

Methodological Issues in Assessing the Role of Patents in Developing Countries

Hiroko Yamane

One of the primary tasks of the Commission on Intellectual Property Rights, Innovation, and Public Health (CIPIH) was to identify various ways in which intellectual property rights (IPRs) affect healthcare in developing countries and to suggest initiatives and policies that could increase the ability of the affected governments to provide adequate health care for their citizens. During our work together, we were informed by a number of interesting studies, opinions and proposals for solutions, many of which are posted on the CIPIH website.

Unfortunately, the CIPIH conducted little empirical research on the role of IPRs in healthcare in developing countries and as a result, commonly-held views and assumptions remained untested and served as part of the basis of the Report. To shed more light on the current controversies regarding the role of patents in healthcare policies, the Report should have provided more evidence-based analyses of different patent policy options for developing countries, considering both their short and long-term impacts.

This statement concerns only those methodological aspects that seem to be missing from the CIPIH Report, with the hope that such issues might be taken into account in conducting future work related to this subject.

I. The Effect of Patents on Access to Drugs to Treat Diseases that Affect Developing Countries

The CIPIH Report and its recommendations cover drug discovery, development and access for all Types I, II, and III, indiscriminately. Nowhere is there a clear picture of what types of medicines (old or novel) are actually needed, and which policy tools and incentives are specifically required for each disease type. While it may be a complex task to identify which medicines are appropriate in different developing country

settings, the WHO Essential Drugs List¹ provides guidance as to the minimum requirement. The list, revised in March 2005, enumerates 311 medicines, of which 17 appear to be protected by patents in developing countries (this figure should be verified by further studies). Of these, at least 7 are covered by widespread patenting². At the very least, the Report should have distinguished the types of medicines that are most needed in different disease categories and regions of developing countries and determined whether such medicines are currently protected by patents. It is important for governments, whenever it is feasible and appropriate, to formulate an effective package of generic products essential to the health of their citizens.

The CIPIH Report is correct in stating that there is no commercial incentive for developing drugs to treat Type III diseases³, but this should not end the analysis. As Table I shows, not only are there many patent filings both from major pharmaceutical companies and other organisations for drugs to treat Type II diseases, but also a significant number of filings for Type III diseases from organisations other than 10 major pharmaceutical companies.

A keyword search shows that, although there is little market incentive, those who work on treatments for Type II and III diseases tend to file for patents nonetheless. Research activities, as well as patent filings during R&D, therefore, do not seem to respond only to commercial incentives, but to other incentives as well. More attention indeed should have been given to discovering the incentives that encourage development of drugs for Type III (truly neglected) diseases and to developing the policy tools needed to nurture such R&D activities.

¹ <http://mednet3.who.int/EMLib/DiseaseTreatments/Medicines.aspx>

² Zithromax, Coartem, Retrovir (AZT patents are now expiring), Ziagen, Epivir, Viracept, Virimune.

³ In the CIPIH report, Type III diseases are those that are overwhelmingly or exclusively incident in the developing countries, such as African sleeping sickness (trypanosomiasis), African river blindness (onchocerciasis) and Chagas disease. Type II diseases are often termed neglected diseases and Type III diseases very neglected diseases. According to the Report, such diseases receive extremely little R&D (see Chapter I, footnote 32 of the CIPIH Report).

Table I PCT Patent Filings for Drugs relating to Diseases Affecting Developing

Countries -MICROPAT Database keyword analysis (searched on 17 May 2004) of patent filings by 10 major pharmaceutical companies* and others for Type II and III diseases-

	Total Number of PCT Patent Filings	Number of PCT filings by 10 major pharmaceutical companies*
HIV/AIDs	3,263	573
Tuberculosis	419	33
Malaria	533	33
Leishmania	146	6
Onchocerciasis	3	0
Chagas Disease	50	1
Leprosy	155	2
Schistosomiasis	31	4
Lymphatic Filariasis	2	0
African Tripanosomiasis	38	1
Dengue Fever	83	9

* Pfizer, GSK, Merck, AstraZeneca, Aventis, Bristol-Myers Squibb, Novartis, Eli Lilly, Hoffman LaRoche, Abbott

II. The Effect of Patents on Innovation in Developing Countries

The CIPIH Report does not provide a conceptual framework through which the role of patents could be analyzed, in the context of markets and industrial policies in developing countries, at various levels of biomedical research or manufacturing capabilities.

