by the supplier;
9 Regulation of the prices of products produced using technology provided by the supplier;
10 Restriction on export;

[94] BARBOSA, 1981, p.1.093.
[95] MADEUF, 1984, p.130.

11 Imposition of obligations to the buyer on the use of intellectual property after the expiration of such rights.

Bundling is the obligation of the licensee to the licensor acquiring other technologies or unnecessary materials.[96] Such devices require the acceptance of complementary technologies, goods or services, ultimately restrict the possibility of other sources of technology, goods or services as a condition for obtaining the technology of interest. However, configured in this way of imposition of acquisitions of supplies, equipment, or even technology, dissociated from the technology of interest, making it unnecessary for the buyer to incorporates a contracted technological solution.

Restrictive contract terms imposing obligations to the buyer relating to intellectual property is readjusted after the expiry of such exclusive right. These devices also disregard the principles of intellectual property system, since it advocates temporary grant of an exclusive right. Once the period of validity of the patent expired, there is no legitimacy in enforcing contractual obligations linked to an expired right.

Contractual practices listed in this segment involve restrictive conditions internationally recognized for decades, and which were at the heart of discussions aimed at establishing an international regulation by UNCTAD, based on the above Draft Code of Conduct on Transfer of Technology (see TOT Code Draft International Code Of Conduct On The transfer Of Technology, 1985 version).

2.4. The Triple Helix Theory

This segment describes the involved sectors in Brazil with a strong tie to this research analyzing the applicability of the Triple Helix theory as observed in the Brazilian environment. Here, we shall also describe the pharmaceutics industry, and our university sample is Universidade Federal de Minas Gerais UFMG.

The essential concepts associated with Triple Helix Model are not new. From the 1980s,broader, and more consensual way since the mid-1990s, regional development has been understood to be a process whose driving forces are innovation, knowledge and learning ability, the phenomenon of “clustering”, technology transfer, technical cooperation, systemic interaction and technological development driven by demand, when establishing quality standards, prefer green products, requires custom, etc products.

One of the most important concepts is the National Innovation System, originally conceptualized by Lundvall, and is easily generalizable to the concept of Regional Innovation

[96] BARBOSA, 1981, p.1.105.

System. Thus, a system of innovation, national, regional or local, can be seen as a network of institutions and actors from the public, academic and private sectors whose activities and interactions generate, adopt, import, modify and diffuse new technologies, and contribute to integrate the economy knowledge: state institutions related to innovation and technological development, network access, R & D units, universities, companies, business associations, science and technology parks, the regulatory framework of institutions and relationships between them.

Actually the concept of national or regional innovation system is a concept, albeit open, relatively static in that it is limited to characterizing the structure and size of the institutions and infrastructure network involved in the innovation process, this is , within the translation process of scientific knowledge in technology and innovation. Although this knowledge is central to an assessment of the innovation potential and development based on knowledge, it is not very informative on the process itself.

Analysis of a Regional Innovation System such as Silicon Valley, for example, without analyzing the historical context in which it appears and the process, the preconditions and causal relationships of development to maturity, can lead to a kind of "recipe" of approach. Thus: "*Take one great university, sprinkle with liberal doses of venture capital, mixed in an entrepreneurial culture and start the virtuous cycle*".[97]

According to Etkowitz if the innovation system can itself be regarded as the result of coordination of different mechanisms and social institutions (markets, scientific, governance, public and private) in the interface regions between the different spheres of the Triple Helix (TH) Model, while analysis of national development processes based on innovation and knowledge model gives us a heuristic study of the dynamics of structural changes that are operating in the institutional network, as the process advances.

These structural changes are dynamic, proactive and reactive, in a constant process of learning and adjustment, which takes place on an upward spiral. Thus, the structure today is also the result of the last structure, structural changes, and a constant process of adjustment, structural and functional institutional spheres involved, University, Government and Industry, a deliberate attitude of coordination and cooperation.[98]

In an approach to the theory of the firm, which views organizations as entities capable of learning the TH Model, while the analysis of processes of regional development model assumes the region itself and the network of relationships established between University, Industry and Government as an entity with the same capacity.

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[97] BRESNAHAN, T.; GAMBARDELLA, A. *Building High-Tech Clusters.* Cambridge: Cambridge University Press, 2004, p.02.

[98] ETKOWITZ, H. *The Triple Helix of University, Industry and Government: Innovation in action.* Nova York: Routledge, 2008.

The evolution and competitive success of a TH region are determined by the the region's ability to: a) determine what it "does best"; b) define the sense that is better able to achieve a change of a technological paradigm to another, as the first is exhausted, and; c) a strategic vision to the level of governance. The learning ability confers the possibility to correct any deviations from the target, and perpetuating the process allows an upward spiral motion.

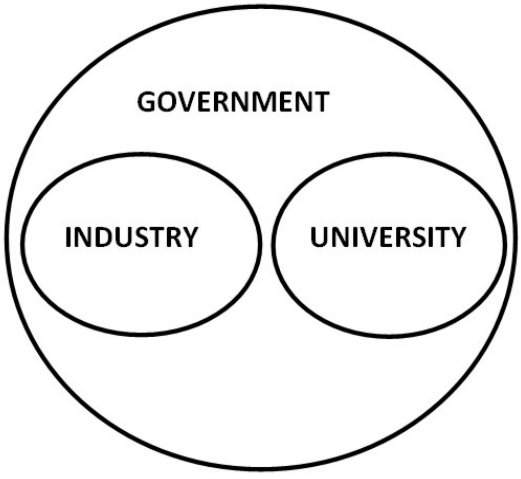
The TH model is an expression of the dynamics associated with what can be considered as a new productive force: knowledge (knowledge, learning and management), which determines the development of the pattern of relationships established between the three spheres of University, Industry and Government Model.

The possibility of using the TH model as analysis of regional development model implies only some adjustment in defining the role of the sphere "Government". The governmental institutions of the state, regional, constitute the link in the region, as a TH entity, to the structure of the National Innovation System.

Each of the institutional categories is called "Helix" or "dynamic Helix", in order to reveal the spiral nature of the interconnections, formal and informal, established between the three levels, with the aim of establishing an interactive relational network forming Innovation system.

2.4.1. Phases of the Model

Fig. 2 – Phase 1: Static model of Industry – University – Government relationships.



Source: Adapted from ETKOWITZ & LEYDESDORFF, 2000.[99]

At this stage, the beads are set institutionally. In the traditional and predominant institutional arrangement in the mid- Twentieth century. The 3 spheres, University, Industry

[99] *Cf.* ETKOWITZ, H., & LEYDESDORF, L. The Triple Helix as a Model for Innovation Studies. In: *Conference Report, Science & Public Policy*, vol. 25 (3), p.195-203, 1998.

and Government, demonstrate clearly defined boundaries and no overlap with well-defined specific functions: University produces and teaches fundamental science, the industry produces. New products are the result of experimental development in the industry, the Government regulates and determines the functioning of the University and Industry and the relationships established between them.

In this historical and institutional context which, through a process of learning and adjustment, there begins the operation at a deep internal restructuring in each of the institutional spheres.

As technology evolves, increasing staff training is required and there is an increased connection pressure towards teaching the practical application of knowledge acquired at the university level.

The process of globalization made possible largely by technological advances that allow increasingly rapid transmission and circulation of information and a marked reduction in transport costs, requires the firms an ability to learn and adapt to the new reality, much dependent on the ease with which they are able to move through an innovative and constantly changing environment. The differentiation at all levels is the only way to achieve lasting competitive advantages.

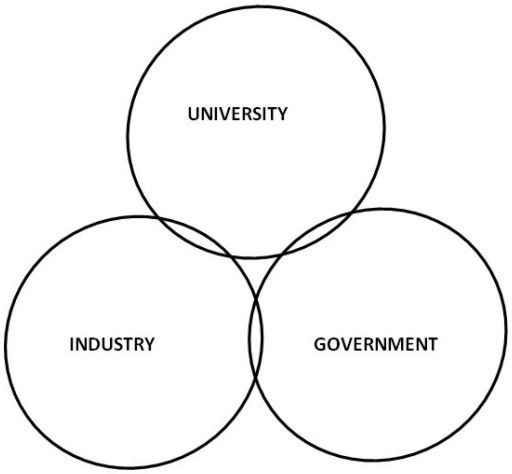
The strengthening of relations between university and industry proceeds still much of the educational system, with recognition of the need to adapt the training supply the needs of the labor market. The Governments move increasingly to an international level in the context of integrated development that are intended, the continuing need to adapt to a constantly changing world implies the need for ongoing analysis, evaluation and adaptation of the objectives in terms of the available information, and desired outcomes.

The approximation to the other two institutional spheres is, in this context, inevitable. The adequacy of the regulatory framework, the motivation of agents, the need for an increasing amount of information and also an increasing qualification of state agents.

The recognition of the profound changes processes within the different spheres of the environment in the operating level requires a fundamental restructuring of mindsets, organizational and institutional structures and furthering of the prevailing institutional relations. It is this first learning cycle adjustment that drives the system to the next stage.

2.4.1.1. Phase 2: The Influence of Bilateral to trilateral interaction

Fig. 3 – Phase 2: Bilateral Relations University – Industry – Government.



Source: Adapted from ETKOWITZ & LEYDESDORFF, 2000.[100]

At this stage the helices system are redefined as different communications systems consisting of the functioning of markets, technology and occurring control at the interfaces "levels".

Internal restructuring within each of the "helices" system and the deepening of bilateral relations, which proceeds as the process evolves and exits the first phase, generates and increases flow of information between the spheres. Hence, there ceases to exists just input – output relationships, there is also passing of "informational relations".

Initially, an increase in relational intensity between university and industry is evident, while the governing institutions assume an attitude of "laissez faire" which is a less interventionist philosophy. As the relational network is taking shape, and the relational patterns between the three helices become consolidated, new transformations occur in each of the spheres.

The pressure on universities in terms of financial autonomy, and the consequential market orientation, makes them acquire entrepreneurial competence. As such:

- Establishes university-industry researches agreements within a philosophy the provision of services and fund raising;
- Increases the autonomy of research centers that are being managed according to social and organizational objectives;
- The system for monitoring the quality of scientific production shall be done by academics and business evaluators. Involving business agents, this evaluation allows

[100] *Ibidem*.

a correction of course when there is a departure from the goals, and increasing orientation towards the industry.

The governmental institutions are pressured by both social and international institutions, in order to promote the convergence of their regions to sustainable levels of, economic, environmental and health development. Strengthening the global competitiveness and the development of competitive advantages, based on Regional Innovation Systems development, becomes one of the central objectives.

The recognition of the importance of the existing interrelationship between the three spheres, at the governmental structure level, generates an approximation of other spheres, industry and universities, towards the mobilization of different actors to the same effect.

While the strengthening of bilateral interactions between the three spheres is evidenced, there is no formal changing boundaries in interfaces level approximation.

If in phase I, the fundamental changes, operate at the level of the industry and the University, and relationship between the two at this stage 2 shows the strengthening of this trend, but the most important factor is the change of the government sphere, which besides contributing to reinforcing the tendency of phase 1, confirms a reflective and deliberate attitude of the governmental institutions, in order to develop relational dynamics between the 3 spheres which can contribute to sustainable economic development.

The governmental institutions assume a facilitating attitude of the inter-relational dynamics, promoting public acceptance in the face of science and technology policies properly structured and targeted for this type of dynamic, promoting and participating in partnerships for social interest but primarily with recognition that the basis for sustainable development is constituted by a knowledge intensive industrial and technological development of the region with a base of relational assets that promotes territorial rooting of activities.

The industry is increasingly aware that its competitiveness in the global economy depends on constant innovation and adaptation to market requirements. But not all companies, mainly small and medium sized businesses and even large companies, have the financial capacity to meet applied research projects and experimental development. In this sense, such companies seek research projects in partnership with universities.

According to Storper (1997), *w*hat marks the entry into Phase 3 is the moment when stakeholders become aware of the process that

> Regional Economics, in particular, and the Territorial Integrated Economies, in general, become redefined as stocks of relational assets [...]. Technology involves not only the tension between scale and variety, but also between codifiable or non-codifiable knowledge; their substantive field becomes

> "learning" and "availability". […] Organizations are interwoven, and changed their defined boundaries, and their interrelationships implemented not only as input-output relations, but as non-negotiable interdependencies, subject to a high degree of reflexivity. The territorial economies in a globalized world economy are not only determined by relations of proximity input-output but more so due to the proximity of the relational dimensions, non-negotiable, organizations and technologies. Its main asset – due to its scarce and slow creation and imitation – ceases to be material, and therefore becomes relational.[101]

2.4.1.2. Phase 3: From "Endless Frontier" to "Unending Transition"

Recognition of changes in Phase 2, and its implication in terms of institutional reorganization and inter-relational, implies that the restructuring of the spheres, at this new level of the ascending spiral that leads to each one, in addition to maintaining their traditional role, will take over the role of the other, which verifies a fluidity of boundaries in the dynamic helical center formed by the 3 spheres.

This is due to a great extent to a profound alteration of how different entities regard the whole process of development and start to view the

> The economy as relationship, the economic process as a conversation and coordination, the subjects of the process, not as factors but as reflexive human actors [...] and the nature of wealth accumulation not only as material assets, but as relational assets.[102]

The blurring of the institutional boundaries, does not correspond in any way to a loss of identity of the actors of the process but results from stakeholders of the process took on a new "mission" that is common to all spheres: the "*capitalization of knowledge*".[103]

Industries assume "capitalization of knowledge" as a way to remain globally competitive. Seeking more research partnerships with universities, promote advanced training programs, participate as partners or funding partners in development initiatives knowledge-intensive activities, seeking investment projects classifiable within the new guidelines for the development of governance institutions, which may correspond to ease of obtaining funding.

Universities assume "*capitalization of knowledge*" not only as a way to get external financing, but as a social function and the university plays a role as an agent empowered to become the engine of development of a knowledge society through the ability of transferring knowledge to the industry through traditional channels – basic research and education – and also participating in innovative ways and proactive in the technology transfer process.

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[101] STORPER, M. *The Regional World*. Territorial Development in a Global Economy. New York: Guilford Press, 1997.
[102] *Ibidem*.
[103] ETKOWITZ, 2008.

The university becomes a bonafide economic agent, and the production of scientific knowledge becomes an economic enterprise "*rather than being epistemological*" Governments regard the "*capitalization of knowledge*" as a "*weapon*" to tackling constraints to development.[104] At the regional level governance institutions act as partners with equal power, acting as financiers of classified projects in this new philosophy, and also as partners with decision-making power to guide the process.

Most countries define their development strategies in accordance with the principle that the constant innovation at all levels is the instrument par excellence for increased global competitiveness at the level of industries, regions and of the country contributing to the growth of the industrial high-tech sectors which are knowledge-intensive, rarely relocated due to its dependence on difficult or very slow reproducibility factors associated with knowledge which is a new "*productive*" factor.

The objective is to lead the economies to Phase 3 of the Triple Helix Model, characterized by an innovation system that has the following five distinguishing characteristics:

1 – "*Capitalization of knowledge*": becomes the basis for economic and social development, so the Entrepreneurial University plays a central role in the processes of technology transfer in the knowledge economy;

2 – Interdependence: there is a dense network of relationships between the three spheres of the model and formatting of institutional relations, which results in a high degree of interdependence. The position of each of the spheres determines, and is determined by, the positioning of the other spheres;

3 – Hybridization: the resolution of the tensions between "independence" and "interdependence" gives rise to new forms of functional organization and Hybrid Institutions that allow pursue both objectives simultaneously, enhancing and streamlining processes for technology transfer;

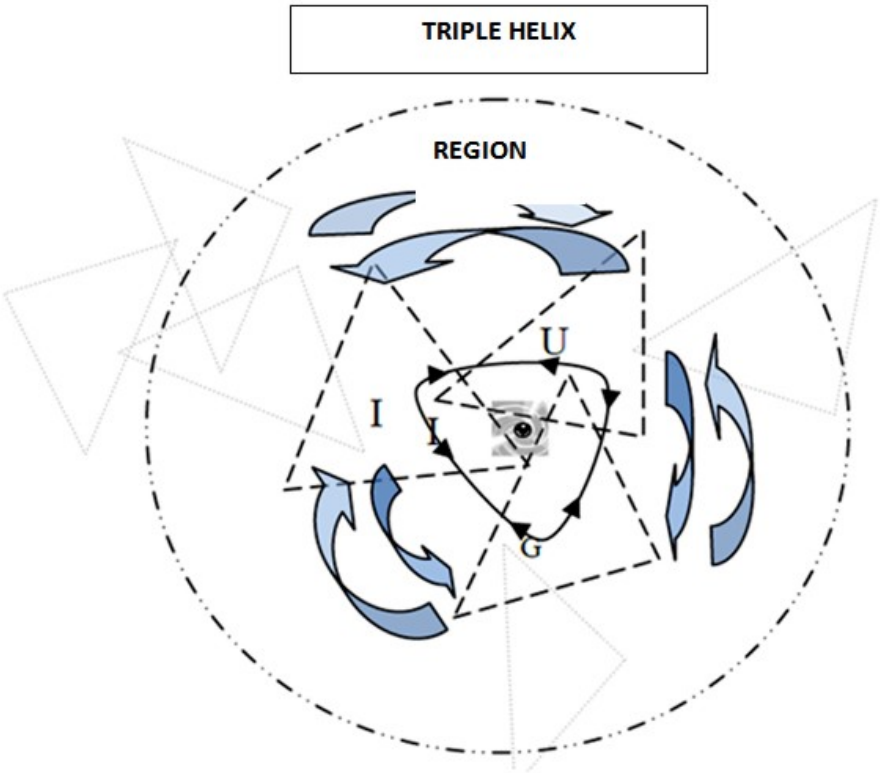
4 – Reflexivity: amendment of relational models between the three helices of the model gives rise to ongoing structural adjustments in each of them, these adjustments which, in turn, contribute to the renewal of relational models, promoting new forms of interaction.[105]

The "*mission*" of "*capitalization of knowledge*", which allows each of the spheres to achieve its own objectives (finance, development, competitiveness) also constitute an approximation factor of the 3 spheres in terms of functions and objectives, leading to a

[104] *Ibidem*.
[105] *Ibidem*.

Central "*space*" of voluntary cooperation and discussion, where a process of mutual information sharing occurs.

Fig. 4 – Phase 3: From the "*endless frontier*" to "*endless transition*".



Source: Adapted from ETKOWITZ & LEYDESDORFF, 2000.[106]

In Figure 4 the institutional spheres are represented by the triangles I, U and G. The overlapping of these triangles represents areas of bilateral interface. The blue arrows represent connections that exist between each of the traditional spheres, but reformulated and increase the level of reciprocity. The boundary of the "helices" is broken because it is dynamics, resetting itself and changing as the process evolves giving way to some dilution of institutional boundaries so that each of the spheres has to assume the role of other to some extent.

The line over the 3 "*helices*" indicates trilateral flows of information and knowledge that are present in all the three institutional spheres which circulate in all directions. Dashed border of the representative sphere of the region indicates that this is not closed and that the institutional spheres of a given region interact with other regions, Innovation Systems from different regions interact, mutually affecting and conditioned by the dynamics.

The information and knowledge circulate between regions contributing to form a network of Regional Innovation Systems forming the National Innovation System in terms of

[106] ETKOWITZ & LEYDESDORF, 1998.

dynamics of the TRIPLE HELIX. The central space between the "*helices*" is intended to mean the voluntary assembly attitude of the parties for sharing, confrontation, debate and reflection of ideas and where to negotiate and form partnerships, agreements and integrated action programs.

Knowledge is different from information: not just the volumes of information available and the speed of circulation of this information are substantial, it is also necessary to have a greater understanding of how different involved agents process, interpret and use available information, thus contributing to the reduction of uncertainty related to the fact that the agents do not act perfectly rational condition, but the limited in rationality.

Conclusively, we can hereby affirm that It is in the self-organizing capacity of the instability of this inter-relational space that the dynamics of the model is established.

2.5. The Development of Intellectual Property in Brazil

The Industrial Property System in Brazil is based on Law nº 9.279/96, of May 14, 1996, which regulates the protection of rights relating to industrial property, determining the technical examination for the granting of a patent be held with the determination of three basic patentability requirements, which are: the novelty, that is, that the invention is not known in the state of art, the inventive activity, ie, it is not an obvious consequence of the state of art and the present invention has industrial application, including applications in agriculture, mining and services.

Similarly, it can be said that the protection of intangible property and its exclusive as regards the history of intellectual property in Brazil dates from the early nineteenth century, shortly after the transfer of the Portuguese Court to Brazil in 1808. Hitherto, the colonial regime ruled whereby the country was subject to the imposition of Portugal and as such were measures restricting the freedom of trade and industry and the closer supervision of all activities of its inhabitants. That is, the country's commercial and industrial activities were not favorable, nor bring about any economic progress and development of the Brazilian ports as they were closed to foreign trade.[107]

Under these circumstances created by the invasion of the mainland and the non-accessibility of the ports, the Prince Regent resolved the contingencies signing the Royal Charter of 28 January 1808, a gesture that then triggered the opening of the Brazilian ports

[107] REGIST. fol. 59 of the Book of Permits at the State Secretariat of Affairs of the Navy, (...). January 5, 1785. National Archives Collection. Quotes an important document known as Permit D. Maria I (D. Maria "A Louca") which prohibited the establishment of factories and manufactures by the colonists, since, from the point of view of metropolitan, it was possible that the inhabitants of Brazil could fail to cultivate and exploit the riches of the earth for "lack of manpower" that would tackle the textile manufacturing. It is known that such Permit had driven economic prerogatives, since the colony of Brazil developed fabrics with great ease factories, surpassing the metropolitan Portugal.

to trade to Navigation of friendly nations. Consequently this provoked other measure notably the Permit of April 1, 1808, which saved the industries of all restrictions that were hitherto subjected.[108]

In an attempt to encourage the advance of industries, The Exploration Permit of April 28 1809 provided the very important lines that mark the beginning of the legal protection of inventions in Brazil. The historical normative act already provided privileges to those who develop a new machine and / or invention within the fields of art:

> VI – Sendo muito conveniente que os inventores, e introdutores de alguma nova máquina, e invenção nas artes gozem do privilégio exclusivo, além do direito que possam ter ao favor pecuniário, que sou servido estabelecer em benefício da indústria, e das artes; ordeno, que todas as pessoas, que estiverem neste caso, apresentem o plano de seu novo invento á Real Junta do Comércio; e que esta, reconhecendo a verdade, e fundamento delle, lhes conceda o privilegio exclufivo por quatorze anos, ficando obrigadas a publicallo depois, para que no fim desse prazo toda a Nação goze do fructo dessa invenção. Ordeno outrofim, que se faça uma exacta revisão dos que se achão atualmente concedidos, fazendo-se publico na fórma acima determinada e revogando-se todas as que por falsa allegação, ou sem bem fundadas razões obtiverão semelhantes concessões.[109]

Already in 1824, having Proclaimed the Independence and the granting of the first Constitution of Brazil by D. Peter I, the legislature gave the inventor a temporary constitutional privilege of exclusivity over his invention. The previous Constitution, on the other hand, did not limit patent protection to tangible objects as the Political Constitution of the Empire of Brazil of March 25, 1824, disposed thus:

> Art. 179. [...] XXVI. Os inventores terão a propriedade das suas descobertas, ou das suas producções. A Lei lhes assegurará um privilegio exclusivo temporario, ou lhes remunerará em resarcimento da perda, que hajam de soffrer pela vulgarisação.

However, the constitution did not consider the existence of protection for industrial trademarks and commerce yet.

On March 28, 1830, the law that provoked the constitutional commandments which provided for an exclusive right regulated the concession of privileges and the rights derived therefrom. In Article 5, the patent was conceded according to the quality of discovery or invention, for the space of five to twenty years. Also Article 1 of the same, which restricted the grant of the benefit only to domestic inventors and violation of rights was notably suppressed with a penalty of fine equivalent to one tenth of the value of manufactured products, and the loss thereof.

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[108] The Royal Charter ordering the then Prince Regent, D. Fernando Jose de Portugal, to Conde da Ponte requesting the repeal of the prohibitions on entrance and reciprocal of commerce and the opening of the ports for sailing among its vessels and foreign's (...). 28 JANUARY 1808. Collection of the John Carter Brown Library.

[109] The LICENCE Rights exempting the first materials that serve as a basis for National Manufactures, (...). 28 April 1809. Collection of the John Carter Brown Libray.

> Art. 1º – A lei garante pela concessão de uma patente ao autor de qualquerinvenção oudescoberta a sua propriedade e uso exclusivo.
> § 1º – Constituem invenção ou descoberta para osefeitos desta lei:
> 1º – a invenção de novos produtos industriais;
> 2º – a invenção de novos meios ou aaplicação nova de meios conhecidos para se obter um produto ou resultado industrial.

On October 23, 1875, forty five years after the first law in Brazil on inventor exclusive right to his invention, the first law on industrial brands was promulgated. On October 23, 1875, forty five years after the first law in Brazil on inventor exclusive right to his invention, was promulgated the first law on industrial brands.[110] Until then, the 1830 law regulated the rights of inventors and had loopholes that facilitated abuses and fraud by merchants and unfair industrialists that hid behind the inapplicability of the law and thus assured their impunity.[111]

The law of October 23, 1875 allowed the claim of any industrial right about its products or trade with the distinction of brands thereof:

> Art. 1º – É reconhecido a qualquer fabricante e negociante o direito de marcar os productos de sua manufactura e de seu commercio com signaes que os tornem distinctos dos de qualquer outra procedencia. A marca poderá consistir no nome do fabricante ou negociante, sob uma fórma distinctiva, no da firma ou razão social, ou em quaesquer outras denominações, emblemas, estampas, sellos, sinetes, carimbos, relevos, involucros de toda a especie, que possam distinguir os productos da fabrica, ou os objectos de commercio. [112]

In 1882, the new law which adjusted the concepts as well as the extent of protection was implemented, and encompassing the chemicals and, moreover, the protection of other processes, including the manufacture and use of existing materials in the state of art:

> Art. 1º – A lei garante pela concessão de uma patente ao autor de qualquer invenção ou descoberta a sua propriedade e uso exclusivo.
> § 1º – Constituem invenção ou descoberta para os efeitos desta lei:
> 1º – A invenção de novos produtos industriais;
> 2º – A invenção de novos meios ou a aplicação nova de meios conhecidos para se obter um produto ou resultado industrial.

The interpretations of the laws that addressed rights for patents and trademarks were made separately and so the patent law in 1882 and trademark in 1887 and 1904 were amended accordingly.

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[110] The company that filed the criminal complaint on April 16 de1874 against “counterfeiters” and prejudiced the trial of the same year was only to obtain judicial protection the following year 1875, when supported by Law nº 2.682 of 23.10.1875, lodged another action against the continuing violation of its brand, now presented and judged differently and with more refinement imitation that generated fake and which is punishable under the new law.

[111] *Cf*. CERQUEIRA, João da Gama. *Tratado da Propriedade Industrial*. Rio de Janeiro: Forense, vol.01, 1946.

[112] Decree nº 2.682 of 23 October 1875 which regulates the right to have the manufacturer and the dealer, to mark the products of their manufacture and their commerce.

In 1923, the Directorate General of Industrial Property was created by the promulgation of Decree 16,264 more that still ensures the privilege to inventors of new products, processes or industrial application. However, this law provided no separate treatment of industrial raw – patents and trademarks. From this point, the Board aggregated and managed the matters related to both segments of the right to industrial property.

While and moreover, in international scenes were recorded some remarkable and world events which reverberated including Brazil within the framework of Intellectual Property. These events include; accession to the Paris Convention as a founding member in 1883, the adoption of the Madrid International agreements and Trademark on Repression of False Indication of Origin in 1896, in 1910, the Pan American Convention in Buenos Aires on Patents, industrial designs, copyright and trade marks which was ratified in 1915, the accession to the Berne Convention on copyright law in 1922, the Pan American Convention of Santiago de Chile of 1923 on Trademarks was enacted in 1924; in 1929, the Revision of the Hague Convention of the Paris Agreement of 1925 was ratified.

In 1933, the Regulation of the National Department of Industrial Property (Departamento Nacional da Propriedade Industrial – DNPI) and the official establishment of the profession of Industrial Property agent was approved. Before World War II, Brazilian industrial property agents had always participated as members of the congress of Association Internationale pour La Proctetion de la Propriéte Intellectuelle - AIPPI and da Féderation des Ingenieurs Conseils em Propriété Industrielle – FICPI. By necessity and for the first time in Brazil, the profession was regulated by Decree number 22,989 of July 26, 1933.[113]

In 1934, Brazil denounced the Madrid Agreement on International Registration of Trademarks and repealed by Decree nº196 of 1934.

> O Presidente da Republica dos Estados Unidos do Brasil, em virtude do art. 18 das disposições transitorias da Constituição da Republica, que approvou os actos do Governo Provisorio, e havendo o Chefe do Governo Provisorio, em attenção aos reiterados appellos das classes praductoras do paiz, consultados os orgãos technicos e competentes da Administração Publica e tendo em vista os altos interesses nacionaes, dado instrucções á Legação do Brasil em Berna para communicar ao Conselho Federal Suisso a resolução do Governo brasileiro de denunciar o Accôrdo relativo ao registro internacional das marcas de fabrica ou de commercio, assignado em Madrid, a 14 de abril, de 1891, e revisto, pela ultima vez, na Haya, a 6 de novembro de 1925, e havendo a mesma Legação feito a devida notificação no dia 8 de dezembro de 1933, e tendo decorrido, de conformidade com o art. 17 bis do Accôrdo, o prazo de um anno para que se tornasse effectiva a denuncia do Brasil, e attendendo ainda ás circumstancias de ser este ajuste

[113] The tests and requirements for qualification of industrial property agents were defined in Article 36 of 22,989 of July 26, 1933, but with the emergence of Decree Law 8.933, of January 26, 1946, which reorganized the DNPI, it was established that the exercise of any acts before that organ could only be by: the interested individuals in person; industrial property agents and legally qualified lawyers. *Cf*. Decree nº 22,989, of July 26, 1933.

> internacional de amplitude menor, quanto ao numero das Partes contractantes, que a Convenção da União de Paris, de 1883, revista pela ultima vez em Washington, a 2 de junho de 1911, que regula a mesma materia e de continuar o Brasil ligado a esta ultima Convenção, resolve promulgar a denuncia feita pelo Chefe do Governo Provisorio da Republica dos Estados Unidos do Brasil do Accôrdo relativo ao registra internacional das marcas de fabrica ou de commercio, assignado em Madrid, a 14 de abril, de 1891 e revisto, pela ultima vez, na Haya, a 6 de novembro de 1925 devendo esta denuncia produzir effeitos legaes a partir de 8 de dezembro de 1934, ficando amparadas Pelo, mesmo Accôrdo e pela legislação nacional todas as marcas depositadas na Secretaria Internacional da Propriedade industrial, de Berna, até essa data, conforme as notas trocadas entre a Legação do Brasil em Berna e o Departamento Politico Federal Suisso, cuja traducção official acompanha o presente decreto.[114]

The Madrid Agreement allows the international deposit of brands, which have effect in the Member States of a national filing. Brazil did not endorse the current version of this agreement, although it had done so (and terminated) in its initial modality in 1891.[115]

In the middle of the same year, 1934 the regulation for grant of industrial design patents, to record the commercial name and the title of establishments and for the repression unfair competition, and other provisions was approved. The decree conceded the exclusive rights and legal protection for creators of new industrial design:

> Art. 1º – Ao autor de desenho ou modelo, novo e original, para applicação industrial, será concedida uma patente que lhe garanta a propriedade e uso exclusivo do desenho ou modelo, observadas as prescripções deste regulamento;
> § 1º – Constituem modelo ou desenho, susceptivel de protecção legal, as fórmas, novas e originaes, de configuração externa, estructura ou ornamentação dos productos industriaes.[116]

In 1945, the first Code of Industrial Property in Brazil that regulates the rights and obligations pertaining to industrial property including inventions that have as object or food substances and medicinal products of any kind, “as well as the” inventions that have as object materials or substances or obtained through chemical processes since it complies compulsorily with the disclosure of the involved processes.[117]

In 1970, the National Office of Industrial Property, previously created in 1933, was replaced by the then new created National Institute of Industrial Property which is under the Ministry of Industry and Trade with the force of law nº 5,648 Federal Authority of 11

[114] Decree nº 196 of December 13, 1934 which promulgates Report of the accord concerning the international registration of trade-marks or commerce, signed in Madrid on April 14, 1891, and revised for the last time, in Haya, on November 6, 1925. *Cf*. *Diário Oficial da União* – Section 1 – 01/04/1935, p.179.
[115] According to Denis Barbosa in the publication *A marca como um fato internacional,* in this text, signed by President Getúlio Vargas, it was observed that this complaint was motivated by “repeated appeals of the producing classes of the country”.
[116] The regulation that accompanies this was approved, assigned by the Minister of State for Labour Affairs, Industry and Commerce, for the granting of industrial design patents, to record the commercial name and the title of establishments and for repression of unfair competition. *Cf*. Decree nº 24,507, of June 29, 1934.
[117] It is Important to point out that between the years 1945 and 1971 in Brazil, new industrial property codes emerged and three more were promulgated in 1967, 1969 and 1971 respectively. And also in 1946 the new regulation of the profession of Industrial Property agent emerged.

December of the same year, in an attempt to improve industrial property in Brazil. In Brazil in 1997, the first Law of Cultivars Protection by Law nº 9,456 of 25 April 1997 emerged:

> Art. 1º – Fica instituído o direito de Proteção de Cultivares, de acordo com o estabelecido nesta Lei.
> Art. 2º – A proteção dos direitos relativos à propriedade intelectual referente a cultivar se efetua mediante a concessão de Certificado de Proteção de Cultivar, considerado bem móvel para todos os efeitos legais e única forma de proteção de cultivares e de direito que poderá obstar a livre utilização de plantas ou de suas partes de reprodução ou de multiplicação vegetativa, no País.

In 1998 there emerged the new law, Law nº 9,609, of February 19, 1998 related to Intellectual Property Protection of Computer Programs ("Software" Law), in order to eliminate restrictions on commercialization, which was then in existence:

> Art. 1º – Programa de computador é a expressão de um conjunto organizado de instruções em linguagem natural ou codificada, contida em suporte físico de qualquer natureza, de emprego necessário em máquinas automáticas de tratamento da informação, dispositivos, instrumentos ou equipamentos periféricos, baseados em técnica digital ou análoga, para fazê-los funcionar de modo e para fins determinados.
> Art. 2º – O regime de proteção à propriedade intelectual de programa de computador é o conferido às obras literárias pela legislação de direitos autorais e conexos vigentes no País, observado o disposto nesta Lei.

In the same year, 1998, the copyright law was amended and updated and consolidates by Law nº 9,610, of February 19, 1998.

In 2002, a new law nº 10,603 came to regulate the "protection of information disclosed not submitted for marketing approval of products" and thus limited to pharmaceutical products for veterinary use, fertilizers, pesticides and their like. In the same year, 2002, Decree n° 4074, on the other hand, in the regulation of Law nº 7,802 of 1989 demonstrated important concepts to the matter, and clarifies relevant health registration issues.

The Innovation Law nº 10.973, of December 2, 2004, which provides for incentives for innovation and scientific and technological research in the production environment, regulated by Decree No. 5,563, of October 11, 2005, emphasizes the challenge that the establishment of innovation culture in the country, which is supported on the grounds that the production of knowledge and technological innovation became increasingly debated in the policies of developing countries.

2.5.1. Brazil and The International Agreements of Intellectual Property

Three years before replacing the DNPI for INP in July 14, 1967, the World Intellectual Property Organization, based in Geneva, which has acquired the status of a specialized agency of the United Nations on December 17 1974 was created by the Stockholm Convention.

In 1992, there was an extension of the adherence of Brazil to Articles 1 to 12 and 28, item 1, the text of the Stockholm Revision of the Paris Convention. [118] Until the emergence of WIPO, international institutions functioned separately on the protection of intellectual property, although gathered by the Bureaux Internationaux Reunis pour la Protection de la Propiete Intellectuelle (BIRPI). The World Intellectual Property Organization (WIPO) proposed a modern international organization that grouped Unions in a single institution to conform to current conceptions.

With this intention, the Uruguay Round, discussed the Trade Related Aspects of Intellectual Property Rights (TRIPS), which according to the Declaration of the Ministers, aimed to formulate a multilateral agreement on a minimum level of protection for the intellectual property rights. The inclusion of TRIPS to the GATT (General Agreement on Tariffs and Trade, signed in Geneva in 1947), demonstrated the recognition and importance of intellectual property to international trade. This inclusion was based on the premise that increasing the protection of intellectual property rights would increase market power, i.e. global trade. Not only would there be an increase in the volume of investments made by enterprises, but the types of investments, because when there is no adequate protection to intellectual property, companies do not transfer technology.[119]

In 1994, there was the Final Act of Uruguay Round of the GATT Agreement (TRIPS), and on the 1st of January 1995, the WTO (World Trade Organization) of which Brazil is a founding member also began operating.

In the advent of the negotiations of the Uruguay Round of the GATT and the enactment of the TRIPS Agreement in Brazil in I994, Brazil introduces a new industrial property law to its domestic legislation matching with the international standard of the new world of industrial routes. In May 1996 the current Industrial Property Law 9.272/96 was published which in its transitional provisions, in addition to the applicability of inventions, trademarks, industrial designs, geographical indications and unfair competition, disposed as

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[118] DANNEMANN SIEMSEN. The evolution of intellectual property in Brazil. http://www.danneman.com.br/site.cfm?app=show&dsp=intellectual_property_in_brazil&pos=2.3&lng=en . Visited on 29/03/2014

[119] BASSO, Maristela. *O direito internacional da propriedade intelectual*. Porto Alegre: Livraria do Advogado, 2000, p.153-155.

patentable relevant substances such as materials or products obtained by chemical processes and substances, substances, mixtures or food products, chemical pharmaceuticals and drugs of any kind, as well as their procedures for obtaining or modifying, the “pipeline”, the certificate of addition of invention. This law came into force on May 15, 1997. [120]

It is considered important to note that Article 43, VII, consigns an exception among the limitations to the power given to the patentee:

> VII – aos atos praticados por terceiros não autorizados, relacionados à invenção protegida por patente, destinados exclusivamente à produção de informações, dados e resultados de testes, visando à obtenção do registro de comercialização, no Brasil ou em outro país, para a exploração e comercialização do produto objeto da patente, após a expiração dos prazos estipulados no art. 40.[121]

2.5.2. The Trips Agreement

Regulations on industrial property, trademarks and patents in Brazil are in accordance with the Agreement on Trade-Related Aspects of Intellectual Property TRIPS in the WTO, Annex 1C of the Treaty of Marrakesh, ratified by Brazil through Decree 1355 of December 30, 1994 incorporated the Final Act of the Uruguay Round of Multilateral Trade Negotiations of GATT.

In 1994, Brazil wass a developing country and had benefited from a transitional period to apply some of the commitments contained in various WTO Agreements. Therefore in the ratification which occurred in 1994, Brazil was effectively necessitated by the TRIPS Agreement, to apply the provisions of the agreement other than Articles that deal with general principles such as non-discrimination within a 5-year-deadline which was till January 1, 2000, the date of expiry of the period of adaptation for developing countries. [122]

Barbosa (2003) commented on predicting forefront in the TRIPs Agreement's protection of data on chemical tests:

> a proteção de resultados de testes ou outros dados não divulgados, cuja elaboração envolva esforço considerável, como condição para aprovar a comercialização de produtos farmacêuticos ou de produtos agrícolas químicos que utilizem novas entidades químicas é novidade do Acordo TRIP’s. Nada na Convenção de Paris ou em qualquer outro instrumento internacional obrigava à proteção no Brasil de tais dados e informações.[123]

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[120] SOARES, José Carlos Tinoco. *Lei de Patentes, Marcas e Direitos Conexos*: Lei 9.279/96. São Paulo: RT, 1997, p.16.

[121] Law nº 9.279 of May 14, 1996. Chapter V – The Awarded Patent Protection for Section I of Rights, Article 42: “*the right to prevent third parties, without his consent, from producing, using, offering for sale, selling or importing*”.

[122] SEATINI Policy Breif. The transition to TRIPS Agreement: EAC utilisation of the extension period: http://www.seatiniuganda.org/downloads/eac.pdf . Visited on 29/03/2014.

[123] BARBOSA, 2003, p.71.

Meanwhile, subsection 3 of Article 39 stipulated:

> Members, when requiring the submission of test results or other undisclosed information, which involves a considerable effort as a condition of approving the marketing of pharmaceutical or of agricultural chemical products which utilize new chemical entities shall protect such data against unfair commercial use. In addition, Members shall take steps to prevent such data against disclosure, except where necessary to protect the public or unless steps are taken to ensure that the data are protected against unfair commercial use.[124]

As such, it is notable that what one can extract from this device is that the countries where there is the presentation of required tests (*e.g. referendum* to the authorization from another country) are not required to offer stipulated protection.[125]

Therefore, the text does not specify what would be the "new chemical entities". Once more freedom is given to the member countries. An interpretation in accordance with the public interest would be to consider only the "new active principles", not the new use. Nevertheless, the simple exegesis of international text, we have not required the establishment of an exclusive right, but only a protection of the data. Another important fact well posed by the doctrine, is that in countries like Brazil, which until recently did not patronize, patent, chemical substances and protection system test data can serve as a "substitute" to the privileges of invention to what was already in the public domain.[126]

2.5.3. Creation and Knowledge Protection in Brazil

Since the enactment of the Law nº 9.279/96, Brazil has granted only two types of patents: Patent of Invention and Utility Model. Additionally, a Certificate called (Certificado de Adição) may be granted to the applicant of the patent application or the holder of an invention to protect improvement or development introduced in the object of the invention, even if deprived of inventive step, provided that the material is included in the same inventive concept. In this case, the certificate is a Patent accessory and has a validity date.

