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Email: mdb-patents-consultation-group@ipaustralia.gov.au

ABN 58 855 816 942

Commissioner of Patents
IP Australia
PO Box 200
Woden ACT 2606

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Contact:
Grant Shoebridge, PhD

Dear Commissioner

D'Arcy v Myriad Genetics Inc [2015] HCA 35

Please find below my submission in relation to the proposed examination practice following the High Court decision in D'Arcy v Myriad Genetics Inc (the Myriad decision).

My qualifications

I have 15 years' experience working as a medical research scientist. During my research career, I was involved a range of projects including the development of gene-based diagnostic assays, breast cancer research, immunology and vaccine development. I have also worked in industry for biotechnology start-up companies in Australia and Europe.

I joined Shelston IP in 2006 and in 2015 I was admitted to the partnership. In addition to my research experience, I have almost a decade of experience in pharmaceutical and biotechnology-related intellectual property.

Summary

The Myriad decision should be interpreted as only impacting the patentability of isolated gene sequences that are used for genetic diagnostic testing and similar applications where the claimed invention relates to the analysis of a nucleotide sequence. Isolated biological material other than genes, such as proteins, which can be used, for example as medicaments should not be excluded from patentability on the basis of the Myriad decision. Similarly, the Myriad decision does not affect the patentability of isolated naturally-occurring microorganisms.

My comments below also conclude that complementary DNA (cDNA) should only be considered patent ineligible if it is used for genetic diagnostic testing and similar applications where the relevant sequence analysis relates to exons sequences.

The Gageler and Nettle JJ as well as the Gordon J rulings are minority rulings. Generally speaking the reasoning of a minority judgement insofar as it differs from the majority judgement would not be relied on for setting precedent law because one assumes that the majority did not agree with the minority reasoning. As such, I have not considered the minority decisions in any detail.

The intent of the Myriad action

In reaching an understanding of how the Myriad decision should be interpreted, it may be useful to consider the intent of the High Court Appeal.

The Institute of Patent and Trademark Attorneys Australia (IPTA) made a submission to intervene in this case and submitted affidavits from senior patent attorneys and scientists indicating that excluding isolated biological material generally from patentability would adversely impact innovation in the Australian biotechnology industry. In reply to IPTA's intervention application, D'Arcy stated at paragraph 21 that "no question concerning the patentability of 'other material isolated from nature' arises on the facts of the present case". Thus, it is clear that D'Arcy's appeal had no intention of challenging the patentability of anything other than isolated human genes.

Isolated biological material other than nucleic acids

The ratio of the majority decision is summarised in paragraphs 6 to 9. Paragraph 85 is also pivotal in understanding the High Court's majority ruling to invalidate claims 1 to 3.

In paragraph 6, it is stated that, *"[a]s appears from s6 of the Statute of Monopolies an invention resides in something which involves making*".

At paragraph 9, it is stated that "*those features of the invention claimed in claims 1 to 3 and its substance as an invention relating to sequence information lead to the conclusion that its patentability would not serve the purpose of the concept of "manner of manufacture*".

Further, the majority decision concludes at paragraph 89 that the claims relate to information because it is the sequence information that is analysed in the diagnostic test that is "an essential element of the invention as claimed".

Thus, the essential integer of the claimed invention is considered to be "information" having regard to the "substance of the invention" of the patent in suit, that being a diagnostic test to determine susceptibility to breast and ovarian cancer. This limits the majority decision to isolated nucleic acid sequences where the essential integer of the claimed invention is information and specifically, nucleic acid sequences that are used in genetic screening tests and other applications that rely on analysis of the relevant sequence information.

Is a claim to an isolated naturally-occurring protein patentable subject matter in view of the Myriad decision? The answer to this will depend on the essential integer of the claimed invention, which requires a case-by case consideration. If the essential integer of the claimed invention relates to an isolated naturally-occurring protein useful as a new medicament or vaccine, then the essential feature of the claimed invention does not relate simply to information, it relates to a chemical product with a beneficial effect. The same can be said about an isolated naturally-occurring nucleic acid sequence that is used as a medicament or vaccine.

