

Australian Medical Biotechnology: Navigating a Complex Patent Landscape

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This paper reports the results of an empirical study of the Australian medical biotechnology industry, involving surveys and interviews with participants in research institutions, companies and diagnostic facilities. Despite ongoing concerns about the impact of gene and research tool patents on downstream research and development, this study reveals evidence of liberal licensing practices associated with some essential or foundational inventions within the Australian industry. However, there are also significant challenges, including negotiating difficulties, restrictive licence terms, refusals to license and stacking royalties. Hence some consideration of the options for law reform is warranted.

Introduction

There is ongoing debate both within Australia and internationally about the ways in which patents impact on the medical biotechnology industry. The underlying purpose of the patent system is to encourage innovation by granting the patent holder a temporary monopoly over the patented invention. However, patents can also have a detrimental effect on innovation, for example, by stifling the free flow of information or increasing transaction costs.¹ Gene patents and broadly applicable research tool patents are of particular concern for two

1 A vast body of academic literature exists on this issue, which is impossible to list fully here. See particularly: M. Heller and R. Eisenberg, "Can Patents Deter Innovation? The Anticommons in Biomedical Research" (1998) 280 *Science* 698; R. S. Eisenberg, "Bargaining over the Transfer of Proprietary Research Tools: Is this Market Failing or Emerging?" in *Expanding the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society* (R. C. Dreyfuss, D. L. Zimmerman and H. First ed., Oxford University Press, 2001), pp.228–229; C. Long, "Proprietary Rights and why Initial Allocations Matter" (2000) 49 *Emory Law Journal* 823. Similarly, a large number of reports and other policy documents consider the potentially detrimental effect of patents in medical biotechnology. Important recent reports include the Nuffield Council on Bioethics, *The Ethics of Patenting DNA: A Discussion Paper* (Nuffield Council, London, 2002); National Research Council (NRC), *Intellectual Property Rights and Research Tools in Molecular Biology* (National Academy

of Sciences, Washington D.C., 1997); Australian Law Reform Commission, Report 99, *Genes and Ingenuity: Gene Patenting and Human Health* (Commonwealth of Australia, Canberra, 2004), also available at www.austlii.edu.au/au/other/alrc/publications/reports/99/ (last accessed May 18, 2005) ("ALRC Report").

2 Leading studies in the area include: J. Walsh, A. Arora and W. Cohen, "Effects of Research Tool Patenting and Licensing on Biomedical Innovation" in *Patents in the Knowledge-Based Economy* (W. M. Cohen and S. A. Merrill ed., National Academies Press, Washington, 2003), p.287, available at <http://books.nap.edu/books/0309086361/html/285.html#pagetop> (last accessed May 18, 2005) (also see Walsh *et al.*, "Working through the Patent Problem" (2003) 299 *Science* 1021); and J. Straus, H. Holzapfel and M. Lindenmeir, *Empirical Survey on Genetic Invention and Patent Law* (Munich, 2002) (copy on file with the authors). For a summary of the key issues see OECD, *Genetic Inventions, Intellectual Property Rights and Licensing Practices: Evidence and Policies* (OECD, Berlin, 2002), available at www.oecd.org/dataoecd/42/21/2491084.pdf (last accessed May 18, 2005) and for a shorter summary see OECD, *Patents and Innovation: Trends and Policy Changes* (OECD, 2004), p.22, available on the OECD website at www.oecd.org (accessed May 18, 2005).

3 J. F. Merz, D. G. Kriss, D. D. G. Leonard and M. K. Cho, "Diagnostic Testing Fails the Test" (2002) 415 *Nature* 577; M. K. Cho, S. Illangasekare, M. A. Weaver, D. G. B. Leonard and J. F. Merz, "Effect of Patents and Licenses on the Provision of Clinical Genetic Testing Services" (2003) 5 *Journal of Molecular Diagnostics* 3.

4 See, for example, Biotechnology Australia, *Australian Biotechnology: A National Strategy* (Commonwealth of Australia, Canberra, 2000), p.7, available at www.biotechnology.gov.au/library/content_library/BA_Biotech_strategy.pdf (last accessed May 18, 2005).

