# Patent pools as a solution to the licensing problems of diagnostic genetics

## *United States and European perspectives*

Advances in diagnostic genetic testing have resulted in the ability to diagnose an increasing number of genetic diseases through the use of multiple genes and/or gene fragments oftentimes displayed on microarrays. The field of drug discovery has also benefited from the use of microarrays containing multiple genes, antibodies, antigens or whole cells, in order to evaluate drug responses, side effects on metabolism and pharmacogenomic profiles. These advances have been accompanied by an increasing number of patents covering not only the genes and their fragments but also new diagnostic or research methods and microarrays.

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Some commentators have predicted that this increase in patents pertaining to diagnostic/evaluative genetic testing has and will continue to prevent clinicians and researchers from developing and using these tests to benefit patients and further drug discovery[1]. Potential road blocks to the widespread use of genetic testing technologies are said to result from (1) patentees exercising their right to exclude the use of their patented technology by anyone other than themselves or their exclusive licensee ('exclusivity')[2] and (2) the need by potential users of genetic testing technology to acquire multiple licences to an ever increasing number of patents owned by different patentees ('stacking')[3]. The problems of licence exclusivity and patent stacking appear particularly acute in the area of multiplex arrays.

Several solutions have been proposed to address the concerns arising out of patenting of diagnostic genetic testing technology. For example, in the US it has been proposed that the United States Patent and Trademark Office (USPTO) apply the existing statutory requirements for patentability more stringently to the field of genomics, or that the Court of Appeals for the Federal Circuit, the most specialised patent court in the US, should apply its non-obviousness standards as stringently to human gene patents as it does to other advancing fields of technology[4]. Other proposed solutions include compulsory licensing[5] or legislative exemptions for diagnostic testing[6].

We propose in this paper that the use of 'patent pools' may overcome the negative consequences of 'exclusivity' and 'stacking' in the field of diagnostic genetics as well as its applications in drug discovery. After providing some common definitions, we will analyse patent pools from both the US as well as the European perspectives and will conclude by looking at the legal and practical requirements for patent pools in both regions of the world, concluding that they are very similar.

## Patent pools

A patent pool is an arrangement in which "two or more patent owners agree to license certain of their patents to one another and/or third parties"[7]. Critical to the structuring and implementing of patent pools are the definitions of complementary, competing, blocking and essential patents. Complementary patents are for "technologies that may be used together, and are not substitutes for each other"[8]. Two different patents, each on a different Single Nucleotide Polymorphism (SNP) for the same disease would be complementary. Competing (also known as substitute) patents cover technologies that substitute for each other[9]. A patent on a SNP and another one on an antibody might be competing technologies to diagnose the same disease. A blocking patent "block[s] another if [the latter] can not be practised without infringing on the basic patent"[10]. A patent on an isolated gene and all its fragments might be blocking to all genetic testing for a disease. Essential patents have been defined as ones having "no technical alternative", and are useful "only in conjunction with other pooled patents"[11]. An example would be a patent on the critical SNP or the gene correlated to a disease. The distinction between complementary and competing technologies is not always crystal clear, since technologies may be partly competing and partly complementary.

The electronics industry is quite familiar with the concept of patent pools, through its standard-setting bodies for the manufacture and sale of, for example, DVDs[12] and MPEGs[13]. Standard-setting has been an integral element of each of these two and other electronics patent pools. The lack of industry standard setting bodies in the genetic diagnostic field (and in biotechnology in general) has led to questions as to whether pro-competitive patent pools can be developed for the industry. We believe structuring and implementing diagnostics patent pools may be facilitated by institutions such as the American College of Medical Genetics (ACMG) which are considering and issuing consensus statements detailing the genes and/or fragments deemed necessary to adequately predict or diagnose a genetic condition[14]. For example, in 2001, the ACMG set the criteria for, and selected a standard panel of, mutations which are recommended for screening cystic fibrosis carriers[15]. Standard panels for the genetic testing of many other diseases could, and most likely will, be set by the scientific community and medical organisations within the next few years.