Sometimes, the Report uses the category, “developing countries without the capacity to produce” (Chapter 2), in order to discuss the relevance of the TRIPS Agreement and patent protection. Additionally, the case of India is used extensively Chapter 3, to discuss the impact of TRIPS implementation (which is relatively recent in India, in comparison to other developing countries). Developing countries need to be placed in a number of categories with a view to analyzing the possible effects (both positive and negative) of patent protection for healthcare purposes. Moreover, the ability of countries to move from one category to another should be taken into account.

With regard to pharmaceutical production capabilities specifically, Carlos Correa, in 1992, classified countries as follows⁴:

- 1) Countries with a sophisticated pharmaceutical industry and research base (10 countries): US, some European countries, Japan
- 2) Countries with innovative capabilities (17 countries): Canada, China, India, Korea, a number of European countries.
- 3) Countries with the ability to reproduce active ingredients and finished products (41 countries): Brazil, Cuba, Bolivia, Poland, Turkey
- 4) Countries with the ability to produce finished products from imported ingredients only (91 countries): Columbia, Costa Rica, South Africa, Brazil, Cuba, Bangladesh, Thailand, Cambodia
- 5) Countries with no pharmaceutical industry (68 countries): Botswana, Congo, Dominican Republic, Central Africa etc

If utilized, this classification scheme would have been helpful in analyzing the relevance of certain TRIPS and Doha provisions, as well as “data exclusivity” in the U.S. FTAs. Even within these classifications, however, the level of development, the relevant capabilities and the resource environment evolve with time. Industrial policy of these countries may also change. The broad generalizations used in the Report create a risk of “type casting” that may prevent developing countries from assessing the benefits and costs of the full range of policy options needed to encourage innovation.

Regarding the substance of the recommended policy options, the Report relies heavily on ongoing discussions in the United States and Europe regarding IP rights in various fields such as genomics, research tools and general patenting practices. Based on such a review, the CIPIH Report encourages a “stringent interpretation of patentability standards” (Chapter 2) based on the assumption that minimizing the number of patents is in the interest of most developing countries. Thus, policies restricting patent protection on a variety of subjects, e.g., genetic materials⁵, animals and plants, etc. are encouraged, without suggesting any substantial impact assessment. In the same vein, the Report is skeptical of patenting technologies relating to functional units of heredity such as cell lines, enzymes, plasmids, cosmids and genes, with important implications for health. How these technologies will be used depends on the

⁴ Ballance et al, 1992, in Carlos M. Correa, “Implications of the Doha Declaration on the TRIPS Agreement and Public Health”, © World Health Organization [2002].

⁵ According to the Convention on Biological Diversity, "Genetic material" means “any material of plant, animal, microbial or other origin containing functional units of heredity”.

resource setting of a specific country, as well as its healthcare and science/industrial policy. It would have been more helpful to further explain the possible uses and effects (both positive and negative) of such technologies on healthcare policy. As the Report suggests *en passant* a better solution than simply limiting patentability may be to retain flexibility and limit the scope of patent protection, through written description (see for example, *University of Rochester v. G.D. Searle & Co.*⁶), enabling disclosure, etc. requirements thus allowing developing countries to protect their innovations.

III. The Evolving Nature of Patent Policies

Chapter 5 of the CIPIH Report, entitled “Fostering Innovation in Developing Countries”, enumerates some of the chemical, pharmaceutical or biomedical innovations in Brazil, Cuba, China and India (see Table 5.1, CIPIH Report). Strangely enough, Chapter 5 does not refer to the patent incentives for these innovations. These inventions, however, are patented widely in foreign countries, not only in developed but also in developing countries. For example, Centro de Immunologia Molecular in Cuba applied for PCT filings for its "Recombinant antibodies and fragments recognizing ganglioside N-clycolyl-GM3 and use thereof in the diagnosis and treatment of tumours" (listed in Table 5.1, Chapter 5 of the CIPIH Report) not only at the EPO and the Japanese Patent Office, but also in such countries as Botswana, Belize, Ghana, and Gambia. The process for producing Human Interferon Alpha from genetically engineered yeast (a relatively advanced technology listed in Table 5.1 of the CIPIH Report), is patented in the United States, Canada and India, as are many other process patents from Indian companies.