5 Detailed results of this study are provided in a comprehensive report: D. Nicol and J. Nielsen, "Patents and Medical Biotechnology: An Empirical Analysis of Issues Facing the Australian Industry", Centre for Law and Genetics Occasional

by the Australian Law Reform Commission in its inquiry into gene patenting and human health in Australia.⁶ The inquiry considered and made recommendations on a range of important issues associated with patenting and licensing practices.

Study methodology

There were two components to this study. First, written surveys were mailed to three industry sectors:

(1) *The research sector*, including universities, government research laboratories, public and private research institutes and hospitals, collectively referred to as research institutions hereafter. Printed surveys were mailed out to 39 research institutions in March 2003 and reminder letters were sent in June 2003. Institutions were identified by prior knowledge of the research sector and using standard search engines. The survey asked 42 questions about research activities, the institution's involvement in patenting, collaborations and licensing, awareness of patents held by others and views on patenting. Twenty-three surveys were returned, yielding a response rate of 59 per cent.

(2) *Biotechnology and pharmaceutical companies* across the full spectrum, from upstream spin offs from research institutions through to downstream subsidiaries of multinational pharmaceutical companies. Approximately 180 surveys were mailed to companies in June 2002.⁷ The same survey was sent to both biotechnology and pharmaceutical companies. Follow-up letters were sent to respondents four weeks after the surveys were mailed out, and follow-up telephone calls were subsequently made. The survey asked 52 questions about the structure and activities of the company, the company's involvement in patenting, collaborations and licensing, and the views of the respondent on patenting within the industry. Forty-nine completed surveys were returned, yielding a response rate of 27 per cent.

(3) *Diagnostic facilities* offering clinical genetic testing and, in some instances, undertaking diagnostic research. Printed surveys were mailed out to the laboratories offering diagnosis of genetic disorders listed on the Human Genetic Society of Australasia's website⁸ in November 2002 and reminder letters were sent in December 2002. The surveys asked 61 questions about the laboratory and its clinical activity, research and patent activity and collaborations. A total of 52 surveys were dispatched. Eighteen completed surveys were

returned (35 per cent response rate). These detailed surveys were supplemented by short telephone surveys conducted in March and April 2003 asking six questions about the laboratory, the tests it performs, payment of licence fees and/or royalties, receipt of notifications from patent or licence holders, responses to notifications, and views on patents. These questions were only asked if respondents indicated that they had not returned the written survey. Hence telephone survey respondents did not overlap with the written survey respondents. There were 13 responses to the telephone survey, yielding a total response rate of 60 per cent for these questions.⁹

The second component of the study involved semi-structured interviews with participants in all of these sectors. Between August 2002 and July 2003, 40 interviews were conducted with respondents from private companies, research institutions and diagnostic testing facilities, as well as other industry and government personnel. Participants were selected based on prior contacts, media reports, internet-based search engines and databases, and snowball sampling. They were asked a series of questions that conformed to a flexible format. The duration of the interviews was generally between 45 minutes and one hour.

Respondents were selected to provide a representative sample of various sectors within the Australian industry, from research institutions and companies operating at the upstream end of the industry, through to companies involved in downstream drug development and therapeutic applications. Within the category of private sector companies, chief operating executives, intellectual property personnel and bench scientists were interviewed. Research institution interviewees included directors of research groups, bench scientists and technology transfer personnel. Within the category of diagnostic testing facilities, directors of research groups were interviewed. A number of other respondents with expertise in the area were also interviewed, including patent attorneys, licensing consultants and government and trade representatives. Interviews were conducted on a confidential basis because of the nature of the data being gathered; non-disclosure of identifying information is standard practice in studies of this nature and a pilot investigation indicated that people would be reluctant to participate without an assurance of confidentiality.

Some key areas of inquiry in both surveys and interviews were as follows:

- the nature of the research that is being undertaken by the Australian medical biotechnology industry and the patent activity associated with it;
- whether the Australian industry has the capacity to commercialise its own technology, or has to transfer this technology for others to commercialise;

⁹ Results of this aspect of the study are reported in D. Nicol, "The Impact of Patents on the Delivery of Genetic Tests in Australia" (2003) 15/5 *Today's Life Science* 22 as well as the Nicol and Nielsen Report, n.5 above, at pp.196–207.