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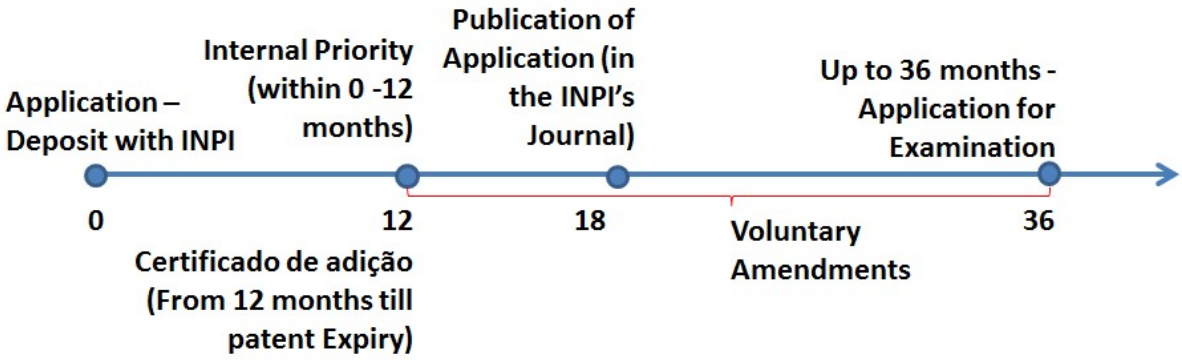
[124] TRIPS URUGUAY ROUND AGREEMENT: Part II — Standards concerning the availability, scope and use of Intellectual Property Rights http://www.wto.org/english/docs_e/legal_e/27-trips_04d_e.htm .Visited on 29/03/2014.
[125] CORREA, Carlos Maria. *Trade related aspects of intellectual property rights*. New York: Oxford Press, 2007, p.379.
[126] *Idem*, p.377.

Fig. 5 – Patent deposit procedure and periodicity in Brazil.



Source: Primary data from CTIT.

According to features internationally adopted in the Patent System, patent applications filed remain confidential for 18 months, from which it follows a period of up to three years stipulated by the law, so that the applicant requires the examination. To the patentee the exclusive right to exploit the object is guaranteed during the validity period of the patent, which is 20 years to the Patent and 15 years for utility model in order to reimburse the incurred expenditure in the research and development as well as the investment that must have been realized to put the invention into practice. In exchange for the temporary privilege that the state grants a person – individual or corporate – the Law requires that the descriptive report explains the claimed object sufficiently and clearly, so that any professional in the art can accomplish it and, if be the case, it should indicate the best means to their execution. [127]

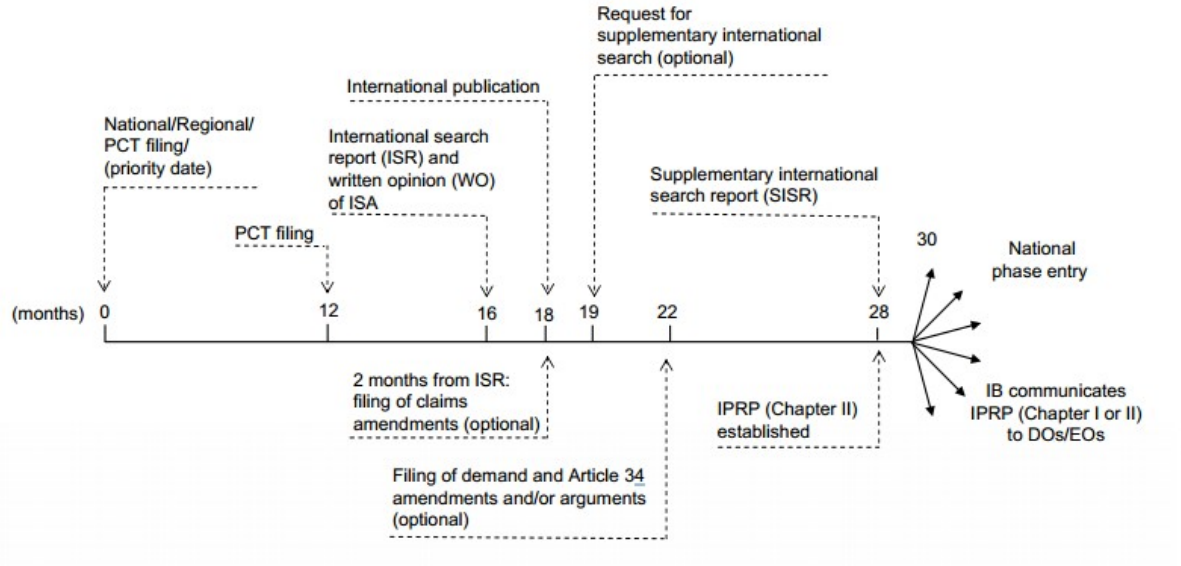
As depicted on Fig. 5 above, during the first 12 months from the date deposit, the patent is given an internal priority wherein the depositor can update the provided information and claims. Here, the initial date of deposit can be maintained for only the content corresponding to the initial data. Thereafter, a certificate called Certificado de Adição is issued to the depositor in the twelveth month by INPI. This certificate remains valid from the twelveth month till the expiry date of the patent's validity. In the 18th month at minimum, the application is published in the INPI's journal. With the 12th month and the 36th mont of application, there may be some voluntary amendmets adding more data, details and description of the invention etc., Whereas the application for examination lasts up to the 36th month of deposit.

These findings emphasize the premise that when starting the study of the legislative history, it is necessary to emphasize that the protection of intellectual property "*has as its*

[127] INPI. Guia Básico de Patentes: http://www.inpi.gov.br/portal/artigo/guia_basico_patentes Accessed on 19th of March 2014.

foundation two justifications" the first being "moral" order, related to the maintenance of a "natural" right of authorship on the performed work. In the second, via economic, intellectual property would serve as a stimulus to the continuation and encouragement of worthwhile activities.[128]

Fig. 6 – Patent Cooperation Treaty (PCT) Timeline.



Source: WIPO PCT Timeline (2010).[129]

The Patent Cooperation Treaty (PCT) is a Global Protection Treaty administered by WIPO. The Patent Cooperation Treaty aims to provide a simplified and less costly method of preserving the rights to file a patent application in member countries. It seeks to achieve this by providing what is known as a PCT application. By filing one international patent application under the PCT, applicants can simultaneously seek protection for an invention in 148 countries throughout the world The PCT makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing a single "international" patent application instead of filing several separate national or regional patent applications. The granting of patents remains under the control of the national or regional patent Offices in what is called the "national phase". [130]

The PCT procedure includes the following steps:

1. PCT Filing: you file an international application, complying with the PCT formality requirements, in a language, and pay a set of fees.

[128] BENTLEY, Lionel; SHERMAN, Brad. *Intellectual property law*. New York: Oxford Press, 2004, p.04.
[129] World Intellectual Property Organization – WIPO PCT Timeline, Accessed on 19/03/2014: <http://www.wipo.int/export/sites/www/pct/en/seminar/basic_1/timeline.pdf>.
[130] The PCT Applicant's Guide Last updated on 13 March 2014 <http://www.wipo.int/pct/en/appguide/index.jsp>

2. International Search: an “International Searching Authority (ISA)” (one of the world’s major patent Offices) identifies the published documents which may have an influence on whether your invention is patentable and establishes an opinion on your invention’s potential patentability.
3. International Publication: as soon as possible after the expiration of 18 months from the earliest filing date, the content of your international application is disclosed to the world.
4. Supplementary International Search (optional): an ISA which is willing to carry out supplementary searches and which did not carry out the main search, identifies published documents which may not have been searched by the ISA which carried out the main search because of the diversity of prior art in different languages and different technical fields.
5. International Preliminary Examination (optional): one of the ISAs, at your request, carries out an additional patentability analysis, after international publication, usually on an amended version of your application.
6. National Phase: after the end of the PCT procedure, you start to pursue the grant of your patents directly before the national (or regional) patent Offices of the countries in which you want to obtain them.

A PCT application is usually filed at any point in time up to 12 months from the initial or priority filing in the home country. At a period of 18 months after the initial application, the PCT application is published. It used to be that at 20 months after the initial filing date, the applicant must have entered the national phase of the application process in the designated states or lose his right to file claiming the earlier priority date. However, this period could be extended by a further 10 months if the applicant requested an examination or preliminary report. The examination gives an inventor a preliminary and non-binding opinion on the patentability of the claimed invention. He is then able to determine whether or not he should proceed with the conversion of the PCT application into numerous, individual national patents.

2.6. The Pharmaceutical Industry in Brazil

The evolution of human knowledge in the sciences allied to the technological field, have enabled the human leap towards innovating the art of healing. However we must not forget that the active substances continue most often, presenting their characteristics and restraining physicochemical properties for their administration and therapeutic success. It is

noteworthy that these substances potentially appropriate for the treatment and cure of diseases need to be conveyed to the human body. The poor solubility in biological media, the high instability of many assets, has forcibly open space to value of those professionals seeking endlessly break through the barriers and physiological constraints, guaranteeing the use and application of the therapeutic potential of new and old known therapeutically consecrated molecules.

Brazil is one of the largest markets for drugs and medicines in the world with core industries of the sector in its territory. The national industry leads sales in the domestic market and reinforces investments in research supported by the strength of the generics brands. The generic is the medicine brand whose patent has expired and therefore can be commercialized without brand designer, at a cheaper price than the market value, which is always less the cost of licensing and other attributes of the exclusive Intellectual Property rights.

The pharmaceutical industry emerged in Brazil within the years 1890 to 1950. According to Ribeiro (2001), later the initial development of the pharmaceutical industry in Brazil "*maintained a strong relationship with the public health institution, health practices towards preventing and combating infectious diseases and, in particular, with the basic and applied research institutions*".[131]

The Brazilian State crucially involved in the early development of the pharmaceutical industry to encourage and provide resources for some of the first pharmaceutical companies.[132] The state has stimulated the formation of the first Brazilian scientists who later became responsible for the development of public health plans, production of serums, vaccines and medicines, by the pioneer companies.

In the advent of the explosion of coffee cultivation supply of cheap labor was guaranteed which then stimulated a great flow of immigrants to the west of São Paulo. So, measures to combating diseases and infections have become necessary due to the unsanitary conditions of ports, tenements and inns that sheltered them. A wide variety of chemicals used on crops such as copper sulfate, calcium chloride, sulfuric acid were still imported from countries like England, Germany and the United States. The small, fledgling Brazilian industry began to produce plant aniline, oils, waxes, and natural medicines, after the discovery and synthesis of organic industrial employment in Europe. [133]

The production of commodities with mineral origin began later, influenced by its greater technological complexity and the necessity of using imported raw materials such as

[131] RIBEIRO, Maria Alice Rosa. Saúde pública e as empresas químico-farmacêuticas. In: *Hist. Cienc. Saúde-Manguinhos*, Rio de Janeiro, v. 7, nº 3, p.607-626, nov.2000/feb.2001.
[132] RIBEIRO, 2001.
[133] RIBEIRO, 2001.

sulfur, nitrates and chlorinated compounds. As progress was obtained in an epidemiological field, scientists discovered that the transmissions of diseases were spread by more complex channels than was then believed. In the late 20s, Instituto Vacinogênico and Butantã were the institutions responsible for the manufacturing of biological products in São Paulo. The first focused on the production of vaccines for smallpox and the second for the production of fever vaccines and later, with the advent of the work of Vital Brazil, the production of serum against snake bites, spiders and scorpions.

Some Brazilian companies have been successful in the production of pharmaceutical drugs to meet the domestic market and for export. Ribeiro, citing Gambeta (1982), credits this success to the "facilities" of the time, as practices that are considered common today, such as trade secret and protectionism of the patent law, were not current; advances in pharmacology contained in the bibliography that was public domain.[134] The profile of the pharmaceutical industry in Brazil has undergone a sudden change from the 50s. The adoption of measures and developmental plans, as encountered in the administration of President Juscelino Kubitschek and the military rule period, opened the doors of the sector to foreign-funded enterprises, endowed with greater know-how and financial resources, which were responsible for the elimination of good part of the competition of the national laboratories.

The 80s was known as a period of economic stagnation and uncontrolled inflation. Productive investments were scarce, a lot due to the option of most companies focus on the gains from financial investments. In the interval that goes from 1980 to 2000, domestic enterprises have faced other difficulties, the main ones being:

a) Price control of the government;

b) Patent law reinforcing monopolies;

c) Difficulty of access to the media;

d) Difficulties arising from Brazilian cultural issues, such as the low status given to domestic products compared with imported;

e) Lack of long-term industrial policy that could allow investments in improving and streamlining the sector;

f) Increase in the level of demand in the concession of registrations of new drugs by the National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária – ANVISA).[135]

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[134] GAMBETA, Wilson Roberto. Ciência e indústria farmacêutica – São Paulo, Primeira República. In: Estudos Econômicos, vol.12, nº 03, p.87-98, dez.1982/mar.1983. Apud *Ibidem*.

[135] DA SILVA. In: Indústria Farmacêutica, Sâo Paulo, 2002, http://www.fcf.usp.br/Ensino/Graduacao/Disciplinas/Exclusivo/Inserir/Anexos/LinkA.

At present, one of the biggest claims of the domestic industry is the formulation of policies that allow and encourage the investment of the domestic private sector in the production of drugs and medicines.

2.6.1 The Pharmaceutical Product

The origin of the pharmaceutical product is in the investment in research activities carried out by laboratories, aiming to synthesize new molecules that can eventually be converted into marketable end products and to ensure the desired financial return. For the development of a new drug research processes and approval by the relevant regulatory bodies follow a long trajectory, initially involving extraction of the molecule, pharmacological steps, toxicological and safety tests to final approval.[136]

Pharmaceutical products can be classified into four broad categories:[137]

a) New molecules: pharmacochemicals materials are generally high aggregated values which are the result of significant investments made by laboratories in research and development activities. Are also known as the active substances, those raw materials responsible for therapeutic action;
b) Medical prescription products: its commercialization is regulated by law and sales outlets can only do so upon presentation of Medical prescription. Can be subdivided into branded products – when producers laboratories are patent holders – and similar products – have similar branded products therapeutic properties. Similar compounds are generally the same active agents and their commercialization is only made possible after the expiration of the patent for the branded drug. Visually, both the packaging of branded products like the similar contain red or black horizontal stripes which account for about 50% of the total commercialized pharmaceutical drugs.
c) Products OTC (over the counter): represents the entire class of pharmaceuticals that can be marketed without the need for a medical prescription. In Brazil these products are regulated by the Ordinance (Portaria) n° 2/95, which lists 19 therapeutic categories authorized for commercialization. Analgesics, vitamins,

[136] VORMITTAG. In: Indústria Farmacêutica, Sâo Paulo, 2000, http://www.fcf.usp.br/Ensino/Graduacao/Disciplinas/Exclusivo/Inserir/Anexos/LinkA.
[137] ABIFARMA. In: Indústria Farmacêutica, Sâo Paulo, 2000, http://www.fcf.usp.br/Ensino/Graduacao/Disciplinas/Exclusivo/Inserir/Anexos/LinkA.

antacids, medicinal soaps and products for reducing the symptoms of flu and colds are a few examples of OTC products;

d) Generic products: are products that have no trademark, they are labeled by the name of the substance or active substance and their employability is only permitted after the end of the term of the patent reference drug or trademark. According to the National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária – ANVISA), sales of generics increased from two million to five million units per month on average (2001). The great benefit of generic medicines is that they offer the possibility of democratizing the state public policies for treatment making it a better control over price fluctuations and thus become less expensive treatments for the population.

In the year 2000, the pharmaceutical industry consists of approximately 369 companies, 17% of them foreign capital and 83% of the national capital. Concentrated mostly in the Southeast, generating about 50,000 direct jobs and 250,000 indirectly (Abifarma 2000 database). It is a sector characterized by speeding market, where no company has more than 8% of the market. The number of commercialized presentations revolves around 11 thousand. With the advent of price controls established by the government in 2002 and 2003, the pharmaceutical industry has not been able to pass part of the rising costs of inputs that are largely are coupled through to its customers.

2.6.2. The Process of Pharmaceutical Patent in Brazil

The granting of patents in Brazil is governed by Law No. 9279 of May 14, 1996, also known as the Industrial Property Law (Lei da Propriedade Industrial – LPI). The LPI was formulated to incorporate the resolutions set out in the Agreement of the Trade-Related Aspect of Intellectual Property Rights (TRIPS), the result of signing the final act of the Results of the Uruguay Round of GATT Multilateral Trade Negotiations on 12 April, 1994. One of the main novelties of the LPI which replaced the old Industrial Property Code (Law nº 5.772/71) was to introduce the possibility of granting patents for pharmaceutical products and processes which were formally banned in the country.

The LPI was partially modified and the device was increased by the enactment of Law 10.196, of February 14, 2001. This legislation added a new element in patent law. Article 229-C of the legal instrument determined that the granting of patents for pharmaceutical products and processes would depend on the prior approval of ANVISA. The mechanism of

prior informed consent was, and still is, the subject of discussion as it created one more step to obtaining the charter.

In the framework of ANVISA, the disambiguation of the activities performed by the INPI and the Agency regarding the technical examination of patent applications, in order to avoid duplication of effort and increased time in the examination of applications is being resolved. ANVISA promoted a first step in that direction when performing a public consultation on 20/03/2013 with a proposal to change the RDC nº 45/2008 laying down the procedures for the prior consent for pharmaceutical products and patent processes. The new rules were published on 15/04/2013 by ANVISA in DRC nº 21/2013. Still, the new resolution device that gives scope for regulatory agency review requirements for patentability resists, as can be observed in Article 4 of the Norm transcript below.

> Art. 4 – Upon receipt of patent applications submitted by the INPI, ANVISA will review such requests in light of public health by decision embodied in technical opinion issued by the competent organizational unit within the Agency.
> § 1: It is considered that the patent application will be contrary to public health when:
> I – [...]; or
> II – Should Patent Product or pharmaceutical process be of interest to the policies of medicines or pharmaceutical assistance within the SUS and does not meet the patentability requirements and other criteria established by Law nº 9279, 1996. (emphasis added).

Despite the measures presented by the institutions involved in the granting of pharmaceutical patents in the country process, the delay in completing the administrative stage of examination can lead to a postponement of the lifetime of the patent, unnecessarily. Although the law has remedies to try to speed up and facilitate access to generic drugs as the exception devise and compulsory licensing, the delay in patent examination, without which applications have a final decision, hampers and even prevents the use of these mechanisms such as compulsory licensing. The LPI provides in § 5 of Article 68 that this type of licensing, based on the lack of exploration of the subject of the patent in the Brazilian territory, can only be requested after three years of the grant of the patent. Thus, the longer the time elapsed until the grant later legal remedies, if necessary, may be used.

Finally, regarding the origin of depositors it was observed that 3.6% of patents issued are Brazilian depositors and 96.4% of foreign depositors. It should be emphasized that among the patents of Brazilian origin, universities and public research institutes, such as the State University of Campinas and FIOCRUZ were identified as holders. In the case of universities, the delay in granting extra negative effect given that these institutions do not have their own production structure, neither institutional mission nor the placement of products in the market. Thus, the legal certainty provided by the charter plays an important role in the

technology transfer process, adding value to products and facilitating the interaction between university and company for the purpose of marketing new drugs.

2.6.3. Generics Drugs and Patents in Brazil

Patent protection in the specific case of the pharmaceutical industry plays an important role given the easiness that exists in copying the chemical molecules and their formulations. Companies in the industry argue that patents serve to recover its investments in research and development (R & D) as well as recover the expenses with the necessary documentation to the registration of the drug with the competent sanitary surveillance organs. Patents also have an economic function in relation to production and commercialization of drugs. It is known that the process of invention and development of new drugs is long, but essential for fueling industry sales. The expiration of patent protection of existing drugs and the entry of substitute products on the market as generic drugs, reduce the competitive advantage of companies that previously held a monopoly. According to Markman *et al*. (2004), the value of patent protection cannot be underestimated by companies that lose about 80% of their income on generic substitution when the patents of innovative medicines expire.[138]

In a situation of temporary monopoly, price negotiations based on free competition is prevented. Thus, even if a patented drug is considered essential for a given population, its availability is subject to political decisions. As the drugs protected by patents are offered at higher prices than drugs without patents, this is one of the reasons for the Government to bring on the responsibility of Medication dispensing. According to the World Health Organization, one third of the world population does not have access to medications, depending exclusively on the state.

Generic drugs, as defined by the Law of Generic product (Law n° 9.787/99) as similar medicament to a reference product or innovative, it is intended to be interchangeable, usually produced after the expiration or waiver of patent rights protection or other exclusive rights, drugs with proven effectiveness, safety and quality are one of the major element of the Brazilian National Drug Policy. Stimulating the generic drug policy to promote manufacturing and adoption of these medicines is urgent for the country, since despite the existence of distribution of free medicines by the Unified Health System (Sistema Único de Saúde – SUS) and proclaimed universality of this system programs. A is observed that Brazilian families with the family income of up to R $ 830.00 and those with a family income of over R$ 830.00

[138] MARKMAN, G. D.; ESPINA, M. I.; PHAN, P. H. Patents as Surrogates for Inimitable and Non-Substitutable Resources. In: *Journal of Management*, v. 30, nº 04, p. 529-544, aug. 2004.

up to R$ 1,245.00 spend 4.2% and 5%, respectively, of their wealth on medicines, according to data from Household Budget Survey 2008-2009 (IBGE, 2010).

Although there are still major challenges is the fact that the generic drug policy of the federal government achieved success and has significantly contributed to consolidating the participation of national laboratories in the Brazilian market. According Scaramuzzo (2013), based on data from IMS Health, sales of the national laboratories currently already represents 50% of total sales of the Brazilian pharmaceutical industry, being the first time that the revenue from Brazilian manufacturers attain this participation.[139] In the last 12 months up to June 2013, industry revenue was totaled to the sum of R$ 47 billion (equivalent to U.S. $20 billion), the generic drug revenue being R$ 13 billion and the similar drug revenue R$ 9 billion in the same period.

In 2000, when generic began to emerge in Brazil, the Brazilian market was heavily dominated by multinationals that held 75% of the market. The increased participation of national companies in the Brazilian pharmaceutical market has a strong possibility of going further in the coming years, given that generics and similar medicines, segments dominated by Brazilian companies established in the country, will be absolutely equal from the point of view of health since similar drugs will gradually undergo bioequivalence tests within a schedule that has already been established by the National Health Surveillance Agency (ANVISA) . However, one should keep in mind that patent rights exert great influence on the architecture of this market and in the possibility of occupation of many existing niches, Bearing in mind the importance of a detailed study of how the current scenario of patent granting can impact on this growing trend of the necessary national participation in the Brazilian pharmaceutical market.

The Brazilian Industrial Property law (Law n° 9.279/96, LPI) provides that patent be valid for twenty years from the filing date. Moreover, according to the sole paragraph of Article 40 of this law, the validity of the patent shall not be less than ten years from the date of grant, except for the hypothesis of cases in which the National Institute of Industrial Property (INPI) is unable to examine the merits of an application due to some judicial delays or proven by higher judicial power. Under this statutory provision, the delay in granting applications for medication by the INPI will involve the expansion of the validity period of the involved pharmaceutical patents in Brazil. This directly interferes in the possibility of launching generic drugs.

[139] SCARAMUZZO, M. Múltis mudam estratégia e focam atuação: farmacêuticas comlimitado portfólio de medicamentos e altos custos, companhias redefinem prioridades. In: *Valor Econômico*, Brasília, 22 de março de 2013.

2.6.3.1 The Generic Products in the Brazilian Pharmaceutical Industry

Generic companies in America emerged in the 60s, when the government established the safety and efficacy of medicines in the market up to 1962; they should be evaluated by the National Research Council of the National Academy of Sciences. The drugs considered effective for the time according to the recommended indications were allowed to remain commercialized without the need for *in vivo* studies.[140]

Only two decades later, on September 24, 1984, the American (U.S.A) federal government published the Drug Price Competition and Patent Term Restoration Act (Public Law 98-417), commonly known as the Hatch – Waxman Act which established, among other measures, the system regulation of generic drugs in the US. The legislation allowed the elimination of duplicate clinical trials, and provides measures to ensure the continued development of new drugs and exclusive rights for New Drug Application (HOLOVAC, 2004).[141] Thus, the law promoted the reduction of costs of the health system with the availability of generic medicines to the population. In the early 1990s, when several medicines patents had been expired after a year of market competition, it was observed that generic medicines were offered with discounts for less than 50% compared to brand name medication and had captured 64% of the market.[142]

In Brazil, the movement of generics is marked by the Ordinance of the Ministry of Health n° 3,916, of 30 October, 1998, which approved the National Drug Policy and presented the promotion of the use of generic drugs as one of its objectives. However, the regulation of this system is effective with the promulgation of Law nº 9.787/99, regulated by Decree n° 3.181/99, which establishes the generic drug and the use of generic names in pharmaceuticals. Dias and Romano-Lieber (2006) emphasized that even with the enactment of the Generics various government actions and regulations were necessary for the effective use of generic drugs when introduced in the country.[143] Among these is the creation of an identifier on packaging by ANVISA, so that consumers do not confuse similar drugs with generic, as well as the prohibition of the commercialization of other registered medicines with generic name. The authors also add the media's role as an advocate of the use of generic drugs, which led to a strong popular support in Brazil, is essential.

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[140] DIAS, C. R. C. *Medicamentos genéricos no Brasil de 1999 a 2002*: análise dalegislação, aspectos conjunturais e políticos. Dissertação de Mestrado em Saúde Pública, USP/FSP, São Paulo, 2003.
[141] HOLOVAC, M. A. A balancing act in the United States Drug industry: pioneer and genericdrugs, the Orange Book, marketing protection and the US consumer. In: *World Patent Information*, v. 26, p.123-129, 2004.
[142] GRABOWSKI, H. Patents, innovation and access to new pharmaceuticals. In: *Journal of International Economic Law*, v. 05, nº 04, p 849-860, 2002.
[143] DIAS, 2003. ROMANO-LIEBER, N. S. Processo da implantação da política de medicamentos genéricos no Brasil. In*: Cad. Saúde Pública*, v. 22, nº 08, p.1661-1669, ago, 2006.

Despite the initial Barriers faced by the practice for of Brazilian Generic Drug Policy, a study by Quental *et al* (2008) brings evidence of the success of this public policy. Both with respect to their impact on public health, with lower prices medicines promoting greater access of the population to essential goods and in relation to promoting the competitiveness of Brazilian companies for the development of national industry and creation of technology services for the realization of bioavailability and bioequivalence testing. To Hasenclever *apud* Quental *et al* (2008) there occurred, in addition to lower prices, increased consumption since a positive and statistically significant correlation is identified between the introduction of generics in the Brazilian market and the growth rate of the quantity of drugs sold in each set of products with the same active substance and similar forms of presentation.[144]

Currently, the market for generic drugs is monitored monthly by the Regulatory Chamber of the Pharmaceutical Market (CMED), inter-ministerial body established by Law nº 10.742, of October 6, 2003, which has its executive office at ANVISA. The CMED has the objectives of adoption, implementation and coordination of activities relating to the economic regulation of the pharmaceutical market aimed at promoting pharmaceutical services to the population, through mechanisms that stimulate the supply of medications and competitiveness of the sector. Even before the creation of the CMED Resolution nº 120 of ANVISA, of April 25, 2002, had already stipulated that the manufacturers of generic drugs should register, until ten (10) of each month, the information relating to the production and commercialization of their products in the previous month.

Table 4 – The Evolution of Generic Drugs Market in Brazil (2000-2007).

MARKET	2000	2001	2002	2003	2004	2005	2006	2007
Drugs (Farmacos)	68	140	203	220	243	271	282	263
Laboratories	11	25	31	33	36	37	40	37
Products	118	295	503	619	818	1.040	1.169	1.099
Presentation	135	490	594	1.029	1.611	2.069	2.385	2.245

Source: ANVISA.[145]

Table 4 shows the evolution of the generic drugs market in Brazil. Despite the growth of marketed products, there should be alert to the fact that many generics are made by industries that control the branded drugs, called “pseudo-generic” or “ultra-generic” (LEXICHIN, 2004). This strategy is observed, for example, in Merck, which has launched the Merck Generics. The medicine containing potassium losartan used in the therapy of

[144] QUENTAL, C.; ABREU, J. C.; BOMTEMPO, J. V.; GADELHA, C.A.G. Medicamentos Genéricos no Brasil: impactos das políticas públicas sobre a indústria nacional. In: *Ciência & Saúde Coletiva*, v.13, supl., p.619-628, 2008.

[145] BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Evolução do Mercado de Medicamentos Genéricos. Disponível em: http://portal.anvisa.gov.br/wps/wcm/connect/91fce500486fab279b3a9b2bd5b3ccf0/Quadro_IV.pdf?MOD=AJPERES. Accessed on : 06 Feb., 2014.

hypertension, is sold by the brand Cozaar® as the generic name. Thus, the company reaches the consumers seeking low price in combination with a known laboratory trademark as a sign of credibility of the product.

Moreover, even if the generic market over the years has been transformed into its structure. Normally, the entry of global operation companies like the Swiss Sandoz and the Indian Ranbaxy and currently, some national laboratories are being acquired by transnational corporations. This is the case of the laboratory and generics manufacturer Teuto. In 2010, Pfizer bought 40% of Goiás laboratory with the option to acquire the remaining 60% by the end of 2013.[146] Thus, a policy initiated to promote skill-building in national laboratories can migrate to the big pharmaceutical conglomerates that already dominate the brand drug market in the country.

Finally, we highlight a new strategy of owners of innovative pharmaceutical patents pharmaceutical companies to control and maintain their market power, the "reverse settlements" named by health insurance plans and consumer as "pay to delay" organizations. This practice, which has already occurred in the U.S., is the payment of a cash value for the company producing the branded drug to a generic company so it does not make available the generic version of the drug on the market after the expiration of patent protection. The legality of this act was evidenced in a leading case Federal Trade Commission v. Actavis, Inc. *et al*, (an issue between Solvay Pharmaceuticals and Actavis generic producer regarding the drug AndroGel®, Case nº 12-416) which was decided on June 17, 2013, by the U.S. Supreme Court. The court rules in Androgel patent settlement agreement case; holds that "*agreements are subject to antitrust scrutiny, but not presumptively unlawful*":

> […] We recognize the value of settlements and the patent litigation problem. But we nonetheless conclude that this patent-related factor should not determine the result here. Rather, five sets of considerations lead us to conclude that the FTC should have been given the opportunity to prove its antitrust claim.
> First, the specific restraint at issue has the "potential for genuine adverse effects on competition." Indiana Federation of Dentists, 476 U. S., at 460 – 461 (citing 7 Areeda ¶1511, at 429, 1986). The payment in effect amounts to a purchase by the patentee of the exclusive right to sell its product, a right it already claims but would lose if the patent litigation were to continue and the pa-tent were held invalid or not infringed by the generic product. Suppose, for example, that the exclusive right to sell produces $50 million in supra competitive profits per year for the patentee. And suppose further that the patent has 10 more years to run. Continued litigation, if it results in patent invalidation or a finding of non in-fringement, could cost the patentee $500 million in lost revenues, a sum that then would flow in large part to consumers in the form of lower prices.
> We concede that settlement on terms permitting the patent challenger to enter the market before the patent expires would also bring about competition, again to the consumer's benefit. But settlement on the terms said by the FTC to be at issue here – payment in return for stay- ing out of

[146] SCARAMUZZO, 2013.

> the market – simply keeps prices at patentee-set levels, potentially producing the full patent-related $500 million monopoly return while dividing that return be-tween the challenged patentee and the patent challenger. The patentee and the challenger gain; the consumer loses. Indeed, there are indications that patentees sometimes pay a generic challenger a sum even larger than what the generic would gain in profits if it won the paragraph IV litigation and entered the market. See Hemphill, 81 N. Y. U. L. Rev., at 1581. See also Brief for 118 Law, Economics, and Business Professors et al. as Amici Curiae 25 (estimating that this is true of the settlement challenged here). The rationale behind a payment of this size cannot in every case be supported by traditional settlement considerations. The payment may instead provide strong evidence that the patentee seeks to induce the generic challenger to abandon its claim with a share of its monopoly profits that would otherwise be lost in the competitive market.
>
> Fifth, the fact that a large, unjustified reverse payment risks antitrust liability does not prevent litigating parties from settling their lawsuit. They may, as in other industries, settle in other ways, for example, by allowing the generic manufacturer to enter the patentee's market prior to the patent's expiration, without the patentee paying the challenger to stay out prior to that point. Although the parties may have reasons to prefer settlements that include reverse payments, the relevant antitrust question is: What are those reasons? If the basic reason is a desire to maintain and to share patent-generated monopoly profits, then, in the absence of some other justification, the antitrust laws are likely to forbid the arrangement.
>
> In sum, a reverse payment, where large and unjustified, can bring with it the risk of significant anticompetitive effects; one who makes such a payment may be unable to explain and to justify it; such a firm or individual may well possess market power derived from the patent; a court, by examining the size of the payment, may well be able to assess its likely anticompetitive effects along with its potential justifications without litigating the validity of the patent; and parties may well find ways to settle patent disputes without the use of reverse payments. In our view, these considerations, taken together, outweigh the single strong consideration – the desirability of settlements – that led the Eleventh Circuit to provide near-automatic antitrust immunity to reverse payment settlements.[147]

In this sense, the more agile and of good quality the analysis system for medicines patent in Brazil, the faster shall generic companies have information on the list of products and patented processes with the delimitation of the respective coverage periods and can plan their actions to manufacturing and marketing of drugs with greater legal certainty and precision.

[147] *Cf*. Supreme Court of The United States nº 12-416. Federal Trade Commission, Petitioner V. Actavis, Inc., *et al*. on Writ of Certiorari to The United States Court of Appeals for The Eleventh Circuit, june 17, 2013.

Chapter 3.0 – Methodology

The methodology employed, disclosed and described in detail in this study reflects a combination of various performed tasks in the research and an assembly of materials used for this purpose. The goal of this scientific activity is comprehensively summarized in an attempt to obtain a better understanding of the interdependently involved fields. Moreover, we attempt to bridges the gap between the observation of reality and scientific theory, thereby searching for their tangential points. The present study is situated in the group of exploratory research, since the nature thereof in relation to the degree of novelty of the subject that is little explored scientifically.

Data Collection Methods: The method used in data collation of our case study can be characterized as: quantitative, qualitative conducted through interviews, observation and comparative analyzes of data collected from various sources including both Brazilian and international database. Given the partial subjectivity of the object of study in this qualitative research adapted to certain needs by engaging a broad and very complex yet innovative and peculiar set of information. By the nature of this research, we opted for a case study of phenomenological nature, with the creation of data based on theoretical propositions, as suggested by Eisenhardt (1989)[148] and Barratt *et al* (2011).[149]

The qualitative research allows us to understand details of the complex relationships among the subsidiaries, for the qualitative approach

> partly on the ground that there is a dynamic relationship between the real world and the observing subject [...] The individual-observer is an integral part of the process of knowledge and interprets the phenomena, by assigning them meaning.[150]

Data Sources, Validity and Reliability: As for the quality of the study, calculated measures were taken on the construct validity and reliability suggested by Yin (1994).[151] In order to avoid errors related to the construct validity, the research is backed up by a wide range of related literature as well as using multiple sources of evidence to buttress the emphasis. As for reliability, some sort of nationally and internationally reliable institutions' databases served as sources of the analyzed primary and secondary data. These include information from the database of Universidade de Minas Gerais – CTIT, the Brazilian Instituto Nacional de

[148] EISENHARDT, K. M. Building theories from case study research: academy of management. In: *The Academy of Management Review*, v. 14, nº 04, 1989, p.532.
[149] BARRATT, M; CHOI, T. Y; LI, M. Qualitative case studies inoperations management: trends, research outcomes, and future research implications. In: *Journal of Operations Management*, v. 29, nº 04, p.329-342, 2011.
[150] CHIZZOTTI, A. *Pesquisa em Ciências Humanas e Sociais*. 2ª ed. São Paulo: Cortez, 1995, p.79.
[151] YIN, R. K. *Case Study Research*. California: Sage, 1994.

Propriedade Industrial – INPI's SINPI, the European Patent Office – EPO's Espacenet, and the World Intellectual Property Organization – WIPO's Patent Scope.

Objectively, we chose the exploratory nature of qualitative research and descriptive analysis of the Federal University of Minas Gerais and its Innovation and Technology Transfer office in relation to the Pharmaceutics Industry as well as a comparative analysis between UFMG patent evolution and the national rate of University Patent deposit in Brasil. Nevertheless, a descriptive analysis of the pharmaceutical industry is also unfolded in this research.

The qualitative research was supported by bibliographical research, a result of the retrospective analysis of the scientific literature and searches: books, journals, newspapers, theses and dissertations. These also include primary and secondary documents, unconventional and grey literature databases, both national and international data. These materials served as a basement of the whole applicable analysis to the research.

The collected patent data at the national level (4.0 part1) and at the Federal University of Minas Gerais used in descriptive and comparative analysis of this work include:

1. Extracted data from the Patents Base of the Federal University of Minas Gerais (Universidade Federal de Minas Gerais) and The Innovation and Technology Transfer Office of UFMG (Coordenadoria de Transferência e Inovação Tecnológica - CTIT), including data base of Patents, Patent licensing and technology transfer contracts between UFMG and Companies.
2. Extracted data from scientific publications, and Brazilian Patent Database (Sinpi), the National Institute of Industrial Property (Instituto Nacional de Propriedade Industrial). The initial date of collection (01/01/1995) was established with a view that Brazil, not having utilized the deadline flexibility provided by the TRIPS agreement, started its grant of patents for pharmaceuticals after this date. So at first we noticed the granting of patents for applications filed between 01/01/1995 (date on which Brazil has granted drug patents) and 31/12/2012 (aiming mostly to reach applications outside the period of secrecy) while the end of the collection was in 2012, the latest year with complete patent data of filings.

The development and patenting of the filed applications and scientific publication of Universidade Federal de Minas Gerais – UFMG between 01/01/1990 and 31/12/2013 were verified and compared focusing on the drug patents.

UFMG's comparison at the National level (4.0 part1) in the elaboration of this work, the Document Analysis System was used, which is a computational tool that was developed

by the INPI and has proven to be effective for the treatment of the existing information in patent documents, drawn from various available patent databases online.

Considering that the International Patent Classification (IPC) is a treasure that serves as a guide for indexers and users of the patent system representing a common language in the diverse technological fields.[152] For objectivity sake, it is noteworthy to clearly state that the drug patents related to medicament is understood as all patents that fall into the IPC class “A61”, Since this classification covers all “MEDICAL OR VETERINARY SCIENCE; HYGIENE”.

The International Patent Classification (IPC) is a system established by the World Intellectual Property Organization (WIPO, 2008) triggered by the Strasbourg Agreement, in 1971, and provides a hierarchical system for classifying patents and utility models according to different technological fields to which they belong.[153]

Currently, over 90 countries including Brazil use the IPC model to standardize archiving and easy retrieval of human technological knowledge. It is also observed that all National and regional offices deposit and classify patents according to this system. In order to follow the evolution of technology, the IPC is reviewed every five years by a committee of experts constituted within WIPO.[154]

It was diagnosed in the process of this research that, in Brazil, the IPC classification is given to a patent by the INPI as one of the results of the technical analyses given to every patent application based on the claims of the patentee(s). However, the basement of the IPC classification is on the product, process, and use of the invention. Thus during the process, patent documents already are given one or more codes that correspond to the section(s), group(s), Class(s) and subclass(s). For example,

In its latest edition (IPC 2014.01) the classification subdivides technologies in about 70,000 categories, organized into eight major sections, which include:

SECTION A: Human Necessities
SECTION B: Performing Operations; Transporting
SECTION C: Chemistry; Metallurgy
SECTION D: Textiles; Paper

[152] JANNUZZI, A. H. L.; AMORIM, R. C. R.; SOUZA, C. G. Implicações da categorização e indexação na recuperação da informação tecnológica contida em documentos de patentes. In: *Ciência da Informação*, Brasília, v. 36, nº 02, p.27-34, ago.2007.
[153] STRASBOURG AGREEMENT CONCERNING THE INTERNATIONAL PATENT CLASSIFICATION. Strasbourg, 1971. Available at: http://www.wipo.int/treaties/en/classification/strasbourg/trtdocs_wo026.html. Accessed on 02 January, 2014.
[154] MACEDO, M. F.; MULLER, A.C; MOREIRA, A.C. Proteção intelectual – características determinantes da escolha da forma de proteção. In: *Patenteamento em Biotecnologia*: um guia prático para os elaboradores de pedidos de patente. 1ª Ed. Brasília, 2001.

SECTION E: Fixed Constructions

SECTION F: Mechanical Engineering; Lighting; Heating; Weapons; Blasting

SECTION G: Physics

SECTION H: Electricity

Each section is subdivided into classes, subclasses, groups and subgroups hierarchically (in descending order). An example follows thus:

SECTION A — HUMAN NECESSITIES

Class A61: MEDICAL OR VETERINARY SCIENCE; HYGIENE

Subclass A61K: PREPARATIONS FOR MEDICAL, DENTAL, OR TOILET PURPOSES (devices or methods specially adapted for bringing pharmaceutical products into particular physical or administering forms A61J 3/00; chemical aspects of, or use of materials for deodorisation of air, for disinfection or sterilisation, or for bandages, dressings, absorbent pads or surgical articles A61L; soap compositions C11D)

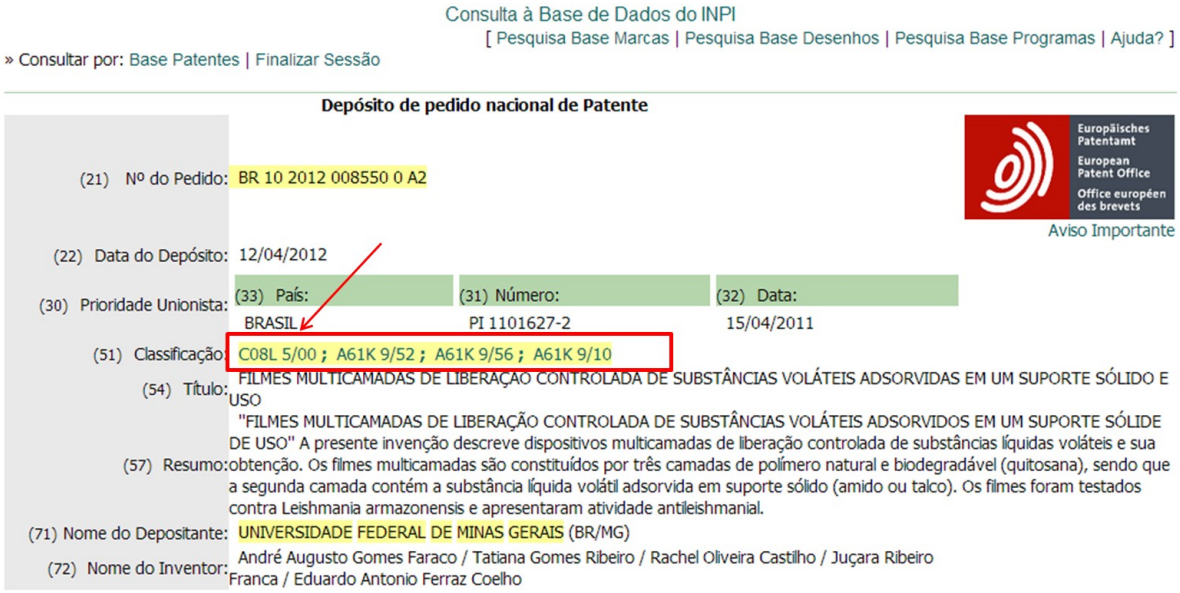
Group A61K 39/00: Medicinal preparations containing antigens or antibodies (materials for immunoassay G01N 33/53):

(1) Preparation of antigen or antibody compositions is also classified in subclass C12N, if the step of cultivating the micro-organism is of interest.