The last sentence in paragraph 6, states (in relevant part) (the specified mutations or polymorphisms, i.e. the "information") "… *has nothing to do with the person who isolates the nucleic acid bearing the mutant sequence*". In contrast, an isolated biological material, such as a protein or even a nucleic acid sequence that can be used as a vaccine or medicament has everything to do with the person who isolates it. In other words, it is a product made as a result of human action. Moreover, such a medicament is a product that can be sold and, as such, the artificialness of it being isolated is directly linked to its economic benefit. This is not the case for an isolated nucleic acid used in a genetic diagnostic test, it is completely different. This point is expanded upon in paragraph 85 of the decision which states:

"*The economic significance necessary to the patentability of an "artificially created state of affairs" in the sense used in NRDC is not demonstrated by stating that the artificially created state of affairs is a step along the way to a process or method itself claimed as an artificially created state of affairs of economic significance*".

This statement is critical in understanding the position of the majority decision because it links the "artificialness" required for a manner of manufacture with the economic significance of a particular invention. As the economic significance in the present case resides in conducting a cancer screening test (a process), the "step along the way to a process", namely the isolation of the nucleic acid sequence is not sufficient to make the isolated sequence itself, (which is not sold and therefore does not have a direct economic benefit), a manner of manufacture. This, however, would not be the case for an isolated naturally-occurring protein, or an isolated naturally-occurring nucleic acid sequence capable of use as a medicament or even an isolated micro-organism because such isolated material can be sold as a product and this provides a direct economic benefit. In other words, the artificialness of an isolated biologically-derived medicament is clearly not a step along the way to its economic significance. Rather, the isolation of the material is crucial to the economic significance and it only occurs as a result of human activity. It follows that an isolated naturally-occurring protein or even an isolated naturally-occurring nucleic acid sequence capable of use as a medicament, or an isolated micro-organism would satisfy the manner of manufacture requirement set out by the High Court decision. This conclusion is consistent with both the intent of D'Arcy's appeal, which never contemplated the patentability of isolated

biological material other than human genes, as well as, paragraph 37 of the majority decision, which states:

"[t]his court is not concerned in this appeal with "gene patenting" generally but whether the invention as claimed in claims 1 to 3 fall within the established concept of manner of manufacture".

The High Court specifically spells out that this Court (not just the majority decision) is not concerned with the patentability of any material with the exception of the nucleic acid sequences defined in claims 1 to 3 i.e. that used in a diagnostic screening assay. Therefore of all the High Court judgements should be interpreted narrowly with reference only to isolated naturally-occurring nucleic acids for sequence analysis applications.

Effects on innovation

At paragraph 28 the High Court states, in points 1 and 2, the basic requirements of patentability laid down in *National Research Development Corporation v Commissioner of Patents* (NRDC), namely "…a product made, or a process producing an outcome as a result of human action" (artificially created state of affairs) and "whether the invention as claimed has economic utility".

The High Court also mentions that "when a new class of claim involves a significant new application or extension of the concept of manner of manufacture other factors including factors connected directly or indirectly to the purpose of the Act may assume importance". Given that the High Court states that these factors "may assume importance", the factors recited by the High Court in points 3 to 6 of paragraph 28 are not mandatory considerations required to determine patent eligibility. Nevertheless, I consider these factors below.

The High Court states that factors 3, 4 and 6 are of primary importance and not mutually exclusive and concludes at paragraph 29 that the Patents Act serves the larger purpose of "encouraging innovation by means which do not stifle it". In this regard, there is no evidence that patents directed to isolated naturally-occurring sequences stifle innovation. Specifically, there was a conspicuous lack of evidence submitted to *Senate Committee on Community Affairs Inquiry into Gene Patents* (2011) demonstrating that so-called "gene patents" negatively impacted research. Moreover, despite at least three decades of patents directed to isolated biological material, Australia is among the top five countries when measuring scientific articles produced per capita, reinforcing Australia's substantial status in relation to medical research innovation. Moreover, an independent report into the economics of isolated human gene patents in Australia by the Centre for International Economics, which was commissioned by IP Australia, found that patents play a key role in promoting innovation and the public-private partnerships required to bring new gene and biological-based medicines and diagnostics to market. Notwithstanding, the Patents Act was recently amended to include a safeguard, a research exemption against patent infringement. As such, there is no case that patents directed to isolated naturally occurring material stifle or have a

chilling effect on innovation. Importantly, IP Australia needs to recognise that innovation encompasses bringing new medicines, diagnostics and treatments to the public, i.e. commercialisation of medical research, and patent protection plays a crucial role in that process. Therefore, making isolated naturally-occurring material, such as proteins and microorganisms, ineligible for patent protection would in fact have a chilling effect on innovation in Australia, which is contrary to the High Court ruling.

