IPR Issues and High Quality Genetic Testing

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Key Points

– Patents for genes and genetic tests
– Patent thickets and refusal to license
– Facilitating access to patents
– Research exemption, licensing, patent pools, clearing houses
– Compulsory licenses
– BRCA saga

Keywords Patents · Genes, genetic tests and tools · Breast and ovarian cancer testing · Genes BRCA1 and BRCA2 · Refusal to license · Blocking effect · Solutions

Abbreviations

EPC	European Patent Convention 1973 (available at http://www.epo.org)
EPO	European Patent Office
EPO OD	Opposition Division of the EPO
EPO TBoA	Technical Board of Appeal of the EPO
EPO EBoA	Enlarged Board of Appeal of the EPO
ESHG	European Society of Human Genetics
EU Biotechnology Directive	Directive 98/44/EC of 6 July 1998 of the European Parliament and of the Council on the legal protection of biotechnological inventions, *Official Journal L* 213, 30/07/1998 p. 0013 (available at http://eur-lex.europa.eu)

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MPLA	MultiPlex Ligation-dependent Amplification method
PCR	Polymerase Chain Reaction
SARS	Severe Acute Respiratory Syndrome
TRIPs	WTO Agreement on Trade Related Aspects of Intellectual Property Rights, 1995
WHO	World Health Organization

Introduction

Over the last years, the patenting of genetic tests sparked significant interest worldwide. Newspapers commented on patent cases and, quite often, portrayed patents as a negative story (Caulfield et al. 2006, 2007). The commotion surrounding the current patent framework for genetic testing is hardly surprising. Although patents on human genes and diagnostics are not novel, patents on genes for diagnostics are indeed a rather special combination. And although licensing has become daily routine in genetics to gain access to patented technology, the emergence of patent clusters and the restrictive licensing behaviour of some patent proprietors has been experienced as quite disturbing.

In an attempt to provide a better understanding of the contentious patent issues at stake in genetic testing, the present contribution first surveys the current legal framework for patenting genetic tests, thus sketching the patent regime from a patent *holder's* perspective. The paper then examines strategies to gain freedom to operate in the genetic field, thus zooming in on the patent landscape from a patent *user's* perspective.

Generally speaking, genetic testing relates to identifying changes in chromosomes, genes, or proteins to find changes that are associated with inherited disorders (http://www.ghr.nlm.nih.gov/handbook/testing/genetictesting). More narrowly, *medical* genetic testing aims at probing genetic material for disease associated geno- or karyotypes (medical applications of cytogenetics, DNA & biochemical tests) (Sequeiros 2008). The present contribution focuses, even more specifically, on medical genetic *DNA/RNA* testing, and reviews patent and licensing issues related to genes, and diagnostic methods and tools from an international and European perspective, illustrated with a concrete, real life example, namely the well known BRCA-case.

Patenting of Genetic Testing

Genes

Based on the principle of non-discrimination with regard to technology, it is agreed on the international level, that biological material should be regarded as patentable subject matter (article 27 (1) TRIPs). It is further accepted that human genes can be subject of patent protection if they meet the patentability criteria such as novelty,

inventive step and industrial applicability (article 27 (1) TRIPs). However, states may take a decision to deny patents on their territory for inventions claiming human genes based on ethical grounds in case the commercial exploitation of such patents runs counter to *ordre public* or morality (article 27 (3) (b) TRIPs) (Van Overwalle, 2008). Till now, few countries have used the option to carve out human genes from their patent laws (Van Overwalle 2008).