Paper No.6 (2003), available at www.ipria.org/publications/reports.html (last accessed May 18, 2005) ("Nicol and Nielsen Report").

⁶ See ALRC Report, n.1 above.

⁷ In 2001 Ernst & Young estimated the number of core biotechnology companies in Australia at 190: Ernst & Young, *Australian Biotechnology Report* (Commonwealth of Australia, 2001). In this study, surveys were sent to those companies for whom contact details could be found using standard search techniques. It should be noted that the number of biotechnology companies in Australia has risen significantly since the 2001 Ernst and Young Report. See ALRC Report, n.1 above, at pp.401–409.

⁸ At www.hgsa.com.au/ (last accessed May 18, 2005).

- the extent of collaborations, assignments and licensing-out of patents held by the Australian industry and the nature of the arrangements;
- the general terms and conditions contained in licences entered into by the Australian industry for the purposes of commercialising research (licensing-out);
- the extent to which the Australian industry needs to obtain authorisation from other patent holders in order to carry out its research and commercialisation, specifically focusing on the types of patents that are being enforced in Australia and the *quantum* of in-licensing;
- the general terms and conditions contained in licences entered into by the Australian industry for the purposes of obtaining access to patents held by others; and
 - the particular issues faced by the research institution, diagnostics and private industry sectors.

Study findings

A key finding of this study is that a very delicate balance exists between the role played by patents in encouraging innovation and the potential for patents to impact negatively on research into, and the development of, new drugs, devices, therapies and diagnostics. While the existing system is not perfect, great care will need to be taken in modifying this system to ensure that the balance is not too greatly disturbed. The primary conclusion from this study is that while there is some scope for legal intervention, given that a fairly vibrant medical biotechnology industry is developing and operating in Australia, any reform should be at the margins. To justify this finding, key outcomes are briefly outlined below.

Research and patent issues

There are concerns in all sectors of the industry about the breadth of some of the patents that were granted in the 1990s. However, respondents generally acknowledged that issues surrounding broad patents are being resolved in some jurisdictions. In particular, the US Patents and Trademarks Office has narrowed the scope of acceptable claims and US courts are striking down overly broad claims. There was some criticism of the Australian Patent Office by respondents in this study. In particular, it was felt that the Patent Office allows overly broad claims to be granted. The lack of Australian biotechnology case law exacerbates this problem because the Patent Office is not being given any guidance by the courts as to biotechnology claims interpretation. Thus, while some concerns were raised by respondents about the quality of patents being granted in Australia, the issues raised seem to be related more to resources and the application of existing patent law standards rather than the constitution of those standards.

There are ongoing concerns about the impact of gene patents on downstream research. There are also some concerns about research tool patents, although in general they would seem to be less an issue in Australia than in the United States. In part the reason for this is

because a number of the more controversial research tool patents have not been granted in Australia and there is little evidence of aggressive enforcement practices in relation to granted patents.¹⁰ The views expressed by respondents on the value of particular types of patents depend very much on the position in the industry of the respondent. Respondents in downstream sectors object to upstream patents, but at the same time vigorously defend downstream patents. For respondents in the upstream sectors, however, upstream patents are essential to their economic viability.

While the importance of maintaining the free flow of raw scientific data is widely recognised, this should not be at the cost of unfair discrimination against certain industry sectors. The cascade of patents that flows from the upstream to the downstream sectors of the industry inevitably increases the price of end products, but this has to be balanced against the value of innovation at the upstream end of the industry and the importance of maintaining its economic viability.

Transfer of technology

The results of this study show that there is an extensive network of collaborations within the Australian industry, particularly between research institutions and upstream or intermediate level companies. Overseas collaborations are particularly important. The mechanisms used to transfer technology within these collaborative arrangements are many and varied. While assignment of patents from research institutions to companies was common in the past, there is now more reluctance to relinquish control over the future development of technology created in the research institution setting.