Companies located in India and China are also filing for an increasing number of pharmaceutical patents in both for developed and developing countries (see Tables II-IV of the Appendix of this paper, Pharmaceutical Patent (A61K) Filings of China, Cuba and India at different national and regional patent offices, source: INPADOC database on January, 2006). Chinese applicants, however, do not appear to be interested in filing patents in African countries, and Cuban applicants, not in the Chinese market. Future studies should explore how patents of companies from these countries with innovative capabilities could be useful for technology transfer to countries at earlier stages of development.

The level of patenting internationally can be seen as a proxy for the level of competitiveness in the field of pharmaceutical innovation (of different kinds) of a particular country. This is illustrated by Table V in the Appendix, established by Carlos Morel from Fiocruz (Brazil) for his presentation at Bellagio and Rio De Janeiro in 2005,

⁶ 125 S. Ct. 629; 160 L. Ed. 2d 484; November 29, 2004.

and is presented at the CIPIH website.

When medical research is carried out predominantly by government-owned entities, governments may worry less about recovering R&D investment than when such research is conducted mainly by the private sector. In the former cases, governments may choose to keep their domestic market unconstrained by patent protection, regardless of international competitiveness.

When innovation is driven by the private sector, it is even more important for governments to examine a broad range of policy options. Patenting practices of private companies may widely diverge, resulting in very conflicting pressures placed on the government. For example, certain Indian companies such as Dr. Reddy's, which started as a generic drug producer, are increasingly seeking patents on new chemical entities (NCEs) in the United States. Other companies, such as Cipla, seek patents for "incremental innovations" (such as purified compounds, crystalline forms, etc.) in the countries they export their products to. In any of these cases, companies are patenting abroad in their export markets. Domestic patents would matter to them only if the domestic market were also important, or if it was strategically important to exclude rivals in the domestic market.

In China, an increasing number of domestic applicants file for Western medicines⁷ at the Chinese Patent Office, whereas Chinese biotech ventures seem to file at foreign offices⁸. As illustrated in Tables II to IV of the Appendix of this paper, patent filings for

⁷ Among those applications in A61K, approximately 1/3 are Chinese medicines and 90% of them were filed by Chinese domestic applicants. Foreign applications account for more than a half of the total applications for western medicine. (In 2002, among 4987 filings, 1520 applications are related to Chinese medicine, 1447 organic chemical and medicinal preparations, new usages of medicines and cosmetics, 606 biological preparations, 1414 in other sub-classes under A61K). Increasing Chinese biotech ventures file for patents abroad.

⁸ According to the Chinese Patent Office statistics, following domestic and foreign applicants files for A61K patents. Note that each country has a slightly different scope of A61K and, therefore, the total filing numbers here differ from those in Table in the Appendix of this paper.

	Total filing	domestic	foreign
2002	4987	3480	1507
2003	5681	4237	1444
2004	6816	5061	1755

pharmaceutical inventions (A61K) from Chinese, Cuban and Indian entities are increasing abroad.

These are just a few examples of developing countries actively using patents systems abroad, indicating the necessity to analyze a diverse set of policy options to fit their specific circumstances.

Historically, the evolution of patent legislation and policies of a given country has been closely connected with its level of industrial development and policy. Attempting to suggest a global policy “from Argentina to Zimbabwe” may not provide a meaningful menu of options for developing countries, some of which would actually benefit from consolidating a strong industrial research base. In other developing countries, the assignment of intellectual property rights may lead to more efficient use of resources (information in the case of patents) and the licensing of such rights can promote the transfer of advanced technology into the local economy.