On the European scene, patent law did not contain an explicit rule concerning the admissibility of patents on human beings or human body material for a long time (cf. article 52 EPC). As a matter of routine, the European Patent Office (EPO) granted EUROPEAN PATENTS for DNA sequences and genes without a great stir, provided they met the conditions of novelty, inventive step and industrial applicability. This lenient policy was first formally challenged when a patent was granted for "a DNA fragment encoding human H2-preprorelaxin" (see claim 1 of European patent EP 112.149). In its decision, the EPO concluded that an invention concerning a human gene was not an exception to patentability because it would not be universally regarded as outrageous: "[. . .] it did not amount to patenting life because DNA as such was not life but one of the many chemical entities participating in biological processes; no offence to human dignity had occurred as the woman who donated tissue was asked for her consent and her self-determination was not affected by the exploitation of the claimed molecules" (EPO OD, 1995, *Howard Florey Institute*).

In the meantime another player, the European Parliament, entered the debate and enacted the EU Biotechnology Directive in an effort to harmonize upcoming patent practices and legislation in the biotech field. The Directive takes the view that neither the human body at the various stages of its formation and development, nor the simple discovery of one of its elements including the sequence or partial sequence of a gene, can constitute a patentable invention. An element isolated from the human body or otherwise produced by means of a technical process, including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of a natural element (article 5 EU Biotechnology Directive) (see Box 1).

Box 1 Article 5 EU Biotechnology Directive

1. The human body, at the various stages of its formation and development, and the simple discovery of one of its elements, including the sequence or partial sequence of a gene, cannot constitute patentable inventions.
2. An element isolated from the human body or otherwise produced by means of a technical process, including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of a natural element
3. The industrial application of a sequence or a partial sequence of a gene must be disclosed in the patent application

After the EU Biotechnology Directive was passed by the European Parliament, the EPO amended their Regulations and added a rule confirming the patentability of isolated human genes (Rule 29 EPC). The question then arose to what extent this new rule was in conformity with the exclusion of inventions the exploitation of which would be contrary to *ordre public* or morality (article 53 (a) EPC) (See Box 2). Based on earlier case law (EPO EBoA G1/98, 1999, *Novartis AG*), the EPO adopted the view that the new rule "only gave a more detailed interpretation of the meaning of article 53 EPC as intended from its inception". It thus followed from the text of the rule itself that genes were not to be considered as an exception from patentability on grounds of *ordre public* or morality (EPO TBoA T272/95, 2002, *Howard Florey Institute*).

Box 2 Article 53 European patent convention (EPC)

European patents shall not be granted in respect of:

(a) Inventions the commercial exploitation of which would be contrary to "ordre public" or morality; such exploitation shall not be deemed to be so contrary merely because it is prohibited by law or regulation in some or all of the Contracting States;
(b) Plant or animal varieties or essentially biological processes for the production of plants or animals; this provision shall not apply to microbiological processes or the products thereof;
(c) Methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body; this provision shall not apply to products, in particular substances or compositions, for use in any of these methods.

The patentability of human genes was also fiercely debated in the EU member states, when discussing the availability of NATIONAL PATENTS for human body material. Since the Directive did not leave any manoeuvring room to cut out human genes from patent law as non patentable subject matter, the major discussion revolved around the exact *scope* of gene patents. Should a patent for a DNA sequence encompass all possible future applications, or should such a patent be restricted to the specific use described in the patent application? In other words, should DNA patents follow the regime of the classical, wide, absolute protection (*absoluter Stoffschutz*), or should a restricted, purpose-bound protection (*zweckgebundener* or *funktionsgebundener Schutz*) apply?

In France and Germany a restricted scope for DNA patents has been adopted (Van Overwalle 2006). However, most EU countries have not introduced any special rules for DNA patents and have thus opted for the conventional, broad scope.

The debates in the EPO, the EU Parliament and the national parliaments indicate that human gene patents were not readily accepted in Europe. Reopening the discussion might prove to be difficult, however, as the necessary political consensus to put the issue back on the agenda of the European Parliament seems to be absent at the moment.