Thus, the High Court Myriad decision cannot be determinative in relation to excluding from patentability isolated biological material other than isolated naturally-occurring nucleic acid sequences where analysis of the sequence information is considered to be an essential part of the claimed invention such as, inventions directed to genetic diagnostic testing. Therefore isolated biological material, such as proteins, microorganisms and nucleic acids should be considered patentable subject matter provided the relevant claimed invention relates to product and other than the analysis of sequence information.

cDNA

The proposed examination practice lists cDNA as patent ineligible in view of the High Court Myriad decision. This is presumably based on paragraph 89, which states in relevant part that *"[t]hat characteristic (i.e. the information which is an essential element of the invention claimed) also attaches to cDNA, covered by the claims, which is synthesised but replicates a naturally occurring sequence of exons".*

However, a broad exclusion of cDNA from patentability is inappropriate and outside the scope of the Myriad High Court decision. This is because there are instances when genomic DNA does not encode a protein that is encoded by cDNA. This results when there is differential splicing of genomic DNA, for example the rearrangement of specific genes from multiple genes that encode various parts of immunoglobulin proteins, such as antibodies. In this case, multiple antibody genes are arranged in the genome and only encode a particular antibody after rearrangement of certain genes as well as somatic hypermutation. The arrangement of the multiple antibody genes in genomic DNA does not have the same information as cDNA that encodes a particular antibody gene. On this basis alone, the Patent Office should amend the proposed examination practice to exclude only cDNA that has the same information as genomic DNA.

Paragraph 89 makes mention of cDNA with specific reference to the invention of the patent-in-suit. In particular, paragraph 89 states "*the existence of that information which is an essential element of the invention as claimed",* where the term "that information" relates to *the information stored in the nucleotides coding for the mutated or polymorphic BRCA1 polypeptide".* Thus, the "coding for" language merely means that the mutations and/or polymorphisms reside in the exons of the BRCA gene. Accordingly, the cDNA derived from the genomic BRCA gene will also include the mutations and polymorphisms associated with cancer predisposition. However, that will not be the case for all cDNA. As indicated at paragraph 108 mutations and polymorphisms can also occur in introns and a cDNA

derived from a gene where mutations occur in introns will not have the same information as the genomic DNA from which it is derived. It will contain distinct information that results from a human action. Such a cDNA will not be subject to the statements of paragraph 89 and therefore should be patent eligible.

It is also correctly stated at paragraph 102 that *"[a]lthough the introns do not encode a polypeptide or protein, they contain information which helps regulate and execute the cell's response to the information encoded in the exon*. Thus an isolated cDNA that is used to express a protein or peptide contains different information to that which is contained within a cell because the introns have been removed. The cDNA lacks the intron information and as a result represents information that has been made by human action. Moreover, the removal of introns confers advantages that permit more efficient expression of proteins from the cDNA. Accordingly, in this case, simply because genomic DNA and cDNA ultimately can code for the same protein is irrelevant. What is relevant is that cDNA that is used for the expression of proteins does not contain the same information of the genomic DNA from which it is derived and so it is human made molecule and this confers an advantage in for example the *in vitro* expression of proteins. On that basis, cDNA which does not contain the same relevant information as the genomic DNA from which it is derived must be considered patent eligible.

Conclusions

The High Court ruling at paragraph 23 states that NRDC "authorised a case-by-case methodology" and this approach must be applied to claims directed to isolated naturally-occurring material. Based on the comments above, the Myriad decision does not set a broad precedent for the exclusion from patentability of isolated naturally-occurring material. In fact it does not set a precedent for the exclusion of isolated naturally-occurring nucleic acids. In order to determine whether isolated nucleic acids or other isolated naturally-occurring material represent patentable subject matter, it is necessary to consider the invention as claimed to determine whether the relevant subject matter relates to information or a product and whether isolation of the claimed material is *step along the way to a process or method itself claimed as an artificially created state of affairs of economic significance.*

Yours respectfully
Shelston IP

Grant Shoebridge, PhD
Registered Patent Attorney
Email: GrantShoebridge@ShelstonIP.com