Although the CIPIH Report recognizes that IPRs provide potential benefits to both developed and developing countries, it quickly falls back to relying on the untested assumption that relaxing the level of protection of intellectual property rights will generally benefit developing countries. The CIPIH should have used this opportunity more carefully to examine how the inventions of “innovative developing countries” are supported in developing countries, and whether the patenting policies in less developed countries have different effects, for example, on pricing or technology transfer.

IV. Actual Level of Patenting in Developing Countries

The actual level of patenting, the scope of protection, and the effects of such factors on price and competition are not adequately examined in the Report. Instead of collecting empirical data, the Report relies on the untested assumptions that patents raise drug prices and thus constitute an obstacle to access. These assumptions reinforce the impression that the TRIPS Agreement makes patents omnipresent and introduces monopoly pricing for all drugs in all WTO member countries (note that the ten biggest markets in pharmaceutical sales cover approximately 80% of the total market which makes little sense to file for patents in numerous countries). In reality, however, pharmaceutical pricing depends not only on patenting, but also on a number of other factors in each particular market, as well as the regulations of each country. For example, the price of a drug often depends on the availability of therapeutic substitutes or “follow-on” drugs. The Report also states repeatedly that developing countries do not represent attractive markets for pharmaceuticals, and indeed, companies do not seem to file for patents in these countries unless there are clear, competitive reasons. Even for

those anti-retroviral drugs which are patented widely in the world⁹, the major pharmaceutical firms have only sought patent protection in a few selected countries in Africa (See Table VI below). Lacking a review of the actual level of patenting of pharmaceuticals in developing countries, the Report should have indicated that linking patents directly to the lack of access to medicines is based on an assumption that would require additional study.

Table VI. PCT Filings for 6 Major Pharmaceutical Companies

Applicant	(ARIPO)	Egypt (EG)	Kenya (KE)	(OAPI)	South Africa (ZA)	Zambia (ZM)	Zimbabwe (ZW)	total	AIDS
Pfizer	31	6	0	6	62	0	0	105	359
BMS	0	4	0	0	22	0	0	26	119
Merck	0	0	0	2	56	0	0	58	367
Abbott	0	0	0	0	7	0	0	7	125
GSK	42	1	0	5	101	0	3	151	367
BI	7	0	0	5	22	0	0	34	112

Source: INPADOC database, searched on 17 May 2004

V. Competition Policy Requires an Understanding of the Relevant Market

The CIPIH Report emphasizes generic competition as a policy to ensure access to drugs. While it seems clear that access to quality generic medicines would benefit patients in developing countries, the CIPIH Report overlooks the specific nature of pharmaceutical markets in its analysis of the effects of patents on competition. For

⁹ The WHO presents data on HIV/AIDS drug patent and prices on its website:

<http://www.who.int/3by5/amds/en/>

On this site, there is an excellent list, directed by Carlos Correa, of patent filings (and some existing patents) for ARVs and drugs for opportunistic diseases. The list indicates that it is necessary to check with the Patent Office of each country to know whether such drugs are in fact covered by actual patents (PCT filings, for example, are not necessarily followed up by actual filing at the national level). A report prepared for WIPO, Patent Protection and Access to HIV/AIDS Pharmaceuticals in Sub-Saharan Africa by IIPi (2000) (http://www.wipo.int/about-ip/en/studies/pdf/iipi_hiv.pdf) suggests similar difficulties.

example, competition may not come only from generic copies of original branded medicines, but also from other drugs in the same therapeutic class. Furthermore, the real issue may not be the lack of competition, but rather the absence of reasonable substitutes due to quality concerns (i.e., drugs which are either not bioequivalent or have not been proven to be bioequivalent) in developing countries and other factors that are not affected by patent protection. As the CIPIH Report itself asserts in another context, “in the absence of significant healthcare systems, generic companies may have little incentive to enter the small market in developing countries, particularly when there is still patent protection in large developed markets, regardless of the patent status in such markets”. By assuming that decreasing the level of protection of intellectual property rights will necessarily increase the level of generic competition and, in turn, access to drugs in developing countries, the Report overlooks a number of important factors that should be considered by developing countries when setting competition policies.