Diagnostic Methods

On the international level it is generally agreed that national patent legislatures can exclude diagnostic, therapeutic and surgical methods for the treatment of humans or animals from patentability (article 27 (3) (a) TRIPs). The option to exclude such methods is based on public health considerations: medical and veterinary practitioners should be free to take the action they consider adequate to diagnose illnesses. In other words, those who carry out diagnostic methods as part of a medical treatment of humans or animals should not be inhibited by patents. It was agreed that this exclusion shall not apply to products, in particular substances or compositions, for use in any of these methods.

Long before the TRIPs agreement came into being, the EPO already decided to exclude diagnostic methods from patent protection when "practiced *on* the human or animal body" (Our italics) (Currently article 53 (c) EPC) (see Box 2). The exclusionary provision in the EPC is constructed more narrowly than its TRIPs counterpart, implying that the *only* methods excluded from patent protection are diagnostic methods practiced *on* the human body. Unfortunately, the EPO legislator did not define the term "diagnostic method", so it was left to the courts to delineate the exact scope of the exclusion. The EPO jurisdictions initially clarified that only diagnostic methods claiming *all* steps involved in reaching a medical diagnosis (viz. examination, recording any significant deviation from the normal value, attributing that deviation to a particular clinical picture) were excluded from patentability and thus not patentable. In other words only diagnostic methods whose result immediately makes it possible to decide on a particular course of medical treatment are excluded. Methods *not* containing *all* the steps involved in making a medical diagnosis do not fall under the exception and are considered patentable. In other words methods providing interim results (even if the results can be utilised in making a diagnosis) are not excluded from patentability and are patentable (EPO TBoA T385/86, 1987, *Bruker*).

A classical example of an invention which would not be excluded from patent protection under this approach is a method relating to the *in vitro* determination of medical laboratory parameters (concentrations of molecules or cells in a body liquid e.g. urine). The sample (the urine) is mixed with the reagents in a reaction vessel, and the detectable change is evaluated by the instrument which belongs to the system. None of the method steps is carried out on the body. Only if direct interaction with the body made a real difference whether the object of the invention was achieved and if the entirety of the diagnostic method had to be practised on the body would the exclusion apply.

EPO case law later departed from this interpretation and held that the expression "diagnostic methods practised on the human body" should not be considered to relate only to methods containing *all* the *steps* involved in reaching a medical diagnosis, but to *all methods* practised on the human body which related to diagnosis or were of value for the purpose of diagnosis (EPO TBoA T964/99, 2001, *Cygnus*). All that was needed to justify an exclusion was that the claimed method comprised *one* step which served diagnostic purposes or related to diagnosis and was to be regarded as an essential activity pertaining to diagnosis and practised on the living human body. This U-turn in the EPO position was motivated by the fact that early case law amounted to setting a different standard for diagnostic methods compared to methods of surgery or therapy, the latter being excluded from patent protection if they comprised only *one* single step of a surgical or therapeutic nature. It was further held that the criterion "practised on the body" was in any case satisfied if direct contact with the body was involved. It remained unclear whether some other kind of interaction with the living body might equally suffice to satisfy this criterion, for example a non-invasive method using radiation that could be performed for measurement and analysis purposes and that could form the basis for a diagnosis.

A classical example of an invention which would be excluded from patent protection under this approach is a method, which in essence is carried out by a machine, but which includes steps which (at least theoretically) can be performed by a physician on the body of a patient.

The ongoing debate on the scope of the exclusion of diagnostic methods recently came to a halt with an authoritative EPO ruling (EPO EBoA G1/04, 2005, *Diagnostic methods*). The decision first clearly confirms that practicing a diagnostic method requires *several* method steps due to the inherent and inescapable multi-step nature of such a method, contrary to surgical or therapeutic methods which can be achieved by a single step. It is accepted that the method steps to be carried out when making a diagnosis as part of the medical treatment of humans include: (i) the collection of data (examination phase), (ii) the comparison of found data with standard values (comparison phase), (iii) the finding of any significant deviation (ie a symptom), and (iv) the attribution of the deviation to a particular clinical picture (the deductive medical decision phase).