## European Union perspectives on patent pools

On May 1, 2004 the Technology Transfer Block Exemption Regulation (TTBER) entered into force in the European Union[16]. The TTBER provides a safe harbour for agreements that, in principle, fall under the prohibition of Article 81(1) of the EC Treaty[17]. Such safe harbour exists for agreements that, while restricting or distorting competition within the common market, would be allowable because they promote technical or economic progress. The TTBER does not cover patent pools, but the individual licences granted by the pool to third party licensees may benefit from the TTBER safe harbour when the conditions set out in the TTBER are fulfilled.

The European Commission has addressed patent pools in its Guidelines on the application of Article 81 (Article 81 Guidelines) to technology transfer agreements that may or may not fall under the scope of the TTBER[18]. The Commission states that patent pools can produce pro-competitive effects, in particular by reducing transaction costs and by setting a limit on cumulative royalties to avoid double marginalisation[19]. 'One-stop licensing' of the technologies in the pool is particularly important in the Commission's view in sectors where intellectual property rights are prevalent and where, in order to operate in the market, licences need to be obtained from a significant number of licensors[20]. This is certainly the case in diagnostic testing.

In the Commission's view, the competitive risks and the efficiency-enhancing potential of patent pools depend to a large extent on the relationship between the pooled technologies and their relationship with technologies outside the pool. The Commission states that, when due to efficiencies stemming from the integration of two technologies, licensees are likely to demand both technologies, the technologies are treated as complements even if they are partly substitutable[21]. A patent pool composed solely or predominantly of substitute or competitive technology amounts to a price fixing cartel[22] and therefore is not allowed under Article 81 EC.

The creation of a patent pool that is composed only of technologies that are essential, and, therefore, by necessity also complementary, is generally allowed under Article 81 EC. The inclusion of non-essential patents in a pool, however, may give rise to competition concern. The Commission finds that the inclusion of non-essential patents in a pool may cause a risk of foreclosure of third party technologies[23]. Also, the inclusion of non-essential

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**5** Andrews, LB. Genes and patent policy: rethinking intellectual property rights. Nature Reviews: Genetics. 3:803-808, 807 (2002).

**6** Office of Legislative Policy and Analysis. 107th Congress. Gene Patenting. H.R. 3966 and H.R. 3967. http://olpa.od.nih.gov/legislation/107/pendinglegislation/9gene.asp (visited March 2, 2005).

**7** Antitrust Guidelines for the Licensing of Intellectual Property. Issued by the US Department of Justice and the Federal Trade Commission. § 5.5, April 6, 1995.

**8** Morse, MH. "Cross-Licensing and Patent Pools: Legal Framework and Practical Issues. Antitrust and Intellectual Property. The Intellectual Property Committee Newsletter. 3:1, p.42 (2002).

**9** *Id.*

**10** *Id.*

**11** Anthony, SF. Antitrust and Intellectual Property Law: From Adversaries to Partners. AIPLA Quarterly Journal. 28:1. Winter (2000).


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12 Klein, J. Acting Assistant Attorney General, Antitrust Division, Department of Justice to Gerrard R. Beeney, Esq. December 16, 1998. http://www.usdoj.gov/atr/public/busreview/2121.htm (DVD-3 Pool Business Review Letter) (visited March 2, 2005); (Digital Versatile Disc (DVD-3) technology is used to store large amounts of audio, video and data onto one disc.) http://www.dvdforum.org/tech-dvdprimer.htm (visited March 2, 2005); Klein, J. Acting Assistant Attorney General, Antitrust Division, Department of Justice to Carey R. Ramos, Esq. June 10, 1999. http://www.usdoj.gov/atr/public/busreview/2485.htm (DVD-6 Pool Business Review Letter).

13 Klein, J. Acting Assistant Attorney General, Antitrust Division, Department of Justice, to Garrard R. Beeney, Esq. June 26, 1997. http://www.usdoj.gov/atr/public/busreview/1170.htm (MPEG_2 Pool Business Review Letter) (visited March 2, 2005); (Motion Pictures Coding Experts Group (MPEG_2) technology is the designation of agreed upon standards for audio and video coding.) http://www.fact-index.com/m/mp/mpeg_2.html (visited March 2, 2005).

14 Grody, WW et al. Laboratory Standards and Guidelines for Population-based Cystic Fibrosis Carrier Screening. Genetics in Medicine. 3:149-154 (2001).

15 *Id.*

16 Commission Regulation (EC) No 772/2004 on the application of Article 81(3) of the Treaty to categories of technology transfer agreements. Official Journal of the European Union. April 27, 2004.