The CIPIH Report drew its conclusions regarding “competition”, in particular from the United State Federal Trade Commission (FTC)’s 2002 report on generic entry¹⁰ and its inference of direct harm to consumers. This FTC analysis, however, was specific to the U.S. regulatory framework created by the Hatch-Waxman Amendments to the Federal Food, Drug and Cosmetic Act. This system streamlines the entry of generic drugs based on the so-called “Orange Book” and “automatic stay” procedures. Moreover, the FTC’s antitrust cases against allegedly illegal settlements between originator and generic firms have less to do with pricing and more to do with the period of exclusivity. The length of exclusivity has an important effect on drug prices in the U.S., because, unlike in most other countries, there is no price regulation in the U.S. pharmaceutical market. In light of the unique aspects of the Hatch-Waxman regulatory framework, as well as the absence of price regulation, U.S. pharmaceutical market is not representative of the majority of markets throughout the world and should not be used as a model for determining competition policy in developing countries.

There is, moreover, no international definition of “anti-competitive behaviour” that can be used, as a standard for determining which activities are improper and which activities are a legitimate exercise of a patent holder’s rights. Accordingly, competition law, much more than patent law or price regulation, comes with the risk of being enforced in a non-transparent and arbitrary manner, without relying on necessarily time-consuming, empirical analyses of the relevant market. Arbitrary enforcement of competition law will inevitably have a chilling effect on investment and, for small

¹⁰ “Generic Drug Entry Prior to Patent Expiration: An FTC Study”(July 2002).

markets, may result in further reducing the entry of cheap and high-quality drugs through its capacity to dissuade potential competitors. In the CIPIH open forum discussions, Jean Lanjouw's empirical study on the entry of new drugs into developing country markets¹¹ showed that price control dissuades drug entry much more than the lack of protection of IPRs. The arbitrary and non-transparent application of competition law may be an additional dissuasive factor. The Report does not adequately address these important issues. The Report should have offered meaningful guidance for developing countries to consider in setting their own policies based on their specific needs.

VI. In Defense of Adaptive Innovation

The CIPIH Report makes the case for controlling anti-competitive use of patents *ex-ante* (i.e., at the time of granting of patents), although of the value of any particular patent, with either pro-competitive or anti-competitive consequences, is not clear at that point. The Report seems to be suggesting that patents which might be considered to be “anti-competitive behaviour” (of all kinds) should not be issued, even though predicting what future product or technology markets will emerge is impossible at the stage of patenting an invention. On one hand, the Report seems to recommend a policy “requiring strict patentability criteria”(Chapter 3) to prevent broad patent scope for technologies used as research tools. On the other hand, the Report seems to recommend *ex-ante* “pro-competitive policy” by requiring a significant inventive step for pharmaceutical products (Chapter 4). The objective, the Report seems to suggest, is to eliminate patents on modifications of existing products, a practice sometimes known as “evergreening”. Evergreening, however, seems to be predominantly an activity of some brand-name pharmaceutical companies taking advantage of the U.S. Hatch-Waxman rules. From examples mostly in the U.S. and Canada, the Report seems to suggest that patenting small, incremental pharmaceutical inventions, such as use patents, can only be anti-competitive (by excluding generics) and socially wasteful.

While it may be true that offering protection that is too narrow could lead to excessive competition resulting in wasteful R&D investment, there are also benefits resulting from such patents that should not be ignored. It is thus difficult to draw general conclusions without actually analyzing the specific market situation. At the least, the Report should have mentioned the potential effects that the recommended

¹¹ “Patents, Price Controls and Access to New Drugs: How Policy Affects Global Market Entry, March 31, 2005 <http://who.int/intellectualproperty/studies>.”

changes may have on future generations of technologies and products. Small patents scattered around various aspects of basic technology could work as a natural barrier against monopolization. Furthermore, eliminating narrow patents may actually discourage local businesses in developing countries from entering the market through small inventions or applied research. Therefore, finding the proper level of protection requires a careful balancing of the needs of present consumers and future domestic innovation.