The ruling further holds that only methods including *all* steps are excluded from patent protection: only methods pertaining to the diagnosis for curative purposes as a purely intellectual exercise representing the deductive medical decision phase (the diagnosis for curative purposes stricto sensu), *as well as* to the preceding steps which were constitutive for making the diagnosis (examination, data gathering and comparison), *and* the specific interactions with the human body which occurred when carrying out those of the said preceding steps which were of a technical nature. A method for obtaining intermediate findings of diagnostic relevance does not fall under the exclusionary provision and is patentable (EPO EBoA G1/04, 2005, *Diagnostic methods*).

It is justified to require that all method steps of a technical nature of a diagnostic method should satisfy the criterion "practised on the human or animal body". In other words, the performance of each and every one of these steps should imply

an interaction with the human or animal body, necessitating the presence of the latter. If, on the other hand, some or all of the method steps of a technical nature are carried out by a device without implying any interaction with the human body (e.g. by using a specific software program), these steps may not be considered to satisfy the criterion "practiced on the human or animal body". By the same token, this criterion is not complied with either in respect of method steps carried out *in vitro* in a laboratory, such as method steps carried out *in vitro* by diagnostic devices known as DNA microarrays (EPO EBoA G1/04, 2005, *Diagnostic methods*).

In short, current EPO case law suggests that diagnostic methods carried out *in vitro* are considered unpatentable, whereas diagnostic methods not carried out on the human or animal body, but practiced *in vitro* are considered patentable (Thomas 2007, 2003).

Carrying Out Genetic Testing

Where a gene is patented, patent holders have the right to stop others from making or using the patented gene. Where a patent for a diagnostic method is granted, patent owners have the right to refrain others from using the diagnostic method (article 28 TRIPs). Various strategies can be designed to limit the right of the patent holder and to facilitate access to patented technology for users, in case diagnostic labs.

Research Exception

A first way that comes to mind to enable the free use of patented genes and methods is the research or experimental use exemption. Prevailing patent acts in many EU member states suggest that the rights that are conferred by a patent shall not extend to acts done for experimental purposes relating to the subject-matter of the patented invention. Unfortunately, the wording of this exception differs from country to country, resulting in a legal patchwork of provisions having a different and uncertain scope. Furthermore, the exemption is directed to "research" and it remains unclear to what extent said exemption can shield diagnostic testing. On the one hand, it can be argued that diagnostic testing falls within the research exemption, because patient blood or tissue sampling is often necessary to do research. On the other hand, it can be claimed that diagnostic testing can not fall within the exemption because once a diagnostic test is established, the act of diagnosis could be defined as and/or confined to the act of providing the referring medical doctor with an opinion as to whether or not the patient carries a deleterious mutation. Recent EPO case law seems to opt for this last viewpoint (EPO EBoA G1/04, 2005, *Diagnostic methods*).

Licensing

As it is most unlikely that genetic testing will fall under the research exemption, securing a license from the patent holder is a second option to gain access to patented genetic testing technology. Roughly speaking, three licensing approaches

can be distinguished in the diagnostic field (Matthijs 2007). In the first or so-called "open" model, put to practice with the Cystic Fibrosis Transmembrane conductance Regulator (CFTR) gene, free access is granted to gene sequences for diagnostic testing using commonly available technologies for mutation analysis, but royalties are collected on gene based commercial test kits. In the second or so-called "monopoly" model, witnessed in the BRCA gene case, an exclusive licensing policy is applied with relatively high prices (see below). In the third model, operationalised with the Hereditary Haemochromatosis (HH) gene, the company offers to license laboratories to carry out testing, but at a cost that makes the company's own, commercial test kit more economically attractive owing to their requirement of up-front payments and a per-test fee.

Apart from a few a-typical license agreements, license arrangements offer wide possibilities to tailor the needs and uses of both patent holders and diagnostic laboratories.