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patents forces licensees to pay for technology that they may not need[24].

Therefore, in general, patent pools that encompass non-essential technologies are likely to fall under the prohibition of Article 81(1) EC. In an assessment of patent pools comprising non-essential technologies the Commission will take into account whether there are any pro-competitive reasons for including the non-essential technologies in the pool, whether the licensors remain free to license their respective technologies independently, whether the pool offers the technologies only as a single package or whether it offers separate packages for distinct applications, and whether the pooled technologies are available only as a single package or whether licensees have the possibility of obtaining a licence for only part of the package with a corresponding reduction of royalties[25].

When assessing individual restraints commonly found in patent pools, the Commission will be guided by the following main principles: the stronger the market position of the pool the greater the risk of anti-competitive effects, pools that hold a strong position in the market should be open and non-discriminatory , and pools should not unduly foreclose third party technologies or limit the creation of alternative pools[26].

Where the pool has a dominant position on the market, royalties and other licensing terms should be fair and non-discriminatory, and licences should be non-exclusive[27]. Also, licensors and licensees must be free to develop competing products and standards, and must also be free to grant and obtain licences outside the pool[28]. Further, grantback provisions should be non-exclusive and limited to developments that are essential or important to the use of the pooled technology[29]. In order to limit the risk of invalid patents, any right to terminate a licence in the case of a challenge must be limited to the technologies owned by the licensor who is the addressee of the challenge and must not extend to the technologies owned by the other licensors in the pool[30].

With regard to the institutional framework governing the patent pool, the Commission highly favours the involvement of independent experts in the selection process in order to ensure that the patents put forward for inclusion in the pool are valid and essential[31]. The Commission will also take into account what safeguards have been put in place to ensure that sensitive information (such as pricing/cost information) is not exchanged[32]. Finally, the Commission takes into account dispute resolution mechanisms[33]. The more that dispute resolution is entrusted to independent bodies or persons, the more likely it is that the dispute resolution will operate in a neutral way[34].

## United States perspectives on patent pools

In 1995 the US Department of Justice (DOJ) issued the Antitrust Guidelines for the Licensing of Intellectual Property (DOJ Guidelines)[35]. Section 5.5 of the DOJ Guidelines indicates that a patent pool which integrates complementary technologies, clears blocking positions, reduces transaction costs, avoids costly infringement litigation and promotes the dissemination of technology may be found to be pro-competitive and thus acceptable[36]. However, a patent pool that constitutes a method of fixing prices, allocates customers and markets, excludes or drives competitors from the market, reduces innovation[37], or discourages the participants from engaging in research and development[38] may be found to be anti-competitive and thus unacceptable. The DOJ Guidelines are – not surprisingly – remarkably similar to the European Commission's Article 81 Guidelines.

Between 1997 and 2002 the guidance of Section 5.5 has been interpreted and expanded by the issuance by the DOJ of Business Review Letters for the (electronic) MPEG-2[39] DVD-3[40] and DVD-6[41] pools and the 3G patent platform[42]. These interpretations suggest additional criteria for structuring and implementing future pro-competitive patent pools. These criteria which are, again, quite similar to the European Article 81 Guidelines include: patents in the pool must be valid, essential and complementary, not substitutive, as determined by an independent expert; any grantback provisions should obligate licensees to grant-back to the pool "essential patents" on a non-exclusive basis, and at a fair and reasonable royalty. In addition, the pools should not enable the licensors to unreasonably: aggregate competitive technologies or set a single price for the pooled technologies, disadvantage competitors in downstream product markets, collude on prices outside the scope of the pool, or impair innovation in the development of rival products or technologies.

Let us now apply these principles from both the US and Europe to the formation of patent pools in diagnostic/evaluative technologies.

## What patents should be included in a diagnostic pool and who decides?

**1. Only essential and complementary patents.** Whether a patent is essential or not will depend on the mutation(s) claimed and their diagnostic value.

If there are multiple patented fragments or SNPs which cover different segments of a gene involved in a particular polymutational disease (ie, a disease that is correlated to more than one mutation or more than one gene), and only a small number have some degree of diagnostic value, then these would be considered essential for the patent pool. A pool for the diagnostic genetics of such disease should only contain these patented fragments or SNPs. The patents will be essential if they are chosen so that they cover or 'read on' the standard panel of mutations or genes (or other biological materials, such as antibodies or antigens) recommended by a consensus setting body such as the ACMG, or similar medical organisation.