(2) Groups A61K 39/002 A61K 39/12 cover preparations containing protozoa, bacteria, viruses, or subunits thereof, e.g. membrane parts.

Group A61K 39/008: ... Leishmania antigens**.**

Fig. 7 – Patent with more than one IPC Class.



Source: Sinpi INPI.

Note: In our analysis, the definition of drug patent may exceed the IPC subclass A61K, which is "PREPARATIONS FOR MEDICAL, DENTAL, OR TOILET PURPOSES", because an invention with some other medicinal uses may be classified under more than one group but once it has to do with "MEDICAL OR VETERINARY SCIENCE; HYGIENE", it carries at least one group classification code under the "A61" class as shown in the diagram in *Figure 7* above. For this reason, we include all subclasses under the class "A61" which include A61B, A61C, A61D, A61F, A61G, A61H, A61J, A61K and their respective groups as listed in table 5 below in more details:

Table 5 – Subclasses Under The IPC "A61" class.

A **SECTION A — HUMAN NECESSITIES**

HEALTH; LIFE-SAVING; AMUSEMENT

A61 MEDICAL OR VETERINARY SCIENCE; HYGIENE

A61B DIAGNOSIS; SURGERY; IDENTIFICATION (analyzing biological **material G01N**, e.g. **G01N 33/48**)

Note(s)

This subclass covers instruments, implements, and processes for diagnostic, surgical and person-identification purposes, including obstetrics, instruments for cutting corns, vaccination instruments, finger-printing, psycho-physical tests.

A61C DENTISTRY; APPARATUS OR METHODS FOR ORAL OR DENTAL HYGIENE (non-driven toothbrushes **A46B**; **preparations** for dentistry **A61K 6/00**; **preparations** for cleaning the teeth or mouth **A61K 8/00**, **A61Q 11/00**)

A61D **VETERINARY INSTRUMENTS, IMPLEMENTS, TOOLS, OR METHODS**

Note(s)

This subclass covers only instruments, implements, tools, or methods specially adapted for **use** with animals.

A61F **FILTERS IMPLANTABLE INTO BLOOD VESSELS; PROSTHESES; DEVICES PROVIDING PATENCY TO, OR PREVENTING COLLAPSING OF, TUBULAR STRUCTURES OF THE BODY, E.G. STENTS; ORTHOPAEDIC, NURSING OR CONTRACEPTIVE DEVICES; FOMENTATION; TREATMENT OR PROTECTION OF EYES OR EARS; BANDAGES, DRESSINGS OR ABSORBENT PADS; FIRST- AID KITS** (dental prosthetics **A61C**) **[8]**

A61G **TRANSPORT, PERSONAL CONVEYANCES, OR ACCOMMODATION SPECIALLY ADAPTED FOR PATIENTS OR DISABLED PERSONS** (appliances for aiding**patients** or **disabled persons** to walk **A61H 3/00**)**; OPERATING TABLES OR CHAIRS; CHAIRS FOR DENTISTRY; FUNERAL DEVICES** (embalming corpses **A01N1/00**)

A61H **PHYSICAL THERAPY APPARATUS, e.g. DEVICES FOR LOCATING OR STIMULATING REFLEX POINTS IN THE BODY; ARTIFICIAL RESPIRATION;MASSAGE; BATHING DEVICES FOR SPECIAL THERAPEUTIC OR HYGIENIC PURPOSES OR SPECIFIC PARTS OF THE BODY** (electrotherapy, magnetotherapy, radiation **therapy**, ultrasound **therapy A61N**)

Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "physical **therapy**" covers the **treatment** of disease or disability by means, e.g. mechanical means, as opposed to drugs or surgery. It includes, by way of example, massage, whirlpool baths and devices for exercising a passive body member.

A61J **CONTAINERS SPECIALLY ADAPTED FOR MEDICAL OR PHARMACEUTICAL PURPOSES; DEVICES OR METHODS SPECIALLY ADAPTED FOR BRINGING PHARMACEUTICAL PRODUCTS INTO PARTICULAR PHYSICAL OR ADMINISTERING FORMS; DEVICES FOR ADMINISTERING FOOD OR MEDICINES ORALLY; BABY COMFORTERS; DEVICES FOR RECEIVING SPITTLE**

A61K **PREPARATIONS FOR MEDICAL, DENTAL, OR TOILET PURPOSES** (devices or methods specially adapted for bringing pharmaceutical **products** into particular physical or administering forms **A61J 3/00**; chemical **aspects** of, or **use** of **materials** for deodorisation of air, for disinfection or sterilisation, or for bandages, dressings, absorbent pads or surgical articles **A61L**; soap compositions **C11D**)

Note(s)

1. This subclass covers the following subject matter, whether set forth as a composition (mixture), process of preparing the composition or process of treating using the composition:

   a. Drug or other biological compositions which are capable of:

   - preventing, alleviating, treating or curing abnormal or pathological conditions of the living body by such means as destroying a parasitic organism, or limiting the effect of the disease or abnormality by

chemically altering the physiology of the host or parasite (biocides **A01N 25/00**-**A01N 65/00**);

- maintaining, increasing, decreasing, limiting, or destroying a physiological body function, e.g. vitamin compositions, sex sterilants, fertility inhibitors, growth promotors, or the like (sex sterilants for invertebrates, e.g. insects, **A01N**; **plant** growth regulators **A01N 25/00**-**A01N 65/00**); **[7]**
- diagnosing a physiological condition or state by an in vivo test, e.g. X-ray contrast or skin patch test compositions (measuring or testing processes involving enzymes or micro-organisms **C12Q**; in vitro testing of biological **material**, e.g. blood, urine, **G01N**, e.g. **G01N 33/48**);

b. Body treating compositions generally intended for deodorising, protecting, adorning or grooming a body, e.g. cosmetics, dentifrices, tooth filling **materials**.

2. Attention is drawn to the definitions of groups of chemical elements following the title of section **C**.
3. Attention is drawn to the notes in class **C07**, for example the notes following the title of the subclass **C07D**, setting forth the rules for classifying organic compounds in that class, which rules are also applicable, if not otherwise indicated, to the classification of organic compounds in **A61K**. **[8]**
4. In this subclass, with the exception of group **A61K 8/00**, in the absence of an indication to the contrary, classification is made in the last appropriate place.
5. Therapeutic activity of medicinal **preparations** is further classified in subclass **A61P**. **[7]**

A61L **METHODS OR APPARATUS FOR STERILISING MATERIALS OR OBJECTS IN GENERAL; DISINFECTION, STERILISATION, OR DEODORISATION OF AIR; CHEMICAL ASPECTS OF BANDAGES, DRESSINGS, ABSORBENT PADS, OR SURGICAL ARTICLES; MATERIALS FOR BANDAGES, DRESSINGS, ABSORBENT PADS, OR SURGICAL ARTICLES** (preservation of bodies or disinfecting characterised by the agent employed **A01N**; preserving, e.g. sterilising, food or foodstuffs**A23**; **preparations** for medical, dental or toilet purposes **A61K**) **[4]**

A61M **DEVICES FOR INTRODUCING MEDIA INTO, OR ONTO, THE BODY** (introducing **media** into or onto the bodies of animals **A61D 7/00**; means for inserting tampons **A61F 13/26**; devices for administering food or medicines orally **A61J**; containers for collecting, storing or administering blood or medical **fluids A61J 1/05**); **DEVICES FOR TRANSDUCING BODYMEDIA OR FOR TAKING MEDIA FROM THE BODY** (surgery **A61B**; chemical **aspects** of surgical articles **A61L**; magnetotherapy using magnetic elements placed within the body**A61N 2/10**); **DEVICES FOR PRODUCING OR ENDING SLEEP OR STUPOR** **[5]**

Note(s)

1. This subclass covers suction, pumping or atomising devices for medical **use** (e.g. cups, breast relievers, irrigators, sprays, powder insufflators, atomisers, inhalers), **apparatus** for general or local anaesthetics, devices or methods for causing a change in the state of consciousness, catheters, dilators, **apparatus** for introducing medicines into the body other than orally.
2. In this subclass, group **A61M 36/00**, which relates to the application of radioactive **material** to the body, takes precedence over other groups. **[5]**
3. When classifying in this subclass, classification is also made in group **B01D 15/08** insofar as subject matter of general interest relating to chromatography is concerned. **[8]**

A61N **ELECTROTHERAPY; MAGNETOTHERAPY; RADIATION THERAPY; ULTRASOUND THERAPY** (measurement of bioelectric currents **A61B**; surgical instruments, devices or methods for transferring non-mechanical forms of energy to or from the body **A61B 18/00**; anaesthetic **apparatus** in general **A61M**; incandescent lamps **H01K**; infra-red radiators for heating**H05B**) **[6]**

Note(s)

In this subclass, the following term is used with the meaning indicated:

- "therapy" implies that the **treatment**, when it aims at destroying sick or abnormal cells, is performed within the limits of healthy cell life, the destruction thereof being undesired, contrary to that which takes place with instruments, devices or methods covered by group **A61B 18/00**. **[7]**

A61P SPECIFIC THERAPEUTIC ACTIVITY OF CHEMICAL COMPOUNDS OR MEDICINAL PREPARATIONS [7]

Note(s)

1. This subclass covers therapeutic activity of **chemical compounds** or medicinal **preparations** already classified as such in subclasses **A61K** or **C12N**, or in classes **C01**, **C07** or**C08**. **[7]**
2. In this subclass, the term "**drugs**" includes **chemical compounds** or compositions with therapeutic activity. **[7]**
3. In this subclass, therapeutic activity is classified in all appropriate places. **[7]**
4. Attention is drawn to cases where the subject of the invention concerns only specific therapeutic activity of **chemical compounds** or medical **preparations**, and the chemical structure, compound, mixture or composition of this subject of the invention is known. In such cases, classification is made in both subclass **A61K** and subclass **A61P** as invention information. In addition, if the chemical structure, compound, mixture or composition or any individual ingredient of a mixture or composition is considered to represent information **of interest** for search, it may also be classified as additional information **[2012.01]**
5. The classification symbols of this subclass are not listed first when assigned to patent documents. **[7]**

A61Q SPECIFIC USE OF COSMETICS OR SIMILAR TOILET PREPARATIONS [8]

Note(s)

1. This subclass covers the **use** of **cosmetics or similar toilet preparations** already classified as such in main group **A61K 8/00**, in subclasses **C11D** or **C12N**, or in classes **C01**,**C07** or **C08**. **[8]**
2. When classifying in this subclass, classification is also made in subclass **A61P** if the **preparation** is stated to have therapeutic activity. **[8]**
3. In this subclass, the **use** of **cosmetics or similar toilet preparations** is classified in all appropriate places. **[8]**
4. Attention is drawn to cases where the subject of the invention concerns only the specific **use** of cosmetics or toilet **preparations**, and the chemical structure, compound, mixture or composition of this subject of the invention is known. In such cases, classification is made in main group **A61K 8/00** or in subclass **C11D**, and also in subclass **A61Q** as invention information. In addition, if the chemical structure, compound, mixture or composition or any individual ingredient of a mixture or composition is considered to represent information **of interest** for search, it may also be classified as additional information. **[2012.01]**
5. The classification symbols of this subclass are not listed first when assigned to patent documents. **[8]**

Source: International Patent Classification (IPC) Official Publication (Version 2014.01).[155]

In the case of UFMG, the drug patent (IPC – A61) as well as other patenting activities per year, participation of Brazilian and specifically UFMG in deposits, and major national institutions involved in the generation and protection of pharmaceutical knowledge were investigated. Here, the depositors are characterized as universities / research institutes.

[155] See International Patent Classification (IPC) Official Publication (Version 2014.01): http://web2.wipo.int/ipcpub/#refresh=page&notion=scheme&version=20140101&symbol=A61. Visited on 31/03/2014.

Meanwhile, the ratio of applications for drug patent with patent grant letters issued, ie, from the patent number, filing date, date of dispatch of letters patent and origin of depositors were collated on 10/06/2013 directly from the internal database of the INPI, SINPI (Sistema Integrado de Propriedade Industrial). Note that the date of issuance of the patent is verified by the publication according to Art 16 § 1 of the Industrial Property Law Nº 9.279, of May 14 1996. The publication means that from that date the title is available for acquisition in the relevant sector of the INPI by the patent applicant. Whence, the six-month period for bringing an administrative revocation by any interested party starts to count (Art. 51 of the LPI).[156]

Finally, with respect to determining the origin of Brazilian and foreign depositors, the depositors' patent grant letters with Brazilian origin are those issued with the country of the patents depositor being "BR". Therefore, other patents are considered to be of foreign origin.

Note that the main limitation of the patent search is the stage of secrecy (18 months from date of filing according to art. 30 of the LPI) of patent documents. Any database or search engine used will retrieve only the documents that have already been published and, as noted, most countries use this period of secrecy upon patent applications.

Limitations of the Study

The study is limited by constraints of resources, access, and time. The finance and material

resource needed for a larger sample size for this study is not attainable. As such data from the industry was not accessible during the research. In the University on the other hand, the investigation was carried out under some legal agreements with CTIT and consequently, some information remain confidential due to the existing contractual terms between CTIT and some other organization(s).

In the national data derived from the INPI's database, data for some years were not available, so analyses for such years were omitted.

Delimitations of the Study

The study is specifically delimited to UFMG, though brievely compared to others, as good sample of the Brazilian university sponsored by the federal government and CTIT which manages its technologies. All UFMG's patents up to December 2013 where analysed and information were extracted from them. Semi-structured Interviews were also conducted involving members of staff of UFMG and CTIT. Furthermore this study excludes and will not

[156] *See* Law nº 9.279, of May 14 1996 which regulates the rights and obligations related to industrial property. http://www.planalto.gov.br/ccivil_03/leis/L9279.htm. Visited on 31/03/2014.

attempt to investigate companies in the pharmaceutic industry as it not the objective, and may be done in some preceeding researches.

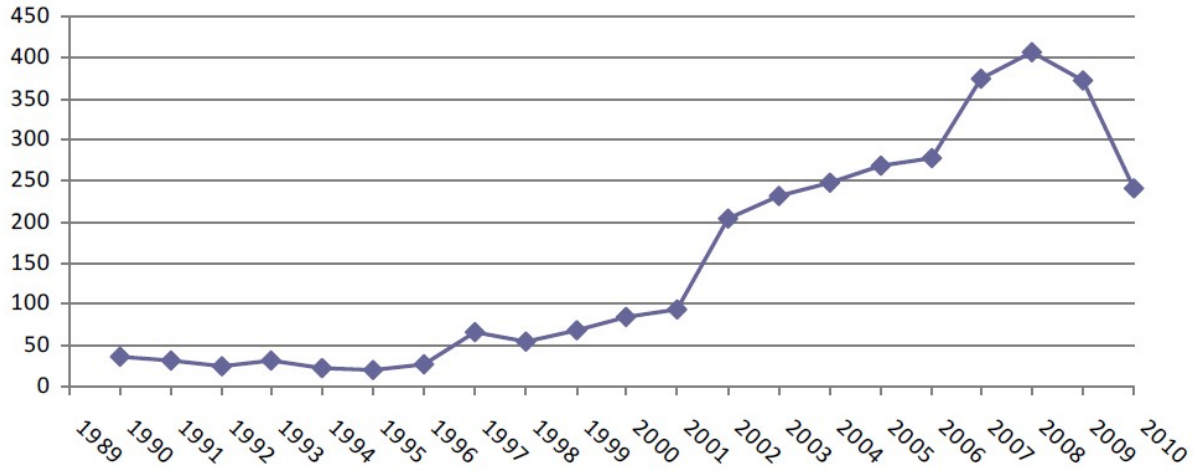
Chapter 4.0 – Results and Discussion Part 1 – UFMG's Position Amongst The Six leading University Patent depositors in Brazil.

4.1. University Patents in Brazil: the protection of knowledge generated in universities between 1990 and 2010

The objective of this segment is to present a vision of the use of the Patent System by the Brazilian Universities, in order to verify the degree of appropriation through patents, technologies developed in their research. It must be emphasized that the data used in this segment are secondary data, all derived from the most recent related publication by the INPI researchers (Luciana Goulart de Oliveira and Jeziel da Silva Nunes)[157] who conducted a survey of published patent applications filed at the INPI, and used the data related to the period between 1990 and 2010. The main depositors have been identified, as well as the concentration of technological applications, the regional distribution of depositors, their legal nature, the existence of linkage between entities that can denote cooperation activities, as well as key inventors.

The survey conducted using the methodology specified selected 3,189 documents, with 2,958 Patents (92.8%), 200 Utility Models (6.3%) and 31 Patent Certificates (1.0%). The evolution of seeking patent protection by Brazilian higher education institutions, called universities in the period 1990-2010 can be seen in Graph 3, below.

Graph 1 – Brazilian University Patent Deposit Trend (1990-2010).



Source: Adapted from sinpi/cedin/sistemaad.

[157] LUCIANA G. O. and JEZIEL S.N Patentes Universitárias no Brasil: a proteção do conhecimento gerado nas Universidades no período entre 1990 e 2010. Link http://www.altec2013.org/programme_pdf/609.pdf. Vistised on 19/03/2014.

Concentrated in 103 depositors a total of 3,189 filings of patents effected by tertiary institutions in the country. In order to enable a more detailed discussion and view the dispersion of deposits between universities a ranking was built, included in Table 05 below, which simply contains the universities with more than sixty (60) patent applications, which are twelve (12), responsible for the total of 2,486 applications found.

Table 6 – Brazilian University Patent Deposit Ranking.

Institution	Acronyms	State	N° of Doc.	(%)
Universidade Estadual de Campinas	UNICAMP	SP	651	22,16
Universidade de São Paulo	USP	SP	550	18,69
Universidade Federal de Minas Gerais	UFMG	MG	344	11,71
Universidade Federal do Rio de Janeiro	UFRJ	RJ	274	9,33
Universidade Federal do Rio Grande do Sul	UFRGS	RS	128	4,32
Universidade Federal do Paraná	UFPR	PR	102	3,47
Universidade Estadual Paulista Julio de Mesquita Filho	UNESP	SP	98	3,34
Universidade Federal de Santa Catarina	UFSC	SC	75	2,55
Universidade Federal de Viçosa	UFV	MG	70	2,38
Universidade Federal de São Carlos	UFSCAR	SP	68	2,31
Universidade Federal de Pernambuco	UFPE	PE	63	2,14
Universidade de Brasília	UNB	DF	63	2,14

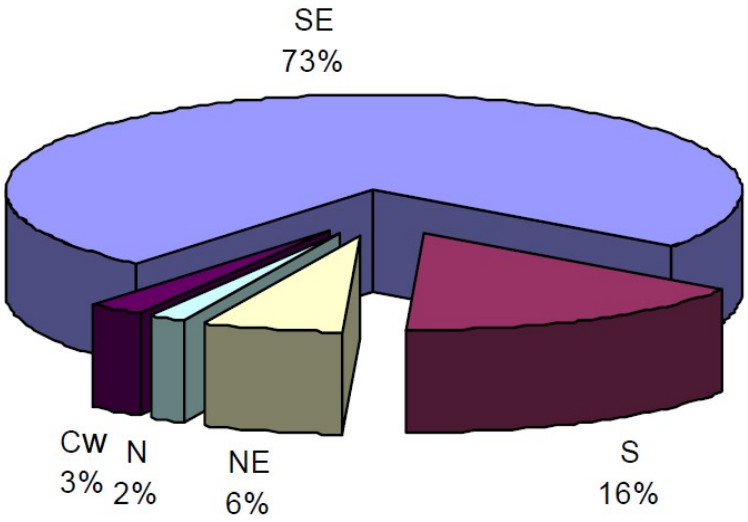
Source: Adapted from sinpi/cedin/sistemaad.

From Table 05 it can be seen that the State University of Campinas (UNICAMP) ranks first with a slight difference to the second place, the University of São Paulo (USP). The Federal University of Minas Gerais (UFMG), which appears in third position, appears to have a slight advantage over fourth place, the Federal University of Rio de Janeiro (UFRJ).

It is observed that all twelve universities that appear in this group are public, highlighting the importance of government policies and guidelines for the establishment of the current standard of teaching and research as well as an adequate budget to maintain the quality of the implemented research and operating apparatus to perform the administrative and technical activities for the protection of Intellectual Property assets. Relevant assertion, too, is that the four most prominent universities in the volume of applications are all in the Southeastern region of the country, bringing together about 73% of total application, which reveals a richer concentration of knowledge and expertise in the region Brazil, both from the industrial point of view as the quality of teaching and research and qualification and quantity of professors.

Graph 2 shows the distribution of regional concentration:

Graph 2 – Regional Distribution of Applications in Brazil.

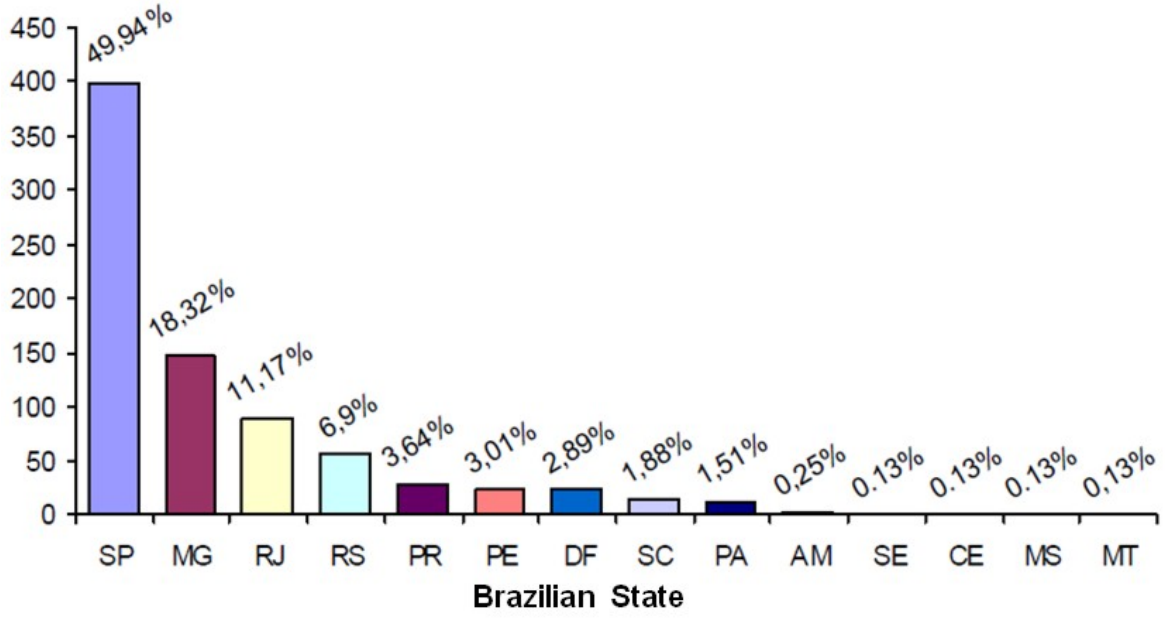


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

As shown on Graph 2 above, The South-East of Brazil deposited 73% of all University patents in the country while the south records 16%, the North-East has 6%,the Central-West has 3% and the North is with 2%. These imply that there is an uneven distribution of scientific researches which may also be attributed to investment in Science, Technology and innovation amongst the regions, or an hypothesis the South-East region of Brazil adapts the more to the patenting culture as a way to acquiring technological innovation.

The distribution of patent deposits by the Brazilian states can be seen in Graph 3:

Graph 3 – Distribution of Deposits by State.



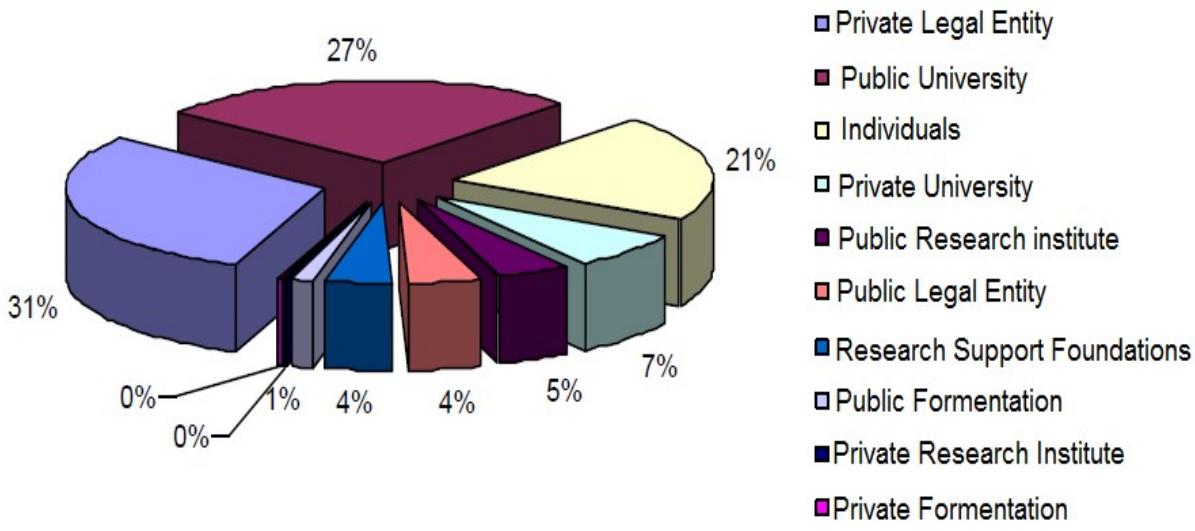
Source: Adapted from sinpi/cedin/sistemaad/relatórios.

Graph5 above shows that the stat of São Paulo deposited the highest number of patents which amounts to 49.94% of the total of Brazilian university patents while Minas Gerais state detains 18.32%, followed by Rio de Janeiro with 11.17%, and Rio Grande do Sul with 6.9% etc. This brings us to the conclusion that the state of Minas Gerais is the second highest depositor of patent in Brazil as at the year 2010.

4.1.1. Legal Nature of the Existing Depositors and Institutional Linkages

The categories that indicate the legal status of depositors were defined as follows: “Individual”, “Public Legal Entities”, “Private Legal Entities”, “Public University”, “Private University”, “Public Fomentation Entity”, “Private fomentation Entity”, “Research Support Foundation (Fundação de Amparo à Pesquisa – FAP)”, “Center for Technological Innovation (Núcleo de Inovação Tecnológica – NIT)”, “Research Institute of Public” and “Private Research Institute”. Graph 4 shows the distribution from the Legal status.

Graph 4 – Distribution based on the Legal status.



Source: Adapted from sinpi/cedin/sistemaad/relatórios.

Already, the nature of the link between depositors depicts the type of relationship between the institution and its partners in their research activities and, even more, which indicates the openness that the institution is indicating to the society. Patent applications with a single depositor were classified in the category “Non-Shared”, when the deposit had as its owners two or more universities, we adopted “Shared Public or Private University” and

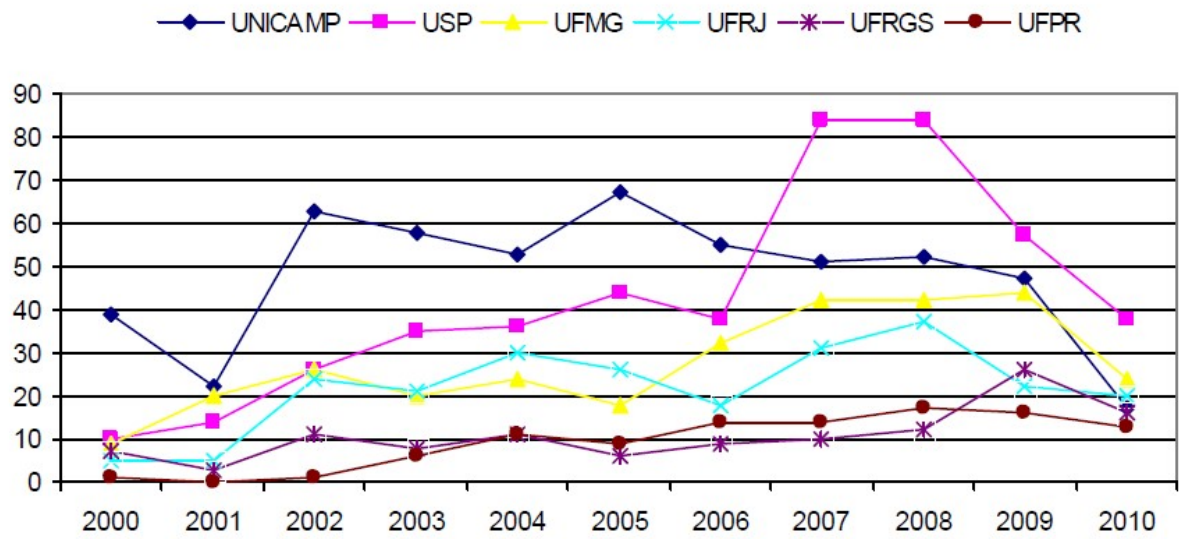
specifically these cases were considered in the count as if each had a deposit owner, since there is no way to know what was the participation of each of them separately.

Another point that should be highlighted refers to the case of deposits made by a University as the second depositor having one or more individuals. In these cases, then, we adopted the name “Shared Private Legal Entities”, however, only the ownership of the institution was counted, when the deposit was made by one or more universities along with an Institute for Public or Private Research adopted the name “shared with the Institute of public and private Research”, respectively, and when shared with public or private company it has been designated as “shared with public or private Legal Entities”.

It is verified that the vast majority of deposits has a sole proprietor, a total of 67.7% of deposits, followed by those with shared ownership with the research support foundations as 8.8%, and Legal Entities with 6.7%. Already collaboration between universities is only 2.8% and 2.6% with Individuals.

4.1.2. Top Universities Depositors

Graph 5 – Temporal Evolution of the Six Biggest Depositors.



Source: Adapted from sinpi/cedin/sistemaad/relatórios.

As a function of number of applications filed were considered institutions that deposited a hundred or more applications, and only 6 institutions attended this regard. UNICAMP leads the ranking of the largest depositors of the University sector with about 20% of total deposits of Universities, followed by 17% USP, **UFMG** and UFRJ with about 10% and 8% respectively. The temporal distribution of the deposits of each of the six universities in patents from 2000 to 2010 is presented in Graph 7 below.

4.1.2.1. Featured Inventors

After editing the Innovation Law there was a change in scores received by university researchers in order to also account for the deposits of patents resulting from their researches, in addition to the traditional valuation given by the publication of scientific articles in specialized journals. Table 07 below lists the most productive researchers in terms of patent applications, with their fields.

Table 7 – Featured Inventors.

Inventor	Instituição	Qde de Pedidos	Áreas de atuação pela CIP (*)
Nélson Eduardo Durán Caballero	UNICAMP	38	C02F; A61K; C07C
Marcos Pinotti Barbosa	UFMG	36	A61C; A61N; A63B
Erna Geessien Kroon	UFMG	28	C07K; C12N
Paulo Ceasr Peregrino Ferreira	UFMG	27	C09C; C09J; C08K
Fernando Galembeck	UNICAMP	25	C09C; C08K
Rodnei Bertazzoli	UNICAMP	24	C02F; C25B
Lauro Tatsuo Kubota	UNICAMP	22	G01N
Vanderlei Salvador Bagnato	USP	20	A61B; A61N; A61K
Fernando Wypych	UFPR	19	B01J; C07C
Ricardo Tostes Gazzinelli	UFMG	16	C12N; A61K
Oswaldo Luiz Alves	UNICAMP	15	C02F; G01N
Maria Regina Wolf Maciel	UNICAMP	14	C07C; C11B
Henrique Eisi Toma	USP	14	G01N
Koiti Araki	UFRJ	14	G01N
Rubens Maciel Filho	UNICAMP	13	C07C
Elena Vitalievna Goussevskaia	USP	13	C07C
Robson Augusto Souza dos Santos	UFMG	13	A61K; C07K
Maria Izabel Maretti Silveira Bueno	UNICAMP	12	G01N
Carlos Alberto Manssour Fraga	UFRJ	12	C07D; A61K
José Carlos Costa da Silva Pinto	UFRJ	12	C08F
Eliezer Jesus de Lacerda Barreiro	UFRJ	12	C07D; A61K

Source: Adapted from sinpi/cedin/sistemaad/relatórios.

We can deduce from table 7 above that UNICAMP only has 8 (over 33%) of the highest university inventors. However, despite the very high performance of UNICAMP in patenting, it's researchers do not focus their inventions on drug patent (IPC A61K) as much as researchers of other Universities like USP(12%) and UFMG (20%) with the highest number of drug patent deposit. USP being the highest depositor and UFMG second highest depositor of drug patent (IPC A61K) as shows below.

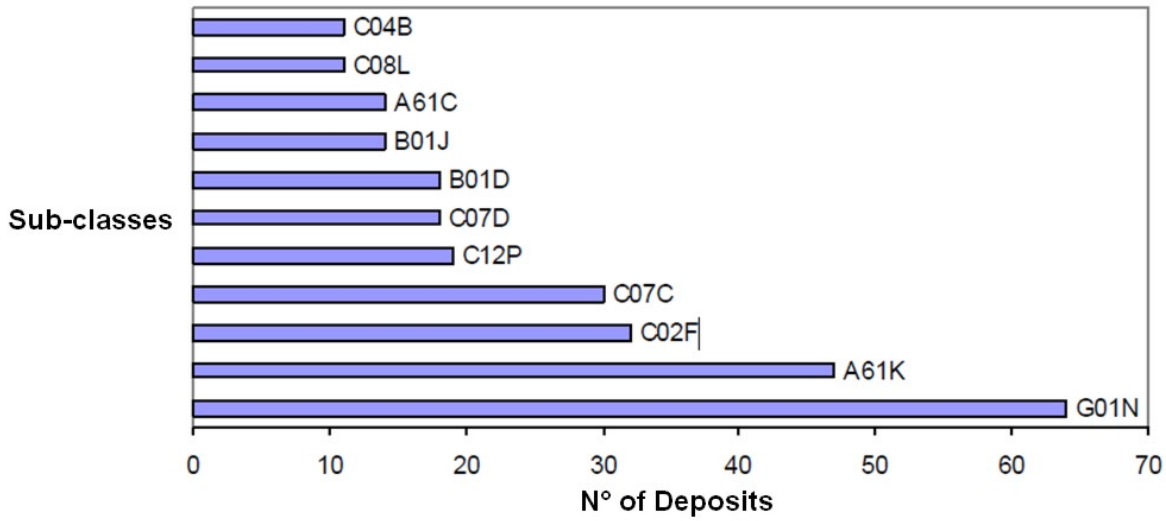
4.1.3. Concentration of Major University Depositors

Patent documents have classification of their subject matter with respect to to the International Patent Classification which, in the context of this work, allows evaluate the technological activities developed by the institution during the period of interest. From the perspective of the patent system, this is the most direct way to verify this information since all documentation is classified according to the IPC, which is used by most countries belonging to the system.

Technological concentrations based on the IPC permits viewing of the sector to which institutions are channeling their efforts. In determining the technological concentration it has been registered that there are three recorded classifications with an incidence of larger deposit than five in each institution, ordered by the sum of all occurrences. It is observed that amongst the six universities with over one hundred deposits discussed below there is an overlap of research in similar fields, such as from the A61K and G01N, with no sharing of resources invested or accrued benefits.

4.1.3.1. The State University of Campinas – Universidade Estadual de Campinas (UNICAMP)

Graph 6 – UNICAMP's Technological Concentrations Based on the IPC.

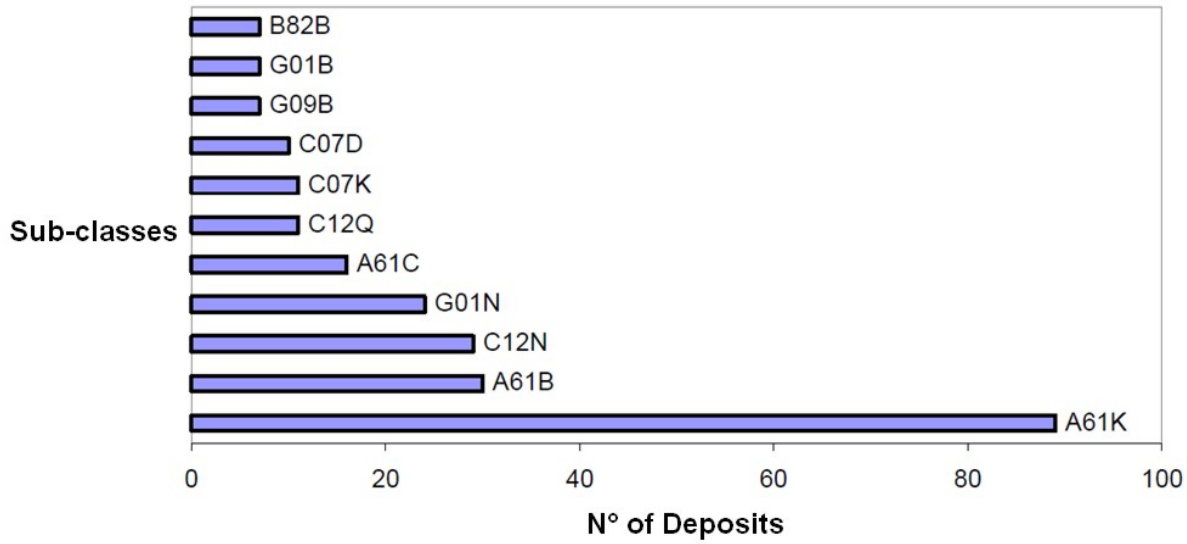


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

UNICAMP sought protection in subclass G01N – "Research and analysis of materials by their physical or chemical properties", with 64 applications and A61K – "preparations for medical purposes" with 47 applications. Subclasses C02F – "Treatment of water, sewage and sludge", along with C07C "acyclic or carbocyclic compounds" have significant presence, with occurrences of 32 and 30 deposits, respectively.

4.1.3.2. The University of São Paulo – Universidade de São Paulo (USP)

Graph 7 – USP's Technological Concentrations Based on the IPC.

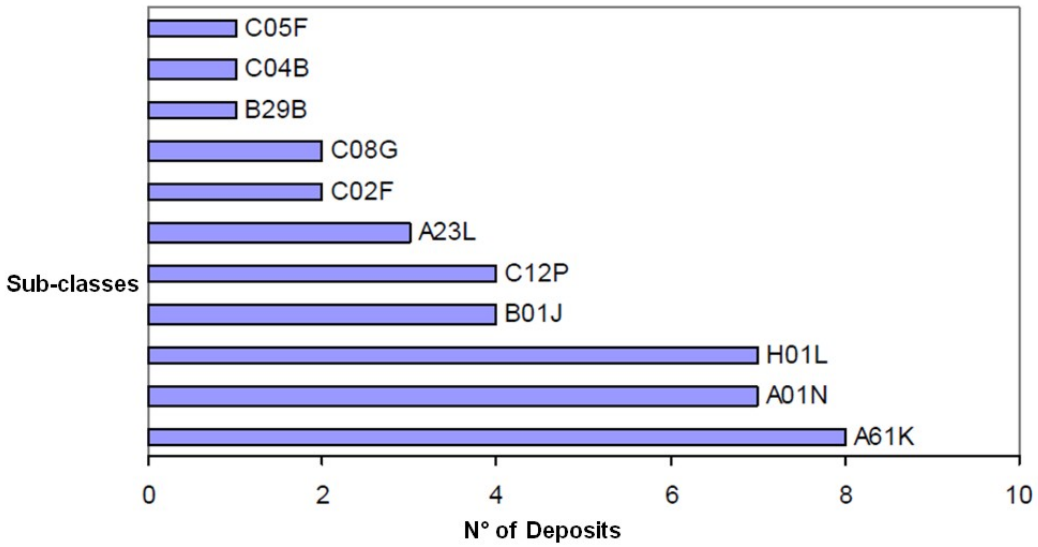


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

Deposits in the subclass A61K – "preparations for medical purposes", 89 occurrences in A61B – "Diagnosis, Surgery and Identification", 30 occurrences. In C12N – "Microorganisms or enzymes; Their compositions" and G01N – "Research and analysis of materials by their physical or chemical properties" has 29 and 24, occurrences respectively.

4.1.3.3. The Federal University of Paraná – Universidade Federal do Paraná (UFPR)

Graph 8 – UFPR's Technological Concentrations Based on the IPC.