Compulsory Licensing

In the event a patent holder refuses to grant (reasonable) licenses, a compulsory license might bring relief to gain access to patented technology. Based on a wide set of international agreements (articles 8 (1) and 30 TRIPs, Doha Ministerial Declaration of 14 November 2007, Declaration on the TRIPS agreement and public health of 14 November 2007), various EU member states introduced a compulsory license specially tailored to the needs in the field of health care. Most prominent in this regard are the newly introduced license schemes of Belgium and France (Van Overwalle 2006). Such compulsory license schemes allow others than the patent holder to exploit an invention protected by a patent for (a) a medication, a medical appliance, a medical appliance or product for diagnosis, a derived or combinable therapeutic product, (b) the process or product necessary for the manufacture of one or more products indicated under (a) and (c) a diagnostic method applied outside of the human or animal body.

Collaborative Licensing

When access to genes and methods necessary to carry out a genetic test is not limited by the restrictive license behaviour of a the license holder, access may be hampered by the existence multiple patents held by different patent owners. When such patent clusters are present, arrangements bundling a set of patents can help to gain access (Van Overwalle et al. 2006; Van Overwalle, 2009). One such model enabling access to a bunch of patents with a single license is a patent pool. A patent pool is an agreement between two or more patent owners to license one or more of their patents to one another, and to license them as a package to third parties who are willing to pay the royalties that are associated with the license (Verbeure 2006a; Verbeure, 2009). A key example of a genetic pool, supported by the WHO, is the SARS corona virus pool (Simon 2007; Correa, 2009). However, the SARS pool is no longer actively being pursued, because with no further outbreaks of SARS, the economic driver

for the formation of such a pool has been removed (Personal communication James Simon, 21 January 2009).

Another model to simplify access to a cluster of patents is a clearing house. A clearing house operates as an intermediary platform between technology/patent holders and technology seekers. It can perform various tasks, ranging from providing information on available technologies, assisting technology owners and/or buyers in initiating negotiations for a license, setting allocation formula for patents, cashing in licence fees from users on behalf of the patent holder (van Zimmeren et al. 2006; Van Zimmeren, 2009). Classical examples of such clearing houses include national copyright societies for playing music on air (e.g. SABAM in Belgium). An example in the genetic field is PIPRA (Public Intellectual Property Resource for Agriculture) aiming to facilitate access to new agricultural technologies for developing countries (http://www.pipra.org).

These new collaborative licensing models have gained wide attention. Meaningful in this regard is the attitude of the European Society of Human Genetics (ESHG) supporting the practical exploration of alternative models for licensing like patent pools and clearing houses (ESHG 2008). The ESHG even suggested the establishment of a European wide patent clearing house for genetic and biological inventions. In other words, a clearing house for European research institutes in genetics which might "facilitate the concentration of gene patent talent and accelerate protection of IP" (ESHG 2008).

A Real Life Example: The BRCA Saga

To bring some more shade and depth to the prevailing legislative framework, we turn to a real life example, more in particular the patenting and licensing of breast and ovarian cancer testing.

The Patenting of Breast and Ovarian Cancer Testing

In the course of 2001 a series of European patents dealing with diagnostic testing for early onset breast and ovarian cancer based on the genes BRCA1 and BRCA2 were granted to the US company Myriad Genetics. In line with the governing EPO rules on human gene patents, all three patents relating to the BRCA *genes* were granted (EP0705902, EP0705903, EP0785216) (see Box 3 and Box 4). Following current EPO legislation and case law on diagnostic methods, the one patent relating to a *method* for diagnosing breast and ovarian cancer was equally accepted (EP0699754) (see Box 3 and Box 5), as well as various diagnostic *techniques* and *tools*. One of the most frequently used techniques to test for BRCA is PCR. The original Mullis patent expired a few years ago, but other patents still protect various aspects of the method (see Box 6). An alternative technique which can be put to work to test for breast and ovarian cancer is Multiplex ligation-dependent amplification method (MLPA), which has been protected by various patents in the US (patents are pending

in Europe) (see Box 7). Yet another way to test breast and ovarian cancer is to use Lightcycler 480 High Resolution Melting Master. Most related patents are owned by Roche Molecular Systems Inc. (see Box 8).