Some participants in the Australian medical biotechnology industry are capable of bringing their own products to market, particularly in the device sector. However, for the most part, particularly in the drug discovery sector, participants need to be able to transfer their technology downstream. Indeed, in most cases there are a number of intermediate steps from the research sector to the market. Most Australian biotechnology companies fall into the upstream and intermediate sectors. As such, the challenge for the Australian industry is to make their technology attractive to downstream partners. In many cases this will require transfer of technology overseas. Adequate patent protection is just one of the challenges for the industry. At present there appears to be a "buyers' market" in the Australian biotechnology industry. It is very difficult to find suitable downstream partners and negotiate a good deal, but not impossible.

The issues facing the Australian industry to some extent mirror the industry elsewhere. While the rates of technology transfer in Australia are encouraging, the process is not without its impediments. Ways need to be found for making the process as streamlined as possible.

10 Results of searches for these research tool patents in Australia are provided in the Nicol and Nielsen Report, n.5 above, at pp.41-48.

Issues for research institutions

Australian research institutions continue to be rich sources of high-quality research results, many of which have great potential for commercialisation. Participants in the research sector accept that patenting is an essential component of the commercialisation process. Like company participants, they see that obtaining patents is necessary to ensure the flow of investment for research and development. Scientists in research institutions in Australia are becoming more knowledgeable about intellectual property issues, and research institutions are putting better strategies in place than was the case in the last decade. Some of the important features of good intellectual property strategies include:

- open dialogue between scientists, technology transfer officers and patent attorneys;
- clean ownership through assignment to the institution (although Melbourne University has the strategy of vesting ownership in the inventor);
- rapid review of publications to ensure that they do not compromise future intellectual property; and
- clear profit-sharing arrangements.

Two issues raised by respondents that are of some concern are the quality of patent applications and the valuing of technology. Some respondents reported that there is a tendency both to over-file and to over-value. However, as research institutions become more familiar with intellectual property management strategies it is likely that they will find ways to work around these problems. Many of these issues could be (and are being) addressed through the implementation of better management procedures. In the area of law reform, there is one particular matter that needs to be addressed. The scope of the current research exemption (if it exists at all) is far from clear. Although clarification of this exemption is highly desirable, it may be that this would have little practical effect because much biomedical research has commercial implications at some stage.¹¹

Restrictions on access

This study revealed evidence of liberal licensing practices associated with some essential or foundational inventions within the Australian industry. Respondents reported having little difficulty gaining access to broadly applicable research tools and technologies. It was not quite so clear that this was the case with technology useful to produce two competing products. There were a number of scenarios where access to technology of this type appeared to have been restricted in some way, and if so it is possible that innovation may be impeded. Although it cannot be concluded with any certainty how frequently this had occurred, there were certainly instances of it. Many respondents did, however, report being able to either access technology they needed, or

¹¹ Note that in addition to the Australian Law Reform Commission inquiry (see ALRC Report, n.1 above), a second independent inquiry is being conducted by the Australian Advisory Council on Intellectual Property. The Council released its Options Paper, *Patents and Experimental Use*, in December 2004. Available at www.acip.gov.au/reviews.htm#expuse (last accessed May 18, 2005). At the time of writing the final report has not yet been released.

redirect their research efforts. But access was often gained at a cost. The imposition of terms claiming reach-through rights is commonplace, and numerous other terms that slow the pace of negotiations are frequently sought. Even when a negotiated outcome is reached, the pace of innovation may be slowed. The cost to the industry is significant, but the social cost may be greater.

It would be premature to conclude that exclusionary practices in relation to patented technology within the Australian biotechnology industry are having a minimal effect on innovation. There was substantial evidence in this study of exclusionary practices, but this to some extent is to be expected in any patent system. The question that needs to be addressed is whether exclusionary practices are having a negative impact on innovation and the development of the industry.

Anticommons issues

There is no doubt that the increasing complexity of the patent landscape is creating difficulties for the Australian medical biotechnology industry. In particular, searching obligations are onerous and expensive. Nevertheless, as with other studies, the results of this study suggest that for any particular research project the number of problematic patents is quite small, generally less than five. However, it is concluded that in part the reason for this is that if there is a higher level of encumbrance research will be redirected. It is difficult to state with any level of precision the number of research projects that are abandoned for the reason that there are too many problematic patents in the area, but it is acknowledged that this problem does exist.