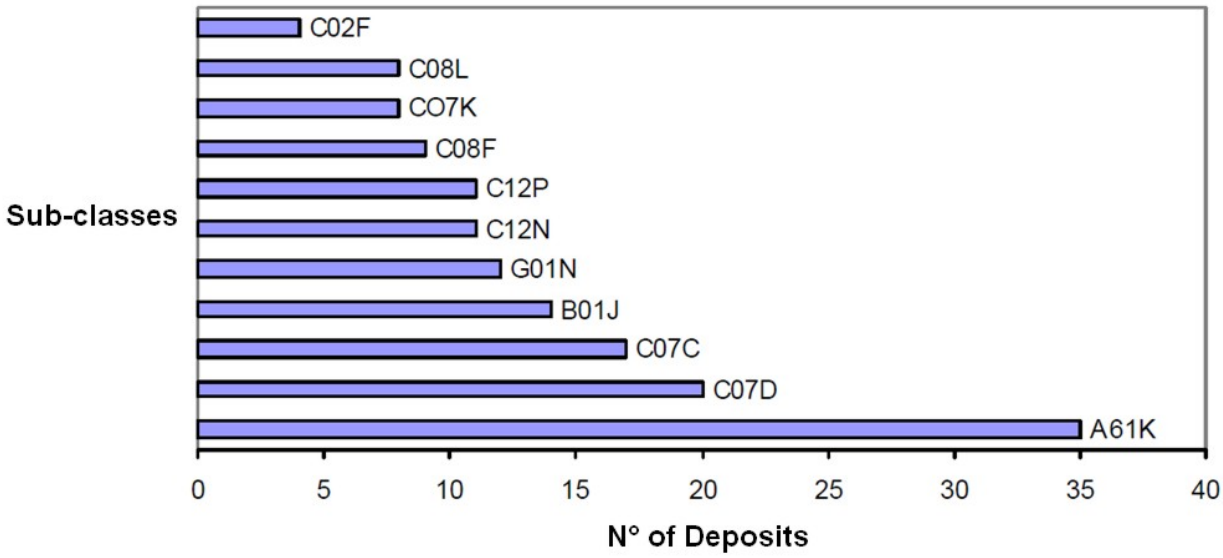


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

Concentrate its researches on subclasses A61K – “preparations for medical purposes”, with 8 A01N – “Preservation of bodies of humans or animals or plants or parts thereof”, with 7 and H01L – “Semiconductor devices and electric” with 7. The B01J – “colloidal chemistry chemical or physical processes, and catalysis; Devices” and C12P – “Fermentation processes or processes that use enzymes to synthesize a desired chemical compound or composition or to separate optical isomers from a racemic mixture” have 4 applications each.

4.1.3.4. The Federal University of do Rio de Janeiro – Universidade Federal do Rio de Janeiro (UFRJ)

Graph 9 – UFRJ’s Technological Concentrations Based on the IPC.

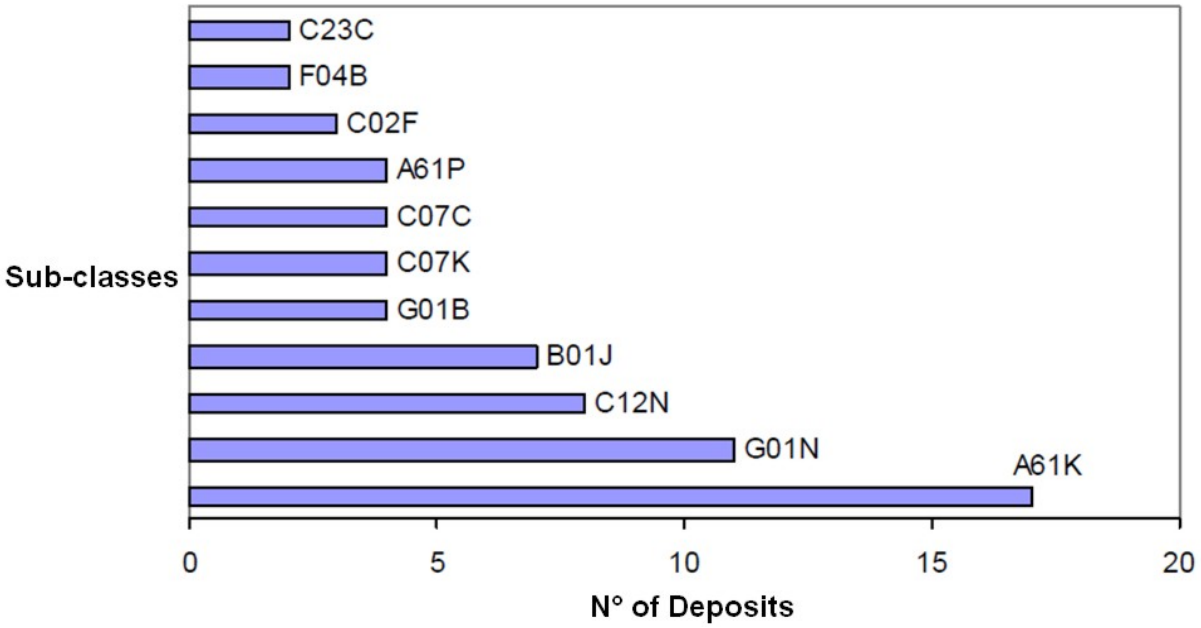


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

The UFRJ focuses its deposits on the field A61K – “preparations for medical purposes”, with 10 occurrences, along with C12N field – Biochemistry, with six occurrences. Also reveals interest in seeking protection in the field A61B and A61M – Medical Science and Health and C07K – Peptides.

4.1.3.5. The Federal University of Rio Grande do Sul – Universidade Federal do Rio Grande do Sul (UFRGS)

Graph 10 – UFRGS's Technological Concentrations Based on the IPC.

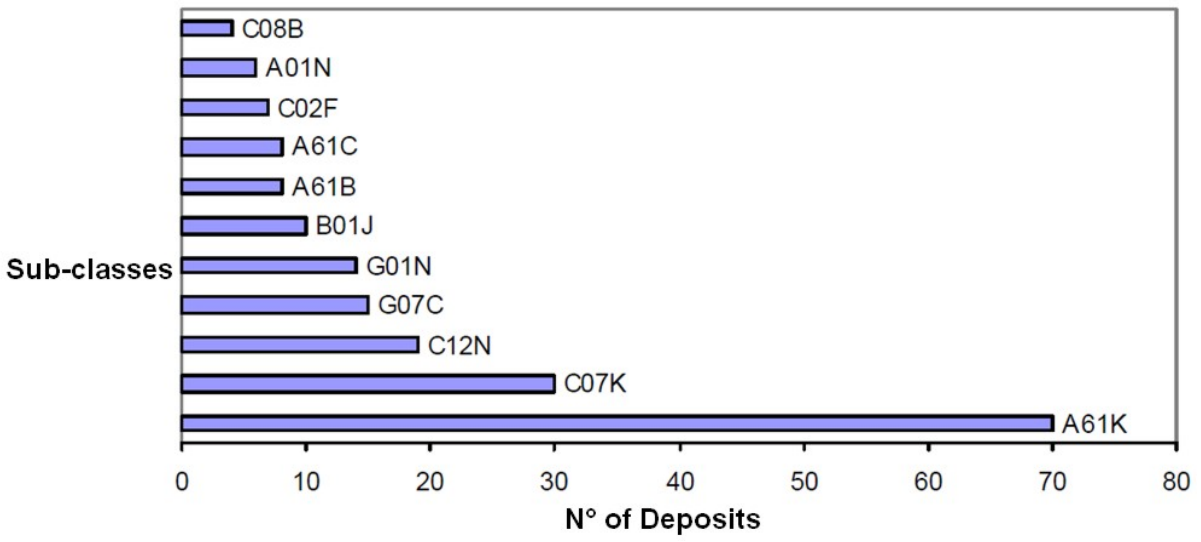


Source: Adapted from sinpi/cedin/sistemaad/relatórios.

UFRGS focuses its deposits on the subclass A61K – "preparations for medical purposes", with 17 applications, G01N – "Research and analysis of materials by their physical or chemical properties", with 11 applications and C12N – "Micro-organisms or enzymes; Their compositions" with 8 applications.

4.1.3.6. The Federal University of Minas Gerais – Universidade Federal de Minas Gerais (UFMG)

Graph 11 – UFMG's Technological Concentrations Based on the IPC.



Source: Adapted from sinpi/cedin/sistemaad/relatórios.

It is observed that UFMG's patented invention is more concentrated on the subclass A61K – "preparations for medical purposes", with 70 occurrences and subclass C07K – "Peptides", with 30 in C12N – "Microorganisms or enzymes" with 19, C07C – "acyclic or carbocyclic compounds", with 15 and G01N – "Research and analysis of materials by their physical or chemical properties" with 14. It is however notable that up to the year 2010, UFMG is the second highest depositor of drug patent with the IP classification A61K, which is of utmost relevance to our case study in the next chapter.

In this context, current discussion regarding the debate on the present / future of higher education is vital. Therefore many conducted national and international forums have recommended the need to align training produced by the Academy to the real-world needs. And Brazil is no stranger to this reality and have felt this need that has been the debated subject.

Specifically, the Universities and Institutions of Higher Education of Brazil have been, over time, fulfilling their role of training of qualified resources with competence and efficiency, despite the heterogeneity in the distribution of resources regionally, whereas standing out in the international arena concerns production and scientific publication.

Within this scenario, it appears that the University produces technologies in its research that, somehow, solve technical problems with utility for the country. In recent years, many initiatives have been developed to take advantage of this expertise to produce goods and services with high technological value, whether through Technology Based Incubators associated with institutions, or through partnerships directly with companies.

Following the enactment of the Innovation Law (Law nº 10.973/2004), there has been the contribution of a new reality for public education institutions, in that it the creation of Technological Innovation Centers became compulsory, with the purpose of forwarding the Intellectual Property issues emerging in the academic environment, since awareness of Intellectual Property was flourishing. This fact has helped the College to understand and use the Patent System more intensively. However, it is generally observed that despite protected technologies being developed by the university most often with the public budget, there exist a very minute return to the society, likewise there is a very low level of successful interaction between the university and companies, be they local or international, which lead to a very low level of economic values and recognition accrued to the produced technologies.

Chapter 5.0 – Results and Discussion Part 2 – Minas Gerais Analysis: the Case Study of UFMG – CTIT in Relation to Its Technology Transfer Performance

5.1. The Federal University of Minas Gerais – Universidade Federal de Minas Gerais (UFMG)

In Minas Gerais, the first institution of higher education was Escola de Farmácia, Ouro Preto – dated to1839. In 1875, Escola de Minas was and in 1892, already in the republican period, the ancient capital of the State was also granted the Faculty of Law.

In 1898, with the relocation of the capital, the Law School was moved to the city of Belo Horizonte. Then, in 1907, Escola Livre de Odontologia was founded, and four years later Faculdade de Medicina as well as Escola de Engenharia were both established. And in 1911, the new Pharmacy course, was attached to the Escola Livre de Odontologia. [158]

The creation of a university in the state was part of the political project of the Conspirators. The idea, however, only came to materialize in 1927 with the founding of the University of Minas Gerais (UMG), a private institution, subsidized by the State, arising from the union of the four tertiary schools then existing in Belo Horizonte. UMG remained at the state level until 1949, when it was federalized. Even in the 40s, was incorporated into the territorial heritage of University extensive which was an extensive area in the Pampulha region for the construction of University City. The campus has only been effectively occupied by the university community in the 60s, with the start of construction of the buildings that now house the majority of the academic units. [159]

The present name – Federal University of Minas Gerais (UFMG) – was adopted only in 1965. At the time of federalization, the School of Architecture and the faculties of Philosophy and Economics were already part of the UFMG. Then, as part of its expansion and diversification, the University incorporated and created new units and courses. Then there successively emerged, the School of Nursing (1950), the Veterinary School (1961), Mining Conservatory of Music (1962) and schools of Library Science (1962), Fine Arts (1963) and Physical Education (1969). [160]

In 1968, the University Reform imposed a radical change to the organizational structure of UFMG. This reform resulted in the split of the former Faculty of Philosophy at various colleges and institutes. Thus arose the current Faculty of Philosophy and

[158] História da UFMG: https://www.ufmg.br/conheca/hi_index.shtml. Visited on 19/03/2014.
[159] *Idem*.
[160] *Idem*.

Humanities, the Institute of Biological Sciences, the Institute of Exact Sciences and their basic cycles, the Institute of Geosciences and the faculties of Arts and Education.

Today, firmly established as a reference institution for the rest of the country, UFMG continues booming and it possesses 23 units between campuses in the cities of Belo Horizonte and Montes Claros.

In addition to developing programs and teaching projects, at the levels of undergraduate and graduate education, research and extension in the form of classroom activities, and the distance in eight fields of knowledge, the University also offers the Elementary School, College technician at the Center for Agricultural Sciences and the University Theatre, basic education and professional mid-level courses.

According to the MEC, UFMG is one of the universities that receive the most funding from the federal government, since it is one of those that most offer courses and programs for teaching, researches and extension.[161] UFMG is also one of the largest centers of innovation in Brazil, UFMG in 2010 was the Brazilian institution that most deposited patents according to the National Institute of Industrial Property (INPI). According to the ARWU, UFMG is currently ranked among the top five universities in Brazil[162].

5.1.1. Current Data of UFMG's Production as at January 2014

Table 8 – UFMG's Production Indicators.

Number of professor at UFMG	2.907
Number of professors with lattes	2.855 (98,21%)
Registered number of units (faculties)	23
Number of patents	613
Número de laboratórios	572

Sources: Adapted from Somos <http://somos.ufmg.br/indicadores> and CTIT's Patent database.

[161] http://portal.mec.gov.br/sesu/. Visited on 19/03/2014.
[162] Academic Ranking of World Universities 2013: http://www.shanghairanking.com/World-University-Rankings-2013/Brazil.html. Visited on 19/03/2014.

Table 9 – UFMG's Production Capacity by Unit.

#	Unit (Faculty)	# of Professors	Total % of Professors	# of Patents	# of Laboratories
01	Faculdade de Medicina	389	13.4%	15	29
02	Instituto de Ciências Exatas	323	11.1%	176	82
03	Escola de Engenharia	310	10.7%	159	173
04	Instituto de Ciências Biológicas	259	8.9%	194	119
05	Faculdade de Filosofia e Ciências Humanas	197	6.8%	0	2
06	Faculdade de Letras	129	4.4%	0	2
07	Faculdade de Educação	118	4.1%	0	2
08	Escola de Belas Artes	109	3.7%	2	0
09	Faculdade de Odontologia	103	3.5%	18	10
10	Faculdade de Ciências Econômicas	101	3.5%	0	0
11	Escola de Veterinária	99	3.4%	24	39
12	Faculdade de Direito	95	3.3%	0	0
13	Escola de Enfermagem	91	3.1%	1	6
14	Instituto de Geociências	81	2.8%	0	2
15	Escola de Educacao Física, Fisioterapia e Terapiacupacional	79	2.7%	0	25
16	Faculdade de Farmácia	73	2.5%	72	33
17	Escola de Arquitetura	71	2.4%	3	17

#	Unit (Faculty)	# of Professors	Total % of Professors	# of Patents	# of Laboratories
18	Instituto de Ciências Agrárias	67	2.3%	1	24
19	Coltec	60	2.1%	10	0
20	Escola de Música	59	2.0%	0	0
21	Escola de Ciência da Informação	44	1.5%	0	0
22	Centro Pedagógico	42	1.4%	0	0
23	Teatro Universitário	8	0.3%	0	0

Sources: Adapted from Somos <http://somos.ufmg.br/indicadores> and CTIT's Patent database.

From table 9 above, we is shown that the UMFG's department with the highest number of patent deposit (194) is the Biology Science Institute (Instituto de Ciências Biológicas – ICB) despite it being with the fourth highest (8%) amount of professors and second highest amount of laboratories (119), followed by the Engineering school which is the second highest depositor of patents despite being with third highest amount of professors (10,7%) and has 173 laboratories. It is also notable that the Faculty of Medicine (Faculdade de Medicina) is with the highest amount of professors (13,7%) though has lesser amount of laboratories (29) compared to others and deposited 15 patents. The faculty of Pharmacy has 2,5 % of the professor to its 33 laboratories and produced 72 patents deposit. These shows that many contingencies determine what is researched, who researches, and facilities as well as resources for technology development. Subsequently, we shall see the evolution of patents in UFMG and their transfer focusing more on the drug patents.

5.2. Coordenadoria de Transferência e Inovação Tecnológica (CTIT – UFMG)

At the the Federal University of Minas Gerais (Universidade Federal de Minas Gerais – UFMG), the management of intellectual property and innovation activities is exercised by the UFMG Center for Technological Innovation called Coordenadoria de Transferência e Inovação Tecnológica – CTIT, which is subordinate to the Dean of Researches (Pró-Reitoria de Pesquisa), according to its internal regulations, observing the provisions of Art. 16 of law

10.973/04, art.17 of Decree 5.563/2005 and resolution N° 08/98 with the University Council's approval.

According to The Council of The Federal University University Of Minas Gerais – UFMG, in exercise of the powers conferred by the UFMG Statute, article 13, paragraphs I and VII, it was necessary to conduct an updated internal resolution on CTIT in 2010, and the definition of its *modus operandi*. This resolution propels the conduct at CTIT due to:

12 The need to establish and regulate the activities of innovation, business incubation, intellectual property, technology transfer and licensing, in accordance with the provisions of the Federal Constitution incentives for innovation and scientific and technological research within the University Articles 218 and 219, Law 8.666/93 (Public Procurement Law), Law 9279/96 (Industrial Property Law), Law 9609/98 (Computer Software); Law No. 9,456, of April 25, 1997 (Law of Plant Varieties), Law 10.973/04 (Innovation Law) and Decree 5.563/05;

13 The need to delegate powers, in order to decentralize actions to expedite the processing of proceedings and initiatives aimed at technological innovation, the protection of intellectual property and technology transfer in the institutional framework;

14 The provisions of art. 16 of Law nº 10,973, of December 2, 2004, regulated by art. 17 of Decree nº 5,563, of October 11, 2005. [163]

Any creation or innovation, as defined in sections II and IV of article 2 of Decree 5.563/2005, which are the result of activities carried out using the facilities of UFMG or with the use of its resources, media, data, information, knowledge and equipment may be subject to protection of intellectual property, at the discretion of UFMG, subject to the provisions of this Resolution. [164]

As such, CTIT which was founded in 1997 ordained with the responsibility of organizing and managing all UFMG's intellectual property and related innovation. It is also noteworthy to include that all registered patent deposited by UFMG's members of staff within 1992 and 1997 using the university's equipment and resources before the existence of CTIT were all in the researchers' names as patentees as guided most often by the INPI, but later regulated by CTIT and the ownership transferred to UFMG while they remain the inventors.[165]

[163] See Resolution amended in January 2011
< http://www.ctit.ufmg.br/2011/images/stories/documentos/nova_resolucao_interna.pdf> Visited on 20/03/2014
[164] See Article 2 § 1 of Resolution amended in January 2011 defines the exercises of CTIT, referring to the minimum powers provided for in Articles 16 of the Law 10.973/04 – art.17 of Decree 5.563/05:
< http://www.ctit.ufmg.br/2011/images/stories/documentos/nova_resolucao_interna.pdf> Visited on 20/03/2014

[165] This information was derived from my interview with the Coordinator of Technology Transfer (Juliana Corrêa Crepalde Medeiros) on 13th of febuary 2014.

CTIT, with the commitment of its purposes, works by the following structure.

Fig. 8 – CTIT's Organizational Flow Chart.

Source: Adapted from Azevedo Valesca (2013). [166]

CTIT is permitted to celebrate UFMG's technology transfer licensing agreements for granting the right of use or exploitation of creation, wherein UFMG stands as the proprietor or co-proprietor of the creation, either through exclusive proprietary and non- exclusive proprietary. Decision on exclusivity of transfer or licensing is overseen by the Reitoria de Pesquisa (the Dean of Research), who hears CTIT, for the purposes mentioned in its regulatory, and should be preceded by the publication of a notice, which must comply with the provisions of paragraph 3, art. 6 of Law 10.973/04 and art. 7 of Decree 5.563/05.[167]

[166] AZEVEDO, Valesca Machado Abi Ackel. *Gestão do Conhecimento Científico e Tecnológico na Universidade Federal de Minas Grais e Regime Jurídico das Patentes de Medicamentos*. Dissertação de Mestrado, UFMG, 2013.
[167] See Art. 6 of the Resolution amended in January 2011
< http://www.ctit.ufmg.br/2011/images/stories/documentos/nova_resolucao_interna.pdf> Visited on 20/03/2014.

UFMG may, in its sole discretion, negotiate as compensation for the licensing and transfer of ownership of its creation, stake in the capital or enjoyment of company stock or shares of the licensee, and the company which has signed technology transfer contract or licensing with UFMG may inform in the dissemination of innovation that the respective creation was developed by the Federal University of Minas Gerais. Interested companies , organizations or legal entities may present their proposal to CTIT through any of its interested researchers in developing the research in conjunction, thereby creating a situation where CTIT would elaborate the proposal through its intellectual property sector as there may be related IP rights and sequentially establishes a research partnership between both institutions, i.e. UFMG and the other upon agreement of certain contractual terms.[168]

Through CTIT's database and SOMOS, UFMG's data integration system and indicator, fostered by the former, it was possible to access and analyze the evolution of research as well as patenting of drug technologies at UFMG. These patent data were compared with data from other sources such as the INPI, Espacenet – EPO, PATENTSCOPE – WIPO and the extracted data from CTIT's legal department and technological transfer department accordingly.

In this sense, CTIT can be described as a motor that propels the technological activities of UFMG towards the protection and exploitation, promotion and commercialization thereof.

5.3. Results of Analyses of the activity data of UFMG and CTIT (1990 and 2013)

This aspect shows the result of the exploration of available information of all drug patent of UFMG deposited with the National Institute of Industrial Property – INPI between 1996 and 2013 being the available data in the INPI's database, as well as the academic evolution in all units of UFMG which has available data from 1990 through the first month of 2014 . These shall be compared with other relevant data to this study from CTIT – UFMG as shown below. It is noteworthy, based on the verified database of the Brazilian INPI, that there are no records of Drug Patents by UFMG before the year 1996, while there are no published IPC for all patents in the year 2013 by the responsible organ in Brazil - INPI which makes a part of this analysis, i.e. Deposited Medicament / Drug Technology from UFMG, limited to the year 2012, therefore we shall not consider the year 2013 in the analysis of Drug Patent Deposit (IPC=A61). [169]

[168] AZEVEDO Valesca *et al*. As Atividades de Proteção do Conhecimento Cientifico. In: *PIDCC*, Ano II, Edição n° 03/2013, P.082 to 142, Aracaju, June 2013.

[169] See Attachment 1.

Table 10 – Performance data of UFMG and CTIT (Jan./1990 – Dec./2013).

Year	Total Scientific Production	Total Annual Patent Deposit	Drug Patent Deposit (IPC=A61)	Total n° of Contracts	Transfer / Licensing Contracts	Transferred / Licensed Drug Patents (IPC=A61)	Other Contacts
1990	1363	0	0	0	0	0	0
1991	1656	0	0	0	0	0	0
1992	2153	1	0	0	0	0	0
1993	2407	0	0	0	0	0	0
1994	3133	0	0	0	0	0	0
1995	3792	2	1	0	0	0	0
1996	4493	10	3	0	0	0	0
1997	5392	27	16	0	0	0	0
1998	5990	1	0	0	0	0	0
1999	7078	3	1	0	0	0	0
2000	7885	10	3	0	0	0	0
2001	8207	20	10	0	0	0	0
2002	9231	27	12	0	0	0	0
2003	9696	22	7	6	2	2	4
2004	10047	27	12	4	4	0	0
2005	11608	21	8	7	3	2	4
2006	11571	32	18	4	0	0	4
2007	12563	42	22	10	0	0	10
2008	13120	45	23	19	3	2	16
2009	13204	46	16	22	6	0	16
2010	12803	64	20	12	4	0	8
2011	13488	75	22	23	7	1	16
2012	13491	80	10	44	8	1	37
2013	10316	77	0	44	13	2	31
2014	492	NA	NA	NA	NA	NA	NA
TOTAL	**19.5179**	**632**	**204**	**195**	**49**	**10**	**146**

Note: NA = Not Available.

Table 11 – Discrepancy between collated data from INPI and CTIT's database.

Year	CTIT'S Patent Record	INPI's Patent Record	Used Record
1996	5	10	10 (INPI's Record)
1997	20	27	27 (INPI's Record)
1999	3	2	3 (CTIT's Record)
2001	20	19	20 (CTIT's Record)
2003	22	21	21 (CTIT's Record)
2005	21	18	21 (CTIT's Record)
2007	41	42	42 (INPI's Record)
2008	45	42	45 (CTIT's Record)

2010	62	64	64 (INPI's Record)
2011	75	74	75 (CTIT's Record)
2012	76	80	80 (INPI's Record)
2013	77	9	77 (CTIT's Record)

Notably, when the data obtained from both database of INPI and CTIT were compared; it was observed that there were some differences in the recorded number of patents by year as shown below. Nevertheless, we have chosen to use the highest registered number between both sources of our variables as demonstrated above in table 11 since it is not possible to affirm that one of both is the most correct.

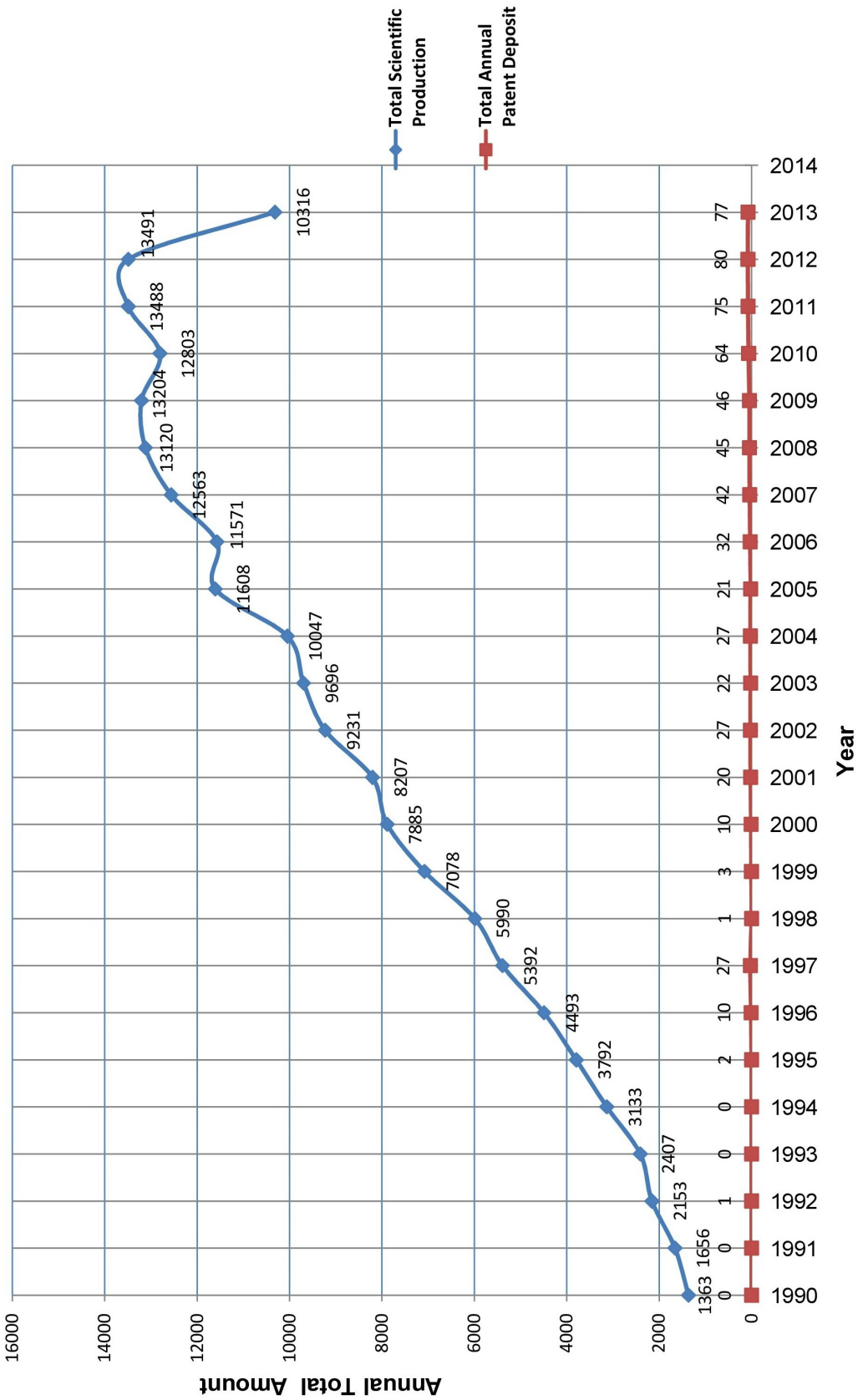
In order to better understand the dynamics and functionality of UFMG and its intellectual property and innovation management sector, CTIT, we hereby explore the available records of its annual patent activities and scientific knowledge production since the year 1990 till date, i.e. from January 1990 to December 2013 as shown above in table 10.

Furthermore**, Drug Patents** is defined as patents with the IPC classification A61, while **Other Contacts** as in Table 10 are all the contracts involving UFMG's technological innovation exercises including partnership with other institutions except Licensing and transfer contracts. In other words, Total Contracts less Transfer/Licensing Contracts equals Other contracts.

As shown on table 10 above, we shall consider some variable that are extracted from primary sources like CTIT's database which include employees' records, transaction documents, Contracts, files, etc, as well as the INPI's database. Collated data from INPI's database are available to the generality of the public on the website's Patent Search Engine (Sinpi). Based on this, a discussion is presented below using the variables:

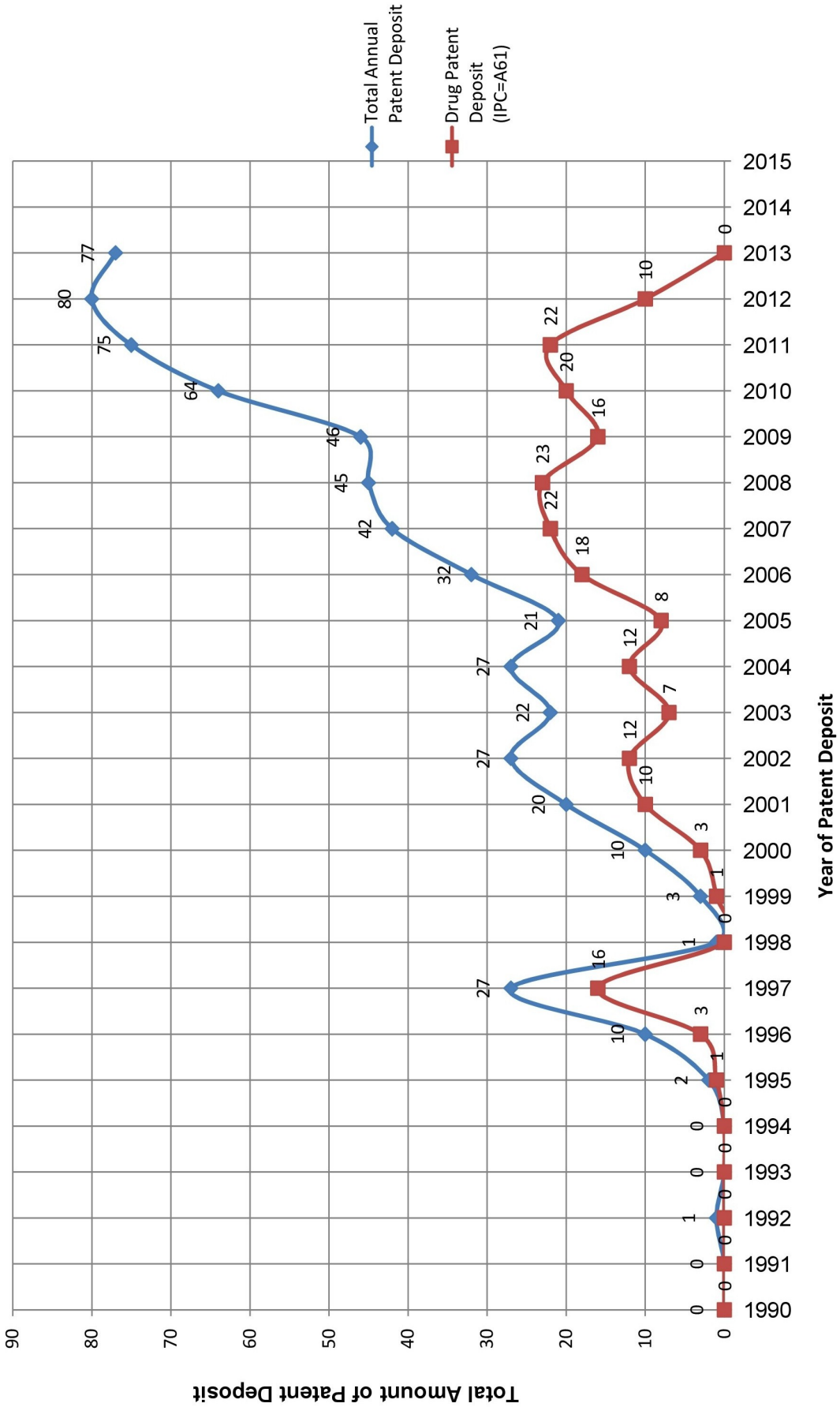
Year : A range of 23 years from 1990 – 2013;
Total Scientific Production: Total annual amount of scientific publication;
Total Annual Patent Deposit: Total annual amount of deposited patents with INPI;
Drug Patent Deposit (IPC=A61): Total annual amount of deposited drug patents with INPI
Total n° of Contracts: Total annual amount of UFMG's contracts exercised by CITIT
Transfer / Licensing Contracts: Total annual unit of contracts involving licensing and technology transfer.
Transferred / Licensed Drug Patents (IPC=A61): Total annual amounts of patents involved in licensing and transfer contracts.
Other Contacts: All other existing contracts between CTIT and other organizations.

Graph 12 – UFMG: Total Annual Output of Scientific Production Compared to Patent Deposit (1990-2013).



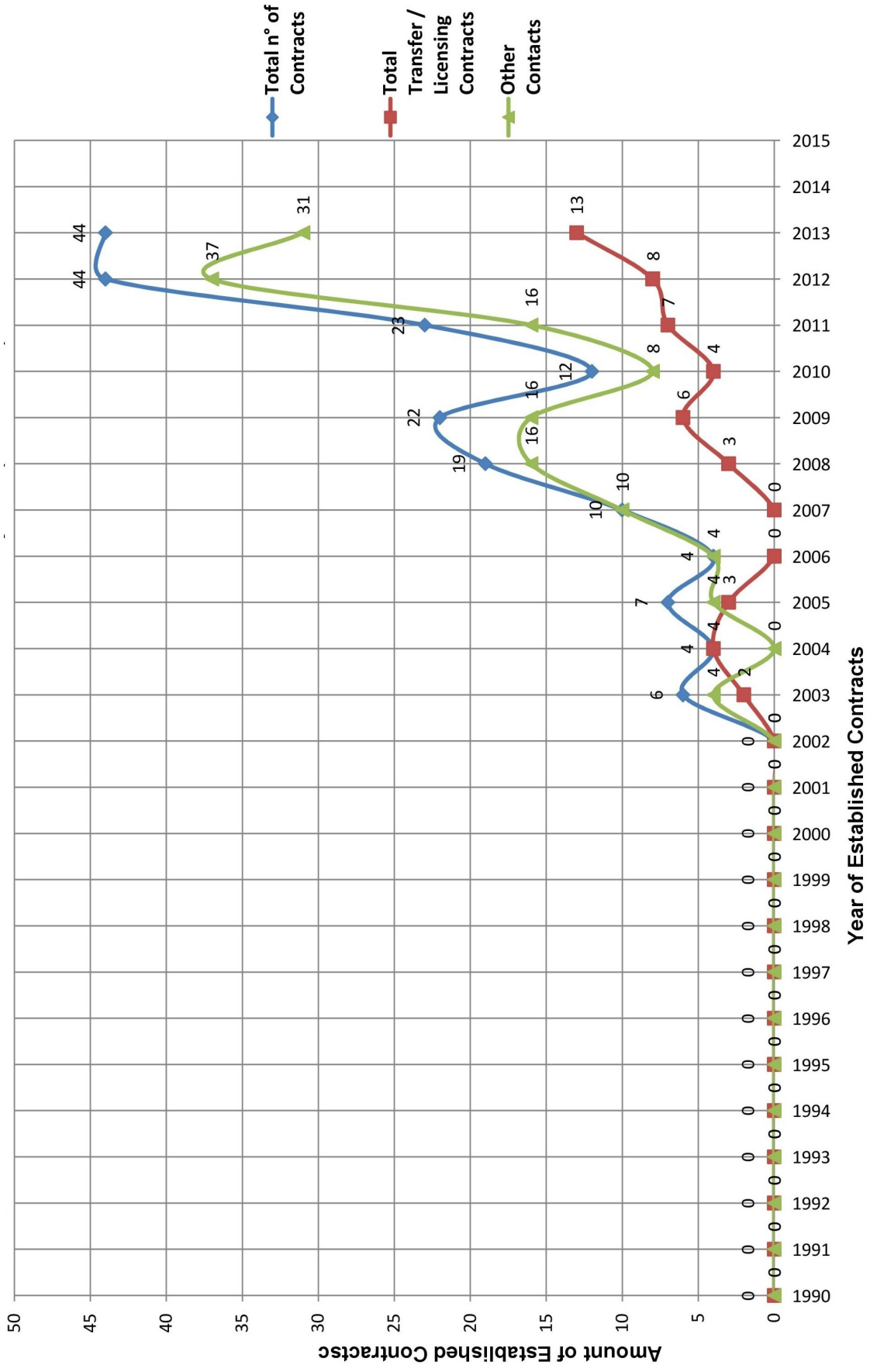
On graph 12, we show a comparison of two variables which could be a way of quantifying the level of disparity between the overall academic production and the possible economic return derived from it. Here we compare the annual growth in scientific publication from academic researches to the annual growth in patenting in UFMG. Therefore, it is observed that the scientific publications rise annually in an increasing rate to tens of thousands along the years with its current maximum being 13,491 in 2012, while patenting crawls in tens with its current maximum being 80 according to findings of this present research.

Graph 13 – UFMG: Total Annual Patent Deposit Compared to Annual Medical Patents.



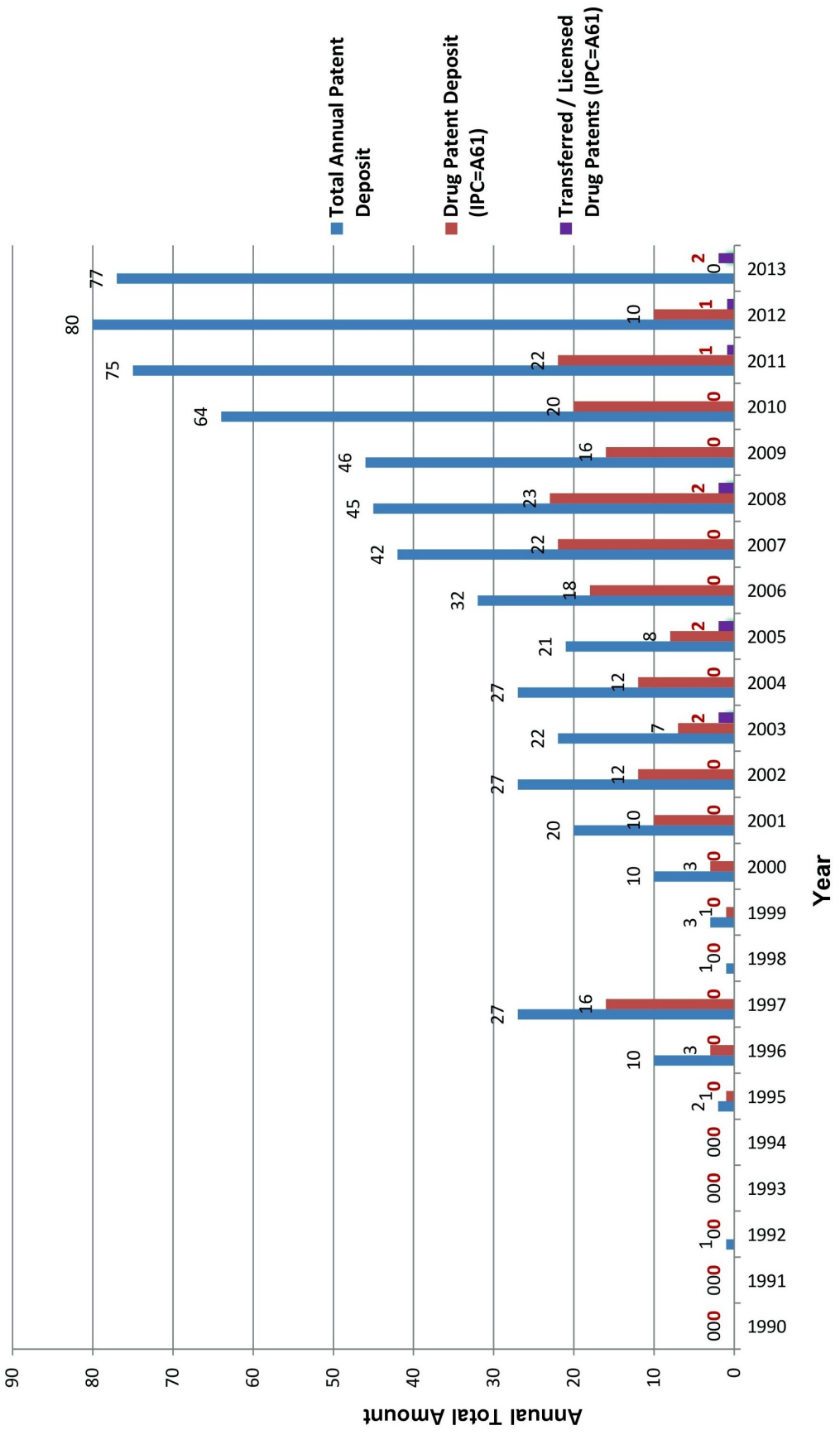
Graph 13 shows the annual growth of total deposited Patents compared to total deposited drug patents along the last twenty three years. It is observed that before the year 1995, UFMG owned only one patent deposited in 1992, which implies that the patenting culture is still almost at its cradle today considering the required period for the granting of a patent. Furthermore, findings of this research depicts herein that though the first 10 years (first decade - 1992 through 2001) of patenting, the annual growth of total patents attained the maximum of 27 patents amongst which drug patents (IPC A61) were 16 as recorded in 1997. The second decade (2002 through 2011) potrays annual growth of patents attaing over a double growth of 64 patents as recorded in the year 2011. In the third decade (2012 – till date), the growth rate of patenting is maintained, therefore reaching 75 in 2012 and the maximum of 80 in 2013 respectively. On the other hand, Annual deposit of drug patents experienced a downward slope to its bearest minimum being zero (0) IPC A61 patent in 1998 (still in the first decade of UFMG's patenting). However, subsequent years seem to be redeeming as annual drug patents increases to attain its maximum of 23 in the year 2008 of the second decade of patening (2002 through 2011). The years 2012 and 2013 demonstrate a recent decline as the annual deposit of drug patents are at 22 and 10 respectively. Nevertheless, the record of 10 in 2013 is to some extend arguable that there may be some recent patent deposit which are not yet given IPC classification or not made available by INPI, since the finding of this research detects that publishing of IPC takes a long process and the INPI often demonstrate backlogs in some of its processes.

