Ensuring Developing-Country Access to New Inventions: The Role of Patents and the Power of Public Sector Research Institutions

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ABSTRACT

If universities adopt sound licensing practices, the universities will not only help stimulate investment in research on diseases that primarily afflict the poor in developing countries, but also ensure that the products of the research are affordable and widely available in those countries. Ensuring global access is one of the central goals of intellectual property management. But universities confront two main obstacles in their efforts to achieve the goal. First, university administrators, technology transfer officers, and business people are too often unaware of both the need to ensure access to new health technologies in developing countries and the manner in which patenting and licensing practices can be an integral component of global access strategies. Second, there is only a short history of experience in incorporating such concerns in negotiating licenses, so no best practices have yet evolved. This chapter offers a few possible approaches to ensuring broad access to university inventions while preserving incentives to development, including patenting inventions in a select list of developing countries. The chapter concludes by urging all of the players in this field to build upon their own experience and to take creative risks in the pursuit of new solutions.

1. INTRODUCTION

From a humanitarian point of view, a patent system presents a paradox. How can a system designed to restrict access to technologies, including medical technologies, also be used to maximize availability of needed medicines and vaccines at affordable prices? One way of looking at that paradox is to consider an extreme case: if all the medicines and vaccines needed for diseases in developing countries existed today, the patent system might be unnecessary. The absence of patents, some experts suggest, would presumably allow for maximum competition, driving prices down and thereby maximizing affordability and availability.

But for many of the diseases of developing countries, few drugs or preventatives exist; in some cases none exists. Patent protection can provide the necessary incentive to encourage industry to use its skills and resources to discover, develop, test, ensure quality control of, manufacture, and distribute new drugs and vaccines. Few companies—if any—would embark on the long trail of new-drug discovery and development, if they could not be protected by patents from competitors.

Thus, patents are neither inherently bad nor inherently good with regard to this purpose, but—like all tools—must be used wisely.

Research institutions, such as universities, medical schools, and other nonprofit institutions engaged in biological and medical research (collectively referred to as "universities" in this chapter), have a special role to play regarding the use of patents for developing and distributing drugs and vaccines for developing countries. These

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institutions are often the source of the core technology and, occasionally, lead compounds that could be developed into drugs and vaccines.

Despite the avowed public purpose of their technology transfer activities, universities have recently come under criticism for using patents in a way that could inhibit (and in very few cases, has inhibited), the distribution of medicines at accessible costs to developing countries. Critics argue that by granting exclusive licenses to developed-country pharmaceutical companies, the universities are allowing the pharmaceutical companies, sometimes, to prevent local companies from producing and selling drugs, potentially at affordable prices—thus effectively denying life-saving drugs to poor people in these countries.

Although nonprofit research institutions are not often involved in these issues, (in part because the fraction of medically related patents owned by these institutions is small), their visibility, coupled with the universities' public responsibility, is causing university technology transfer offices to modify their licensing practices for patents relevant to healthcare in developing countries.

Some thinkers have suggested that the best thing universities can do to ensure access is to cease patenting medically related inventions and place everything in the public domain. But doing so would be both unrealistic and counterproductive. Patents have been shown to be a powerful tool for directing investment into the development of technologies that would otherwise lie fallow. University inventions are usually at such an early stage (*embryonic* is a term commonly used to describe them) that investment in development involves substantial risk. Neither the technical practicality nor the market acceptability of the invention is proven. And many more inventions fail to reach than do reach the market—particularly in the medical field. Patents are an essential way for companies to manage the risk, and the use of patents is even more important for medicines and vaccines, where the costs of development and particularly of clinical trials require much larger investments and much greater risk.

Universities and research institutions hope for some financial return from their patents, but contrary to widely held beliefs, this return is seldom large. On average, U.S. universities receive licensing royalties equivalent to only 2%–4% of their research budgets. Most universities believe that the primary purpose of their technology transfer activities is either (1) to induce investment in developing technologies to bring products to public use, (2) to aid local economic development through spinout companies based on licenses to their technology, or (3) both.

Given their commitment to encouraging the development of new technologies via patenting, universities need sophisticated policies and procedures in licensing to ensure that the poor will have access to medicines based on the universities' technologies. Potentially, the access policies developed by universities may—if the policies are practical, properly implemented, and publicized—become "norms" that will be more widely adopted by the private sector.

Awareness about these issues is new; techniques for addressing the problem are only just emerging, and there is no consensus yet on best practices. The remainder of this chapter addresses some potential solutions.

2. RAISING AWARENESS

The first task in encouraging effective licensing policies and practices is to raise awareness of the issues (discussed in section 1 above) in the research institution community. Technology transfer officers need to become aware of developing country health-care needs and the universities' responsibilities with respect to those needs. Given the general commitment of universities to transfer technology to promote public welfare, this awareness alone will go a long way toward preventing the inadvertent granting of licenses that lack consideration for the health needs of developing countries. Senior administrators and researchers also need to become more aware of the issues involved so that these professionals will acknowledge the broader value of licensing terms that may be somewhat less profitable from an economic standpoint, but that may address

urgent medical problems in poor parts of the world. Finally, consistent university policies on these issues will raise awareness inside the companies universities work with, making such companies more readily accepting of licensing terms that address these issues.