Because most participants in the Australian industry need to license out their patents, they are very conscious about the need to keep their technology as attractive as possible to downstream partners. One of the critical factors is the need to avoid over-encumbrance. Participants in the Australian industry are conscious of royalty stacking and endeavour to keep this to a minimum in their licensing-in activities.

Respondents in this study did not report significant problems associated with the enforcement of multiple research tool patents. In part this is because a number of the most aggressively enforced research tool patents do not exist in Australia, or, if they do exist, they do not appear to be enforced.¹² However, these or other research tool patents may well be enforced in the future. Hence it would be premature to say that the Australian industry is free from the rigours of research tool patent enforcement.

Impact on end users: the provision of diagnostic services

Although biotechnology patents have the capacity to impact on many types of health care products, this study primarily focused on the issue of supply of diagnostic services. In contrast to a recent study in the United States, there was little evidence of enforcement

¹² See n.10 above.

of patents in this area in Australia, apart from one notable exception: some respondents commented that they had received demands for licence fees by Hoffmann-La Roche for in-house production of taq polymerase for use in the polymerase chain reaction. In addition, since the completion of this study it appears likely that diagnostic testing facilities may have received similar demands from Genetic Technologies Ltd ("GTG"), a Melbourne-based company, relating to its patents claiming intron sequence analysis. Like the polymerase chain reaction, this technology is a foundational research tool for much modern biomedical research. Dr. Mervyn Jacobson, the chief executive officer of GTG, has intimated that these patents are now being enforced against Australian diagnostic facilities.¹³

Respondents in this area have far greater concerns about the effect of patents on research than respondents from either of the other two sectors. In addition, many have concerns about the impact of patents on the provision of diagnostic tests to end users. Because the owners of gene patents do have the capacity to exert significant influence on the provision of these services, options for law reform may need to be scrutinised more closely in this area than in others.

Market solutions

When faced with the knowledge that they might be infringing a patent, most respondents said that their first option would be to attempt to negotiate a licence.¹⁴ The Australian industry relies heavily on licensing arrangements: over half of the research institution and company respondents in this study that owned patents reported licensing-out activities. Similarly, around half of all research institution and company respondents also reported in-licensing. Notwithstanding this evidence of significant licensing activity, there are also significant challenges. Negotiating difficulties, restrictive licence terms, refusals to license and stacking royalties can all create impediments to a well-functioning market. There are doubtless cases where unhindered research and development is impossible.

One of the other main ways to avoid patent infringement is to invent around patented technology. This is easier to do in some areas than in others; it is generally made more difficult when broad patents are granted. Moreover, significant costs are involved in finding appropriate ways to invent around. One other option when a particular area of research is discovered to be infringing a patent is to ignore it. Many respondents in research institutions rely on the argument that their research is exempt. Indeed, although the law in this area is unclear in Australia, there is some evidence to suggest

that a practice-based research exemption exists. Companies are unwilling to enforce their patents against researchers in research institutions both because it would create a negative image against the company and also because research institutions lack the financial resources to make legal challenge worthwhile. However, this attitude may not continue into the future.

There is also some evidence of patents being ignored in the company sector. Similarly, in the diagnostics area, it appears that most patents are ignored. The risk from the individual perspective is that if caught the individual could face a large damages award and/or an injunction preventing them from continuing their research. From the broader social perspective, such actions could be seen to be undermining the social value of the patent system. Patent holders encounter serious difficulties in tracking infringers. In particular, infringement of research tool patents is notoriously difficult to detect. Even when infringement has been detected, enforcement is a high-cost procedure and there is a risk that once infringement proceedings are initiated a counter-claim could be made for revocation.

Some industry participants will look at the option of challenging the validity of patents, either in pre-grant opposition proceedings or post-grant revocation. However, the costs are significant and such challenges cannot be embarked upon lightly. One of the difficulties this presents in Australia is that because of the costs there are few challenges and because of this there is little in the way of precedent. This increases the risks associated with litigation in this area. As a consequence, many patents that may be invalid are never challenged, emphasising the importance of granting good patents or of better enabling challenges to questionable patents. Research institution patent holders in particular are unlikely to be able to take the step of challenging competitors' patents because of lack of resources and risk-averse strategies.