Graph 14 – The Trend of UFMG's Established Patent Based Contracts by CTIT (1990-2013).



Graph 14 shows the result of the inquiry into UFMG's contracts exercised by CTIT along the years of study. As such we distict the annual amout of technology transfer/licensing from other contracts established by CTIT through its "departamento Juridico" (Law department). As such it is shown that in the first decade (1992 -2001) of UFMG's patenting, there was no record of any patent or technology transfer contract. In the second decade of patenting (2012 through 2011), UFMG registered an annual growth of total contracts up to 23 in 2011 while transfer/licensing contracts strived to attain 7 in amount registered in the same year, 2011 and other contract i.e. the non transfere/licensing contracts reached 16 acordingly. In the third decade (2012 till date), there was a recent doubled increase in the year 2012 to the maximum of 44 total amount of contracts which remains constant in the following year 2013 whereas, the annual growth of total amount of transferred/licensing contracts increases to 8 in 2012 and 13 in 2013 respectively. Here other contract are negatively related to transferred/licensing contracts i.e. the higher the transferred/licensing contracts, the lesser the other contracts.

Graph 15 – The Growth Rate of UFMG's Deposited and Transferred / Licensed Drug Patents Compared To Other Patent Deposits and Contracts (1990-2013).



Graph 15 shows a comparison of the annual growth in amount of patents, drug patents (IPC A61), as well as the annual growth in total amount transferred/licensing of drug patents (IPC A61). Here, the findings of this research show that drug patent has a huge percentage in UFMG's annual amount of deposited patents and transfer and there is a high level of discrepancy between the annual amount of deposited drug patents (IPC A61) and annual amount of transferred drug patent. While the annual growth rate of deposited drug patents (IPC A61) is in its tens, Tranfer/licensing of drug patents demonstrates a stunted annual growth rate at the maximum of 2 althrough the years of study.

Despite its position as the third highest depositor of patent in the Brazilian national ranking as at 2010 as shown in table 5, it is observed that the growth rate of patent deposit at UFMG is not any close to its massive publication of scientific articles on yearly bases. Nevertheless, it may be too ambitious to have attempted to equate both variables i.e. Total Scientific Production and Total Patent Deposit as depicted on Graph 14, but this kind of comparison is to provoke a tilt toward patenting culture showing evidence that there exist many researches done in UFMG despite the low rate of deposit.

We may then consider other variables to measuring the performance of UFMG /CTIT in knowledge production and applicability of the generated knowledge to economic growth. For a specific or conjunction of knowledge to be economically viable its worth must be quantifiable monetarily. This upholds the need for identifying the characteristics of a given knowledge and thus its protection on the one hand as an invention or process, through invention patent or utility model, or through the use of other means of protection like preserving it as knowhow to a technology or its process on the other hand.

Given these contingencies, we hereby compare the total amount of patented technologies on annual bases with the growth rate of patented drug technologies as shown on Graph 15. As such, it was discovered that the drug patents i.e. patents with the IPC classification A61 equal 32.3% (204 patents) of the total UFMG's patents and the yearly trend as shown on Graph 15 and only 5% (10 patents) has been successfully transferred. Whereas the national university patent analysis demonstrated that UFMG is the second highest depositing university of drug patent (A61) immediately after the Federal University of São Paulo as demonstrated on unit 4.2.3 (see Technological Concentrations Based on the IPC – Graph 8, 9,10,11,12 and 13).

Graph 16 shows the combination of contracts related to UFMG's Patents through CTIT. It was detected that about 195 contracts were established by the CTIT along the years between 1990 and 2013. According to the analyzed data from the law department of CTIT, it was in 2003 that the first set of contracts was recorded. These contracts, whose objects are patent, know-how, trademark, Industrial design, and Software, were established between

UFMG and other various institutions like universities and industrial companies on diverse economic platforms involving technology transfer, Licensing, Incubation, Co-proprietorship and Research, and Technical Partnership, Technology Tests, etc.

On the same graph, Graph 16, we observe that Total amount of Contract has grown at an increasing rate along the years of study, while Transfer and Licensing Contracts grow as well, but at a much slower rate compared to other kinds of contracts established along the year of study.

Finally, the collated data on UFMG's drug patents were compared with patents of other classification as well as the established contracts involving these classes of patents. As such, we discovered that technological transfer is growing slowly along these years, but the transfer/licensing of drug patents is at the barest minimum. The total amount of transferred drug patents is only 10 since the inception of CTIT, being 14.3% of the total transferred patents, 5.1% of UFMG's total drug patents, 3.6% of the total amount of established contracts at CTIT, and 1.1% of the total amount of UFGM's patents which is due to a very low level of the Brazilian pharmaceutical industry's objective towards innovation which is notably cultural.

Table 12 – List of Companies and Organizations involved in Partnership and contracts with UFMG (2003-2013).

Nº	Companies and Organizations	Nº	Companies and Organizations
1	Agripec – Química e Farmacêutica S.A.	15	Domingos Costa Indústria Alimentícia S.A.
2	Cristália Produtos Químicos Farmacêuticos Ltda.	16	Eurofarma Laboratórios Ltda.
3	Sigma Instrumentos Ltda.	17	UFOP
4	Biolab Sanus Farmacêutica Ltda.	18	USP
5	CDTN/CNEN	19	Associação dos Trabalhadores em Materiais Recicláveis da Pampulha
6	Vivien Ferrari	20	MDC
7	Viriontech do Brasil Indústria de Insumos e Serviços em Biotecnologia Ltda.	21	JHS Laboratório Químico Ltda.
8	COINFAR – Consórcio de Indústrias Farmacêuticas (Biolab, Biosintética e União Química)	22	ECON Engenharia de Controle Industrial Ltda.
9	P2S2 – Indústria e Comércio de Produtos para Pesquisas em Saúde e Nutrição Animal e Humana Simões Saliba Ltda.	23	Glen Kennelly Dell
10	Biocâncer – Centro de Pesquisa e Tratamento de Câncer S.A.	24	EINCO Biomaterial Ltda.
11	Cetec – Fundação Centro Tecnológico de Minas Gerais	25	Fiocruz – René Rachou
12	FAPEMIG	26	DUKE University
13	Bios Serviços e Comércio Ltda.	27	SAAE
14	Institute Ludwig de Pesquisa em Câncer	28	FCO
29	Companhia Paulista Força e Luz	62	Geyer Medicamentos S.A.
30	Magistec	63	CEFET
31	International Syst	64	Nuclear Biotec
32	Bramets	65	Aips Tecnologia
33	UFRN	66	University of Southampton
34	TCBH Engenharia	67	EDETEC
35	Vencofarma	68	FUNED
36	Hertape Calier	69	In-vitro Cells
37	Bioprospect	70	Zunnit
38	Multline	71	Jota Samrt Grid
39	Cell Care	72	Geraes Tecnologias Assistivas Ltda.
40	PDI	73	UNICAMP

41	Methanum	74	Minas Fungi
42	UFU	75	Texas Agricultural Experiment
43	Soluções de Software Inteligentes	76	GSK
44	Fiat Automóveis	77	Bravir
45	MMV	78	Biominas
46	CEELBIO	79	Plastilabor
47	GAFIT	80	Rio Grande Energia
48	AXOON Soluções Tec. Em Saúde Ltda.	81	Secretaria do Pará
49	SEMEMTE	82	Alamantec Ltda.
50	BIOEENTS SAS		
51	SERPRO		
52	Analógica		
53	Valid		
54	Pharmaxis		
55	Intercement		
56	Biotron		
57	Phoneutria		
58	Orteng		
59	MBiolog		
60	Quantasec		
61	Enghenho Nove		

Apart from the Licensing and transfer of technology, CTIT has a record of some other contracts along these years of study, which include Research, Technical, and cooperate Partnership in the development of new technologies, Co-Ownership contracts of technologies, Services contracts, Technology Test contracts, Use of didactic material contracts, Incubation Contract, etc. As such, findings of this research shows that CTIT potrays a certain level of seriousness and willingness to establish various types of institutional relationships which may contribute to business innovation. Therefore, in a way of awareness creation to interested groups and members of the public, a list of invented technologies (UFMG's Drug patents, as well as others), with which this research is done, is compiled and made available for easy access and briefing in chapter 8.1 and 8.2 as attachment.

Chapter 6.0 – Conclusion

This research has been deliberately focused on a broad inter-discipline view. In order to comprehend the complexity of the structure of patenting and transfer of invented technologies generated from domestically produced knowledge and researches in the University, we have delved into observing and defining the structure of each key element to technology transfer in the local and national context.

Economic growth and advancement can be attained by strengthening the links between the University, Industry and the Government, therefore establishing a strong knowledge based economy.

The Brazilian Government invests in education and basic researches through public and private universities, though not as much as the developed countries, but remains the highest investor in its nation. This investment reflects in the government's annual budget and expenditure and as such should have better returns in the local knowledge generation and economic, human and social capital, as favourable policies are employed to regulate and stimulate the industries towards innovating and investing in technological researches.

Most industries function with a unique culture often distinct from the expected due to their origins, visions, missions, objectives and legal status. Most appear to be influenced by, or inherit foreign operational and strategic culture, which may be sometimes positive or detrimental to the local economic advancement. The pharmaceutical Industry in Brazil therefore has its own structure whereby multinational companies compete with the local companies apart from the necessarily huge investment in basic researches which slims the chances of local companies of competing on equal grounds. Nevertheless, most pharmaceutical companies own laboratories and run some researches independently or in collaboration with the universities since it may be much cheaper.

Technology transfer and licensing is sometimes the fastest solution to technological necessities, and as such, companies go into transfer and/or licensing contracts in the case of a patented technology or know-how which is not patented knowledge but has economic and monetary values attached to it based on its originality and peculiarity.

The today's Brazilian pharmaceutical industry operates with over half of its production investment in the Generic drugs. This shows that the most confortable zone for the Brazilian pharmaceutics is producing medicaments using expired patents which are already in the public domain, since there would be lesser amount of tests and phases as well as ANVISA's scrutiny in the approval of the production thereof. However, this has its price which is retarding the advancement of domestic basic researches towards competing locally and internationally.

Despite the fact that the Brazilian universities are tending towards being much more active in the national economic scene, providing technological and innovative solutions to the industries, there still lies a great distance between both. Due to the business culture, many companies are a bit aback in taking the risky steps of entering into business with the university since the university is not seen as a business entity where business solutions should originate. However, this might be a wrong conclusion in the sense that universities have recently been restructuring their models, with a tilt towards providing knowhow and technologies to the society. But the society can have more access to these technologies if they are used in the production process which reaches the society as finished good. This may also have a positive impact on international trade as most companies import technologies i.e. if there be a reduction of importation of technology in exchange domestic technologies, the local inventors would be triggered to advance their researches, which leads to a situation where there would be better strengthened and freer flow of transaction between the university and the industry. Also, the government would have lesser trade deficit in the international realm.

Most basic researches in Brazil are being developed in the public universities whose aim, traditionally, is not profit making, and commercializing commodities is not considered as part of their mission. However, there are controversial points of view towards the universities' involvement and capacity in creation and commercialization of technologies whereas, knowledge can be better valued when it goes through the patenting process where it ceases to be a mere knowledge but a recognized and licensable technology. Therefore the monetary returns derived from this may be reinvested in laboratories, infrastructures, advanced research technology or advancement of basic researches as well as incentivizing their inventors.

The Role of the University in Triple Helix Phase 3

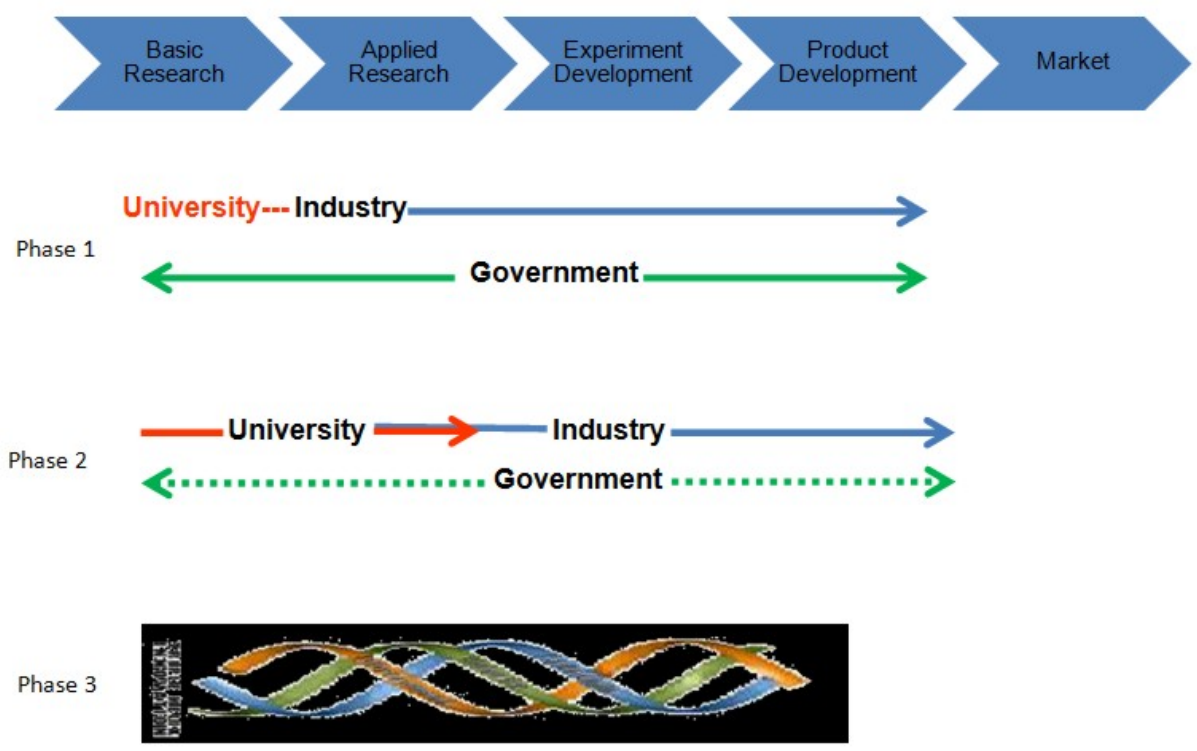
In the development processes based on this type of Triple Helix dynamics, we can verify that the role played by each of the actors, i.e. the role of universities in technology transfer process, change as the process passes through different phases. These alterations a illustrated below.

The innovation channel (1) represents the direction in which the technology transfer process is develops. The broken line between basic research and applied research means that the transition is not linear, the primary objective of science is not the applicability of the results and therefore in most cases their results do not result in innovation in a direct manner.

On the other hand, applied research and experimental development are targeted although there are some nuances in its concept: both depart from existing knowledge, as applied research may not be directed to a specific product, but only generate new knowledge with potential applicability in given area. Hence, the experimental development regulation has a specific purpose and transformation of the result in a product or process. The 3 “helices” appear differentiated by color: orange for University, green for Government and blue for Industry.

The broken line means less involvement and the orientation of the arrows representing the direction of action.

Fig. 9 – The alteration of the position of each of the “*helices*” in the technology transfer process.



In Phase 1, we identified a university little involved in the technology transfer process. The university as “Ivory Tower” produces basic science and its connection to industry occurs mainly in teaching, not taking an active role in innovation. Innovation belongs to the sphere of Industry, which researches and develops new products, applications and processes. The Government determines the framework of the whole process, but it does not actively participate in the process, but the control.

In Phase 2, the university assumes a more active role in the innovation process, sharing with industry the duties of applied research and experimental development.

The Government assumes an attitude of less control of the process, however is much closer to the university and industry, with a view of facilitating and promoting relationship between both. However, the industry has easier access to laboratories and equipment to develop their research projects, initially in terms of acquiring services and research partnerships from the universities.

In Phase 3, in a TH region, the 3 helices are interwoven in a spiral, wherein the position of each one influences, and is influenced by, the other position.

To maintain this cohesive structure implies a pro-active involvement of each institution and an attitude of cooperation, which results in a constant process of action, assessment of the outcome of the action and adjustment in order to maintain the trend and amplify the rising dynamics.

The three institutional spheres participate in the technology transfer process as partners. The functions of each of the entities are altered, institutional boundaries are no longer clear and hybrid institutions emerge.

These institutions are connected to 3 spheres simultaneously and perform functions traditionally performed by each of the spheres.

Incubators for high-tech companies integrated to universities, or created by governmental institutions with the aim of boosting the industrial fabric, science parks and technology that include research laboratories, business parks and units of college education or advanced training, are hybrid institutions whose valences can fit in the 3-helices of the model, often with capital provided by all of them and management bodies consisting of elements from all of them too.

One of the determinants of the evolution of the dynamic type of the Triple Helix in a given region is undoubtedly occurring at the university, developing entrepreneurial skills and plays a central role in the technology transfer process.

The entrepreneurial university may seem the antithesis of the concept of “Ivory Tower” in which the primary objective, until the mid-nineteenth century, should be to preserve and disseminate knowledge, from whence also assuming the role of producing scientific knowledge through Basic research.[170] Whereas, in the Phase 3 of a TH process beyond the traditional functions, the “capitalization of knowledge” becomes an academic purpose.

The university and its research units, does not “sell” innovation, this should not be its role. However, it is expected that the production of knowledge, which can potentially be translated into innovation in the industry, corresponds to a source of university funding. It is this capacity to attract funding that reflects the function of “*capitalization of knowledge*”.

[170] ETKOWITZ, 2008.

In this perspective it is important to distinguish between mere provision of services by the research units, related to the economic rationalization of expensive equipment, whose profitability necessarily entails an intensity of utilization higher than corresponding to the research, and financial participation by the industry in its own research activity. An industry that is behind both types of financing is however considered economic rationality.

However, while the acquisition of services from research units relates to an economic rationale for reducing costs through "*outsourcing*", subcontracting which is not efficient on its own, plus in the nature of the acquisition of efficient technical services than properly with a goal of innovation, participation in research projects mainly fundamental and applied nature corresponds to an investment that can be translated, even for a limited period of time, in over-profits in certain activity. Both actually correspond to the transfer of knowledge between the two spheres, university and industry. But the first corresponds to a situation in which "*knowledge*" is traded like any product resulting from a production process, while the second corresponds to a blurring of the boundaries of the spheres, since both participate to the same extent, in the process of innovation.

Thus, academic entrepreneurship is on the one hand the extension of the activities of education and research, and the other is a process of internalization of the activity of technology transfer which traditionally is the duties of the industry.[171]

According to this author, the entrepreneurial university is based on 4 pillars:

1 – Academic leadership with ability to formulate and implement a strategic vision;

2 – Patrimonial Autonomy / Financial and Administrative / The university has legal control of the academic resources, including physical property such as buildings and equipment, and intellectual property resulting from academic research, and has the ability to make definitive decisions and administrative acts promptly with appropriate flexibility to specific situations;

3 – Organizational capacity to transfer technology through patenting, licensing and incubation: the existence of dedicated academic structures, with competences to seek, promote and commercialize expertise, projects and research results between universities and industry (function of "technology brokerage"), is often a way of boosting an entrepreneurial culture at academic level;

4 – An entrepreneurial culture among administrators, academics and students: if the university is by nature an incubator of entrepreneurship, and a breeding ground of new scientific fields and new industrial sectors, the entrepreneurial university initiates this process, becoming a recognized source of technology, in the same way that the resource is

[171] *Ibidem*.

human and knowledge through formal channels of technology transfer and business incubation, using their skills of research and training in advanced areas of science and technology for the promotion of spin-offs.

Thus, the focus of the entrepreneurial university is extended from training of individuals, to the "training" of companies.[172] The development of this identity and entrepreneurial culture also changes the way scientists perceive research results. The research shall be valued as much for its validity and fundamental scientific interest, as its applicability and commercial potential.

This kind of culture and entrepreneurial activity may make, in certain sectors, the university to be seen as a competitor rather than as a partner.

Although Henry Etkowitz was emphatic on 3 key factors that led to the strengthening of the University – Industry relationships, we can conclude that one of them is central, and the other two are derived from the first.[173]

The first factor mentioned by the author, is the existence of industrial sectors, and the emergence of new knowledge intensive sectors, whose development depend on specific academic inputs.

The requirement of specific academic inputs, is to ensure the flow of innovation which sustains the competitiveness of such industries is to develop expertise in certain areas or simply as a way of rationalizing costs, ensuring access to laboratories and technologies with high costs and unaffordable for most companies, in order to generates interest from industry to fund basic research, and the formulation of joint research projects, both fundamental and applied, with diverse sources of financing the second and third factors mentioned by the author.

This interest from the industry is reflected in the functional structure of research units:

- The Units or Research Groups, academics are increasingly operating in an approximate manner to companies, turning often in Private Nonprofit Institutions with industrial partners and the public sector;
- Science and technology parks embrace or establish partnerships with both public and private academic research units;
- The researchers of different research units are derived both from the university and industry, and collaborate with various units thus allowing increased flow of knowledge and skills in research as well as the level of technology transfer;

[172] *Ibidem*.
[173] *Ibidem*.

The academic support structures for technology transfer act in 2 ways: they select the results of research with the greatest potential applicability and promote their placement in external entities, and on the other hand, identify the needs of the industry, helping to identify new collaborative opportunities in research projects.

For there to be a free flow of information and contractual and economics interaction between the University, Industry and the Government, better ways of production and policies must be made and therefore the attainment of the Phase 3 of the Triple Helices model where there are little or no barriers to the relationship of the parties.

An incremental innovation may also be established in partnership with the Brazilian universities as it has its vital social rolls. According to Medeiros (2010), citing the GlaxoSmithKline pharmaceutical Industry, emphasized the need to recognize the social importance of the both radical and incremental innovation in the medical field.[174]

Universidade Federal de Minas Gerais, being the second highest depositor of drug patents – IPC's A61 in the Academic sector – as shows on graphs 8 to 13, is expected to be at the forefront of commercialization of drug technology through patent transfer and licensing. However, this seems not to be the case when we compare its level of patent production to the commercialized patents along over 18 years (1995 till the beginning of 2014) of patenting.

Nevertheless, the UFMG's CTIT has been working tirelessly to guarantees improvements and bridge the huge gap between the industry and the university. In its contracts it is glaring that CTIT renders some grooming of many companies operating without R&D segment, as such CTIT become responsible for the transferred or licensed technology as well as monitoring of the use in its production process and good negotiating possibilities that entice both big pharmaceutics and small scale industries.

[174] GSK, Glaxosmithkline *Apud* MEDEIROS, Juliana Corrêa Crepalde. *Parcerias Tecnológicas e Inovação Incremental*: na Indústria Farmoquímica e Farmacêutica Nacional. Curitiba: Juruá Editora, 2012.

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Attachments

Attachment 1 – Deposited Medicament / Drug Technology from UFMG (1996 – 2012). Source: INPI.

Processo	Depósito	Título
BR 10 2012 033587 5	28/12/2012	COMPOSIÇÃO FARMACÊUTICA ANTIMALÁRICA E USO
BR 20 2012 033571 4	28/12/2012	DISPOSITIVO FLEXÍVEL EMISSOR DE LUZ PARA TRATAMENTO DE FERIDAS CUTÂNEAS
BR 10 2012 017232 1	12/07/2012	DISPOSITIVO E PROCESSO PARA A DETECÇÃO DE POTENCIAIS EVOCADOS SOMATO-SENSITIVO EM REGIME PERMANENTE
BR 10 2012 009317 0	20/04/2012	PROCESSO DE PREPARAÇÃO DE COMPOSTOS DE INCLUSÃO ENVOLVENDO CICLODEXTRINAS E FÁRMACOS, USANDO UM SISTEMA DE FLUXO CONTÍNUO
BR 10 2012 009316 2	20/04/2012	DISPOSITIVO DE LIBERAÇÃO PROLONGADA DE TALIDOMIDA E USO EM DOENÇAS OCULARES CAUSADORAS DE NEOVASCULARIZAÇÃO
BR 10 2012 008550 0	12/04/2012	FILMES MULTICAMADAS DE LIBERAÇÃO CONTROLADA DE SUBSTÂNCIAS VOLÁTEIS ADSORVIDAS EM UM SUPORTE SÓLIDO E USO
BR 10 2012 005265 2	09/03/2012	COMPOSIÇÃO FARMACÊUTICA CONTENDO LIPOSSOMAS CONVENCIONAIS E LIPOSSOMAS DE CIRCULAÇÃO PROLONGADA PARA O TRATAMENTO DA LEISHMANIOSE VISCERAL
BR 10 2012 001875 6	27/01/2012	COMPOSIÇÃO FARMACÊUTICAS CONTENDO ATIVADORES DO EIXO ENZIMA CONVERSORA DE ANGIOTENSINA 2/ANGIOTENSINA-(1-7)/RECEPTOR MAS PARA TRATAMENTO DE PATOLOGIAS OCULARES
BR 10 2012 001450 5	23/01/2012	FORMULAÇÃO VACINAL ANTITUMORAL BASEADA EM NANOTUBOS DE CARBONO E USO
BR 10 2012 001453 0	23/01/2012	COMPOSIÇÃO FARMACÊUTICA CONTENDO MYRACRODRUON URUNDEUVA E USO
PI 1107182-6	29/12/2011	COMPOSIÇÕES FARMACÊUTICAS CONTENDO ANG-(1-7) OU OUTRO AGONISTA DE RECEPTOR MAS EM COMBINAÇÃO COM INIBIDORES DE PI3K/AKT PARA TRATAMENTO TERAPÊUTICO ANTICÂNCER
MU 9102997-0	29/12/2011	DISPOSITIVO FLEXÍVEL EMISSOR DE LUZ PARA TRATAMENTO DE FERIDAS CUTÂNEAS
PI 1107187-7	29/12/2011	COMPOSIÇÃO FARMACÊUTICA ANTIMALÁRICA E USO
PI 1105974-5	29/12/2011	DISPOSITIVO E PROCESSO PARA A DETECÇÃO DE LIMIARES AUDITIVOS DE FORMA OBJETIVA COM BASE NO POTENCIAL EVOCADO EM REGIME PERMANENTE
PI 1107183-4	29/12/2011	COMPOSIÇÕES FARMACÊUTICAS CONTENDO POLI-HIDROXI-FULERENO [C60(OH)N] E USO
PI 1106237-1	23/12/2011	MANOCARREADORES FORMADOS POR COMPLEXOS ANFIFÍLICOS DE ANTIMÔNIO(V), PROCESSO DE OBTENÇÃO, COMPOSIÇÕES FARMACÊUTICAS E USO
PI 1106236-3	23/12/2011	VESTE BASEADA EM TENSEGRIDADE PARA OTIMIZAÇÃO DE POSTURA E MOVIMENTO HUMANO
PI 1106239-8	23/12/2011	DISPOSITIVO PARA MEDIÇÃO DE PRESSÃO INTRA-ABDOMINAL
PI 1105045-4	10/11/2011	COMPOSIÇÕES FARMACÊUTICAS Á BASE DE ANESTÉSICOS LOCAIS E HIALURONIDADE ASSOCIADA E/OU INCLUÍDA EM CICLODEXTRINAS E SEUS USOS
PI 1106037-9	31/10/2011	COMPOSIÇÕES IMUNOGÊNICAS CONTRA DENGUE VÍRUS, PROCESSO, PRODUTO E USO
PI 1106466-8	27/10/2011	COMPOSIÇÕES FARMACÊUTICAS ANTIVIRAIS CONTENDO EXTRATO, FRAÇÕES E/OU COMPOSTOS ISOLADOS DE ARRABIDAEA PULCHRA E USO
PI 1106463-3	27/10/2011	COMPOSIÇÕES FARMACÊUTICAS PARA O TRATAMENTO DE DISTÚRBIOS GASTRIENTESTINAIS CONTENDO EXTRATO OU FRAÇÃO DE CAMPOMANESIA LINEATIFOLIA
PI 1106432-3	23/09/2011	COMPOSTOS DERIVADOS DE ALDIMINAS, COMPOSIÇÕES FARMACÊUTICAS E USO
PI 1106429-3	23/09/2011	CEFTIZOXIMA RADIOMARCADA ENCAPSULADA EM LIPOSSOMAS RECOBERTOS COM ALENDRONATO E USO
PI 1104700-3	31/08/2011	DISPOSITIVO PORTÁTIL E PROCESSO PARA ESTIMULAÇÃO VISUAL, COM BASE EM DIODO EMISSOR DE LUZ
PI 1103967-1	04/08/2011	MESA CIRÚRGICA PARA ANIMAIS DE PEQUENO PORTE
PI 1103325-8	26/07/2011	VACINA CONTRA TENÍASE E CISTICERCOSE
PI 1103683-4	14/07/2011	COMPLEXO 99M TC-HYNIC-BOMBESINA (7-14) ENCAPSULADO EM LIPOSSOMAS PH-SENSIVEIS E USO

PI 1103394-0	04/07/2011	**COMPOSIÇÕES DOMISSANEANTES Á BASE DE ÓLEO DE MACAÚBA E EXTRATOS DE SALVINIA AURICULATA E SEUS DERIVADOS COM AÇÃO TERAPÊUTICA E SEU USO PARA PREVENÇÃO E/OU CONTROLE DE MASTITE BOVINA**
PI 1102628-6	30/06/2011	**DISPOSITIVO ARTICULADO**
PI 1102071-7	30/05/2011	**DISPOSITIVO BLOQUEADOR**
PI 1101322-2	04/03/2011	**COMPOSIÇÕES FARMACÊUTICAS ANTIFÚGICAS CONTENDO EXTRATOS E/OU ÓLEO ESSENCIAL DE SCHINUS TEREBINTHIFOLIUS**
PI 1005474-0	30/12/2010	**PRECURSORES DENDRIMÉRICOS BIS-DFUNCIONALIZADOS COM GRUPOS TIPO AMIDINA E BIOISÓSTEROS, COM ATIVIDADE ANTIMICROBIANA E ANTITUMORAL E PROCESSO DE PREPARAÇÃO**
PI 1005050-7	30/12/2010	**PRECURSORES DENDRIMÉRICOS TRIS- E TETRA-FUNCIONALIZADOS, COM ATIVIDADE ANTIMICROBIANA E ANTITUMORAL E PROCESSO DE PREPARAÇÃO**
PI 1005216-0	20/12/2010	**COMPOSTOS DE COORDERNAÇÃO METAL-SACARÍDEO PARA TERAPIA E DIAGNÓSTICO**
PI 1005217-8	20/12/2010	**DISPOSITIVO PARA AVALIAR E TREINAR A FORÇA DA LÍNGUA**
PI 1005619-0	13/12/2010	**VERNIZ POLIMÉRICO DE PRÓPOLIS**
PI 1005539-8	07/10/2010	**COMPOSIÇÃO FARMACÊUTICA CONTENDO FRAÇÃO DE APITOXINA E USO**
PI 1005054-0	29/09/2010	**VACINA DE DOSE ÚNICA CONTRA BOTULISMO**
C1 0105499-6	22/09/2010	**PROCESSO DE OBTENÇÃO DE NANOCOMPÓSITOS FERRITA/CICLODEXTRINA E USO COMO DISPOSITIVOS DE DESCONTAMINAÇÃO MAGNETICAMENTE DIRIGÍVEL**
PI 1006644-6	17/09/2010	**CEPA ATENUADA DE CORYNEBACTERIUM PSEUDOTUBERCULOSIS E VACINA VIVA CONTRA LINFADENITE CASEOSA**
PI 1005908-3	02/09/2010	**IMUNOMODULAÇÃO ATRAVÉS DE CEPA BACTERIANA RECOMBINANTE**
PI 1006646-2	13/08/2010	**COMPOSIÇÃO IMUNOGÊNICA PARA VACINA E KIT PARA TESTE IMUNODIAGNÓSTICO DE LEISHMANIOSE VISCERAL**
PI 1003050-6	04/08/2010	**COMPOSTOS DERIVADOS DO ÁCIDO ARAQUIDÔNICO SUBSTITUÍDOS COM ANÁLOGOS DE COXIBES PARA TRATAMENTO DE DOR**
PI 1002523-5	14/07/2010	**PROCESSO DE SÍNTESE DE COMPLEXOS DE COBRE COM ATIVIDADE ANTITUMORAL**
PI 1006647-0	07/07/2010	**COMPOSIÇÃO IMUNOGÊNICA PARA PARACOCCIDIOIDOMICOSE UTILIZANDO AS PROTÉINAS PB40R E PB27R**
PI 1003297-5	07/07/2010	**COMPOSIÇÕES FARMACÊUTICAS ANTINEOPLÁSICAS CONTENDO COMPOSTOS NITROIMIDAZÓIS SUBSTITUÍDOS**
PI 1010493-3	07/07/2010	**COMPOSIÇÕES FARMACÊUTICAS ANTINEOPLÁSICAS CONTENDO COMPOSTOS NITROAROMÁTICOS SUBSTITUÍDOS**
PI 1000093-3	25/05/2010	**PROCESSO PARA A PREPARAÇÃO DE SISTEMA DE VETORIZAÇÃO PASSIVA DE FÁRMACOS LIPOFÍLICOS NA FORMA DE POLÍMERO ENXERTADO DE QUITOSANA**
PI 1001702-0	07/05/2010	**DISPOSITIVOS E MÉTODO PARA TRAQUEOSTOMIA PERCUTÂNEA**
PI 1001164-1	26/04/2010	**COMPOSIÇÃO FARMACÊUTICA CONTENDO DERIVADOS ACILADOS DE MANGIFERINA E USO**
PI 1003231-2	15/03/2010	**EQUIPAMENTO BINOCULAR DIGITAL PARA A VERIFICAÇÃO DA ACUIDADE VISUAL E DO LIMIAR AUDITIVO**
PI 0905584-3	23/12/2009	**EXTRATO E FRAÇÃO PADRONIZADOS DE CASCAS DE ASPIDOSPERMA PARVIFOLIUM E/OU ULEÍNA E SUA COMPOSIÇÃO FARMACÊUTICA**
PI 0905029-9	27/11/2009	**DISPOSITIVO MAGNÉTICO ORTODÔNTICO E SEU USO**
PI 0904754-9	20/11/2009	**RADIOFÁRMACO E SUAS COMPOSIÇÕES PARA CINTILOGRAFIA DE SÍTIOS INFLAMATÓRIOS E INFECCIOSOS**
PI 0904765-4	10/11/2009	**DISPOSITIVO ELETROCAUTÉRIO ESPECÍFICO PARA HEPATOTOMIA POTENCIALIZADO COM SOLUÇÃO IÔNICA**
PI 0904752-2	06/11/2009	**PROCESSO DE PREPARAÇÃO DE UM SISTEMA DE LIBERAÇÃO CONTROLADA DE CLOREXIDINA E SEUS COMPOSTOS DE INCLUSÃO, A PARTIR DE CIMENTO RESINOSO, PRODUTO E USO**
PI 0904036-6	07/10/2009	**PROCESSO DE PRODUÇÃO DE BIOPRODUTOS ELABORADOS COM COMPONENTES ISOLADOS DE APITOXINA DE ABELHAS APIS MELLIFERA, COMPOSIÇÃO E USO**
PI 0903718-7	04/09/2009	**DISPOSITIVO DE IMPLANTE NO OSSO REVESTIDO POR NANOTUBOS DE CARBONO FUNCIONALIZADOS COM ÁCIDO HIALURÔNICO E USO**
PI 0902643-6	30/07/2009	**MÉTODO PARA REDUÇÃO DO ESTÍMULO SEXUAL DE ANIMAIS VISANDO AUMENTO DA PRODUÇÃO DE CARNE**
PI 0902539-1	20/07/2009	**DISPOSITIVO E MÉTODO PARA IDENTIFICAÇÃO DE ARRITMIAS CARDÍACAS E ALTERAÇÕES ELETROLÍTICAS A PARTIR DA ANÁLISE DO ELETROCARDIOGRAMA**
PI 0902278-3	30/06/2009	**FORMULAÇÃO ANTIPARASITÁRIA, SUA FORMA FARMACÊUTICA E USO**
PI 0902242-2	30/06/2009	**COMPOSIÇÃO COMPREENDENDO AGONISTA DO RECEPTOR MAS DA ANGIOTENSINA (1-7) E SEU USO PARA A MODULAÇÃO DA RESPOSTA**

		INFLAMATÓRIA E/OU ANALGÉSICA
MU 8901900-8	19/05/2009	**BISTURI CIRCULAR PARA DISSECAÇÃO ANIMAL POR SONDAGEM**
PI 0901877-8	19/05/2009	**PROCESSO DE OBTENÇÃO DE NANOAGREGADOS NA BASE DOS ANTAGONISTAS DO RECEPTOR AT1 COM CÁTIONS METÁLICOS OU CÁTIONS ORGÂNICOS, FORMULAÇÕES, E USOS**
PI 0905068-0	30/03/2009	**DISPOSITIVO FOTOBIOMODULADOR PARA PREVENÇÃO E TRATAMENTO DE TRAUMAS MAMILARES E LESÕES NÃO-INFECCIOSAS DOS TETOS**
PI 0901192-7	20/03/2009	**APARELHO FONOAUDIOLÓGICO PARA GANHO DA FORÇA LINGUAL**
MU 8901693-9	30/01/2009	**FÓRCEPS PARA EXTRAÇÃO DENTÁRIA**
PI 0805778-8	04/12/2008	**DISPOSITIVO PARA BRAQUITERAPIA OCULAR E MÉTODO**
PI 0804696-4	09/10/2008	**PLATAFORMA PARA EXECUÇÃO E AVALIAÇÃO DE TREINOS DE PERTURBAÇÃO DO EQUILÍBRIO**
PI 0804859-2	22/08/2008	**PEPTÍDEOS SINTÉTICOS PARA A OBTENÇÃO DE POLÍMERO PROTEICO PARA IMUNIZAÇÃO CONTRA LEISHMANIOSE, PRODUTOS E SEUS USOS**
PI 0803807-4	21/08/2008	**PROCESSO DE OBTENÇÃO DE FILME MULTICAMADA DE LIBERAÇÃO CONTROLADA DE FÁRMACOS LIPOFÍLICOS E PRODUTO**
PI 0802850-8	06/08/2008	**USO DO OSU 03012 E DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES DOLOROSAS**
PI 0802806-0	22/07/2008	**USO DO PEPTÍDEO ANGIOTENSINA-(1-7), SEUS ANÁLOGOS, AGONISTAS OU DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES DOLOROSAS**
PI 0802834-6	12/06/2008	**PROCESSO DE FABRICAÇÃO DE SEMENTE RADIOATIVA PARA BRAQUITERAPIA ATRAVÉS DA ATIVAÇÃO NEUTRÔNICA DE UMA MATRIZ DE CARBONO AMORFO DOPADO COM XENÔNIO-124 E PRODUTO**
PI 0802800-1	10/06/2008	**DISPOSITIVO E MÉTODO NÃO INVASIVO PARA DETERMINAÇÃO DAS CONCENTRAÇÕES DE METAIS NO PLASMA SANGÜINEO**
PI 0802804-4	02/06/2008	**APARELHO FONOAUDIOLÓGICO PARA AVALIAÇÃO DA FORÇA DOS LÁBIOS**
PI 0802004-3	19/05/2008	**EXTRATO E FRAÇÃO PADRONIZADOS DE FOLHAS DE HANCORNIA SPECIOSA E SUA COMPOSIÇÃO FARMACÊUTICA**
PI 0802009-4	30/04/2008	**FORMULAÇÃO FARMACÊUTICA À BASE DE ALOE VERA PARA CAPEAMENTO DIRETO EM POLPA DENTÁRIA E COMO MATRIZ PARA TRANSPORTE DE FÁRMACOS E/OU CÉLULAS**
PI 0801418-3	01/04/2008	**DISPOSITIVO FOTOBIOMODULADOR PARA TRATAMENTO DE TRAUMAS MAMILARES**
PI 0801542-2	18/03/2008	**MODIFICAÇÃO, REDUÇÃO DA ESTRUTURA PRIMÁRIA E SÍNTESE DE PEPTÍDEOS HIPOTENSIVOS PRESENTES NO VENENO DE ESCORPIÃO PARA OTIMIZAÇÃO NA UTILIZAÇÃO DOS MESMOS COMO FÁRMACOS**
PI 0801417-5	13/03/2008	**PROCESSO PARA OBTENÇÃO DE COMPOSIÇÃO FARMACÊUTICA DE RETINÓIDES, PRODUTO DERIVADO DE RETINÓIDES E USO**
PI 0800585-0	13/02/2008	**PEPTÍDEO DES-[ASP1]-[ALA1]- AGONISTA DA ANGIOTENSINA-(1-7) E COMPOSIÇÕES FARMACÊUTICAS PARA TRATAMENTO DE DOENÇAS**
PI 0800606-7	13/02/2008	**USO DE ANGIOTENSINA-(1-7)-ß-HPCD, ANÁLOGOS OU DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES CARDÍACAS**
PI 0800596-6	31/01/2008	**MÉTODO PARA A POTENCIALIZAÇÃO DA FUNÇÃO ERÉTIL ATRAVÉS DO USO DAS COMPOSIÇÕES FARMACÊUTICAS DE TOXINA Tx2-6 DA ARANHA PHONEUTRIA NIGRIVENTER**
PI 0800492-7	31/01/2008	**RADIOFÁRMACO E SUA COMPOSIÇÃO FARMACÊUTICA PARA TRATAMENTO E DIAGNÓSTICO DE CÂNCER**
PI 0800601-6	31/01/2008	**MÉTODO DE VACINAÇÃO DOSE-REFORÇO PARA MALÁRIA QUE UTILIZA VÍRUS RECOMBINANTES E COMPOSIÇÃO VACINAL**
PI 0800788-8	31/01/2008	**PROCESSO PARA OBTENÇÃO DE DERIVADOS DE MAG-3 E PRODUTO**
C1 0206336-0	17/01/2008	**COMPLEXOS SUPRAMOLECULARES DE ALTA ESTEQUIOMETRIA EM SISTEMAS NANOAGREGADOS CONSTITUÍDOS POR CLOREXIDINA OU TETRACICLINA INCLUÍDOS EM CICLODEXTRINA**
PI 0800485-4	17/01/2008	**VETORES VIRAIS RECOMBINANTES, COMPOSIÇÃO VACINAL PARA LEISHMANIOSE E MÉTODO PROFILÁTICO/TERAPÊUTICO DE VACINAÇÃO PARA LEISHMANIOSE**
PI 0801906-1	15/01/2008	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO TS DE TRYPANOSOMA CRUZI, PROTEÍNA RECOMBINANTE TS E VÍRUS GENETICAMENTE MODIFICADOS QUE EXPRESSAM O ANTÍGENO TS RECOMBINANTE**
PI 0705586-2	08/11/2007	**USO DE ANTAGONISTAS DO RECEPTOR FATOR DE ATIVAÇÃO PLAQUETÁRIA PARA O TRATAMENTO INFECÇÕES CAUSADAS PELO VÍRUS INFLUENZA**
PI 0704730-4	26/10/2007	**SEQÜENCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (AM) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP RECOMBINANTE**
PI 0706004-1	26/10/2007	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (MT) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP**