Box 3 BRCA1 and BRCA2 patents (Europe)

Patents relating to BRCA1
- EP0699754 "Method for diagnosing a predisposition for breast and ovarian cancer" granted on 10/01/2001
- EP0705902 entitled "Nucleic acid probes comprising a fragment of the 17q-linked breast and ovarian cancer susceptibility gene", granted on 28/11/2001
- EP0705903 entitled "Mutations in the 17q-linked breast and ovarian cancer susceptibility gene", granted on 23/05/2001

Patent relating to BRCA2
- EP0785216 entitled "Chromosome 13-linked breast cancer susceptibility gene BRCA2", granted on 08/01/2003

Box 4 Major BRCA1 *gene* claim (Europe)

"1. An isolated nucleic acid which comprises a coding sequence for the BRCA1 polypeptide defined by the amino acid sequence set forth in SEQ. ID. NO:2, or an amino acid sequence with at least 95% identity to the amino acid sequence of SEQ. ID. NO:2" (Claim 1 from EP705902B1, as published on 28/11/2001)

Box 5 Major BRCA1 *method* claim (Europe)

"1. A method for diagnosing a predisposition for breast and ovarian cancer in human subject which comprises determining in a tissue sample of said subject whether there is a germline alteration in the sequence of the BRCA1 gene coding for a BRCA1 polypeptide having the amino acid sequence set forth in SEQ. ID. NO:2 or a sequence with at least 95% identity to that sequence, said alteration being indicative of a predisposition to said cancer" (Claim 1 from EP699754B1, as published on 10/01/2001)

Box 6 Major patents related to PCR (Europe)

- EP0201184, entitled "Process for amplifying nucleic acid sequences" entails the process for exponentially amplifying at least one specific double-stranded nucleic acid sequence
- EP0236069, entitled "Apparatus and method for performing automated amplification of nucleic acid sequences and assays using heating and cooling steps" deals with an apparatus for automated temperature cycling and a method of using this
- EP0258017 entitled "Purified thermostable enzyme and process for amplifying, detecting, and/or cloning nucleic acid sequences using said enzyme" covers this thermostable enzyme having DNA polymerase activity and a method of using this enzyme.
- EP0395736 entitled "Purified thermostable enzyme" comprises a DNA sequence encoding a thermostable DNA polymerase.

Box 7 Major patents related to MPLA (Europe)

- EP1130113-A1 (US6955901-B2), entitled "Multiplex ligatable probe amplification" is owned by De Luwe Hoek Octrooien (NL)
- EP1472369 (US6960436-B2), entitled "Quantitative methylation detection in DNA samples" covers a method for the cytosine methylation detection in a DNA sample and is owned by Epigenomics AG (DE)

Box 8 Major patents related to Lightcycler (Europe)

- EP512334, entitled "Methods for detecting a target nucleic acid in a sample", assigned to Hoffmann la Roche
- EP872562, entitled "Instrument for monitoring nucleic acid amplification reactions", assigned to PE Corp NY US
- EP906449, entitled "System and method for carrying out and monitoring polymerase chain reactions", assigned to Utah University US
- EP912760, entitled "System and methods for monitoring for dna amplification by fluorescence", assigned to Utah University US
- EP1033411, entitled "Fluorescent donor-acceptor pair", assigned to Utah University US
- EP581953, entitled "Process for determining -i(in vitro) amplified nucleic acids", assigned to Evotec Biosystems, DE

The grant by the EPO of the series of patents covering the breast cancer *gene*, its mutations, as well as *diagnostic* and therapeutic applications based on the gene's sequence, evoked strong reactions and led to the questioning of the nature, legitimacy and scope of gene patents and diagnostic methods instrumental to public health (Matthijs and Halley 2002; Verbeure 2006b). The award by the EPO of patents on additional *tools* and *techniques* necessary to carry out genetic testing hardly met any (public) resistance. Significant in this regard is the position of the ESHG admitting that they see "no harm in the patenting of novel technical tools for genetic testing (e.g. PCR or chip technologies), as they can promote investments and still allow for invention around" (ESHG 2008).