Reform options

Although working solutions are being found by industry participants to many of the problems associated with biotechnology patents and technology transfer, some consideration of options for law reform is warranted. Legal solutions can be broadly categorised into solutions that regulate the grant of patents and solutions that regulate in some way the manner in which patents are used.

Regulating the grant of patents

The results of this study suggest that wholesale reform of the patent-granting requirements is not desirable at this time. However, this does not preclude a consideration of a refinement of patent standards and ways in which the grant of patents might be constrained. Indeed, many commentators have called for such a consideration. For example, two members of a working group on research tools commissioned by the US National Institutes of Health expressed concern about

¹³ See the Australian Broadcasting Corporation *Four Corners* programme, "Patently a Problem", broadcast on August 11, 2003, transcript available at www.abc.net.au/4corners/content/2003/transcripts/3922059.htm (last accessed May 18, 2005).

¹⁴ Low levels of cross-licensing were also reported in order to overcome blocking patent situations. Blocking patents occur where one patent holder holds a broad patent over an invention (the dominant patent) and another patent holder holds a narrower patent over an improvement to that invention, or a new invention (the subservient patent). See R. Merges and R. Nelson, "On the Complex Economics of Patent Scope" (1995) 90 *Columbia Law Review* 839.

the ways in which patent standards were applied in biotechnology.¹⁵ Fine-tuning the patent system in biotechnology was considered by them to be a necessary exercise.

As noted above, the results of this study indicate that there is a need to improve examination practices in Australia to ensure that good-quality patents are issued. This is particularly important because pre- and post-grant challenges to validity do not occur routinely enough to strike out invalid patents or to provide guidance as to examination of other patents. However, a gene sequence exclusion or a *ordre public*/morality exclusion is unlikely to add a great deal and may in fact create uncertainty. The following options warrant further consideration:

- the addition of an industrial applicability/utility requirement at the examination stage; and
- the crafting of more biotechnology-specific guidelines for assessing the description criteria.

Recommendations resulting from the inquiry into gene patenting conducted by the Australian Law Reform Commission largely support these options for reform.¹⁶

Regulating the use of patents

There are various options for regulating the use of patents, each of which warrants closer scrutiny.¹⁷ However, any proposals for reform must be carefully evaluated

15 National Institutes of Health, *Report of the National Institutes of Health Working Group on Research Tools* (1998), available at www.nih.gov/news/researchtools/index.htm (last accessed May 18, 2005) at fn.5 of that Report.

16 See ALRC Report, n.1 above, particularly Recommendations 6-1 to 6-4, &-1 and 8-2.

17 The ALRC Report, n.1 above, canvasses many of these options. See particularly Chs 23, 24, 26 and 27.

before implementation because any option that is aimed at promoting access will have some impact on technology providers.¹⁸ There is certainly room for improvement in streamlining technology transfer practices. There is some desirability for finding ways of reducing the onerous demands of patent searching and tracking infringement. Moreover, it may be desirable to have standard term licensing contracts in some areas, with standard licence fees. In particular, it may be appropriate to consider some of these measures in the areas of non-profit research, diagnostics and research tool licensing. However, such measures should not be adopted in any wholesale way across the industry. In most instances freedom of contract should prevail. While there may be some desirability in relaxing the compulsory licensing procedures, this should not be at the cost of devaluing the patent grant. It may be more fruitful to look at co-regulatory mechanisms for regulating the use of patents. In this regard, some of the mechanisms employed under the Australian copyright system may provide guidance.

Competition law may also provide an appropriate vehicle for addressing some access issues, and exists as a remedy in the event of anti-competitive practices. It is, however, rarely utilised in relation to restricted access to intellectual property, and this suggests that there could be some difficulties promoting its use to address exclusionary licensing practices. Given the confidential nature of many transactions involving intellectual property, carving out a role for competition law may be difficult. Any extension of the role of competition law should be evaluated very carefully.

Each issue raises complex questions and implications for the industry. As such, caution is required in the implementation of law reform to ensure that the momentum of the industry is sustained.

18 The ALRC Report, n.1 above, emphasises the importance of a "nuanced approach to reform" at p.14.