		RECOMBINANTE
PI 0705880-2	26/10/2007	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (PA) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP RECOMBINANTE**
PI 0705874-8	26/10/2007	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO CS DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE CS E VÍRUS GENETICAMENTE MODIFICADOS QUE EXPRESSAM O ANTÍGENO CS RECOMBINANTE**
PI 0705990-6	26/10/2007	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO MSP-1 DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE MSP-1 E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO MSP-1 RECOMBINANTE**
PI 0706003-3	26/10/2007	**SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO AMA-1 DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE AMA-1 E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO AMA-1 RECOMBINANTE**
PI 0705590-0	07/08/2007	**USO DE COMPOSIÇÃO FARMACÊUTICA CONTENDO CROTOXINA PARA O TRATAMENTO DE DISTONIAS MUSCULARES**
PI 0705591-9	02/08/2007	**COMPOSIÇÃO FARMACÊUTICA E MÉTODO PARA O TRATAMENTO DE LESÕES TUMORAIS CUTÂNEAS E OUTRAS DERMATOSES DE MAMÍFEROS POR TERAPIA FOTODINÂMICA**
PI 0705519-6	17/07/2007	**LIPOSSOMAS pH-SENSÍVEIS DE CISPLATINA E OUTROS AGENTES ANTINEOPLÁSICOS E SEU PROCESSO DE OBTENÇÃO**
PI 0705589-7	09/07/2007	**COMPOSIÇÕES FARMACÊUTICAS DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS E/OU SEUS DERIVADOS E PRODUTOS DESSAS COMPOSIÇÕES E USOS COMO ANTICONVULSIVANTES, ANTINOCICEPTIVOS ANTIINFLAMATÓRIOS, E NA TERAPIA ANGIOGÊNICA**
PI 0705596-0	09/07/2007	**PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO**
C1 0200751-7	02/07/2007	**PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO**
PI 0705535-8	15/06/2007	**SEQÜÊNCIAS GENETICAMENTE MODIFICADAS DOS ANTÍGENOS TS E ASP-2 DE TRYPANOSOMA CRUZI, CONSTRUCTOS GENÉTICOS QUE CONTÉM TS OU ASP-2 E ADENOVÍRUS GENETICAMENTE MODIFICADOS QUE CODIFICAM TS OU ASP-2**
PI 0701561-5	01/06/2007	**CABO COM SEGMENTOS ELASTICOS**
PI 0705918-3	01/06/2007	**DISPOSITIVO PARA MEDIÇÃO DA FORÇA ISOMÉTRICA MULTIDIRECIONAL DOS MÚSCULOS DO ASSOALHO PÉLVICO**
PI 0702738-9	10/05/2007	**PROCESSO DE PREPARAÇÃO DE UM DISPOSITIVO DE LIBERAÇÃO CONTROLADA DE AGENTES ANTIBIÓTICOS OU ANTISSÉPTICOS INCLUÍDOS OU ASSOCIADOS EM CICLODEXTRINA EM UMA BASE DE GUTA-PERCHA, PRODUTOS E USOS**
PI 0702739-7	10/05/2007	**SEGMENTOS E FIOS POLIMÉRICO-CERÂMICOS DE As-76 PARA IMPLANTES INTERSTICIAIS RADIOTERÁPICOS POR EMISSÃO DE PARTÍCULAS BETAS**
PI 0701040-0	09/04/2007	**PROCESSO DE CONSTRUÇÃO DE UM CASSETE DE EXPRESSÃO GENÉTICA PARA A TRANSFORMAÇÃO DE BACTÉRIAS PARA USO VACINAL E SEUS PRODUTOS**
PI 0702734-6	02/04/2007	**TOXINA PhKv, cDNA DO GENE DA TOXINA PhKv, COMPOSIÇÕES FARMACÊUTICAS CONTENDO A TOXINA PhKv, PROCESSO PARA SUA OBTENÇÃO, PROCESSO PARA OBTENÇÃO DO cDNA, E PRODUTO**
PI 0700940-2	02/03/2007	**PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE LIPOSSOMAS PH-SENSÍVES RADIOMARCADOS COM 99MTECNÉCIO, PRODUTO E USOS**
PI 0701085-0	27/02/2007	**USO DE ANTAGONISTA DO RECEPTOR DO PAF PARA O TRATAMENTO DE INFECÇÕES CAUSADAS POR FLAVIVIRIDAE**
PI 0605982-1	15/12/2006	**PROCESSO DE PRODUÇÃO DE UMA RESINA SUPERABSORVENTE A PARTIR DE POLIESTIRENO**
PI 0605978-3	01/12/2006	**ESTIMULAÇÃO ELÉTRICA DE ESTRUTURAS DO SISTEMA NERVOSO PARA TRATAMENTO DE EPILEPSIAS E SUPRESSÃO DE CRISES EPILÉPTICAS, DISPOSITIVO, CONTROLADOR DE DISPOSITIVO E USOS**
PI 0605484-6	21/11/2006	**TOXINA Ph(ALFA)1B, cDNA DO GENE DA TOXINA Ph(ALFA)1B, COMPOSIÇÕES FARMACÊUTICAS CONTENDO A TOXINA Ph(ALFA)1B, PROCESSO PARA SUA OBTENÇÃO, PROCESSO PARA OBTENÇÃO DO cDNA, E PRODUTO**
PI 0605102-2	31/10/2006	**PREPARAÇÃO DE NANOCÁPSULAS CAPAZES DE SEREM MARCADAS COM 99M TECNÉCIO-HMPAO PARA IDENTIFICAÇÃO DE FOCOS INFLAMATÓRIOS E INFECCIOSOS**
PI 0605088-3	04/10/2006	**PROCESSO DE OBTENÇÃO DE COMPOSIÇÕES FARMACÊUTICAS PARA ADMINISTRAÇÃO PARENTERAL DE ANTAGONISTAS DE OPIÓIDES E PRODUTO**
PI 0604577-4	31/08/2006	**DISPOSITIVO BIODEGRADÁVEL PARA ADMINISTRAÇÃO INTRA-OCULAR DE FÁRMACOS**

PI 0604132-9	28/08/2006	**KIT PARA TESTE COM ANTIBIÓTICO RADIOMARCADO**
PI 0605721-7	21/07/2006	**COMPÓSITO ÓSSEO RADIOATIVO**
PI 0603490-0	21/07/2006	**PROCESSO PARA VACINA RECOMBINANTE CONTRA A LEISHMANIOSE VISCERAL CANINA CONTENDO O ANTÍGENO RECOMBINANTE A2 E QUE PERMITE A DISTINÇÃO SOROLÓGICA ENTRE ANIMAIS VACINADOS DE ANIMAIS INFECTADOS**
PI 0602975-2	14/06/2006	**COMPÓSITOS MODIFICADOS COM POLÍMERO NO ESTADO DE BORRACHA SEUS PROCESSOS DE PREPARAÇÕES E USOS**
PI 0602372-0	18/05/2006	**PROCESSO DE PREPARAÇÃO DE COMPÓSITOS EM BASE DE BIOCERÂMICAS E POLÍMEROS BIODEGRADÁVEIS, CONTENDO ANTIBIÓTICOS E ANGIOTENSINA (1-7), ENCAPSULADOS OU NÃO, MICRO OU NANOPARTICULADOS, PARA RESTITUIÇÃO TECIDUAL DE PRODUTOS DERIVADOS**
PI 0602371-1	17/05/2006	**COMPOSTOS A BASE DE ANTIMÔNIO EM ESTADO DISSOCIADO PARA TRATAMENTO DE LEISHMANIOSE E OUTRAS DOENÇAS, SEUS PROCESSOS DE OBTENÇÃO E COMPOSIÇÕES FARMACÊUTICOS**
PI 0605472-2	17/05/2006	**COMPOSIÇÕES DE HIDRAZONAS E SEUS DERIVADOS E EXCEPIENTES E COMPOSIÇÕES DE HIDRAZONAS E SEUS DERIVADOS COM METAIS E EXCEPIENTES E SEUS PROCESSOS DE OBTENÇÃO**
PI 0602366-5	26/04/2006	**USO DE AGONISTAS DO RECEPTOR ACOPLADO A PROTEÍNA G, MAS, NO TRATAMENTO DA SINDROME METABÓLICA, SEUS COMPONENTES E SUAS COMPLICAÇÕES**
PI 0604176-0	17/04/2006	**PROTEÍNA DE MEMBRANA SM29 DO SCHISTOSOMA MANSONI, KIT PARA TESTE IMUNOENZIMÁTICO UTILIZANDO A PROTEÍNA SM29 NO DIAGNÓSTICO DA ESQUISTOSSOMOSE, VACINA CONTENDO A PROTEÍNA SM29 E PROCESSO DE OBTENÇÃO DA VACINA E USOS**
PI 0601751-7	12/04/2006	**COMPÓSITO DE COLÁGENO E NANOTUBOS DE CARBONO E SEU PROCESSO DE OBTENÇÃO**
PI 0600636-1	03/02/2006	**PROCESSO PARA FORMULAÇÕES DE INIBIDORES DA ENZIMA CONVERSORA DE ANGIOTENSINA E PRODUTO**
PI 0601053-9	01/02/2006	**COMPOSTOS INÉDITOS DE TETRACICLINAS PARA TRATAMENTO DE INFECÇÃO POR BACTÉRIAS SENSÍVEIS E RESISTENTES E SEU PROCESSO DE SÍNTESE**
PI 0506229-2	15/12/2005	**PROCESSO DE OBTENÇÃO DE FILME SOL-GEL COM ÁREA PROJETADA; ARTIGO E UTILIZAÇÃO DO FILME**
PI 0504979-2	30/09/2005	**PREPARAÇÃO DE COMPOSTOS ENTRE AS CICLODEXTRINAS E SEUS DERIVADOS E COMPOSTOS DE BISMUTO E SEUS DERIVADOS, COMPOSIÇÕES FARMACÊUTICAS E PRODUTOS DESSAS COMPOSIÇÕES E USO COMO AGENTES ANTIBACTERIANOS**
PI 0504978-4	30/09/2005	**PROCESSO DE PREPARAÇÃO DE COMPOSTOS ENTRE OS ANTAGONISTAS DO RECEPTOR AT1 E ANGIOTENSINA-(1-7) SEUS ANÁLOGOS E/OU MISTURAS DESSES SISTEMAS, SUAS COMPOSIÇÕES FARMACÊUTICAS E USO DOS PRODUTOS DERIVADOS**
PI 0504704-8	21/09/2005	**ÓRTESE FUNCIONAL PARA MÃO ACIONADA POR DISPOSITIVO ELÉTRICO**
PI 0503479-5	27/07/2005	**LIPOSSOMAS PH-SENSÍVEIS PARA TRANSPORTE DE ÁCIDOS NUCLÉICOS E SEU PROCESSO DE OBTENÇÃO**
PI 0502497-8	28/06/2005	**USO DE AGONISTAS E ANTAGONISTAS DO RECEPTOR ACOPLADO A PROTEÍNA G, MAS, COMO MODULADORES DE ATIVIDADE APOPTÓTICA PARA O ESTUDO, A PREVENÇÃO E O TRATAMENTO DE DOENÇAS**
PI 0503122-2	30/05/2005	**COMPOSIÇÕES FARMACÊUTICAS DO PEPTÍDEO ANGIOTENSINA-(1-7) [ANG-(1-7)] E SEUS ANÁLOGOS, AGONISTAS E ANTAGONISTAS USANDO AS CICLODEXTRINAS, SEUS DERIVADOS, E O POLÍMEROS BIODEGRADÁVEIS E/OU DOS PRODUTOS DERIVADOS PARA USO NO CONTROLE DAS FUNÇÕES DO SISTEMA REPRODUTIVO**
PI 0502411-0	31/03/2005	**PROCESSO DE DESENVOLVIMENTO DE SUBSTÂNCIAS COMO INIBIDORES POTENTES E SELETIVOS DE ISOFORMAS DE FOSFODIESTERASES DOS TIPOS 1 A 5 (PDE1,PDE2,PDE3, PDE4, PDE5) NA BASE DE DIOCLEÍNA, FLURANOL OU ANÁLOGOS E SUAS COMPOSIÇÕES FARMACÊUTICAS PARA O ESTUDO E TRATAMENTO DE DOENÇAS CARDIOVASCULARES E PRODUTOS ASSOCIADOS**
C1 0103887-7	20/12/2004	**COMPOSIÇÕES IMUNOGÊNICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO ANTÍGENOS, VETORES GÊNICOS E ADJUVANTES**
PI 0405347-8	25/11/2004	**PROCESSO DE PREPARAÇÃO DE GÉIS MUCOADESIVOS PARA PREVENÇÃO DE CÁRIE, USOS E PRODUTOS DERIVADOS**
PI 0405489-0	09/11/2004	**PROCESSO PARA A PREPARAÇÃO DE FORMULAÇÕES FARMACÊUTICAS DO ANTIMONIATO DE MEGLUBINA EM LIPOSSOMAS E USO DAS FORMULAÇÕES FARMACÊUTICAS EM ANIMAIS ACOMETIDOS COM LEISHMANIOSE VISCERAL**
PI 0404655-2	18/10/2004	**APARATOS E PROCESSOS PARA IMPLANTES PERMANENTES ONCOLÓGICOS**
PI 0403540-2	17/08/2004	**VACINA CONTRA CLOSTRIDIOSE E PROCESSO DE PURIFICAÇÃO DO ANTÍGENO**
PI 0404270-0	09/08/2004	**IMOBILIZADOR E POSICIONADOR DOS ARTELHOS II, III, IV**
PI 0402893-7	13/07/2004	**UTILIZAÇÃO DO ÓLEO DE OURICURI (SYAGRUS CORONATA) PARA EM PACIENTES SUBMETIDOS A TRATAMENTO COM DROGAS QUIMIOTERÁPICAS**
PI 0402892-9	13/07/2004	**FORMULAÇÃO FARMACÊUTICA DE CÁLCIO COLOIDAL E VITAMINA**

		LIPOSSOLÚVEL PARA USO INJETÁVEL EM VETERINÁRIA
MU 8401193-9	11/05/2004	**ANDADOR DOBRÁVEL COM ASSENTO BASCULANTE E SUPORTE PARA AS MÃOS**
MU 8401192-0	11/05/2004	**ESTRUTURA TRELIÇADA PARA CADEIRA DE RODAS**
C1 0304952-3	02/03/2004	**PROCESSO DE PREPARAÇÃO DE COMPOSTOS ENTRE AS CICLODEXTRINAS OU SEUS DERIVADOS E O ANTIMONIO OU SEUS DERIVADOS, DE FORMULAÇÕES FARMACEUTICAS CONTENDO ESSES COMPOSTOS E PRODUTOS ASSOCIADOS, PARA O TRATAMENTO DAS LEISHMANIOSES E DA ESQUISTOSSOMOSE**
PI 0406547-6	13/01/2004	**MODIFICAÇÃO SUPERFICIAL DE MATERIAIS, DISPOSITIVOS E INSTRUMENTAÇÃO MÉDICOS UTILIZADOS EM CIRCULAÇÃO INTRACORPÓREA E EXTRACORPÓREA PARA AUMENTO DE HEMOCOMPATIBILIDADE, TROMBORESISTÊNCIA E RESISTÊNCIA À OXIDAÇÃO**
PI 0306774-2	03/12/2003	**LIPOSSOMAS pH-SENSÍVEIS DE CISPLATINA E OUTROS AGENTES ANTINEOPLÁSICOS E SEU PROCESSO DE OBTENÇÃO**
PI 0303631-6	17/09/2003	**DISPOSITIVO E MÉTODO PARA MEDIÇÃO DE FORÇAS AXIAIS PRODUZIDAS PELA LÍNGUA HUMANA**
PI 0303078-4	22/08/2003	**DISPOSITIVO DE GRADUAÇÃO DA PRESSÃO DE SUCÇÃO DO ASPIRADOR**
MU 8303688-1	02/07/2003	**Dispositivo distrator das articulações coxofemorais para auxílio ao exame radiográfico.**
MU 8303493-5	23/06/2003	**DISPOSITIVO ÓPTICO PARA BIOMODULAÇÃO DE TECIDO EPITELIAL ÓSSEO E MUSCULAR POR MEIO DE DIODOS EMISSORES DE LUZ EMITINDO EM ALTA INTENSIDADE NAS BANDAS DO ESPECTRO ÓPTICO COMPREENDIDO ENTRE 610nm - 910nm, DOTADO DE UMA LENTE POLARIZADA E DE UM SISTEMA DE REFRIGERAÇÃO**
MU 8301504-3	15/05/2003	**EQUIPAMENTO ÓPTICO PARA BIOESTIMULAÇÃO DE TECIDOS OROFACIAIS.**
PI 0304952-3	17/03/2003	**PROCESSO DE PREPARAÇÃO DE COMPOSTOS ENTRE AS CICLODEXTRINAS OU SEUS DERIVADOS E O ANTIMÔNIO OU SEUS DERIVADOS, DE FORMULAÇÕES FARMACEUTICAS CONTENDO ESSES COMPOSTOS E PRODUTOS ASSOCIADOS, PARA O TRATAMENTO DAS LEISHMANIOSES E DA ESQUISTOSSOMOSE**
MU 8203339-0	27/12/2002	**EQUIPAMENTO PARA CLAREAMENTO DENTAL POR MEIO DE LEDS COM COMPRIMENTO DE ONDA ENTRE 350nm E 700nm, COM OU SEM EMISSÃO DE LASER NO INFRAVERMELHO, DOTADO DE SISTEMA DE REFRIGERAÇÃO**
PI 0206336-0	06/12/2002	**PROCESSO DE PREPARAÇÃO DE COMPOSIÇÕES FARMACÊUTICAS DE ANTIMICROBIANOS, ANESTÉSICOS, ANTIFÚNGICOS E ANTINFLAMATÓRIOS PARA LIBERAÇÃO LENTA E PRODUTOS DERIVADOS**
PI 0205783-2	29/10/2002	**SISTEMA TUBULAR PARA REALIZAÇÃO DE CICLOS DE ESVAZIAMENTO E IRRIGAÇÃO DE CANAIS RADICULARES DENTÁRIOS.**
PI 0210367-2	10/10/2002	**PADRÃO DE IDENTIFICAÇÃO E BENGALAS DE PORTADORES DE DEFICIÊNCIA VISUAL OU FÍSICA**
PI 0203908-7	11/09/2002	**TUBO ENDOTRAQUEAL DE POSICIONAMENTO OROTRAQUEL OU NASOTRAQUEAL PARA ASPIRAÇÃO CONTINUA OU INTERMITENTE DE SECREÇÕES RESPIRATÓRIAS INTRALUMINAIS DE CURTA E LONGA PERMANÊNCIA E RECIPIENTE PARA COLETA DE MATERIAL MICROBIOLÓGICO E PROCESSO DE ASPIRAÇÃO CONTINUA ENDOTRAQUEAL**
PI 0206074-4	08/08/2002	**ATIVOS ANTIPERSPIRANTES CONTENDO ALUMÍNIO, ZINCÔNIO E AMINOÁCIDOS NEUTROS E BÁSICOS, E OS PROCESSOS DE PREPARAÇÃO DOS MESMOS**
PI 0202596-5	27/06/2002	**PROTEÍNA E SEQUÊNCIA DE DNA DA ARANHA LOXOSCELES INTERMEDIA PARA PRODUÇÃO DE UMA PROTEÍNA RECOMBINANTE E SUA UTILIZAÇÃO NO PROCESSO DE PRODUÇÃO DE SORO E VACINA ESPECIFICADA CONTRA A PICANHA DE ARANHAS DO GÊNERO LOXOSCELES**
PI 0202157-9	07/06/2002	**PEPTÍDEO OBTIDO DE VENENO ESCORPIÃO PARA USO COMO AGENTE HIPOTENSIVO**
PI 0212405-0	21/05/2002	**COMPOSIÇÕES FARMECÊUTICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO COMPLEXO DE INSULINA E PROCESSOS DE OBTENÇÃO**
PI 0208523-2	05/04/2002	**PROCESSO DE OBTENÇÃO DO COMPLEXO DICLOFENACO-ZINCO E COMPLEXO DICLOFENACO-ZINCO**
PI 0200698-7	06/02/2002	**PROCESSO PARA OBTENÇÃO DE UM REVESTIMENTO BIOATIVO DE FOSFATO DE CÁLCIO SOBRE SUBSTRATOS SÓLIDOS**
PI 0200751-7	06/02/2002	**PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO**
MU 8103161-0	20/12/2001	**SISTEMA DE RODÍZIOS AXIAIS COM SUSPENSÃO E FREIOS ACIONADOS POR FORÇA NO EIXO AXIAL, ADAPTÁVEL EM ANDADORES PARA AUXÍLIO DA LOCOMOÇÃO E REABILITAÇÃO DO PORTADOR DE DEFICIÊNCIA FÍSICA**
PI 0105500-3	05/11/2001	**PROCESSO DE OBTENÇÃO DE DISPERSÕES COLOIDAIS DE ANFOTERICINA B; COMPOSIÇÕES À BASE DE ANFOTERICINA B DE USO ENTERAL, PARENTERAL E TÓPICO; USO DESTAS COMPOSIÇÕES NO TRATAMENTO DE MICOSES SISTÊMICAS E INFECÇÕES PARASITÁRIAS**
PI 0105499-6	05/11/2001	**PROCESSO DE OBTENÇÃO DE COMPÓSITOS FORMADOS POR MATERIAIS**

		PARTICULADOS E CICLODEXTRINAS E/OU DOS PRODUTOS DERIVADOS
PI 0105243-8	23/08/2001	**PROCESSO PARA A OBTENÇÃO DE COMPÓSITOS DE ZIRCÔNIA PARCIALMENTE ESTABILIZADA COM CÁLCIA-HIDROXIAPATITA, APARELHAGEM, E PEÇAS CERÂMICAS ESTRUTURAIS OBTIDAS PELO PROCESSO.**
PI 0103887-7	17/07/2001	**COMPOSIÇÕES IMUNOGÊNICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO ANTÍGENOS, VETORES GÊNICOS E ADJUVANTES**
PI 0104074-0	09/07/2001	**FLAVONÓIDES COM ATIVIDADE VASODILATADORA , ANTIHIPERTENSIVA E ANTIARRÍTMICA**
PI 0104539-3	21/06/2001	**PROCESSO PARA PURIFICAÇÃO E CARACTERIZAÇÃO DA CROTOXINA PARA OBTENÇÃO DE COMPOSIÇÕES FARMACOLÓGICAS PARA USO MEDICINAL E COSMÉSTICO**
PI 0106305-7	10/04/2001	**PROCESSO PARA PREPARAÇÃO DE DERIVADOS DE ANTIMÔNIO**
PI 0102252-0	10/04/2001	**Sistema de liberação controlada para antagonista do receptor AT1 da angiotensina II, composição farmacêutica e seu uso**
PI 0101322-0	06/04/2001	**PROCESSO DE OBTENÇÃO, COMPOSIÇÃO E USO DE UM SISTEMA DE HORMÔNIOS RECOMBINANTES PARA SUPEROVULAÇÃO EM VERTEBRADOS E INVERTEBRADOS**
PI 0004436-9	25/08/2000	**COMPLEMENTO DIETÉTICO DE AMINOÁCIDOS, PROCESSO PARA TRATAMENTO E PREVENÇÃO DE DOENÇAS E PROCESSO DE ADMINISTRAÇÃO DE UM COMPLEMENTO DIETÉTICO DE AMINOÁCIDOS**
PI 0003148-8	03/07/2000	**PROCESSO DE FABRICAÇÃO DE VIDROS POROSOS**
PI 0001075-8	17/04/2000	**MONITOR DE SINAIS BIOLÓGICOS MULTIPARAMÉTRICO USÁVEL**
PI 9907575-0	09/12/1999	**PROCESSO PARA PREPARAÇÃO DE ANTIMONIATO DE MEGLUMINA E DE ANTIMONIATO GLUCONATO DE POTÁSSIO UTILIZADOS NO TRATAMENTO DE PROTOZOONOSES**
PI 9710830-8	30/12/1997	**PROCESSO PARA PRODUÇÃO DE FATOR DE CRESCIMENTO DO VÍRUS BEAN58058 (BEGF) RECOMBINANTE E DA PROTEÍNA DO BEGF RECOMBINANTE.**
PI 9710828-6	18/12/1997	**PROCESSO PARA A PRODUÇÃO DA PROTEINA DO INTERFERON BETA-CIS HUMANO RECOMBINANTE E PROTEÍNA DE INTERFERON BETA-CIS HUMANO RECOMBINANTE**
PI 9710824-3	16/12/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP160 RECOMBINANTE E DA PROTEINA GP160 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9710825-1	16/12/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA P24 RECOMBINANTE E DA PROTEÍNA P24 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9710827-8	16/12/1997	**PROCESSO PARA PRODUÇÃO DO INTERFERON RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA E DA PROTEÍNA DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA.**
PI 9710833-2	16/12/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP120 RECOMBINANTE E DA PROTEÍNA GP120 RECOBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA**
PI 9710834-0	16/12/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP41 RECOMBINANTE E DA PROTEÍNA GP41 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA**
PI 9706072-0	16/12/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA P17 RECOMBINANTE E DA PROTEÍNA P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA**
PI 9710826-0	16/10/1997	**PROCESSO PARA PRODUÇÃO DO INTERFERON EPSILON DE MEMBRANA AMINIÓTICA HUMANA E PROTEÍNA DO INTERFERON EPSILON HUMANO DE MEMBRANA AMINIÓTICA HUMANA**
PI 9700860-5	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA P24 RECOMBINANTE E DA PROTEÍNA P24 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9700858-3	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA HÍBRIDA P24/P17 RECOMBINANTE E DA PROTEÍNA HÍBRIDA P24/P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9700859-1	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA P17 RECOMBINANTE E DA PROTEÍNA P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9700861-3	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP41 RECOMBINANTE E DA PROTEÍNA GP41 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9700855-9	02/01/1997	**PROCESSO PARA PRODUÇÃO DE FATOR DE CRESCIMENTO DO VÍUS BEAN 58058 (BEGF) RECOMBINANTE E DA PROTEÍNA DO BEGF RECOMBINANTE.**
PI 9700856-7	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP160 RECOMBINANTE E DA PROTEÍNA GP160 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9700857-5	02/01/1997	**PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP120 RECOMBINANTE E DA PROTEÍNA GP120 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.**
PI 9606269-0	18/12/1996	**PROCESSO PARA PRODUÇÃO DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA E DA PROTEÍNA DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA.**
PI 9606270-3	18/12/1996	**PROCESSO PARA A PRODUÇÃO DA PROTEÍNA DO INTERFERON BETA-CIS HUMANO RECOMBINANTE E PROTEÍNA DE INTERFERON BETA-CIS HUMANO RECOMBINANTE.**
PI 9606271-1	18/12/1996	**PROCESSO PARA PRODUÇÃO DO INTERFERON EPSILON DE MEMBRANA AMNIÓTICA HUMANA E PROTEÍNA DO INTERFERON EPSILON HUMANO DE**

		MEMBRANA AMNIÓTICA HUMANA.
PI 9502472-7	12/05/1995	**EQUIPAMENTO ELETROMECÂNICO GERENCIADOR DE MOVIMENTOS DE MINI FONTES RADIOATIVAS FIXADAS EM MÚLTIPLAS HASTES FLEXÍVEIS**

Source: Sinpi – INPI's databased

Attachment 2 – List of UFMG's deposited Technologies with INPI (1992-2013). Source: INPI.

Processo	Depósito	Título
BR 10 2013 027542 5	25/10/2013	
BR 10 2013 027544 1	25/10/2013	
BR 10 2013 009771 3	22/04/2013	
BR 13 2013 009538 8	19/04/2013	
BR 10 2013 008846 3	11/04/2013	
BR 10 2013 008296 1	05/04/2013	
BR 10 2013 005935 8	13/03/2013	
BR 10 2013 005601 4	08/03/2013	
BR 13 2013 001271 7	18/01/2013	
BR 10 2012 033564 6	28/12/2012	
BR 10 2012 033580 8	28/12/2012	
BR 10 2012 033595 6	28/12/2012	
BR 10 2012 033555 7	28/12/2012	
BR 10 2012 033563 8	28/12/2012	
BR 10 2012 033560 3	28/12/2012	
BR 10 2012 033598 0	28/12/2012	
BR 10 2012 033594 8	28/12/2012	
BR 10 2012 033593 0	28/12/2012	
BR 10 2012 033587 5	28/12/2012	COMPOSIÇÃO FARMACÊUTICA ANTIMALÁRICA E USO
BR 20 2012 033571 4	28/12/2012	DISPOSITIVO FLEXÍVEL EMISSOR DE LUZ PARA TRATAMENTO DE FERIDAS CUTÂNEAS
BR 10 2012 033561 1	28/12/2012	
BR 10 2012 033602 2	28/12/2012	
BR 13 2012 033559 9	28/12/2012	
BR 10 2012 033605 7	28/12/2012	
BR 10 2012 033552 2	28/12/2012	
BR 10 2012 033604 9	28/12/2012	
BR 10 2012	27/12/2012	

033306 6		
BR 10 2012 033302 3	27/12/2012	
BR 10 2012 033303 1	27/12/2012	
BR 10 2012 033305 8	27/12/2012	
BR 13 2012 033307 3	27/12/2012	
BR 10 2012 033308 2	27/12/2012	
BR 10 2012 033304 0	27/12/2012	
BR 10 2012 032430 0	19/12/2012	
BR 10 2012 032483 0	19/12/2012	
BR 10 2012 032493 8	19/12/2012	
BR 10 2012 032487 3	19/12/2012	
BR 10 2012 032499 7	19/12/2012	
BR 10 2012 032478 4	19/12/2012	
BR 10 2012 032476 8	19/12/2012	
BR 10 2012 032479 2	19/12/2012	
BR 20 2012 032020 2	14/12/2012	
BR 10 2012 032022 3	14/12/2012	
BR 10 2012 030999 8	05/12/2012	
BR 10 2012 030548 8	30/11/2012	
BR 10 2012 030068 0	26/11/2012	
BR 10 2012 030066 4	26/11/2012	
BR 10 2012 027997 5	31/10/2012	
BR 10 2012 028002 7	31/10/2012	
BR 13 2012 028005 0	31/10/2012	
BR 10 2012 027681 0	29/10/2012	
BR 10 2012 027554 6	26/10/2012	
BR 10 2012 027551 1	26/10/2012	
BR 10 2012 027556 2	26/10/2012	
BR 10 2012 027363 2	25/10/2012	
BR 10 2012 027338 1	25/10/2012	
BR 10 2012 026973 2	22/10/2012	
BR 10 2012 024444 6	26/09/2012	
BR 10 2012 023897 7	21/09/2012	
BR 10 2012 023898 5	21/09/2012	
BR 10 2012	20/09/2012	

023741 5		
BR 10 2012 023210 3	14/09/2012	
BR 10 2012 023206 5	14/09/2012	
BR 10 2012 022729 0	10/09/2012	
BR 10 2012 022547 6	06/09/2012	
BR 10 2012 022016 4	31/08/2012	
BR 13 2012 022017 1	31/08/2012	
BR 10 2012 021502 0	27/08/2012	
BR 10 2012 020800 8	20/08/2012	
BR 10 2012 020348 0	14/08/2012	
BR 10 2012 017232 1	12/07/2012	
BR 10 2012 017234 8	12/07/2012	
BR 10 2012 016871 5	09/07/2012	
BR 20 2012 016183 0	29/06/2012	
BR 20 2012 015542 2	25/06/2012	
BR 10 2012 011864 5	11/05/2012	
BR 10 2012 019426 0	11/05/2012	
BR 10 2012 019423 6	11/05/2012	
BR 10 2012 009317 0	20/04/2012	PROCESSO DE PREPARAÇÃO DE COMPOSTOS DE INCLUSÃO ENVOLVENDO CICLODEXTRINAS E FÁRMACOS, USANDO UM SISTEMA DE FLUXO CONTÍNUO
BR 10 2012 009316 2	20/04/2012	DISPOSITIVO DE LIBERAÇÃO PROLONGADA DE TALIDOMIDA E USO EM DOENÇAS OCULARES CAUSADORAS DE NEOVASCULARIZAÇÃO
BR 10 2012 008550 0	12/04/2012	FILMES MULTICAMADAS DE LIBERAÇÃO CONTROLADA DE SUBSTÂNCIAS VOLÁTEIS ADSORVIDAS EM UM SUPORTE SÓLIDO E USO
BR 10 2012 007003 0	29/03/2012	MÉTODO DE DESDOBRAMENTO E ANÁLISE DE INDICADORES
BR 10 2012 006708 0	26/03/2012	
BR 10 2012 006709 9	26/03/2012	
BR 10 2012 005265 2	09/03/2012	COMPOSIÇÃO FARMACÊUTICA CONTENDO LIPOSSOMAS CONVENCIONAIS E LIPOSSOMAS DE CIRCULAÇÃO PROLONGADA PARA O TRATAMENTO DA LEISHMANIOSE VISCERAL
BR 10 2012 001876 4	27/01/2012	TRYPANOSOMA CRUZI RECOMBINANTE E USO
BR 10 2012 001875 6	27/01/2012	COMPOSIÇÃO FARMACÊUTICAS CONTENDO ATIVADORES DO EIXO ENZIMA CONVERSORA DE ANGIOTENSINA 2/ANGIOTENSINA-(1-7)/RECEPTOR MAS PARA TRATAMENTO DE PATOLOGIAS OCULARES
BR 10 2012 001453 0	23/01/2012	COMPOSIÇÃO FARMACÊUTICA CONTENDO MYRACRODRUON URUNDEUVA E USO
BR 10 2012 001450 5	23/01/2012	FORMULAÇÃO VACINAL ANTITUMORAL BASEADA EM NANOTUBOS DE CARBONO E USO
PI 1107186-9	29/12/2011	DISPOSITIVO DE TORQUEAMENTO HIDRÁULICO CONTÍNUO
PI 1105968-0	29/12/2011	DISPOSITIVO MACIÇO COM EXTREMIDADE UNIDIMENSIONAL PARA MICROSCOPIA E ESPECTROSCOPIA ÓPTICA DE CAMPO PRÓXIMO
PI 1107182-6	29/12/2011	COMPOSIÇÕES FARMACÊUTICAS CONTENDO ANG-(1-7) OU OUTRO AGONISTA DE RECEPTOR MAS EM COMBINAÇÃO COM INIBIDORES DE PI3K/AKT PARA TRATAMENTO TERAPÊUTICO ANTICÂNCER
PI 1107183-4	29/12/2011	COMPOSIÇÕES FARMACÊUTICAS CONTENDO POLI-HIDROXI-FULERENO [C60(OH)N] E USO
PI 1105972-9	29/12/2011	DISPOSITIVO DE FIBRA ÓPTICA COM ELEMENTO UNIDIMENSIONAL PARA

		MICROSCOPIA E ESPECTROSCOPIA ÓPTICA DE CAMPO PRÓXIMO
PI 1107185-0	29/12/2011	DISPOSITIVO VAZADO COM EXTREMIDADE UNDIMENSIONAL PARA MICROSCOPIA E ESPECTROSCOPIA ÓPTICA DE CAMPO PRÓXIMO
PI 1105974-5	29/12/2011	DISPOSITIVO E PROCESSO PARA A DETECÇÃO DE LIMIARES AUDITIVOS DE FORMA OBJETIVA COM BASE NO POTENCIAL EVOCADO EM REGIME PERMANENTE
MU 9102997-0	29/12/2011	DISPOSITIVO FLEXÍVEL EMISSOR DE LUZ PARA TRATAMENTO DE FERIDAS CUTÂNEAS
PI 1105966-4	29/12/2011	BIOFILME DE GLICEROL E SEU USO COMO AGENTE REDUTOR DA PRODUÇÃO DE MICOTOXINAS EM PRODUTOS DE ORIGEM VEGETAL
PI 1107181-8	29/12/2011	VERNIZES TRANSPARENTES CONTENDO RESINAS NATURAIS ADITIVADOS COM COMPOSTOS NANOESTRUTURADOS
PI 1107187-7	29/12/2011	COMPOSIÇÃO FARMACÊUTICA ANTIMALÁRICA E USO
PI 1101186-6	29/12/2011	
PI 1107184-2	29/12/2011	ACELERADOR DE PRÓTONS RECIRCULAR E SEUS ARRANJOS
PI 1106235-5	23/12/2011	DISPOSITIVO E PROCESSO PARA A NAVEGAÇÃO ORIENTADA DE VEÍCULOS EM REGIÕES URBANAS E REGIÕES RURAIS
PI 1106236-3	23/12/2011	VESTE BASEADA EM TENSEGRIDADE PARA OTIMIZAÇÃO DE POSTURA E MOVIMENTO HUMANO
PI 1106237-1	23/12/2011	MANOCARREADORES FORMADOS POR COMPLEXOS ANFIFÍLICOS DE ANTIMÔNIO(V), PROCESSO DE OBTENÇÃO, COMPOSIÇÕES FARMACÊUTICAS E USO
PI 1106239-8	23/12/2011	DISPOSITIVO PARA MEDIÇÃO DE PRESSÃO INTRA-ABDOMINAL
PI 1105977-0	22/12/2011	
PI 1105978-8	22/12/2011	BARRA DE ESTERILHAS DE BAMBU COLADAS E SEU PROCESSO DE FABRICAÇÃO
PI 1105922-2	12/12/2011	
PI 1107375-6	07/12/2011	PROCESSO DE PREPARAÇÃO DE SUSPENSÕES/DISPERSÕES DE NANOTUBOS DE CARBONO, PRODUTOS E USOS
PI 1107376-4	07/12/2011	DISPOSITIVO E PROCESSO DE REPRODUÇÃO E DE ATUALIZAÇÃO DE ÁUDIO DIGITAL PARA SISTEMAS DE ESPERA TELEFÔNICA E DE TELEMÍDIA
PI 1106121-9	25/11/2011	
PI 1105841-2	10/11/2011	COMPENSADOR EM SÉRIE DE TENSÃO
PI 1105045-4	10/11/2011	COMPOSIÇÕES FARMACÊUTICAS Á BASE DE ANESTÉSICOS LOCAIS E HIALURONIDADE ASSOCIADA E/OU INCLUÍDA EM CICLODEXTRINAS E SEUS USOS
PI 1106037-9	31/10/2011	COMPOSIÇÕES IMUNOGÊNICAS CONTRA DENGUE VÍRUS, PROCESSO, PRODUTO E USO
PI 1106466-8	27/10/2011	COMPOSIÇÕES FARMACÊUTICAS ANTIVIRAIS CONTENDO EXTRATO, FRAÇÕES E/OU COMPOSTOS ISOLADOS DE ARRABIDAEA PULCHRA E USO
PI 1106463-3	27/10/2011	COMPOSIÇÕES FARMACÊUTICAS PARA O TRATAMENTO DE DISTÚRBIOS GASTRIENTESTINAIS CONTENDO EXTRATO OU FRAÇÃO DE CAMPOMANESIA LINEATIFOLIA
PI 1106615-6	14/10/2011	LIGNINA ENRIQUECIDA, PROCESSO DE OBTENÇÃO E USO
PI 1106426-9	05/10/2011	PROCESSO DE RECUPERAÇÃO DE CIANETO E DE COBRE DE EFLUENTES DE MINÉRIOS DE OURO-COBRE E DE GALVANOPLASTIA
PI 1106425-0	04/10/2011	
PI 1106431-5	30/09/2011	
PI 1106427-7	26/09/2011	
PI 1106429-3	23/09/2011	CEFTIZOXIMA RADIOMARCADA ENCAPSULADA EM LIPOSSOMAS RECOBERTOS COM ALENDRONATO E USO
PI 1106432-3	23/09/2011	COMPOSTOS DERIVADOS DE ALDIMINAS, COMPOSIÇÕES FARMACÊUTICAS E USO
PI 1106424-2	23/09/2011	CATALISADORES À BASE DE TITANATO NANOESTRUTURADO E OXIDANTE, PROCESSO E USO
PI 1106035-2	21/09/2011	
PI 1104699-6	31/08/2011	VERMICULITA MODIFICADA A PARTIR DA DEPOSIÇÃO DE NANOESTRUTURAS DE CARBONO
PI 1104701-1	31/08/2011	COMPÓSITOS ANFIFÍLICOS PARA APLICAÇÃO EM PROCESSOS INDUSTRIAIS
PI 1104700-3	31/08/2011	DISPOSITIVO PORTÁTIL E PROCESSO PARA ESTIMULAÇÃO VISUAL, COM BASE EM DIODO EMISSOR DE LUZ
PI 1104669-4	26/08/2011	
PI 1105461-1	09/08/2011	
PI 1103967-1	04/08/2011	MESA CIRÚRGICA PARA ANIMAIS DE PEQUENO PORTE
C1 0803807-4	29/07/2011	
PI 1102907-2	26/07/2011	
PI 1103325-8	26/07/2011	VACINA CONTRA TENÍASE E CISTICERCOSE