**2. Any blocking positions should be included.** If, for example, a company were to have a dominating patent on a purified gene involved in breast cancer, including all fragments that hybridise to it, it would be critical to include that patent in the pool so that any problems caused by blocking later patents on valuable SNPs can be eliminated. If the blocking patent is not included, the pool may not cover the essential patents and may be anti-competitive.

**3. No aggregation of competing patents and setting a single price for them.** Consider diagnostically useful genes or gene fragments X1a and X1b which cover a similar area of genetic material and which are owned by different patentees. Allowing both patents into the pool could run the risk of the two patentees colluding on the price for the licence. This type of situation is less likely to happen in the application of a patent pool to diagnostic genetics of a polymutational disease because there should not be two patents on the same area of genetic material; if there were multiple ones, only one should be selected.

**4. Only valid and unexpired patents in the patent pool.** There ought to be a mechanism to vet patents of dubious validity. It is relatively easy to mandate that if a member's only patent expires or is invalidated by a third party, it is necessary for that member to replace the invalid or expired patent with a new patent which meets the patent pool criteria in order to remain as a member of the pool. However, absent an invalidation event, the pool participants might agree that if prior art or argumentation not previously considered by the US or European Patent Offices is brought to one the members' attention, the pool has the responsibility of either obtaining an opinion of counsel that the patent remains valid and enforceable, or, in the US, request re-examination of the patent before the USPTO, or both.

**5. An independent expert(s) is required.** We recommend the formation of an independent committee of experts consisting primarily of representatives from commercial and clinical institutions, as well as attorneys who are experts in biotechnology patent law and antitrust law. The committee's tasks will include selecting the patented genes, fragments or SNPs considered complementary, essential and/or blocking to the patent pool. The committee may treat recommendations issued from a consensus-setting body such as the ACMG as establishing a 'standard' to be implemented in deciding which patents are essential, and complementary but not substitutive.

## What terms, including pricing, should a diagnostic pool offer?

**6. The pool should promote the dissemination of technology.** A patent pool should not restrict innovation. Several ways to accomplish this are: 1) licences offered to the patent pool by its members should be non-exclusive so that individual members may still offer outside individuals a separate licence to their essential patent(s)[43]. This will, in effect, help prevent the anti-competitive effects of 'tying' or requiring multiple licences to be taken when only one is desired; 2) assure non-discriminatory pool licensing on the same terms and conditions to all would-be licensees[44]; and 3) allow for receipt by the pool of a narrow grant-back clause from the licensees[45]. Under such a grant-back clause the licensee agrees to offer back to the patent pool a non-exclusive licence to any of its own essential improvement patents at a fair and reasonable royalty[46]. A successful grant-back clause will be narrowly drafted so that it only encompasses those essential future patents of the licensee that are commensurate with the technology of the patent pool licence[47]. This agreement prevents the licensee from extracting the benefits of the patent pool while holding out its own essential patents[48].

**7. Do not disadvantage competitors' downstream markets that use the pooled technologies as inputs.** The US DOJ approved the MPEG and DVD patent pools partly because each proposed pool had limitations to prevent foreclosure of competition in the downstream market[49]. These pools had a "reasonable" royalty which was a "tiny fraction" of downstream product prices or "small relative to the total costs of manufacture"[50]. The determination of how