Awareness is already growing. In the United States, the Association of University Technology Managers (AUTM) began to publicize this issue to its members in 2003. This organization is having a substantial impact on the understanding of technology transfer professionals with respect to these concerns: more than 90% of technology transfer professionals from nonprofit research institutions in the United States and Canada belong to AUTM, along with several hundred professionals from other countries. An AUTM Special Interest Group, formed in 2003, has evolved into the Technology Managers for Global Health (TMGH),[1] which is partially supported by MIHR (the Centre for the Management of IP in Health Research and Development). TMGH's purpose is to raise awareness about global health issues and, with AUTM, to compile a collection of best-practice policies and licensing terms that can be distributed to AUTM members and others. The interest shown on the part of the greater AUTM membership is especially encouraging. At its 2006 annual meeting, the opening plenary session of AUTM was on "Innovative Policies and Practices in Technology Transfer: A Global Health Perspective." The meeting agenda included a program of education with several workshops on global-health technology transfer issues.

Through its guidelines on the patenting and licensing of research tools, the National Institutes of Health (NIH) have helped alert universities to the need for thoughtful policies in exclusive licensing.[2] The NIH wants to make certain that researchers in the health arena have access to research materials without undue hindrance by patents, and so NIH has issued guidelines for patenting and licensing research tools. The two objectives—fostering access to medicines and making research materials widely available—often merge in the minds of technology transfer professionals, making them more aware of the need to exercise care when licensing university technology.

3. SUGGESTED APPROACHES

3.1 *Considering where to file patents*

When a research institution patents and licenses out a technology, usually the institution can—if it insists—continue to own the patent after licensing. (This is the practice in most U.S. universities.) The institution can then control, by contract with the licensee, which countries the patent will be filed in. Determining a strategy of where to file, however, is not easy.

3.1.1 *Prohibition-of-filing strategy*

Where a drug or vaccine in question has a large developed-country market, one possible strategy is to prohibit the patent from being filed in developing countries. Most of the licensee's profits would presumably come from markets in developed countries—with or without developing country patents. The loss of potential revenue from developing countries (which in any case could not afford to purchase large quantities of the medicines at developed country prices) would be negligible, and the licensee mostly likely would not be substantially disadvantaged by this approach. The absence of patents in the developing world, however, could allow "generic" competitors to produce the drugs in those countries at low prices.

This strategy will be effective *only* if:

- The developed country market for the medicine is large. If the developed country market is only a specialty "travelers' market" and the primary demand for the medicine is in developing countries (malaria vaccines are a good example), this strategy may not be acceptable to the licensee company.
- The drug or vaccine is relatively easy to manufacture and does not rely on special know-how possessed only by the licensee company (including valuable regulator dossiers). This is more likely with simple chemical drugs than with biological drugs (including vaccines), whose techniques for

production and purification may be beyond the capabilities of most developing country manufactures. Also, if the drug is easy to manufacture, then safeguards must be in place to avoid parallel imports.[3]

- The research institution owns the core patent for the drug or vaccine, while other "secondary" patents, owned by the licensee, are not critical to developing and manufacturing the medicine. If secondary patents are critical and the licensee chooses to file them in developing countries, then attempts by the university to provide its own technology free of charge may be moot. The only benefit would be to shelter the university from criticism. Theoretically, it is also possible for the university to demand in its licensing agreement that the licensee not file such secondary patents in developing countries, but it is doubtful that the university would have the negotiating power to make that demand—particularly if the university's invention, at the time it is licensed, is still far from a product.

3.1.2 *When patent filing in developing countries may be beneficial for access*

When the demand for a drug or vaccine is primarily (or exclusively) in developing countries and there are no alternative products, the primary problem is to develop a sufficiently profitable market to provide an incentive for the private sector to invest in R&D. The only other alternative is for governments or nongovernmental organizations (NGOs) to fund all of the research, development, clinical testing costs, and manufacture. But having a public sector entity develop a commercially viable product is usually impossible.

Patents may provide an incentive to the private sector to invest by aggregating the developing world market into a single, larger market. To be successful, this strategy relies on:

- sufficient available resources for buying the product once it is developed (Governments and NGOs may have to step in to supply money to the public sector of low-income developing countries so that the product can be purchased—particularly if there is no private travelers' market that can support higher prices.)
- adequate systems for quality control and regulatory approval to ensure consistent, high-quality products in the absence of developed country regulatory controls
- a belief that the legal systems in the nonmanufacturing countries will be strong and consistent enough to allow the supplier to enforce its patent rights and to maintain its monopoly for a reasonable period of time
- a willingness of governments and NGOs to accept prices that are high enough for suppliers to recoup research and development costs

3.1.3 *Licensing strategies*

Research institutions have the most control over optimizing the use of their inventions at the time of licensing. It is before the invention is licensed that the university can best ensure that the invention will be used to advance—or at least not hinder—solutions to developing country health needs.