The Report affirms in Chapter 4 that “countries can adopt legislation and examination guidelines requiring a (high) level of inventiveness that would prevent evergreening patents from being granted (parenthesis added)”, in line with Section 3(d) of the Indian Patents (Amendment) Act, 2005 . This seems to be advising a disproportionately radical means to limit patentability, simply to avoid “evergreening” (which is understood to be predominantly a North American phenomenon). In doing so, the Report may be overlooking the fact that some drugs of crucial importance for developing countries, such as AZT and d4T in the fight against HIV/AIDS, received use patents that allowed for their clinical development. Slight modifications of a known compound, which improves the safety profile or stability of a final product, are worth protection, provided they meet patentability criteria

The Report should have provided an economic analysis of several different patent policy options for developing countries, considering both their projected short-term and long-term consequences, and should have proposed appropriate solutions for different categories of developing countries.

Intellectual property rights can have both a positive and a negative impact on competition and the economy, but which role they play is a highly empirical question. Abuse of intellectual property rights should not be controlled ex ante but rather ex post, so that governmental institutions encourage innovative minds rather than stifle them.

VII. Innovation and Access Problems Should be Addressed Separately

The Report does not sufficiently differentiate between two separate processes in healthcare technologies: innovation and access. If not adequately protected, innovation will decrease due to the lack of economic incentives, or there will be an incentive for inventors to withhold disclosure of innovation through trade secrets, thus stifling further innovation. Conversely, a rent economy that prevents an optimum level of innovation might result if innovators are granted too much protection (especially in duration, scope, or enforcement). This is not to say that all innovation should be based on purely economic incentives. Research for novel therapeutics, in HIV/AIDS for

example, is no doubt necessary, and in many cases, government policies should ensure that such research efforts are continued and sustained regardless of economic incentives.

Access, on the other hand, is not primarily related to the process of stimulating innovative output, but rather with the process of ensuring that people in need benefit from existing or improved technologies by using public policy instruments, infrastructure and human resources to ensure that people in need benefit from existing or improved technologies. We have seen examples from a variety of developing countries which have demonstrated that innovation, or multiplication of manufacturing facilities has not improved access per se, and have not necessarily lead to greater access to particular medicines.

Access policies are generally concerned with equity considerations. All levels of technology (from clean water to antiretroviral therapies) are relevant, regardless of whether they are innovative. Access, more often than not, focuses on the actual level of financing and the particular mix (public/private) of participation that is needed to ensure sustainable and equitable access to existing technologies. Immunization is a case in point. Each year 3 million children die of preventable childhood diseases due to the lack of access to existing vaccines. Those vaccines are old technologies and cost only pennies per shot and many of them are no longer patented. The lack of access to such medicines is clearly not the result of IPRs, but rather the absence of an effective healthcare delivery system. Therefore, it seems to be of utmost importance for the governments of developing countries to address the issue of providing access to healthcare for their citizens through pragmatic policy instruments. Creating capital markets, auction systems and incentives for healthcare workers, as well as using free drugs with prevention programs seem to be important components of a solution.

The Need for Further Research

Throughout the work of the CIPIH, the members of the Commission met truly courageous people from NGOs, health authorities, governments, international organizations and industry. Such an exchange should have led the CIPIH to propose a framework of realistic policy tools and options that could actually be used in divergent economic, industrial and scientific conditions.

It is important to scrutinize the functioning of patent institutions for continuing innovation and realizing access to medicines. The Report, however, did not analyze specific problems and situations in developing countries relating to the cost and benefits of these institutions or the actual effects of intellectual property rights in the

market, choosing instead to propose broad and abstract policy options. Further analysis and study of the conditions facing individual countries, with a view to suggesting more effective policy choices for each country, would be helpful.