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17 Article 81(1) of the EC Treaty prohibits all agreements "which have as their object or effect the prevention, restriction or distortion of competition within the common market." This article may not apply for those agreements which fall under Article 81(3).
18 Commission Notice: Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements (2004/C 101/02). Official Journal of the European Union. April 27, 2004.
19 *Id.* at ¶ 214.
20 *Id.*
21 *Id.* at ¶ 218.
22 *Id.* at ¶ 213.
23 *Id.* at ¶ 221.
24 *Id.*
25 *Id.* at ¶ 222.
26 *Id.* at ¶ 224.
27 *Id.* at ¶ 226.
28 *Id.* at ¶ 227.
29 *Id.* at ¶ 228.
30 *Id.* at ¶ 229.
31 *Id.* at ¶ 232-233.
32 *Id.* at ¶ 234.
33 *Id.* at ¶ 235.
34 *Id.*
35 See n. 7, *supra.*
36 *Id.*
37 *Id.*
38 ABA Section of Antitrust Law, The Federal Antitrust Guidelines for the Licensing of Intellectual Property: Origins and Applications (2nd ed.2002) pp.82-83.
39 See n. 13, *supra.*
40 See n. 12, *supra.*
41 *Id.*
42 James, C. Acting Assistant Attorney General, Antitrust Division, Department of Justice to Ky P. Ewing, Esq. November 12, 2002. http://www.usdoj.gov/atr/public/busreview/200455.htm (3G Pool Business Review Letter) (visited March 2, 2005). See also, Balto, D. The Antitrust Analysis of the 3G Patent Platform, Antitrust And Intellectual Property 5:16 (Spring 2004).
43 See n. 11, *supra.*
44 See n. 13, *supra.*

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45 See n. 8, *supra*, at 51; Merges, Robert P. Institutions for Intellectual Property Transactions: The Case of Patent Pools. University of California at Berkeley (Boalt Hall) School of Law. August, 1999, Revision. pp. 1-74, 35. http://www.law.berkeley.edu/institutes/bclt/pubs/merges/pools.pdf (visited March 4, 2005).
46 *Id.*
47 *Id.*
48 *Id.*
49 See n. 8, *supra*, at 48-50.
50 *Id.*
51 *Id.*
52 *Id.*
53 See n. 13, *supra*.
54 *Id.*
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56 Resnik, DB. A Biotechnology Patent Pool: An Idea Whose Time Has Come? The Journal of Philosophy, Science & Law. Volume 3 (2003). http://www.psljournal.com/archives/papers/biotechPatent.cfm (visited March 4, 2005).
57 *Id.*
58 Sung, LM. Greater Predictability May Result in Patent Pools. http://www.ftc.gov/opp/intellect/020417lawrencemsung1.pdf (last visited March 4, 2005).

"small" or "reasonable" a royalty is has been inconsistent because of the lack of standard royalty rates and multiple interpretations of "reasonable"[51]. It has been suggested that a percentage cap should be implemented for pools so that the royalties do not grow to be excessive over time. This is so because even though a royalty may have been "small" or "reasonable" at the beginning, the cost of producing the downstream product decreases with time[52].

**8. Pool members must be prohibited from colluding on prices outside the scope of the patent pool licence.** A patent pool on diagnostic genetics should discourage collusion among the licensors or licensees in any market[53]. In the MPEG-2 patent pool the US DOJ noted approvingly that confidentiality provisions existed which prohibited the patent pool licensors and licensees from exchanging competitively sensitive information[54]. Also, the DOJ acknowledged that because the royalty rates were to be reasonable, it was unlikely that they could be used to facilitate collusion of prices for downstream products[55].

## Conclusions

Based on the US DOJ Guidelines/Business Review letters, as well as the Article 81 European Guidelines, we suggest that patent pools for diagnostic genetics can be formed without running afoul of anticompetition laws in either region of the world.

One obstacle to forming any patent pool will always be to find incentives for the critical patent holders to provide their patents to the patent pool instead of going at it alone[56]. The biggest incentive for the holders of essential patents especially blocking ones to join with other essential patent holders rather than going at it alone, will occur once consensus-setting bodies like ACMG greatly expand the diseases for which it makes recommendations and sets standards. If a well established and respected entity such as ACMG deems it important enough to issue a consensus statement regarding a handful of mutations necessary to adequately predict a disease or condition, then the relevant patent holders will recognise how crucial it is that all of these mutations be tested simultaneously, and offer assistance by agreeing to participate in a patent pool. Going at it alone will become the less-favoured mode of doing business. Other incentives include a fair distribution of income generated from the pool[57] and the ability for members to operate freely among the pooled patents[58].

Pools crafted in this manner may well resolve potential roadblocks to the widespread use of the new genetic testing technologies. As a result, the financial and social value of patent pools will become apparent to the diagnostic industry and to other industries that utilise diagnostic or evaluative tests, such as for example the use of microarrays in drug development. The new genetic and evaluative testing technologies will then be more broadly available to all. DDW

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