The first decision is whether to grant (1) a fully exclusive license, (2) an exclusive license limited by product type, (3) an exclusive license limited by geographical territory, or (4) a nonexclusive license.[4] Considering two extreme cases is illuminating:

- Where the invention is a tool for discovery that is useful to many without significant development, then nonexclusive licensing is probably most appropriate for developed country use. Patents in developing countries will essentially be unnecessary. (Many universities will also require that the patents not be asserted against nonprofit research institutions in any country, thus allowing free access by such institutions.)
- Where the patent covers the core invention of a potential new drug or a vaccine that require many years and tens, if not hundreds, of million dollars of investment, an exclusive license may be the best strategy. In such a case, patenting in selected developing

countries may be an important element in a strategy to ensure global access.

Exclusive licensing places a large responsibility on the university to negotiate license clauses that ensure both development of the product and rapid distribution to developing countries at affordable prices. Not every member of the university technology transfer community is yet conscious of this requirement. Best practices have not yet been established for such negotiations, and so strategies need to be based on evolving experience. A few situations, we know in retrospect, were clearly mistakes—experiences we can now learn from. Some better, but still experimental strategies include:

- **development of milestones**. As a condition for a company maintaining a license, the university requires that the company devote at least a certain reasonable minimum of resources (money or staff time) to developing the technology. The university may also require certain success milestones (for example, first clinical trials by a certain date, product on the market by a certain later date, and so forth).[5] However, success milestones are particularly difficult to negotiate for very early-stage technology.
- **requirement of delivery of product for developing countries**. The university may require the company to begin testing and distributing the product for developing countries simultaneously, or nearly simultaneously, with its introduction to developed countries. This is particularly important for vaccines, for which the trickle-down theory[6] has sometimes deprived developing countries of suitable product for decades.
- **control over pricing in developing countries**. This is usually set at a small percentage over cost (so-called cost-plus pricing). This may be particularly relevant where there is a large—and presumably profitable—market as in the developed world.
- **sublicensing**. If the company cannot deliver the product or deliver it at acceptable prices, then the university may require the company to sublicense the patent to others. When manufacturing the product is simple, this strategy may work, but when the product requires substantial company know-how and background technology, the "victory" in forcing a sublicense of the patent alone may be a hollow one. This is particularly true for complex biological drugs and many vaccines. The university should therefore negotiate clauses that make sublicensing as attractive as possible, so that the company will cooperate fully in the venture. A paper by Friedman and colleagues[7] describes such a strategy by the Pharmacia Company. The company enthusiastically sublicenses the patent along with its know-how and exerts some control over the quality of the product. The benefits to the company are primarily to its reputation, with a justifiable pride in the good that is done, but allowing sublicensing also protects the company from the criticism of not meeting the needs of the poor in developing countries.

4. CONCLUSION

University technology transfer professionals are becoming more aware of their obligations to ensure that the poor have access to medicines based on university technologies. To a large extent, universities are embracing this obligation in the hope that well-crafted patent and licensing policies can be powerful tools to provide such access. But there are no clear-cut mechanisms, nor many precedents to guide professionals in this endeavor. This chapter presented just a few of the strategies that research institutions can pursue in their quest to provide developing countries with access to new medicines. Each of these strategies has been tried, but they are all relatively new and will need further refinements. This can only be achieved, however, in actual negotiations between research institutions and companies. New approaches will also certainly develop in the future. None of these efforts will be effective unless both research institutions and companies first become more aware of their obligations to the poor in developing countries. Awareness is only the first step, however, for none of these strategies will thrive unless

they meet the needs of both the research institutions and the companies that are developing new technologies to improve human health. Building upon the knowledge and successes we already possess, we must not only strive for novel, creative solutions but also take reasonable risks in the pursuit of these much-needed solutions. ■

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1 See www.tmgh.org.

2 NIH. 2005. Best Practices for the Licensing of Genomic Inventions: Final Notice. *Federal Register* 70(68): 18413–415. www.ott.nih.gov/pdfs/70FR18413.pdf.

3 See, also in this *Handbook*, chapter 15.4 by D Matthews and V Munoz-Tellez.

4 See, also in this *Handbook*, chapter 11.8 by SL Shotwell.

5 See, also in this *Handbook*, chapter 2.7 by J Oehler.

6 Trickle-down theory relates to a product that may at first be so expensive that only wealthy people can afford it. The theory states that over time, however, the price will fall until it is available to the general public. In other words, the benefits trickle down.

7 Friedman MA, H den Besten and A Attaran. 2003. Out-Licensing: A Practical Approach for Improvement of Access to Medicines in Poor Countries. *Lancet* 361: 341–44. www.fightingmalaria.org/pdfs/Lancet%20Article.pdf.