APPENDIX

Pharmaceutical Patent (A61K) Filings of China, Cuba and India at different national and regional patent offices**, source: INPADOC database on January, 2006

-INPADOC database on January, 2006, Numbers for 2003 and 2004 might be partial in selected countries – These include A61K broadly, i.e., main and secondary classifications. For different patent offices on the left column, see below-

Table II. Chinese A61K patent fillings before patent offices in the world

	95	96	97	98	99	00	01	02	03	04
ARIPO		1		1	1					
BR		2	4	2	2	3	3	5	9	
CN	2502	3057	3170	3067	3179	4887	5737	6056	7476	5657
MX						1		1	1	
OAPI			1		1	1				
ZA	1		1	1		1		2	2	1
US	10	7	10	13	11	22	45	52	73	51
EP	11	19	24	33	21	27	45	52	45	6
WO	9	11	18	19	18	201	613	94	130	127

Table III. Cuban A61K patent fillings before patent offices in the world

	95	96	97	98	99	00	01	02	03	04
BR	2	1	4	5	5	2	7	3	9	
CN	3	3	4	14	13	10	11	6	5	
MX							1	2		2
ZA				2	1			3	5	4
US	1	2	2	4	2	4	4	3	3	4
EP	5	4	4	10	11	7	8	6	13	1
WO	1	4	5	6	7	4	13	10	14	17

Table IV. Indian A61K patent fillings before patent offices in the world

	95	96	97	98	99	00	01	02	03	04
ARIPO							1	2		
BR			1	4	11	14	19	17	34	1
CN		2	4	4	29	21	41	22	23	
IN	113	108	132	157	137	118	76	21		
MX							3	8	14	6
ZA	2		3	4	1	3	8	15	20	14
US			3	7	14	22	69	54	96	83
EP	1	2	3	8	30	44	44	43	75	20
WO				2	23	67	86	91	221	256

****National and Regional Patent Offices**

ARIPO	AP African Regional Intellectual Property Organisation (English speaking)
BR	Brazil
CN	China
CU	Cuba
IN	India
MX	Mexico
OAPI	African Intellectual Property Organisation (French speaking, patents are granted automatically to all patent filings)
ZA	South Africa
US	United States of America
EP	European Patent Office
WO	WIPO Patent Cooperation Treaty

Table V. Patenting practices abroad

	Country	Country classification(*)	US Patents	GDP per capita	US patents per GDP per capita
1	United States	G8, OECD	50000	36,006	1.389
2	Japan	G8, OECD	36889	31,407	1.175
3	<i>India</i>	<i>IDC</i>	<i>444</i>	<i>487</i>	<i>0.913</i>
4	<i>China</i>	<i>IDC</i>	<i>724</i>	<i>989</i>	<i>0.732</i>
5	Germany	G8, OECD	12960	24,051	0.539
6	Korea, Rep.	OECD	4246	10,006	0.424
7	France	G8, OECD	4906	24,061	0.204
8	Canada	G8, OECD	4368	22,777	0.192
9	United Kingdom	G8, OECD	4920	26,445	0.186
10	Italy	G8, OECD	2147	20,528	0.105
11	<i>Brazil</i>	<i>IDC</i>	<i>209</i>	<i>2,593</i>	<i>0.081</i>
12	Israel	HIE	1231	15,792	0.078
13	Sweden	OECD	1958	26,929	0.073
14	<i>South Africa</i>	<i>IDC</i>	<i>142</i>	<i>2,299</i>	<i>0.062</i>
15	Australia	OECD	1105	20,822	0.053
16	Switzerland	OECD	1917	36,687	0.052
17	Belgium	OECD	1055	23,749	0.044
18	Finland	OECD	945	25,295	0.037
19	Austria	OECD	657	19,749	0.033
20	<i>Thailand</i>	<i>IDC</i>	<i>64</i>	<i>2,060</i>	<i>0.031</i>
21	Singapore	HIE	564	20,886	0.027
22	<i>Malaysia</i>	<i>IDC</i>	<i>95</i>	<i>3,905</i>	<i>0.024</i>
23	<i>Indonesia</i>	<i>IDC</i>	<i>19</i>	<i>817</i>	<i>0.023</i>
24	<i>Argentina</i>	<i>IDC</i>	<i>64</i>	<i>2,797</i>	<i>0.023</i>
25	Mexico	OECD	129	6,320	0.020

Source : Carlos Morel Fiocruz 2005

Presented at the Bellagio meeting in May 2004 and the CIPIH meeting in Rio de Janeiro in January 2005.