PI 1103387-8	21/07/2011	
PI 1103375-4	21/07/2011	
PI 1103683-4	14/07/2011	COMPLEXO 99M TC-HYNIC-BOMBESINA (7-14) ENCAPSULADO EM LIPOSSOMAS PH-SENSIVEIS E USO
PI 1103680-0	14/07/2011	
PI 1103269-3	07/07/2011	
PI 1103279-0	07/07/2011	PROCESSO DE OBTENÇÃO DE BEADS ACRÍLICOS, PRODUTO E USO
PI 1103394-0	04/07/2011	COMPOSIÇÕES DOMISSANEANTES Á BASE DE ÓLEO DE MACAÚBA E EXTRATOS DE SALVINIA AURICULATA E SEUS DERIVADOS COM AÇÃO TERAPÊUTICA E SEU USO PARA PREVENÇÃO E/OU CONTROLE DE MASTITE BOVINA
PI 1102628-6	30/06/2011	DISPOSITIVO ARTICULADO
PI 1104409-8	30/06/2011	
PI 1103104-2	22/06/2011	
PI 1102071-7	30/05/2011	DISPOSITIVO BLOQUEADOR
C1 0802009-4	20/05/2011	
PI 1102450-0	11/05/2011	
PI 1102449-6	09/05/2011	PROCESSO DE OBTENÇÃO DE FERRO ESPONJA E DE FERRO GUSA
PI 1102443-7	06/05/2011	
PI 1102202-7	02/05/2011	
PI 1101935-2	15/04/2011	
PI 1101627-2	15/04/2011	
PI 1101656-6	15/04/2011	
PI 1101230-7	15/04/2011	
PI 1101916-6	15/04/2011	
PI 1101682-5	15/04/2011	PROCESSO PARA RECUPERAÇÃO DE CATALISADORES DE COMPLEXOS DE METAIS DE TRANSIÇÃO
PI 1106308-4	28/03/2011	
PI 1101322-2	04/03/2011	COMPOSIÇÕES FARMACÊUTICAS ANTIFÚGICAS CONTENDO EXTRATOS E/OU ÓLEO ESSENCIAL DE SCHINUS TEREBINTHIFOLIUS
PI 1101323-0	04/03/2011	
PI 1100419-3	18/02/2011	PROCESSO DE RESTAURAÇÃO CROMÁTICA DIGITAL
PI 1100489-4	16/02/2011	DISPOSITIVO ELETROMECÂNICO PARA EQUIPAMENTOS DE ATIVIDADE FÍSICA
PI 1100429-0	16/02/2011	
PI 1005636-0	30/12/2010	
PI 1005050-7	30/12/2010	PRECURSORES DENDRIMÉRICOS TRIS- E TETRA-FUNCIONALIZADOS, COM ATIVIDADE ANTIMICROBIANA E ANTITUMORAL E PROCESSO DE PREPARAÇÃO
PI 1010491-7	30/12/2010	PRECURSORES DENDRÍMÉRICOS BIS-FUNCIONALIZADOS, COM ATIVIDADE ANTIMICROBIANA E ANTITUMORIAL E PROCESSO DE PREPARAÇÃO
PI 1005474-0	30/12/2010	PRECURSORES DENDRIMÉRICOS BIS-DFUNCIONALIZADOS COM GRUPOS TIPO AMIDINA E BIOISÓSTEROS, COM ATIVIDADE ANTIMICROBIANA E ANTITUMORAL E PROCESSO DE PREPARAÇÃO
PI 1013448-4	29/12/2010	
PI 1005020-5	23/12/2010	
PI 1010500-0	23/12/2010	
PI 1005478-2	23/12/2010	
PI 1005622-0	23/12/2010	
PI 1015495-7	23/12/2010	
PI 1005216-0	20/12/2010	COMPOSTOS DE COORDERNAÇÃO METAL-SACARÍDEO PARA TERAPIA E DIAGNÓSTICO
PI 1005217-8	20/12/2010	DISPOSITIVO PARA AVALIAR E TREINAR A FORÇA DA LÍNGUA
PI 1005625-4	13/12/2010	PEPTÍDEOS RECOMBINANTES DE CORYNEBACTERIUM PSEUDOTUBERCULOSIS, COMPOSIÇÃO VACINAL E KIT PARA TESTE IMUNODIAGNÓSTICO DE LINFADENITE CASEOSA
PI 1005619-0	13/12/2010	VERNIZ POLIMÉRICO DE PRÓPOLIS
PI 1005033-7	13/12/2010	PEPTÍDEOS RECOMBINANTES, MÉTODO E KIT PARA TESTE IMUNODIAGNÓSTICO DE LEISHMANIOSE VISCERAL
PI 1013447-6	29/11/2010	
PI 1003745-4	18/10/2010	
PI 1004737-9	18/10/2010	PROCESSO DE CONVERSÃO DO REJEITO LAMA VERMELHA EM MATERIAIS ANFIFÍLICOS E SUAS APLICAÇÕES NA FORMA E RECUPERAÇÃO DE MATERIAL EMULSIFICANTE
PI 1004140-0	15/10/2010	MESA FUNCIONAL
PI 1005539-8	07/10/2010	COMPOSIÇÃO FARMACÊUTICA CONTENDO FRAÇÃO DE APITOXINA E USO

PI 1003893-0	05/10/2010	COMPOSIÇÃO SOLUBILIZANTE DE AMOSTRAS INORGÂNICAS E ORGÂNICAS, DE ORIGEM ANIMAL, VEGETAL E HUMANA
PI 1005054-0	29/09/2010	VACINA DE DOSE ÚNICA CONTRA BOTULISMO
PI 1003345-9	22/09/2010	
C1 0105499-6	22/09/2010	PROCESSO DE OBTENÇÃO DE NANOCOMPÓSITOS FERRITA/CICLODEXTRINA E USO COMO DISPOSITIVOS DE DESCONTAMINAÇÃO MAGNETICAMENTE DIRIGÍVEL
PI 1003415-3	17/09/2010	MÉTODO E KIT PARA AVALIAÇÃO DE ATIVIDADE ESFINGOMIELINÁSICA
PI 1006644-6	17/09/2010	CEPA ATENUADA DE CORYNEBACTERIUM PSEUDOTUBERCULOSIS E VACINA VIVA CONTRA LINFADENITE CASEOSA
PI 1005908-3	02/09/2010	IMUNOMODULAÇÃO ATRAVÉS DE CEPA BACTERIANA RECOMBINANTE
PI 1005909-1	02/09/2010	
PI 1002916-8	25/08/2010	CONEXÃO NERVURADA PARA TUBOS DE BAMBU
PI 1005052-3	25/08/2010	
PI 1006646-2	13/08/2010	COMPOSIÇÃO IMUNOGÊNICA PARA VACINA E KIT PARA TESTE IMUNODIAGNÓSTICO DE LEISHMANIOSE VISCERAL
PI 1002917-6	13/08/2010	PROCESSO DE RECUPERAÇÃO DE CIANETO DE ZINCO A PARTIR DE SOLUÇÕES CIANETADAS
PI 1003050-6	04/08/2010	
PI 1003054-9	04/08/2010	
PI 1004465-5	04/08/2010	SIMULADORES ANTROPOMÓRFICOS E ANTROPOMÉTRICOS DE ESTRUTURAS, TECIDOS E ORGÃOS DO CORPO HUMANO
PI 1005885-0	14/07/2010	PROCESSO DE PREPARAÇÃO, APLICAÇÃO E RECUPERAÇÃO DE MATERIAL ABSORVENTE PARA COMPOSTOS OU MISTURAS APOLARES
PI 1002523-5	14/07/2010	PROCESSO DE SÍNTESE DE COMPLEXOS DE COBRE COM ATIVIDADE ANTITUMORAL
PI 1006647-0	07/07/2010	COMPOSIÇÃO IMUNOGÊNICA PARA PARACOCCIDIOIDOMICOSE UTILIZANDO AS PROTÉINAS PB40R E PB27R
PI 1006645-4	07/07/2010	
PI 1003297-5	07/07/2010	COMPOSIÇÕES FARMACÊUTICAS ANTINEOPLÁSICAS CONTENDO COMPOSTOS NITROIMIDAZÓIS SUBSTITUÍDOS
PI 1010493-3	07/07/2010	COMPOSIÇÕES FARMACÊUTICAS ANTINEOPLÁSICAS CONTENDO COMPOSTOS NITROAROMÁTICOS SUBSTITUÍDOS
PI 1002010-1	30/06/2010	CHAPA DE AÇO LAMINADA A FRIO E RECOZIDA COM EFEITO TWIP E PROCESSO DE OBTENÇÃO
PI 1013481-6	14/06/2010	
PI 1002600-2	14/06/2010	CATALISADOR DE METAL DE TRANSIÇÃO OU DE ÓXIDO DE METAL DE TRANSIÇÃO SUPORTADO EM CONCRETO CELULAR AUTOCLAVADO
PI 1002059-4	11/06/2010	
PI 1001940-5	08/06/2010	OBTENÇÃO DE MISTURAS POLIMÉRICAS CONTENDO NANOCOMPÓSITOS, DEGRADÁVEIS POR VIA MICROBIOLÓGICA
PI 1004450-7	31/05/2010	MÉTODO E SISTEMA PARA PURIFICAÇÃO E FUNCIONALIZAÇÃO DE NANOTUBOS DE CARBONO VIA RADIAÇÃO MICROONDAS
PI 1000093-3	25/05/2010	PROCESSO PARA A PREPARAÇÃO DE SISTEMA DE VETORIZAÇÃO PASSIVA DE FÁRMACOS LIPOFÍLICOS NA FORMA DE POLÍMERO ENXERTADO DE QUITOSANA
PI 1015900-2	21/05/2010	
PI 1002067-5	11/05/2010	
PI 1001702-0	07/05/2010	DISPOSITIVOS E MÉTODO PARA TRAQUEOSTOMIA PERCUTÂNEA
PI 1001699-6	07/05/2010	PROCESSO PARA A PREPARAÇÃO DE EMULSÃO AQUOSA VINIL ACRÍLICA CONTENDO NANOCOMPONENTES INORGÂNICOS, PRODUTO E USO
PI 1013470-0	30/04/2010	
PI 1004449-3	30/04/2010	KIT PARA TESTAR A POTÊNCIA NEUTRALIZANTE DE SORO ANTI-BOTHRÓPICO IN VITRO
PI 1001164-1	26/04/2010	COMPOSIÇÃO FARMACÊUTICA CONTENDO DERIVADOS ACILADOS DE MANGIFERINA E USO
PI 1005867-2	09/04/2010	ARMADILHA PARA CAPTURA DE FLEBOTOMÍNEOS E SEU USO
PI 1000790-3	31/03/2010	USO DE PORFIRINAS SUBSTITUÍDAS COMO INDICADOR FLUORESCENTE DE NANOPARTÍCULAS E NANOMATERIAIS
PI 1003231-2	15/03/2010	EQUIPAMENTO BINOCULAR DIGITAL PARA A VERIFICAÇÃO DA ACUIDADE VISUAL E DO LIMIAR AUDITIVO
C1 0903159-6	05/03/2010	MATERIAS CERÂMICOS PARA ABSORÇÃO DE GASES ÁCIDOS, PROCESSO DE PREPARAÇÃO DOS MESMO E PROCESSO CÍCLICO PARA A ABSORÇÃO E REGENERAÇÃO DE GASES ÁCIDOS
PI 1000664-8	03/03/2010	MÉTODO E KIT PARA DIAGNÓSTIGO DE LEISHMANIOSE VISCERAL
PI 1001703-8	26/02/2010	
PI 1000583-8	25/02/2010	CICLO ERGÔMETRO COM CONTROLE DE TORQUE E VELOCIDADE

PI 1002119-1	23/02/2010	PROCESSO PARA PRODUÇÃO DE HIDROGÊNIO GASOSO A PARTIR DA FRAGMENTAÇÃO MOLECULAR DA ÁGUA
PI 1002842-0	23/02/2010	MONITORAMENTO EPIDEMIOLÓGICO DE ENDEMIAS ATRAVÉS DE PROCESSO PARA DETECÇÃO DE PATÓGENOS HUMANOS EM VETORES CAPTURADOS
PI 0912489-6	30/12/2009	CONJUGADO DE NANOTUBOS DE CARBONO PARA INIBIR ESTRUTURAS DE INFECÇÃO DE PATÓGENOS EM VEGETAIS
PI 0905584-3	23/12/2009	EXTRATO E FRAÇÃO PADRONIZADOS DE CASCAS DE ASPIDOSPERMA PARVIFOLIUM E/OU ULEÍNA E SUA COMPOSIÇÃO FARMACÊUTICA
PI 0905543-6	16/12/2009	PROCESSO PARA A OBTENÇÃO DE FIBRAS INSOLÚVEIS, PRODUTO DERIVADO E USOS
PI 0905520-7	16/12/2009	PROCESSO DE SÍNTESE DE ALDEÍDOS DERIVADOS DE MONOTERPENOS PARA-MENTÊNICOS ATRAVÉS DA REAÇÃO DE HIDROFORMILAÇÃO, PRODUTO E USO
PI 0912487-0	16/12/2009	EQUIPAMENTO PARA EXERCÍCIO FÍSICO COM VIBRAÇÃO APLICADA NO SENTIDO OPOSTO AO ENCURTAMENTO MUSCULAR
PI 0905530-4	16/12/2009	PROCESSO DE SÍNTESE DE POLICARBONATOS SULFONADOS, PRODUTO E USO
PI 0905585-1	16/12/2009	PROCESSO DE SÍNTESE, EM UMA ÚNICA ETAPA DE ACETAIS DERIVADOS DE MONOTERPENOS, PRODUTO E USO
PI 0913254-6	04/12/2009	DISPOSITIVO PARA DISGNÓSTICO DE FALHAS EM TRANSFORMADORES DE DISTRIBUIÇÃO E MÉTODO
PI 0905482-0	04/12/2009	PROCESSO E KIT DE IDENTIFICAÇÃO E DIFERENCIAÇÃO MOLECULAR DE DUAS ESPÉCIES CRÍPTICAS DE ROEDORES SILVESTRES DO GÊNERO AKODON (RODENTIA, CRICETIDAE)
PI 0905029-9	27/11/2009	DISPOSITIVO MAGNÉTICO ORTODÔNTICO E SEU USO
PI 0904754-9	20/11/2009	RADIOFÁRMACO E SUAS COMPOSIÇÕES PARA CINTILOGRAFIA DE SÍTIOS INFLAMATÓRIOS E INFECCIOSOS
PI 0904765-4	10/11/2009	DISPOSITIVO ELETROCAUTÉRIO ESPECÍFICO PARA HEPATOTOMIA POTENCIALIZADO COM SOLUÇÃO IÔNICA
PI 0904752-2	06/11/2009	PROCESSO DE PREPARAÇÃO DE UM SISTEMA DE LIBERAÇÃO CONTROLADA DE CLOREXIDINA E SEUS COMPOSTOS DE INCLUSÃO, A PARTIR DE CIMENTO RESINOSO, PRODUTO E USO
PI 0904036-6	07/10/2009	PROCESSO DE PRODUÇÃO DE BIOPRODUTOS ELABORADOS COM COMPONENTES ISOLADOS DE APITOXINA DE ABELHAS APIS MELLIFERA, COMPOSIÇÃO E USO
PI 0904098-6	02/10/2009	PROCESSO DE OBTENÇÃO DE PARTÍCULAS MAGNÉTICAS RECOBERTAS POR CARBONO
PI 0919816-4	25/09/2009	USO COMPOSTOS BENZOXAZÓLICOS NO TRATAMENTO DE MALÁRIA
PI 0912486-1	17/09/2009	MÓDULO DE INSTRUMENTAÇÃO, CONTROLE E AUTOMAÇÃO
PI 0903675-0	09/09/2009	PROCESSO PARA RECUPERAÇÃO SELETIVA DE CIANOCOMPLEXOS EM UMA RESINA DE TROCA IÔNICA
PI 0903718-7	04/09/2009	DISPOSITIVO DE IMPLANTE NO OSSO REVESTIDO POR NANOTUBOS DE CARBONO FUNCIONALIZADOS COM ÁCIDO HIALURÔNICO E USO
MU 8902063-4	04/09/2009	SISTEMA DE ATENUAÇÃO DE RUÍDO PARA VÁLVULAS DE CONTROLE ELETRO-ELETRÔNICO
PI 0903266-5	31/08/2009	MÉTODO E SONDA DE ASPIRAÇÃO ENDOBRONQUIAL DE SECREÇÕES
PI 0903174-0	24/08/2009	MÉTODO DE OBTENÇÃO DA ACETOFENONA E DA 2-ACETONAFTONA
PI 0904246-6	14/08/2009	
PI 0902643-6	30/07/2009	MÉTODO PARA REDUÇÃO DO ESTÍMULO SEXUAL DE ANIMAIS VISANDO AUMENTO DA PRODUÇÃO DE CARNE
PI 0902859-5	22/07/2009	MÉTODO DIAGNÓSTICO PARA DETECÇÃO DE DOENÇA CELÍACA ATRAVÉS DE MINISEQÜENCIAMENTO DE HAPLÓTIPOS DE HLA E KITS DE DIAGNÓSTICO
PI 0902933-8	20/07/2009	PROCESSO PARA OBTENÇÃO DE PROTEÍNAS HIDROLISADAS DO SORO DE LEITE SEM SABOR AMARGO E COM ELEVADO VALOR NUTRICIONAL, SEUS PRODUTOS E USOS
PI 0902539-1	20/07/2009	DISPOSITIVO E MÉTODO PARA IDENTIFICAÇÃO DE ARRITMIAS CARDÍACAS E ALTERAÇÕES ELETROLÍTICAS A PARTIR DA ANÁLISE DO ELETROCARDIOGRAMA
PI 0902278-3	30/06/2009	FORMULAÇÃO ANTIPARASITÁRIA, SUA FORMA FARMACÊUTICA E USO
PI 0902242-2	30/06/2009	COMPOSIÇÃO COMPREENDENDO AGONISTA DO RECEPTOR MAS DA ANGIOTENSINA (1-7) E SEU USO PARA A MODULAÇÃO DA RESPOSTA INFLAMATÓRIA E/OU ANALGÉSICA
PI 0902240-6	17/06/2009	PROCESSO DE OBTENÇÃO DE RECOBRIMENTOS ESPECIAIS A PARTIR DE PROCESSOS QUÍMICOS COM GLICERINA, ESPECIALMENTE A GLICERINA SUBPRODUTO DO BIODIESEL
PI 0902264-3	17/06/2009	DISPOSIÇÃO CONSTRUTIVA PARA SISTEMA DE AMORTECIMENTO
PI 0911216-2	22/05/2009	MÉTODO DE DIAGNÓSTICO DA PRÉ-ECLAMPSIA (P-EC) EM UMA MULHER GRÁVIDA

PI 0901970-7	22/05/2009	COMPOSIÇÃO DE ATRAENTE SINTÉTICO PARA OVIPOSIÇÃO DE FÊMEAS GRÁVIDAS DE AEDES AEGYPTI
PI 0903587-7	22/05/2009	PROCESSO DE PIRÓLISE DE BIOMASSA E RESÍDUOS SÓLIDOS EM MÚLTIPLOS ESTÁGIOS
PI 0901877-8	19/05/2009	PROCESSO DE OBTENÇÃO DE NANOAGREGADOS NA BASE DOS ANTAGONISTAS DO RECEPTOR AT1 COM CÁTIONS METÁLICOS OU CÁTIONS ORGÂNICOS, FORMULAÇÕES, E USOS
MU 8901900-8	19/05/2009	BISTURI CIRCULAR PARA DISSECAÇÃO ANIMAL POR SONDAGEM
PI 0924581-2	05/05/2009	SEQUENCIAS GENETICAMENTE MODIFICADAS DE ANTIGENOS DE PLASMODIUM VIVAX, COMPOSICOES VACINAIS CONTENDO PROTEINAS RECOMBINANTES E VIRUS RECOMBINANTES QUE EXPRESSAM ESSES ANTIGENOS E METODO DE VACINACAO DOSEREFORCO CONTRA MALARIA
PI 0905068-0	30/03/2009	DISPOSITIVO FOTOBIOMODULADOR PARA PREVENÇÃO E TRATAMENTO DE TRAUMAS MAMILARES E LESÕES NÃO-INFECCIOSAS DOS TETOS
PI 0901192-7	20/03/2009	APARELHO FONOAUDIOLÓGICO PARA GANHO DA FORÇA LINGUAL
PI 0903373-4	20/03/2009	PROCESSO DE OLIGOMERIZAÇÃO, CO-OLIGOMERIZAÇÃO E CO-TELOMERIZAÇÃO DO ISOPRENO E/OU MIRCENO PARA OBTENÇÃO DE ANÁLOGOS A DITERPENOS E SESQUITERPENOS
PI 0903159-6	13/03/2009	MATERIAIS CERÂMICOS PARA ABSORÇÃO DE GASES ÁCIDOS, PROCESSO DE PREPARAÇÃO DOS MESMOS E PROCESSO PARA A ABSORÇÃO E REGENERAÇÃO DE CO2
PI 0901141-2	13/03/2009	NANOCOMPÓSITO DE GESSO COM NANOESTRUTURAS DE CARBONO, SEU MÉTODO DE OBTENÇÃO E USOS RELACIONADOS
MU 8901626-2	30/01/2009	DISPOSITIVO DE AUXÍLIO À MANIPULAÇÃO DE EMBALAGENS COM TAMPAS DE ANEL PUXADOR E TAMPAS DE ROSCAS
PI 0901194-3	30/01/2009	MÉTODO DE PRODUÇÃO DE SUPRESSOR DE POEIRA OBTIDO A PARTIR DA MODIFICAÇÃO QUÍMICA DO GLICEROL, SEU PRODUTO E USO DO GLICEROL PARA A PRODUÇÃO DO SUPRESSOR DE POEIRA
MU 8901693-9	30/01/2009	FÓRCEPS PARA EXTRAÇÃO DENTÁRIA
PI 0902936-2	30/01/2009	SISTEMA AUTO-RECONFIGURÁVEL DE CÉLULAS SOLARES FOTOVOLTAICAS E DEMAIS FOTODETECTORES
PI 0805736-2	23/12/2008	REATOR UASB COM DUPLO ESTÁGIO DE COLETA DE BIOGÁS
PI 0805786-9	19/12/2008	RESSONADOR ELETRÔNICO DE VOLUME VARIÁVEL PARA AUMENTO DE EFICIÊNCIA VOLUMÉTRICA DE MOTORES DE COMBUSTÃO INTERNA E MÉTODO PARA CONTROLE DE VOLUME DO RESSONADOR
PI 0805789-3	19/12/2008	ESPUMA FLEXÍVEL DE POLIURETANO CONTENDO O REJEITO ADVINDO DO PROCESSO BAYER, SEU PROCESSO DE OBTENÇÃO E USO DO REJEITO
PI 0805778-8	04/12/2008	DISPOSITIVO PARA BRAQUITERAPIA OCULAR E MÉTODO
PI 0809391-1	25/11/2008	MÉTODO DIAGNÓSTICO ESPÉCIE-ESPECÍFICO DE BRUCELLA OVIS E KIT DIAGNÓSTICO PARA DETECÇÃO DE BRUCELLA OVIS ATRAVÉS DE REAÇÃO EM CADEIA DA POLIMERASE (PCR)
PI 0805748-6	25/11/2008	VÁLVULA DE RETENÇÃO DE SENTIDO E VAZÃO REGULÁVEIS
PI 0804696-4	09/10/2008	PLATAFORMA PARA EXECUÇÃO E AVALIAÇÃO DE TREINOS DE PERTURBAÇÃO DO EQUILÍBRIO
PI 0805967-5	08/09/2008	METODOLOGIA DE AVALIAÇÃO DE CITOTOXIDADE IN VITRO DE MOLÉCULAS E SUBSTÂNCIAS ATRAVÉS DA TECNOLOGIA DE SINALIZAÇÃO CELULAR, SEU USO E KIT DIAGNÓSTICO
PI 0804859-2	22/08/2008	PEPTÍDEOS SINTÉTICOS PARA A OBTENÇÃO DE POLÍMERO PROTEÍCO PARA IMUNIZAÇÃO CONTRA LEISHMANIOSE, PRODUTOS E SEUS USOS
PI 0803807-4	21/08/2008	PROCESSO DE OBTENÇÃO DE FILME MULTICAMADA DE LIBERAÇÃO CONTROLADA DE FÁRMACOS LIPOFÍLICOS E PRODUTO
PI 0802850-8	06/08/2008	USO DO OSU 03012 E DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES DOLOROSAS
PI 0802832-0	22/07/2008	PROCESSO PARA A RECUPERAÇÃO DE CIANETO E COBRE
PI 0802806-0	22/07/2008	USO DO PEPTÍDEO ANGIOTENSINA-(1-7), SEUS ANÁLOGOS, AGONISTAS OU DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES DOLOROSAS
PI 0802789-7	14/07/2008	CARRO PARA COLETA DE RESÍDUOS SÓLIDOS URBANOS COM SISTEMA DE MOTORIZAÇÃO
PI 0802834-6	12/06/2008	PROCESSO DE FABRICAÇÃO DE SEMENTE RADIOATIVA PARA BRAQUITERAPIA ATRAVÉS DA ATIVAÇÃO NEUTRÔNICA DE UMA MATRIZ DE CARBONO AMORFO DOPADO COM XENÔNIO-124 E PRODUTO
PI 0802801-0	10/06/2008	MÉTODO DE OBTENÇÃO DO ISOLONGIFOLENO PELA ISOMERIZAÇÃO DO LONGIFOLENO UTILIZANDO UM ÁCIDO
PI 0802800-1	10/06/2008	DISPOSITIVO E MÉTODO NÃO INVASIVO PARA DETERMINAÇÃO DAS CONCENTRAÇÕES DE METAIS NO PLASMA SANGÜINEO
MU 8801292-1	06/06/2008	ARMADILHA MODIFICADA PARA CAPTURA DO PRINCIPAL MOSQUITO VETOR DA MALÁRIA ANOPHELES DARLINGI
PI 0802804-4	02/06/2008	APARELHO FONOAUDIOLÓGICO PARA AVALIAÇÃO DA FORÇA DOS LÁBIOS

PI 0802004-3	19/05/2008	EXTRATO E FRAÇÃO PADRONIZADOS DE FOLHAS DE HANCORNIA SPECIOSA E SUA COMPOSIÇÃO FARMACÊUTICA
PI 0802814-1	15/05/2008	ARGILAS HIDROFOBIZADAS E PROCESSO DE HIDROFOBIZAÇÃO PARA PRODUÇÃO DE ABSORVENTES DE CONTAMINANTES ORGÂNICOS
PI 0802009-4	30/04/2008	FORMULAÇÃO FARMACÊUTICA À BASE DE ALOE VERA PARA CAPEAMENTO DIRETO EM POLPA DENTÁRIA E COMO MATRIZ PARA TRANSPORTE DE FÁRMACOS E/OU CÉLULAS
PI 0802018-3	30/04/2008	PROCESSO DE SÍNTESE CONTÍNUA E EM LARGA ESCALA DE NANOTUBOS DE CARBONO SOBRE O CLÍNQUER DE CIMENTO E PRODUTOS NANOESTRUTURADOS
PI 0802005-1	17/04/2008	MÉTODO DE HIDROAMINOMETILAÇÃO DO ACENAFTILENO E SEUS DERIVADOS
PI 0802006-0	17/04/2008	DISPOSITIVO DE CONTROLE E MONITORAÇÃO DA PRESSÃO DE VÁCUO EM SISTEMAS DE ASPIRAÇÃO DE SECREÇÕES BIOLÓGICAS
PI 0801418-3	01/04/2008	DISPOSITIVO FOTOBIOMODULADOR PARA TRATAMENTO DE TRAUMAS MAMILARES
PI 0801430-2	26/03/2008	DISPOSITIVO ESTRUTURADOR DE ROTINA
PI 0801542-2	18/03/2008	MODIFICAÇÃO, REDUÇÃO DA ESTRUTURA PRIMÁRIA E SÍNTESE DE PEPTÍDEOS HIPOTENSIVOS PRESENTES NO VENENO DE ESCORPIÃO PARA OTIMIZAÇÃO NA UTILIZAÇÃO DOS MESMOS COMO FÁRMACOS
PI 0801417-5	13/03/2008	PROCESSO PARA OBTENÇÃO DE COMPOSIÇÃO FARMACÊUTICA DE RETINÓIDES, PRODUTO DERIVADO DE RETINÓIDES E USO
PI 0800585-0	13/02/2008	PEPTÍDEO DES-[ASP1]-[ALA1]- AGONISTA DA ANGIOTENSINA-(1-7) E COMPOSIÇÕES FARMACÊUTICAS PARA TRATAMENTO DE DOENÇAS
PI 0800606-7	13/02/2008	USO DE ANGIOTENSINA-(1-7)-ß-HPCD, ANÁLOGOS OU DERIVADOS PARA O TRATAMENTO DE CONDIÇÕES CARDÍACAS
PI 0800788-8	31/01/2008	PROCESSO PARA OBTENÇÃO DE DERIVADOS DE MAG-3 E PRODUTO
PI 0800601-6	31/01/2008	MÉTODO DE VACINAÇÃO DOSE-REFORÇO PARA MALÁRIA QUE UTILIZA VÍRUS RECOMBINANTES E COMPOSIÇÃO VACINAL
PI 0800596-6	31/01/2008	MÉTODO PARA A POTENCIALIZAÇÃO DA FUNÇÃO ERÉTIL ATRAVÉS DO USO DAS COMPOSIÇÕES FARMACÊUTICAS DE TOXINA Tx2-6 DA ARANHA PHONEUTRIA NIGRIVENTER
PI 0800492-7	31/01/2008	RADIOFÁRMACO E SUA COMPOSIÇÃO FARMACÊUTICA PARA TRATAMENTO E DIAGNÓSTICO DE CÂNCER
PI 0806230-7	24/01/2008	COMPOSIÇÕES FARMACÊUTICAS, MÉTODO PARA TRATAR A DISFUNÇÃO ERÉTIL E MÉTODO PARA RESTAURAR A CAPACIDADE DE EREÇÃO
C1 0206336-0	17/01/2008	COMPLEXOS SUPRAMOLECULARES DE ALTA ESTEQUIOMETRIA EM SISTEMAS NANOAGREGADOS CONSTITUÍDOS POR CLOREXIDINA OU TETRACICLINA INCLUÍDOS EM CICLODEXTRINA
PI 0800485-4	17/01/2008	VETORES VIRAIS RECOMBINANTES, COMPOSIÇÃO VACINAL PARA LEISHMANIOSE E MÉTODO PROFILÁTICO/TERAPÊUTICO DE VACINAÇÃO PARA LEISHMANIOSE
PI 0801906-1	15/01/2008	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO TS DE TRYPANOSOMA CRUZI, PROTEÍNA RECOMBINANTE TS E VÍRUS GENETICAMENTE MODIFICADOS QUE EXPRESSAM O ANTÍGENO TS RECOMBINANTE
PI 0806285-4	15/01/2008	SEQUÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO ASP-2 DE TRYPANOSOMA CRUZI, PROTEÍNA RECOMBINANTE ASP-2 E VÍRUS GENETICAMENTE MODIFICADOS QUE EXPRESSAM O ANTÍGENO ASP-2 RECOMBINANTE
PI 0800605-9	15/01/2008	PROCESSO DE SÍNTESE DE SISTEMAS NANOESTRUTURADOS HÍBRIDOS: NANOTUBOS DE CARBONO-NANOPARTÍCULAS METÁLICAS
PI 0800552-4	15/01/2008	SISTEMA DE AMORTECIMENTO PARA SOLADOS DE CALÇADOS
PI 0705593-5	22/11/2007	MÉTODO DE QUANTIFICAÇÃO DE AMINAS EM RESÍDUOS DE FLOTAÇÃO DE MINÉRIO DE FERRO
PI 0705586-2	08/11/2007	USO DE ANTAGONISTAS DO RECEPTOR FATOR DE ATIVAÇÃO PLAQUETÁRIA PARA O TRATAMENTO INFECÇÕES CAUSADAS PELO VÍRUS INFLUENZA
PI 0705990-6	26/10/2007	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO MSP-1 DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE MSP-1 E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO MSP-1 RECOMBINANTE
PI 0706004-1	26/10/2007	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (MT) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP RECOMBINANTE
PI 0705880-2	26/10/2007	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (PA) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP RECOMBINANTE

PI 0704730-4	26/10/2007	SEQÜENCIA GENETICAMENTE MODIFICADA DO ANTÍGENO DBP (AM) DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE DBP E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO DBP RECOMBINANTE
PI 0706003-3	26/10/2007	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO AMA-1 DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE AMA-1 E ADENOVÍRUS GENETICAMENTE MODIFICADO QUE EXPRESSA O ANTÍGENO AMA-1 RECOMBINANTE
PI 0705874-8	26/10/2007	SEQÜÊNCIA GENETICAMENTE MODIFICADA DO ANTÍGENO CS DE PLASMODIUM VIVAX, PROTEÍNA RECOMBINANTE CS E VÍRUS GENETICAMENTE MODIFICADOS QUE EXPRESSAM O ANTÍGENO CS RECOMBINANTE
PI 0705992-2	25/09/2007	PROCESSO PARA FABRICAÇÃO DE LENTES OFTÁLMICAS ATRAVÉS DE MOLDES DE SILÍCIO
PI 0703456-3	25/09/2007	INICIADORES E KIT PARA DIAGNÓSTICO
PI 0705472-6	11/09/2007	PROCESSO DE DESTERPENAÇÃO QUÍMICA PELA OXIDAÇÃO CATALÍTICA DO ÓLEO ESSENCIAL DE CITRUS E PRODUTO
PI 0705569-2	11/09/2007	MÉTODO PARA MEDIÇÃO E MONITORAMENTO
PI 0715604-9	21/08/2007	MAMÍFERO NÃO HUMANO RECOMBINANTE, CÉLULA, CULTURA DE CÉLULAS, MÉTODO DE TRIAR UM COMPOSTO PARA ATIVIDADE COLINÉRGICA OU ATIVIDADE NO TRATAMENTO DE UM DISTÚRBIO DE NEUROTRANSMISSÃO COLINÉRGICA, E, USO DE UM MAMÍFERO
PI 0705869-1	14/08/2007	MEIO SUPORTE PARA FILTRO BIOLÓGICO PERCOLADOR E MÉTODO
PI 0705590-0	07/08/2007	USO DE COMPOSIÇÃO FARMACÊUTICA CONTENDO CROTOXINA PARA O TRATAMENTO DE DISTONIAS MUSCULARES
PI 0705591-9	02/08/2007	COMPOSIÇÃO FARMACÊUTICA E MÉTODO PARA O TRATAMENTO DE LESÕES TUMORAIS CUTÂNEAS E OUTRAS DERMATOSES DE MAMÍFEROS POR TERAPIA FOTODINÂMICA
PI 0705998-1	02/08/2007	APARELHO PARA EXERCÍCIOS DA MÃO
PI 0705519-6	17/07/2007	LIPOSSOMAS pH-SENSÍVEIS DE CISPLATINA E OUTROS AGENTES ANTINEOPLÁSICOS E SEU PROCESSO DE OBTENÇÃO
PI 0705922-1	16/07/2007	PROCESSO DE FABRICAÇÃO DE GRELHAS DE MADEIRA UTILIZADAS COMO TAMPAS DE BOCAS-DE-LOBO
PI 0705152-2	09/07/2007	MEDIÇÃO DO TEMPERAMENTO ANIMAL
PI 0705589-7	09/07/2007	COMPOSIÇÕES FARMACÊUTICAS DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS E/OU SEUS DERIVADOS E PRODUTOS DESSAS COMPOSIÇÕES E USOS COMO ANTICONVULSIVANTES, ANTINOCICEPTIVOS ANTIINFLAMATÓRIOS, E NA TERAPIA ANGIOGÊNICA
PI 0705596-0	09/07/2007	PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO
C1 0200751-7	02/07/2007	PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO
PI 0706073-4	28/06/2007	PROCESSO DE OBTENÇÃO DO MENTOL UTILIZANDO UM CATALISADOR SÓLIDO BIFUNCIONAL DE HETEROPOLIÁCIDO E METAL
PI 0705997-3	21/06/2007	MÉTODO PARA MEDIÇÃO E MONITORAMENTO DO MÓDULO E ÂNGULO DE UMA IMPEDÂNCIA CONECTADA EM UM SISTEMA ELÉTRICO E MEDIÇÃO E MONITORAMENTO DA FREQÜÊNCIA DESTE SISTEMA ELÉTRICO
MU 8702514-0	15/06/2007	DIFUSOR SONORO
PI 0705535-8	15/06/2007	SEQÜÊNCIAS GENETICAMENTE MODIFICADAS DOS ANTÍGENOS TS E ASP-2 DE TRYPANOSOMA CRUZI, CONSTRUCTOS GENÉTICOS QUE CONTÉM TS OU ASP-2 E ADENOVÍRUS GENETICAMENTE MODIFICADOS QUE CODIFICAM TS OU ASP-2
MU 8702491-8	15/06/2007	ABSORVEDOR SONORO
MU 8702492-6	15/06/2007	BRISE SOLEIL
MU 8702657-0	15/06/2007	MÁQUINA DE ENSAIO MECÂNICO DE MÚLTIPLOS ROLETES DE CORREIA TRANSPORTADORA
PI 0706186-2	15/06/2007	PREPARAÇÃO DE NANOCOMPÓSITOS PARA USO BIOMÉDICO E PRODUTO
PI 0705918-3	01/06/2007	DISPOSITIVO PARA MEDIÇÃO DA FORÇA ISOMÉTRICA MULTIDIRECIONAL DOS MÚSCULOS DO ASSOALHO PÉLVICO
PI 0701561-5	01/06/2007	CABO COM SEGMENTOS ELASTICOS
PI 0701322-1	11/05/2007	PROCESSO PARA A OBTENÇÃO DE METAIS E COMPOSTOS BASEADOS EM METAIS MICRO OU NANOESTRUTURADOS
PI 0702738-9	10/05/2007	PROCESSO DE PREPARAÇÃO DE UM DISPOSITIVO DE LIBERAÇÃO CONTROLADA DE AGENTES ANTIBIÓTICOS OU ANTISSÉPTICOS INCLUÍDOS OU ASSOCIADOS EM CICLODEXTRINA EM UMA BASE DE GUTA-PERCHA, PRODUTOS E USOS
PI 0702739-7	10/05/2007	SEGMENTOS E FIOS POLIMÉRICO-CERÂMICOS DE As-76 PARA IMPLANTES

