Unfortunately, EWP guidelines are unspecific about which cognitive tasks should be used to assess drug effects. Good advice is hard to obtain, although an ideal source of assistance for companies wishing to select appropriate tests is psychologists with a thorough understanding of the drug development process. These individuals, although rare, can be invaluable in providing advice on the selection of reliable, valid and sensitive cognitive tests. However, in the absence of this expertise it is possible to identify tests appropriate for use in different disorders by reference to reviews of cognitive testing in neuropsychiatric disorders (e.g. [4]). Excellent guidance with respect to the qualities needed for a good cognitive test can be obtained from a recent position paper on objective psychometric testing [5].

Several companies have identified the potential value of routinely incorporating cognitive testing into their drug development protocols. Many cognitive tasks are highly sensitive to the effects of compounds crossing into the brain and so can provide useful evidence of brain penetration. It is clear that cognitive testing, when well conducted, has considerable value as a means of measuring the efficacy and safety of new compounds. Recent work has also indicated that cognitive test measures might find further use as biomarkers and surrogate endpoints [6].

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Gene patents: are they socially acceptable monopolies, essential for drug discovery? – reply ▲

Initial letter: Williamson, A.R. (2001) *Drug Discov. Today* 6, 1092–1093

Response from Richard Binns

Patent law does not have to be changed for gene patents

In a recent issue of *Drug Discovery Today* [1], Alan Williamson questions whether society benefits from gene patents. He proposes that patents should only be allowed for specified uses of genes with narrow claims. I entirely agree that unduly broad claims should not be granted by patent offices, but I believe this requires a change in patent office practice rather than in patent law itself. However, I would argue that claims in gene patents for DNA compositions and gene products should continue to be allowed, provided of course that they do not claim molecules in their natural state and are otherwise new, non-obvious and have an identified 'real world' use.

Are gene patents really so obvious?

Some of the earlier gene patents were granted at a time when the isolation and sequencing of DNA encoding virtually any gene was recognized as a major achievement. The work demanded perseverance and ingenuity and surely we should not introduce a rule that denies the validity of all these patents on the grounds of obviousness.

Even for more recent gene patents, although the generation of raw genomic sequence data might now be routine in many cases, identification and characterization of functional DNA can still present difficulties. Based on a comparative study which involved the European, Japanese and US patent offices, it is unlikely that homology data alone would be sufficient in Europe and Japan for the inventor to obtain a patent on DNA that encodes a putative gene. Other evidence will, therefore, have to be given to support an assertion of the DNA's use or function.

The US patent office took the view that patents that purport to demonstrate use or function by homology alone will be looked at on a case-by-case basis. Although this might be controversial, at least it does mean that in the absence of supporting evidence, such patents will be carefully examined by the US patent office. In addition, many patent applicants will still provide such supporting evidence to obtain patent coverage in Europe and Japan and to avoid the risk of rejection in the US.

Gene patents give early access to information

A patent must disclose sufficient details of how to perform the claimed invention. Patents are in the public domain and it has long been possible to search the patent literature. The disclosure requirement usually means, among other things, that full sequence information must be given in gene patents.

If a commercially minded inventor identified and isolated DNA encoding the gene for a drug target and could not patent this DNA, at what stage would the DNA sequence be disclosed to the public? A commercial organization might never publish the sequence, because in many cases it would be

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possible to patent compounds that act on the target without disclosing the sequence. Although an academic inventor will no doubt still be under pressure to publish the sequence, he or she might still be tempted to sell the information to a commercial partner in return for delaying publication to give the commercial partner a head-start. The availability of patent protection for the isolated DNA, therefore, enables the sequence (and information on its function and use) to be published while, at the same time, protecting the inventor's commercial interests.

Gene patents encourage scientific progress

The simultaneous completion in June 2000 of a draft sequence for the human genome by the international Human Genome Project (HGP) and Celera Genomics Corporation was a landmark achievement in science. Genomes from various other organisms have also been sequenced in the past few years. This has resulted in a phenomenal amount of genomic information being made available to the scientific community.

In both Europe and the USA, academic researchers are effectively free to use patented drug targets for non-commercial research because, in practice, patents are rarely used to prevent such research. However, commercial entities can still use the ever-increasing amounts of publicly and commercially available genomic data to identify alternative targets. They might be able to discover drugs for the same target by using techniques that do not require use of the patent, perhaps using molecular modelling combined with screening techniques that use the target in its natural environment. Finally, they might be able to negotiate a licence to use the patent in fields and applications that the patentee does not wish to exploit. In any event, after expiry of the patent, the drug target will be free for anyone to use.

We have progressed a long way in genomic research. Many would argue that strong patent protection has been, and continues to be, instrumental in encouraging commercial efforts to conduct research and to develop and exploit its results. In the absence of these efforts, one has to consider whether genomic research would have been publicly funded to the same scale and made such progress. From 1990 until as late as 1998, the HGP was still estimating that the human genome would not be completed before 2005 and was not planning to produce a draft sequence before completion. Without the demonstration by the early biotechnology companies that concrete medical and economic benefits could arise from gene technology, would the political will and public funding have been available to begin the HGP in 1990 and finish it in 15 years? And even if the answer to that question is yes, without commercial competition, would the HGP have been accelerated to the position it is in now?

Reference

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Gene patents: are they socially acceptable monopolies, essential for drug discovery? – reply ▲

Initial letter: Williamson, A.R. (2001) *Drug Discov. Today* 6, 1092–1093
Response from Patrick Nef

Gene patenting: maintaining competitiveness in the EU

A recent letter by Alan Williamson [1] expresses the view that withholding patents on genes in the European Union (EU) will encourage the expansion of pharmaceutical R&D and that, ideally, genes should be patent free. Although I fully agree that full and free access to genome sequence data without the hindrance of patents is essential for the pursuit of scientific research (e.g. target and pathway identification and validation), I doubt that refraining from patenting in the EU is the appropriate solution for R&D companies.

A harmonized regulatory system within the EU admitting gene patents under defined circumstances protects inventions and improvements to existing inventions, promotes transparency and creates the needed legal and ethical environment for scientific advances. Thus, gene patents are viewed as value generators by academia, the biotech industry, the investors, and now also by pharmaceutical companies. Patenting is a meaningful way to protect and recover the huge investment in R&D, and to ensure freedom of operation, although an alternative is prior-art publication or greater use of secrecy. However, it is generally accepted that the broad use of secrecy would have a chilling effect on scientific progress and health research.

The basic requirements for obtaining a patent are: inventive step, novelty and industrial applicability ('utility' in the USA). The inventor provides information in exchange for obtaining a limited time period of exclusivity (~20 years from date of filing). Both the patent holder and society benefit from shared information which, in turn, stimulates innovation. The patent description must sufficiently disclose the invention, and the claims have to be clear and supported by the description. Many biotechnology patents suffer from 'enablement' problems, that is, the specification really doesn't enable an independent party to recreate the processes described in the patent. Therefore, multiple but costly strategies exist to challenge those patents.

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