The Licensing of Breast and Ovarian Cancer Testing

After Myriad Genetics obtained several European (and US patents) for breast cancer *genes* and the related *diagnostic screening method*, it licensed the breast cancer test exclusively to a limited number of commercial genetic laboratories within specific geographical regions (Walpole et al. 2003). These laboratories were apparently allowed to carry out testing of only a limited set of BRCA1 and BRCA2 mutations, while the complete sequence analysis was still carried out only by Myriad. In turn, the licensing policies applied for the complementary *diagnostic technology* seemed rather loose. These days, the PCR, MPLA and Lightcycler patents all require licenses, but mostly on a non-exclusive basis and at reasonable royalty rates.

The highly restrictive licensing policy from Myriad gave rise to a strong and worldwide reaction (Baldwin 2007; Bird 2007; Herrlinger 2005; Matthijs and Halley 2002; NRC 2005). In order to address these concerns, OECD member countries agreed to Guidelines for the Licensing of Genetic Inventions used in health care (OECD 2006). The Guidelines set out principles and best practices for those in business, research and health systems who enter into license agreements for genetic inventions used for the purpose of human health care. They are targeted at those involved with innovation and the provision of services in health, and particularly at those involved in the licensing of such inventions. Overall, the Guidelines seek to foster the objectives of stimulating genetic research and innovation while maintaining appropriate access to health products and services. In the same spirit, the ESHG developed Recommendations underlining that rights holders should license genetic inventions for health applications, including diagnostic testing, on terms and conditions that seek to ensure the widest public access to, and variety of products and services (ESHG 2008). The ESHG held that foundational genetic inventions – as well as methods for diagnosis – should be licensed so as to be broadly accessible, at a fair and reasonable price.

Concluding Remarks

The genetic community is very sensitive to possible unfair use of the patent system in the field of genetic inventions, witness the strong reactions against the grant to Myriad Genetics of patents dealing with diagnostic testing for early onset breast and

ovarian cancer based on the genes BRCA1 and BRCA2. The impasses identified and the criticism voiced is not always directed to the *existence* of the patent *system* as such, but rather to some excesses in the *exercise* of patent *rights* and the unrestrained behaviour of individual patent owners, in an effort to maximize profit.

It is hoped that the new compulsory license for public health will address undesirable effects and unreasonable behaviour from patent holders in an adequate manner, thanks to its preventive and dissuading effect towards patent holders applying (extremely) restrictive licensing policies. It is also to be expected that new models of collaborative licensing may contribute to facilitating access to genetic testing when clusters of patents are rendering access to genetic testing technology too complex and uncertain Huys et al., 2009.

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Lexicon

EUROPEAN PATENT. On the basis of a single application and examination procedure one can protect an invention in up to 36 European countries, all contracting states which have ratified the European Patent Convention of 1973 (EPC). The term "European patent", however, is misleading from three points of view. It is not a single patent that is valid for the whole of Europe: the application and granting procedures are uniform, after which the patent is broken up into a "bundle" of national patents which are further subject to national legislation and, more particularly, to national regulations with regard to nullification and impairment. Nor is a "European patent" a patent granted by the European Union (EU): European patents have nothing to do with the EU apart from the fact that all EU Member States have also signed the EPC. Furthermore, it is on the basis of the EPC that the European Patent Office (EPO) was brought into being, for dealing with European patent applications. It bears repeating that the EPO is not an EU institution, either.

NATIONAL PATENT. In Europe it is also possible to obtain patent protection by separate application to each of the national patent offices within Europe.

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