		INTERSTICIAIS RADIOTERÁPICOS POR EMISSÃO DE PARTÍCULAS BETAS
PI 0702676-5	09/04/2007	MÉTODO PARA EXTRAÇÃO DE ÓLEO, PRODUTO E USOS
PI 0701040-0	09/04/2007	PROCESSO DE CONSTRUÇÃO DE UM CASSETE DE EXPRESSÃO GENÉTICA PARA A TRANSFORMAÇÃO DE BACTÉRIAS PARA USO VACINAL E SEUS PRODUTOS
PI 0702734-6	02/04/2007	TOXINA PhKv, cDNA DO GENE DA TOXINA PhKv, COMPOSIÇÕES FARMACÊUTICAS CONTENDO A TOXINA PhKv, PROCESSO PARA SUA OBTENÇÃO, PROCESSO PARA OBTENÇÃO DO cDNA, E PRODUTO
PI 0700940-2	02/03/2007	PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE LIPOSSOMAS PH-SENSÍVES RADIOMARCADOS COM 99MTECNÉCIO, PRODUTO E USOS
PI 0701085-0	27/02/2007	USO DE ANTAGONISTA DO RECEPTOR DO PAF PARA O TRATAMENTO DE INFECÇÕES CAUSADAS POR FLAVIVIRIDAE
PI 0700732-9	27/02/2007	PROCESSO DE UTILIZAÇÃO DE BIOGÁS COMO REAGENTE GASEIFICANTE TERMOQUÍMICO
PI 0606100-1	22/12/2006	CONECTOR DE CISALHAMENTO EM CRISTA
PI 0606099-4	22/12/2006	HIDROPLETISMÔMETRO
PI 0605982-1	15/12/2006	PROCESSO DE PRODUÇÃO DE UMA RESINA SUPERABSORVENTE A PARTIR DE POLIESTIRENO
PI 0606087-0	01/12/2006	CIMENTO PRODUZIDO COM ADIÇÃO DE RPP
PI 0605978-3	01/12/2006	ESTIMULAÇÃO ELÉTRICA DE ESTRUTURAS DO SISTEMA NERVOSO PARA TRATAMENTO DE EPILEPSIAS E SUPRESSÃO DE CRISES EPILÉPTICAS, DISPOSITIVO, CONTROLADOR DE DISPOSITIVO E USOS
PI 0605484-6	21/11/2006	TOXINA Ph(ALFA)1B, cDNA DO GENE DA TOXINA Ph(ALFA)1B, COMPOSIÇÕES FARMACÊUTICAS CONTENDO A TOXINA Ph(ALFA)1B, PROCESSO PARA SUA OBTENÇÃO, PROCESSO PARA OBTENÇÃO DO cDNA, E PRODUTO
PI 0605126-0	21/11/2006	PROCESSO DE OBTENÇÃO DE FENÓIS E ANILINAS HALOGENADOS PELA OXI-HALOGENAÇÃO DE FENÓIS E ANILINAS CATALISADO POR SAIS DE COBRE EM SOLUÇÃO OU INCOPORADO A UMA MATRIZ SÓLIDA E USOS
PI 0605102-2	31/10/2006	PREPARAÇÃO DE NANOCÁPSULAS CAPAZES DE SEREM MARCADAS COM 99M TECNÉCIO-HMPAO PARA IDENTIFICAÇÃO DE FOCOS INFLAMATÓRIOS E INFECCIOSOS
PI 0605089-1	04/10/2006	PROCESSO DE PREPARAÇÃO DE 1,4 E 1,8-CINEÓIS ATRAVÉS DA ISOMERIZAÇÃO DO (ALFA)-TERPINEOL CATALISADA POR HETEROPOLIÁCIDO
PI 0605088-3	04/10/2006	PROCESSO DE OBTENÇÃO DE COMPOSIÇÕES FARMACÊUTICAS PARA ADMINISTRAÇÃO PARENTERAL DE ANTAGONISTAS DE OPIÓIDES E PRODUTO
PI 0604142-6	31/08/2006	PROCESSO DE PREPARAÇÃO DE METAKFLEX AGLOMERANTE DE ALTA RESISTÊNCIA DE PRODUTOS E PROCESSOS QUE VENHAM A UTILIZAR METAKFLEX
PI 0604577-4	31/08/2006	DISPOSITIVO BIODEGRAD?VEL PARA ADMINISTRA??O INTRA-OCULAR DE F?RMACOS
PI 0604132-9	28/08/2006	KIT PARA TESTE COM ANTIBIÓTICO RADIOMARCADO
PI 0604111-6	24/08/2006	PROCESSO DE ELIMINAÇÃO DE MERCÚRIO DE REJEITOS SÓLIDOS
PI 0604102-7	04/08/2006	PROCESSO DE INTERPRETA??O DE DADOS TERMOGRAVIM?TRICOS UTILIZANDO T?CNICAS DE INTELIG?NCIA ARTIFICIAL
PI 0605721-7	21/07/2006	COMPÓSITO ÓSSEO RADIOATIVO
PI 0603490-0	21/07/2006	PROCESSO PARA VACINA RECOMBINANTE CONTRA A LEISHMANIOSE VISCERAL CANINA CONTENDO O ANTÍGENO RECOMBINANTE A2 E QUE PERMITE A DISTINÇÃO SOROLÓGICA ENTRE ANIMAIS VACINADOS DE ANIMAIS INFECTADOS
PI 0602976-0	19/06/2006	?TER DI-ISOBORN?LICO E O PROCESSO DE S?NTESE DO ?TER DI-ISOBORN?LICO A PARTIR DO CANFENO CATALISADO POR HETEROPOLI?CIDO
PI 0602975-2	14/06/2006	COMPÓSITOS MODIFICADOS COM POLÍMERO NO ESTADO DE BORRACHA SEUS PROCESSOS DE PREPARAÇÕES E USOS
PI 0602254-5	26/05/2006	PLACA ALETADA PARA TROCADOR DE CALOR, A PARTIR DE CHAPAS MET?LICAS, UNIDAS EM FASE S?LIDA POR COLAMINA??O OU POR OUTROS PROCESSOS DE COMPRESS?O
PI 0602372-0	18/05/2006	PROCESSO DE PREPARA??O DE COMP?SITOS EM BASE DE BIOCER?MICAS E POL?MEROS BIODEGRAD?VEIS, CONTENDO ANTIBI?TICOS E ANGIOTENSINA (1-7), ENCAPSULADOS OU N?O, MICRO OU NANOPARTICULADOS, PARA RESTITUI??O TECIDUAL DE PRODUTOS DERIVADOS
PI 0602371-1	17/05/2006	COMPOSTOS A BASE DE ANTIM?NIO EM ESTADO DISSOCIADO PARA TRATAMENTO DE LEISHMANIOSE E OUTRAS DOEN?AS, SEUS PROCESSOS DE OBTEN??O E COMPOSI??ES FARMAC?UTICOS
PI 0605472-2	17/05/2006	COMPOSI??ES DE HIDRAZONAS E SEUS DERIVADOS E EXCEPIENTES E COMPOSI??ES DE HIDRAZONAS E SEUS DERIVADOS COM METAIS E EXCEPIENTES E SEUS PROCESSOS DE OBTEN??O

PI 0602366-5	26/04/2006	USO DE AGONISTAS DO RECEPTOR ACOPLADO A PROTE?NA G, MAS, NO TRATAMENTO DA SINDROME METAB?LICA, SEUS COMPONENTES E SUAS COMPLICA??ES
PI 0604176-0	17/04/2006	PROTE?NA DE MEMBRANA SM29 DO SCHISTOSOMA MANSONI, KIT PARA TESTE IMUNOENZIM?TICO UTILIZANDO A PROTE?NA SM29 NO DIAGN?STICO DA ESQUISTOSSOMOSE, VACINA CONTENDO A PROTE?NA SM29 E PROCESSO DE OBTEN??O DA VACINA E USOS
PI 0601751-7	12/04/2006	COMP?SITO DE COL?GENO E NANOTUBOS DE CARBONO E SEU PROCESSO DE OBTEN??O
PI 0601224-8	14/02/2006	PROCESSO DE OBTENÇÃO DE COMPOSTOS ANÁLOGOS A MONOTERPENOS E SESQUITERPENOS DE OCORRÊNCIA NATURAL E COMPOSTOS INÉDITOS
PI 0600636-1	03/02/2006	PROCESSO PARA FORMULA??ES DE INIBIDORES DA ENZIMA CONVERSORA DE ANGIOTENSINA E PRODUTO
PI 0601053-9	01/02/2006	COMPOSTOS IN?DITOS DE TETRACICLINAS PARA TRATAMENTO DE INFEC??O POR BACT?RIAS SENS?VEIS E RESISTENTES E SEU PROCESSO DE S?NTESE
PI 0603485-3	01/02/2006	SISTEMA INTEGRADO UTILIZADO EM VE?CULO PARA USO AGR?COLA E DE ESTRADA
MU 8600257-0	25/01/2006	CONT?INER PARA TRANSPORTE E CONSERVA??O DE IMUNOBIOL?GICOS
PI 0602712-1	25/01/2006	PROCESSO DE PREPARAÇÃO DE ESPUMAS POLIURETÂNICAS REFORÇADAS COM FIBRA DE COCO E PRODUTOS ASSOCIADOS
PI 0506220-9	27/12/2005	SISTEMA DE MONITORAMENTO E CONTROLE DE ENDEMIAS E ARMADILHA COM ATRAENTES SINTÉTICOS DE OVIPOSIÇÃO PARA CAPTURA DE MOSQUITOS
PI 0505952-6	19/12/2005	Armadilha com atraentes sintéticos de oviposição para captura de mosquitos
PI 0506229-2	15/12/2005	PROCESSO DE OBTENÇÃO DE FILME SOL-GEL COM ÁREA PROJETADA; ARTIGO E UTILIZAÇÃO DO FILME
PI 0506214-4	15/12/2005	INGREDIENTES INÉDITOS DE AROMAS DERIVADOS DO LIMONENO E PROCESSO DE SUA SÍNTESE PELA OXIDAÇÃO CATALÍTICA DO LIMONENO
PI 0504979-2	30/09/2005	PREPARAÇÃO DE COMPOSTOS ENTRE AS CICLODEXTRINAS E SEUS DERIVADOS E COMPOSTOS DE BISMUTO E SEUS DERIVADOS, COMPOSIÇÕES FARMACÊUTICAS E PRODUTOS DESSAS COMPOSIÇÕES E USO COMO AGENTES ANTIBACTERIANOS
PI 0504978-4	30/09/2005	PROCESSO DE PREPARAÇÃO DE COMPOSTOS ENTRE OS ANTAGONISTAS DO RECEPTOR AT1 E ANGIOTENSINA-(1-7) SEUS ANÁLOGOS E/OU MISTURAS DESSES SISTEMAS, SUAS COMPOSIÇÕES FARMACÊUTICAS E USO DOS PRODUTOS DERIVADOS
PI 0504704-8	21/09/2005	ÓRTESE FUNCIONAL PARA MÃO ACIONADA POR DISPOSITIVO ELÉTRICO
PI 0504250-0	12/09/2005	PROCESSO DE OBTENÇÃO DE FENÓIS CLORADOS PELA OXICLORINAÇÃO CATALISADA POR CLORETO DE COBRE EM SOLUÇÃO OU SUPORTADO
PI 0504456-1	02/09/2005	FOTOCATALISADORES FLUTUANTES A BASE DE SEMICONDUTORES SUPORTADOS PARA A DESCONTAMINAÇÃO DE ÁGUAS
PI 0504972-5	11/08/2005	PROCESSO IMUNO-HISTOQUIMICO PARA DETECÇÃO DE PARASITOS DO GÊNERO LEISHMANIA CAUSADORES DA LEISHMANIOSE VISCERAL CANINA (LVC)
PI 0503479-5	27/07/2005	LIPOSSOMAS PH-SENSÍVEIS PARA TRANSPORTE DE ÁCIDOS NUCLÉICOS E SEU PROCESSO DE OBTENÇÃO
PI 0502497-8	28/06/2005	USO DE AGONISTAS E ANTAGONISTAS DO RECEPTOR ACOPLADO A PROTEÍNA G, MAS, COMO MODULADORES DE ATIVIDADE APOPTÓTICA PARA O ESTUDO, A PREVENÇÃO E O TRATAMENTO DE DOENÇAS
PI 0502489-7	09/06/2005	PROCESSO DE OBTENÇÃO DO ISOPULEGOL PELA CICLIZAÇÃO DO CITRONELAL CATALISADA POR HETEROPOLIÁCIDO
PI 0501375-5	31/05/2005	PROCESSO DE SEPARAÇÃO MAGNÉTICA DE MATERIAIS PARTICULADOS AUXILIADO POR ULTRA-SONS E DISPOSITIVO PARA EFETUAR O PROCESSO
PI 0503122-2	30/05/2005	COMPOSIÇÕES FARMACÊUTICAS DO PEPTÍDEO ANGIOTENSINA-(1-7) [ANG-(1-7)] E SEUS ANÁLOGOS, AGONISTAS E ANTAGONISTAS USANDO AS CICLODEXTRINAS, SEUS DERIVADOS, E O POLÍMEROS BIODEGRADÁVEIS E/OU DOS PRODUTOS DERIVADOS PARA USO NO CONTROLE DAS FUNÇÕES DO SISTEMA REPRODUTIVO
PI 0502411-0	31/03/2005	PROCESSO DE DESENVOLVIMENTO DE SUBSTÂNCIAS COMO INIBIDORES POTENTES E SELETIVOS DE ISOFORMAS DE FOSFODIESTERASES DOS TIPOS 1 A 5 (PDE1,PDE2,PDE3, PDE4, PDE5) NA BASE DE DIOCLEÍNA, FLURANOL OU ANÁLOGOS E SUAS COMPOSIÇÕES FARMACÊUTICAS PARA O ESTUDO E TRATAMENTO DE DOENÇAS CARDIOVASCULARES E PRODUTOS ASSOCIADOS
PI 0504026-4	21/02/2005	PROCESSO IMPLEMENTADO EM MICROCOMPUTADOR PARA AGILIZAR E PRECISAR O CÁLCULO DE 10 DQ PARA COMPOSTOS DE COORDENAÇÃO, UTILIZANDO OS DIAGRAMAS DE TANABE-SUGANO
PI 0500116-1	07/01/2005	SISTEMA FECHADO PARA AGITAÇÃO/MISTURA DE SUBSTÂNCIAS

C1 0103887-7	20/12/2004	COMPOSIÇÕES IMUNOGÊNICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO ANTÍGENOS, VETORES GÊNICOS E ADJUVANTES
PI 0405347-8	25/11/2004	PROCESSO DE PREPARAÇÃO DE GÉIS MUCOADESIVOS PARA PREVENÇÃO DE CÁRIE, USOS E PRODUTOS DERIVADOS
PI 0405489-0	09/11/2004	PROCESSO PARA A PREPARAÇÃO DE FORMULAÇÕES FARMACÊUTICAS DO ANTIMONIATO DE MEGLUBINA EM LIPOSSOMAS E USO DAS FORMULAÇÕES FARMACÊUTICAS EM ANIMAIS ACOMETIDOS COM LEISHMANIOSE VISCERAL
PI 0404655-2	18/10/2004	APARATOS E PROCESSOS PARA IMPLANTES PERMANENTES ONCOLÓGICOS
PI 0403540-2	17/08/2004	VACINA CONTRA CLOSTRIDIOSE E PROCESSO DE PURIFICAÇÃO DO ANTÍGENO
PI 0402892-9	13/07/2004	FORMULAÇÃO FARMACÊUTICA DE CÁLCIO COLOIDAL E VITAMINA LIPOSSOLÚVEL PARA USO INJETÁVEL EM VETERINÁRIA
PI 0402893-7	13/07/2004	UTILIZAÇÃO DO ÓLEO DE OURICURI (SYAGRUS CORONATA) PARA EM PACIENTES SUBMETIDOS A TRATAMENTO COM DROGAS QUIMIOTERÁPICAS
C1 0304952-3	02/03/2004	PROCESSO DE PREPARAÇÃO DE COMPOSTOS ENTRE AS CICLODEXTRINAS OU SEUS DERIVADOS E O ANTIMONIO OU SEUS DERIVADOS, DE FORMULAÇÕES FARMACEUTICAS CONTENDO ESSES COMPOSTOS E PRODUTOS ASSOCIADOS, PARA O TRATAMENTO DAS LEISHMANIOSES E DA ESQUISTOSSOMOSE
PI 0306774-2	03/12/2003	LIPOSSOMAS pH-SENSÍVEIS DE CISPLATINA E OUTROS AGENTES ANTINEOPLÁSICOS E SEU PROCESSO DE OBTENÇÃO
C1 0105509-7	26/11/2003	
PI 0305646-5	22/10/2003	COLEÇÃO DE PRODUTOS CITOLÓGICOS, HISTOLÓGICOS, DESENVOLVIMENTO EMBRIONÁRIO E FETAL HUMANOS E DE ÓRGÃOS TRIDIMENSIONAIS E EM RELEVO E PROCESSO DE INTERPRETAÇÃO EM IMPRESSO TIPOGRAFICO E EM BRAILE
C1 0203907-9	18/09/2003	ARMADILHA PARA CAPTURA DE MOSQUITOS
PI 0303631-6	17/09/2003	DISPOSITIVO E MÉTODO PARA MEDIÇÃO DE FORÇAS AXIAIS PRODUZIDAS PELA LÍNGUA HUMANA
PI 0303623-5	11/09/2003	PROCESSO E DISPOSITIVO BASEADO EM SISTEMAS INTELIGENTES - INTELIGÊNCIA ARTIFICIAL - REDES NEURAIS ARTIFICIAIS, PARA DETERMINAÇÃO E CONTROLE EM TEMPO REAL DE CONTAMINANTES EM SISTEMAS FÍSICOS E/OU QUÍMICOS E/OU BIOLÓGICOS
PI 0303078-4	22/08/2003	DISPOSITIVO DE GRADUAÇÃO DA PRESSÃO DE SUCÇÃO DO ASPIRADOR
PI 0302837-2	31/07/2003	PROCESSOS PARA DETECÇÃO MOLECULAR DE MUTAÇÕES RELACIONADAS À SÍNDROME DE BERARDINELLI-SEIP
PI 0302988-3	18/07/2003	SISTEMA PARA CONTAGEM DE PESSOAS EM TEMPO REAL BASEADO EM VISÃO COMPUTACIONAL
MU 8303486-2	09/07/2003	IDENTIFICADOR DE LÂMPADAS QUEIMADAS, MAL INSTALADAS OU INEXISTENTES EM VEICULOS AUTOMOTIVOS
MU 8303487-0	04/07/2003	SISTEMA DE SOLDAGEM SUBAQUÁTICA MECANIZADA COM ELETRODO REVESTIDO COM SISTEMA AUTOMÁTICO PARA ABERTURA DO ARCO
MU 8303688-1	02/07/2003	Dispositivo distrator das articulações coxofemorais para auxílio ao exame radiográfico.
PI 0302774-0	02/07/2003	Processo de separação de vapores metálicos alcalinos por indução magnética
MU 8303493-5	23/06/2003	DISPOSITIVO ÓPTICO PARA BIOMODULAÇÃO DE TECIDO EPITELIAL ÓSSEO E MUSCULAR POR MEIO DE DIODOS EMISSORES DE LUZ EMITINDO EM ALTA INTENSIDADE NAS BANDAS DO ESPECTRO ÓPTICO COMPREENDIDO ENTRE 610nm - 910nm, DOTADO DE UMA LENTE POLARIZADA E DE UM SISTEMA DE REFRIGERAÇÃO
PI 0303120-9	05/06/2003	MÉTODOS PARA MEDIÇÃO DO TEMPERAMENTO ANIMAL POR MEIO DA SUA REATIVIDADE EM AMBIENTES DE CONTENÇÃO COM MOBILIDADE E DISPOSITIVOS PARA EFETUAR OS MÉTODOS
MU 8301505-1	27/05/2003	TELEFONE PÚBLICO COM REGULAGEM DE ALTURA
MU 8301504-3	15/05/2003	EQUIPAMENTO ÓPTICO PARA BIOESTIMULAÇÃO DE TECIDOS OROFACIAIS.
MU 8303691-1	12/05/2003	" CONJUNTO PADRÕES DE TEXTURA PARA AUXILIAR A ORIENTAÇÃO DE PORTADORES DE NECESSIDADES ESPECIAIS ".
PI 0302768-6	12/05/2003	PADRÃO REFLEXIVO DE VISUALIZAÇÃO PARA USO EM DISPOSITIVOS E/OU EQUIPAMENTOS COM RODAS
PI 0304736-9	25/04/2003	PROCESSO DE ISOLAMENTO E PURIFICAÇÃO DA LIGNINA DO "EUCALYPTUS GRANDIS" (LIPE) E EMPREGO DESTA LIGNINA COMO INDICADOR EM ENSAIO DE DIGESTIBILIDADE APARENTE EM DIFERENTES ESPÉCIES ANIMAIS
MU 8203339-0	27/12/2002	EQUIPAMENTO PARA CLAREAMENTO DENTAL POR MEIO DE LEDS COM COMPRIMENTO DE ONDA ENTRE 350nm E 700nm, COM OU SEM EMISSÃO DE LASER NO INFRAVERMELHO, DOTADO DE SISTEMA DE REFRIGERAÇÃO
MU 8203338-2	27/12/2002	ATUADOR FLUIDO MECÂNICO DE FÁCIL MONTAGEM CONSTUTUÍDO DE DOIS TUBOS MALEÁVEIS E SISTEMA DE FIXAÇÃO DE ANILHAS
MU 8203135-5	17/12/2002	INTEGRAÇÃO ENTRE NO-BREAK E ELEMENTO DE REDE

PI 0206336-0	06/12/2002	PROCESSO DE PREPARAÇÃO DE COMPOSIÇÕES FARMACÊUTICAS DE ANTIMICROBIANOS, ANESTÉSICOS, ANTIFÚNGICOS E ANTINFLAMATÓRIOS PARA LIBERAÇÃO LENTA E PRODUTOS DERIVADOS
PI 0206063-9	29/11/2002	PROCESSO DE FABRICAÇÃO DE HIDROGÉIS DE ÁLCOOL POLIVINÍLICO
PI 0205908-8	13/11/2002	ESFERA DE SINALIZAÇÃO AÉREA DE LINHAS DE TRANSMISSÃO PARA INSTALAÇÃO POR SISTEMA AUTÔNOMO OU SEMI-AUTÔNOMO
PI 0205916-9	13/11/2002	SISTEMA AUTÔNOMO OU SEMI-AUTÔNOMO PARA INSTALAÇÃO E REMOÇÃO DE DISPOSITIVOS DE SINALIZAÇÃO DE CABOS DE LINHAS DE TRANSMISSÃO AÉREA OU SIMILAR
PI 0205900-2	11/11/2002	PROCESSO DE ANÁLISE E SEQÜENCIAMENTO MOLECULAR PARA CLASSIFICAÇÃO E IDENTIFICAÇÃO DE RNA, DNA E/OU PROTEÍNAS UTILIZANDO TÉCNICAS DE INTELIGÊNCIA ARTIFICIAL
PI 0210369-9	11/11/2002	Processo alternativo para neutralização do resíduo industrial ácido proveniente do beneficiamento do caulim, e produto resultante.
PI 0205783-2	29/10/2002	SISTEMA TUBULAR PARA REALIZAÇÃO DE CICLOS DE ESVAZIAMENTO E IRRIGAÇÃO DE CANAIS RADICULARES DENTÁRIOS.
PI 0210367-2	10/10/2002	PADRÃO DE IDENTIFICAÇÃO E BENGALAS DE PORTADORES DE DEFICIÊNCIA VISUAL OU FÍSICA
PI 0203909-5	11/09/2002	PROCESSO PARA DETERMINAÇÃO DIRETA DE ALUMÍNIO SEM DIGETÃO DAS AMOSTRAS EM SORO SANGUÍNEO E URINA HUMANOS OU DE ANIMAIS POR ESPECTROMETRIA DE ABSORÇÃO ATÔMICA EM FORNO DE GRAFITE USANDO RUTÊNIO COMO MODIFICADOR QUÍMICO PERMANENTE
PI 0203908-7	11/09/2002	TUBO ENDOTRAQUEAL DE POSICIONAMENTO OROTRAQUEL OU NASOTRAQUEAL PARA ASPIRAÇÃO CONTINUA OU INTERMITENTE DE SECREÇÕES RESPIRATÓRIAS INTRALUMINAIS DE CURTA E LONGA PERMANÊNCIA E RECIPIENTE PARA COLETA DE MATERIAL MICROBIOLÓGICO E PROCESSO DE ASPIRAÇÃO CONTINUA ENDOTRAQUEAL
PI 0203907-9	05/09/2002	ARMADILHA PARA CAPTURA DE MOSQUITOS
PI 0206074-4	08/08/2002	ATIVOS ANTIPERSPIRANTES CONTENDO ALUMÍNIO, ZINCÔNIO E AMINOÁCIDOS NEUTROS E BÁSICOS, E OS PROCESSOS DE PREPARAÇÃO DOS MESMOS
PI 0202596-5	27/06/2002	PROTEÍNA E SEQUÊNCIA DE DNA DA ARANHA LOXOSCELES INTERMEDIA PARA PRODUÇÃO DE UMA PROTEÍNA RECOMBINANTE E SUA UTILIZAÇÃO NO PROCESSO DE PRODUÇÃO DE SORO E VACINA ESPECIFICADA CONTRA A PICANHA DE ARANHAS DO GÊNERO LOXOSCELES
PI 0202157-9	07/06/2002	PEPTÍDEO OBTIDO DE VENENO ESCORPIÃO PARA USO COMO AGENTE HIPOTENSIVO
PI 0212405-0	21/05/2002	COMPOSIÇÕES FARMECÊUTICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO COMPLEXO DE INSULINA E PROCESSOS DE OBTENÇÃO
PI 0203211-2	09/05/2002	SISTEMA DE SINALIZAÇÃO DE ÔNIBUS E TÁXI PARA PORTADORES DE DEFICIÊNCIAS VISUAIS COM INTERFACE VOCAL
PI 0202188-9	08/05/2002	Processo para fabricação de compósito metal/recobrimento preparado via sol-gel e compósito metal/recobrimento
PI 0203210-4	07/05/2002	PROCESSO E DISPOSITIVO DE MONITORAMENTO E DE PREVISÃO DE COLAPSO EM ESCAVAÇÕES - SISMO
PI 0201666-4	23/04/2002	“Compósito Termoplástico Reciclado Com ou Sem Reforço de Fibras e Seu Processo Produtivo”.
PI 0208523-2	05/04/2002	PROCESSO DE OBTENÇÃO DO COMPLEXO DICLOFENACO-ZINCO E COMPLEXO DICLOFENACO-ZINCO
PI 0200698-7	06/02/2002	PROCESSO PARA OBTENÇÃO DE UM REVESTIMENTO BIOATIVO DE FOSFATO DE CÁLCIO SOBRE SUBSTRATOS SÓLIDOS
PI 0200697-9	06/02/2002	PROCESSO DE RECUPERAÇÃO DE ALUMINA DO PÓ DO FILTRO ELETROSTÁTICO DO PROCESSO BAYER, PARA APLICAÇÃO NA CROMATOGRAFIA EM CAMADA FINA E PRODUTOS AFINS
PI 0200751-7	06/02/2002	PROCESSO DE PREPARAÇÃO DE FORMULAÇÕES DE SEMICARBAZONAS E/OU TIOSSEMICARBAZONAS COM CICLODEXTRINAS E SEUS DERIVADOS E PRODUTOS OBTIDOS DESSE PROCESSO
PI 0200516-6	28/01/2002	PROCESSO DE PREPARAÇÃO DE ADSORVENTES À BASE DE AGLOMERADOS DE PARTÍCULAS MAGNÉTICAS DE ÓXIDOS DE FERRO PARA APLICAÇÕES AMBIENTAIS E INDUSTRIAIS, MATERIAIS ADSORVENTES MAGNÉTICOS, E, MÉTODO DE TRATAMENTO DE ÁGUA PARA A ADSORÇÃO DE COMPOSTOS ORGÂNICOS ALIFÁTICOS OU AROMÁTICOS, DE CÁTIONS METÁLICOS, DE RADIONUCLÍDEOS E DE ÂNIONS.
MU 8103161-0	20/12/2001	SISTEMA DE RODÍZIOS AXIAIS COM SUSPENSÃO E FREIOS ACIONADOS POR FORÇA NO EIXO AXIAL, ADAPTÁVEL EM ANDADORES PARA AUXÍLIO DA LOCOMOÇÃO E REABILITAÇÃO DO PORTADOR DE DEFICIÊNCIA FÍSICA
PI 0106701-0	20/12/2001	ATRAENTES DE OVIPOSIÇÃO DE MOSQUITOS
PI 0106765-6	27/11/2001	PROCESSO DE OBTENÇÃO DOS SISTEMAS GERADORES 115-CD - 115M- IN e 115M-IN E DISPOSITIVO PARA EXECUÇÃO DO PROCESSO

PI 0105499-6	05/11/2001	PROCESSO DE OBTENÇÃO DE COMPÓSITOS FORMADOS POR MATERIAIS PARTICULADOS E CICLODEXTRINAS E/OU DOS PRODUTOS DERIVADOS
PI 0105500-3	05/11/2001	PROCESSO DE OBTENÇÃO DE DISPERSÕES COLOIDAIS DE ANFOTERICINA B; COMPOSIÇÕES À BASE DE ANFOTERICINA B DE USO ENTERAL, PARENTERAL E TÓPICO; USO DESTAS COMPOSIÇÕES NO TRATAMENTO DE MICOSES SISTÊMICAS E INFECÇÕES PARASITÁRIAS
PI 0105955-6	18/10/2001	CONCENTRADO EMULSIONÁVEL DO ÓLEO ESSENCIAL DO EUCALYPTUS GLOBULUS CONTRA PARASITAS
PI 0105956-4	18/10/2001	CONCENTRADO EMULSIONÁVEL DO ÓLEO ESSENCIAL DO EUCALIPTUS STAIGERIANA CONTRA PARASITAS
MU 8102317-0	18/10/2001	Fotorreator simplificado de radiação ultravioleta para desinfecção de águas de abastecimento e esgotos tratados
PI 0105957-2	18/10/2001	CONCENTRADO EMULSIONÁVEL DO ÓLEO ESSENCIAL DO EUCALYPTUS CITRIODORA CONTRA PARASITAS
PI 0105959-9	18/10/2001	"SISTEMA COMPACTO UASB/FILTRO BIOLÓGICO PERCOLADOR PARA TRATAMENTO DE ÁGUAS RESIDUÁRIAS".
PI 0105243-8	23/08/2001	PROCESSO PARA A OBTENÇÃO DE COMPÓSITOS DE ZIRCÔNIA PARCIALMENTE ESTABILIZADA COM CÁLCIA-HIDROXIAPATITA, APARELHAGEM, E PEÇAS CERÂMICAS ESTRUTURAIS OBTIDAS PELO PROCESSO.
PI 0103887-7	17/07/2001	COMPOSIÇÕES IMUNOGÊNICAS CONTENDO MICROESFERAS BIODEGRADÁVEIS ENCAPSULANDO ANTÍGENOS, VETORES GÊNICOS E ADJUVANTES
PI 0103947-4	10/07/2001	EQUIPAMENTOS, DISPOSITIVOS E PROCESSOS PARA DETECÇÃO, EM TEMPO REAL, PARA A ANÁLISE E DETERMINAÇÃO DE ALTERAÇÕES EM SISTEMAS FÍSICOS E/OU QUÍMICOS E/OU BIOLÓGICOS ATRAVÉS DE SISTEMAS INTELIGENTES PARA APRENDIZADO E CONTROLE - SIAC
PI 0104074-0	09/07/2001	FLAVONÓIDES COM ATIVIDADE VASODILATADORA , ANTIHIPERTENSIVA E ANTIARRÍTMICA
PI 0104539-3	21/06/2001	PROCESSO PARA PURIFICAÇÃO E CARACTERIZAÇÃO DA CROTOXINA PARA OBTENÇÃO DE COMPOSIÇÕES FARMACOLÓGICAS PARA USO MEDICINAL E COSMÉSTICO
PI 0106305-7	10/04/2001	PROCESSO PARA PREPARAÇÃO DE DERIVADOS DE ANTIMÔNIO
PI 0102252-0	10/04/2001	Sistema de liberação controlada para antagonista do receptor AT1 da angiotensina II, composição farmacêutica e seu uso
PI 0102235-0	10/04/2001	PROCESSO DE DESVULCANIZAÇÃO DE BORRACHAS VULCANIZADAS ESPECIALMENTE A UTILIZADA EM PNEUMÁTICOS PARA A REUTILIZAÇÃO DO MATERIAL POLIMÉRICO
PI 0101322-0	06/04/2001	PROCESSO DE OBTENÇÃO, COMPOSIÇÃO E USO DE UM SISTEMA DE HORMÔNIOS RECOMBINANTES PARA SUPEROVULAÇÃO EM VERTEBRADOS E INVERTEBRADOS
PI 0006469-6	27/11/2000	PHASE-LOCKED LOOP RÁPIDO PARA RASTREAMENTO DE FASE, FREQÜÊNCIA E AMPLITUDE DE SINAIS MONOFÁSICOS.
PI 0004507-1	28/09/2000	MÉTODO E KIT PARA A DIFERENCIAÇÃO DE LEISHMANIA (VIANNIA) DE LEISHMANIA (LEISHMANIA), CAUSADORAS DE LEISHMANIOSE, POR PCR-RFLP
PI 0005017-2	15/09/2000	"PROCESSO DE REGENERAÇÃO E RECICLAGEM DE MATERIAIS ADSORVENTES COM DESTRUIÇÃO DE CONTAMINANTES ORGÂNICOS ADSORVIDOS".
PI 0004436-9	25/08/2000	COMPLEMENTO DIETÉTICO DE AMINOÁCIDOS, PROCESSO PARA TRATAMENTO E PREVENÇÃO DE DOENÇAS E PROCESSO DE ADMINISTRAÇÃO DE UM COMPLEMENTO DIETÉTICO DE AMINOÁCIDOS
PI 0003819-9	31/07/2000	"PROCESSO PARA REMOÇÃO DE METAIS PESADOS PB+2 , HG+2 , CD+2 E/OU COMPOSTOS ORGANOMERCURIAIS DE DEJETOS CONTAMINADOS".
PI 0002538-0	06/07/2000	IDENTIFICAÇÃO ESPECÍFICA DOS MOLUSCOS BRASILEIROS DO GÊNERO BIOMPHALARIA HOSPEDEIROS INTERMEDIÁRIOS DO SCHISTOSOMA MANSONI
PI 0003148-8	03/07/2000	PROCESSO DE FABRICAÇÃO DE VIDROS POROSOS
C1 9902118-8	19/04/2000	VÁLVULA DE DESCARGA CAPACITIVA PARA VASOS SANITÁRIOS.
MU 8000724-4	19/04/2000	CARTEIRA ESCOLAR PARA ALUNOS PORTADORES DE DEFICIÊNCIA FÍSICA, USUÁRIO DE CADEIRA DE RODAS.
PI 0001075-8	17/04/2000	MONITOR DE SINAIS BIOLÓGICOS MULTIPARAMÉTRICO USÁVEL
PI 9907575-0	09/12/1999	PROCESSO PARA PREPARAÇÃO DE ANTIMONIATO DE MEGLUMINA E DE ANTIMONIATO GLUCONATO DE POTÁSSIO UTILIZADOS NO TRATAMENTO DE PROTOZOONOSES
PI 9902118-8	10/05/1999	VÁLVULA DE DESCARGA CAPACITIVA PARA VASOS SANITÁRIOS.
PI 9806353-7	10/11/1998	PROCESSO PARA A PREPARAÇÃO E APLICAÇÃO FARMACOLÓGICA DE NOVOS BETA-AMINOTIÓIS E RESPECTIVOS SAIS
PI 9715035-5	30/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA HÍBRIDA P24/P17

		RECOMBINANTE E DA PROTEÍNA HÍBRIDA P24/P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMAMA.
PI 9710830-8	30/12/1997	PROCESSO PARA PRODUÇÃO DE FATOR DE CRESCIMENTO DO VÍRUS BEAN58058 (BEGF) RECOMBINANTE E DA PROTEÍNA DO BEGF RECOMBINANTE.
PI 9710829-4	18/12/1997	PROCESSO PARA O TESTE IMUNOENZIMÁTICO COM PROTEÍNA P26 RECOMBINANTE DO CAPSÍDIO VIRAL NO DIAGNÓSTICO DA ANEMIA INFECCIOSA EQUINA
PI 9709475-7	18/12/1997	PROCESSO PARA O TESTE IMUNOENZIMÁTICO COM PROTEÍNA GP90 RECOMBINANTE DO ENVELOPE VIRAL NO DIAGNÓSTICO DA ANEMIA INFECCIOSA EQÜINA
PI 9710828-6	18/12/1997	PROCESSO PARA A PRODUÇÃO DA PROTEINA DO INTERFERON BETA-CIS HUMANO RECOMBINANTE E PROTEÍNA DE INTERFERON BETA-CIS HUMANO RECOMBINANTE
PI 9710834-0	16/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP41 RECOMBINANTE E DA PROTEÍNA GP41 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA
PI 9710825-1	16/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA P24 RECOMBINANTE E DA PROTEÍNA P24 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9710824-3	16/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP160 RECOMBINANTE E DA PROTEINA GP160 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9710827-8	16/12/1997	PROCESSO PARA PRODUÇÃO DO INTERFERON RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA E DA PROTEÍNA DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA.
PI 9710833-2	16/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP120 RECOMBINANTE E DA PROTEÍNA GP120 RECOBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA
PI 9706072-0	16/12/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA P17 RECOMBINANTE E DA PROTEÍNA P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA
MU 7702418-4	26/11/1997	MODELO DE DISPOSITIVO PARA MEDIÇÃO DE PESO E CARGA DE VEÍCULOS E EQUIPAMENTOS A PARTIR DA VARIAÇÃO DE PRESSÃO OU DA DEFLEXÃO NOS SISTEMAS PNEUMÁTICOS.
MU 7702988-7	26/11/1997	MODELO DE FILTRO A SER INSTALADO NO SISTEMA DE DESCARGA DE GASES DE COMBUSTÃO DE MOTORES A COMBUSTÃO INTERNA DESTINADO A APLICAÇÕES AUTOMOTIVAS, ESTACIONÁRIAS E DEMAIS APLICAÇÕES
PI 9705250-7	25/11/1997	EQUIPAMENTO DESTINADO AO MONITORAMENTO DE LINHAS DE TRANSMISSÃO / DISTRIBUIÇÃO DE ENERGIA ELÉTRICA, CARRO DE INSPEÇÃO DE LINHAS AUTOPROPULSIONADO E AUTOMÁTICO
MU 7702417-6	25/11/1997	MODELO DE MEDIDORA DE VAZÃO ELETRÔNICO BASEADO NA VARIAÇÃO DAS CARACTERÍSTICAS ELÉTRICAS EM FUNÇÃO DA TROCA DE CALOR EM UM COMPONENTE ELETRÔNICO SEMICONDUTOR, COM COMPENSAÇÃO DE TEMPERATURA DE FLUIDO
MU 7702416-8	25/11/1997	MODELO DE DISPOSITIVO MULTICÂMARA PARA APLICAÇÃO EM PNEUMÁTICOS A SER UTILIZADO EM VEÍCULOS E DEMAIS APLICAÇÕES
PI 9710826-0	16/10/1997	PROCESSO PARA PRODUÇÃO DO INTERFERON EPSILON DE MEMBRANA AMINIÓTICA HUMANA E PROTEÍNA DO INTERFERON EPSILON HUMANO DE MEMBRANA AMINIÓTICA HUMANA
PI 9703992-6	28/07/1997	EQUIPAMENTO PEDAGÓGICO PARA ENSINO DE PARASITOLOGIA
MU 7700796-4	29/04/1997	MODELO DE DISPOSITIVO A SER INSTALADO EM MEDIDORES CONVENCIONAIS DE ENERGIA ELÉTRICA TRANSFORMANDO-OS EM MEDIDORES HOROSAZONAIS PARA UTILIZAÇÃO EM SISTEMAS DE DISTRIBUIÇÃO DE ENERGIA ELÉTRICA DESTINADO A APLICAÇÕES RESIDENCIAIS, COMERCIAIS, INDUSTRIAIS E DEMAIS APLICAÇÕES.
PI 9700830-3	30/01/1997	PROCESSO PARA PREPARAR UM ANTÍGENO DE LEISHMANIAS UTILIZÁVEL EM ENSAIO IMUNOENTIZIMÁTICO E ANTÍGENO DE LEISHMANIAS DE ALTA ESPECIFICIDADE E ALTA REATIVIDADE
PI 9700855-9	02/01/1997	PROCESSO PARA PRODUÇÃO DE FATOR DE CRESCIMENTO DO VÍUS BEAN 58058 (BEGF) RECOMBINANTE E DA PROTEÍNA DO BEGF RECOMBINANTE.
PI 9700856-7	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP160 RECOMBINANTE E DA PROTEÍNA GP160 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9700857-5	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP120 RECOMBINANTE E DA PROTEÍNA GP120 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9700858-3	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA HÍBRIDA P24/P17 RECOMBINANTE E DA PROTEÍNA HÍBRIDA P24/P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9700859-1	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA P17 RECOMBINANTE E DA PROTEÍNA P17 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9700860-5	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA P24 RECOMBINANTE E DA PROTEÍNA P24 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.

PI 9700861-3	02/01/1997	PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP41 RECOMBINANTE E DA PROTEÍNA GP41 RECOMBINANTE DO VÍRUS DA IMUNODEFICIÊNCIA HUMANA.
PI 9606271-1	18/12/1996	PROCESSO PARA PRODUÇÃO DO INTERFERON EPSILON DE MEMBRANA AMNIÓTICA HUMANA E PROTEÍNA DO INTERFERON EPSILON HUMANO DE MEMBRANA AMNIÓTICA HUMANA.
PI 9606269-0	18/12/1996	PROCESSO PARA PRODUÇÃO DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA E DA PROTEÍNA DO INTERFERON BETA RECOMBINANTE DE MEMBRANA AMNIÓTICA HUMANA.
PI 9606273-8	18/12/1996	PROCESSO PARA O TESTE IMUNOENZIMÁTICO COM PROTEÍNA P26 RECOMBINANTE DO CAPSÍDIO VIRAL NO DIAGNÓSTICO DA ANEMIA INFECCIOSA EQUINA.
PI 9606272-0	18/12/1996	PROCESSO PARA O TESTE IMUNOENZIMÁTICO COM PROTEÍNA GP90 RECOMBINANTE DO ENVELOPE VIRAL DO DIAGNÓSTICO DA ANEMIA INFECCIOSA EQUINA
PI 9606270-3	18/12/1996	PROCESSO PARA A PRODUÇÃO DA PROTEÍNA DO INTERFERON BETA-CIS HUMANO RECOMBINANTE E PROTEÍNA DE INTERFERON BETA-CIS HUMANO RECOMBINANTE.
PI 9605874-9	25/11/1996	PROCESSO DE FABRICAÇÃO DE PEÇAS CERÂMICAS POR COLAGEM DE ARDÓSIA
PI 9605464-6	29/10/1996	SISTEMA DE TRATAMENTO DE ESGOTOS POR AERAÇÃO ALTERNADA
PI 9603708-3	02/09/1996	PROTEÍNA DE CAPSÍDIO P-26 E PROCESSO PARA PRODUÇÃO DA PROTEÍNA P-26 RECOMBINANTE DO VÍRUS DA ANEMIA INFECCIOSA EQUINA
PI 9603709-1	02/09/1996	PROTEÍNA DE ENVELOPE GP90 E PROCESSO PARA PRODUÇÃO DA PROTEÍNA GP-90 RECOMBINANTE DO VÍRUS DA ANEMIA INFECCIOSA EQUINA
PI 9603799-7	29/08/1996	PROCESSO DE IDENTIFICAÇÃO DAS ESPÉCIES DE MICOBACTÉRIAS DE TUBERCULOSE E MICOBATERIOSES PELO ENSAIO DE MOBILIDADE DE HETERODUPLEXES (HMA)
PI 9502472-7	12/05/1995	EQUIPAMENTO ELETROMECÂNICO GERENCIADOR DE MOVIMENTOS DE MINI FONTES RADIOATIVAS FIXADAS EM MÚLTIPLAS HASTES FLEXÍVEIS
PI 9502473-5	12/05/1995	SISTEMA GERADOR DE LASER 585.3 nm E 588.1 nm BASEADO EM GASES Ne E H2-D2 BOMBEADO POR RADIONUCLÍDEOS EMISSORES ALFA
PI 9204369-0	06/11/1992	PROCESSO DE OBTENÇÃO DE MADEIRA SERRADA DE EUCALIPTO, PROCESSO DE FABRICAÇÃO DE PEÇAS DE MADEIRA LAMINADA COLADA DE EUCALIPTO, DORMENTES E ESTRUTURAS DE MADEIRA LAMINADA COLADA DE EUCALIPTO

Source: Sinpi – INPI's databased

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