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COMMENTARY

Patenting time-lapse microscopy: the European story

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Abstract European Patent No. 2430454 of Stanford University is open to opposition before the European Patent Office if such opposition is filed by 23 October 2013. This is the European equivalent of the US Patent that raised such controversy in this journal in August 2013 as being a patent on time. The European Patent, which is directed to a method of selecting embryos for implantation using the results of time-lapse microscopy, should, in the present authors' opinion, be revoked as being directed to a method of medical diagnosis, which is unpatentable under European patent law. The only party currently opposing Stanford's patent is a competitor, Unisense FertiliTech A/S which is itself seeking to patent similar methods in Europe; the objection that Stanford has patented a method of diagnosis has not been raised by Unisense FertiliTech. We submit that Stanford's patent should be opposed to safeguard competition and to protect the freedom to operate of clinicians. In this paper we explain how Stanford's patent should fail under European law.

Keywords: patents, time-lapse microscopy, diagnosis, Stanford, Unisense FertiliTech, opposition

Background

In the August 2013 issue of this journal, a debate arose following the grant to Stanford University of a US patent on a method using time-lapse microscopy (TLM) to study in-vitro embryo development in order to select appropriate embryos for implantation (Wong et al., 2012). The contributions began with an editorial (Cohen, 2013a), which was followed by a reply by one of the inventors (Reijo-Pera, 2013) and a response by the editor (Cohen, 2013b), and included two eminently sensible pieces by a patent attorney who explained why the grant of the US patent is problematic (Pieczenik, 2013a,b). The debate was essentially about the patent-eligibility of the TLM procedure under Section 101 of the US patent law following the 2012 decision by the US Supreme Court in *Mayo v. Prometheus* (Mayo Collaborative Services v. Prometheus, Inc. (2012) 566 U.S.). The point at issue there was whether or not the method claimed was a 'law of nature', one of the judicially-developed exclusions from patent-eligibility. The debate, however, also has a European side which has hardly received any attention so far, even though it is no less interesting or controversial, and so this article will focus on the situation in Europe.

Stanford's European patent

Earlier this year, on 23 January 2013, a patent equivalent to the US patent was granted to Stanford (European Patent No. 2430454) (Wong et al., 2013). In Europe, any interested party can oppose a granted European Patent during the nine months following its grant. Filing an opposition simply involves paying a fee to the European Patent Office (745 euros), and identifying the patent, the opponent, and the reasons why it is felt that some or all of the patent claims should be revoked. Thus, Stanford's European Patent is

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open to opposition up to 23 October 2013. To date, one opposition has been filed, by the Danish Company Unisense FertiliTech A/S. We will come back to this opposition below.

The European Patent contains one independent claim, which reads as follows:

> 'A method for assessing good or poor developmental competence of a human embryo comprising (1) measuring cellular parameters of the human embryo in vitro, wherein said cellular parameters include: (a) the duration of the first cytokinesis; (b) the time interval between cytokinesis 1 and cytokinesis 2; or (c) the time interval between cytokinesis 2 and cytokinesis 3, and (2) determining that the human embryo has good developmental competence when, (a′) the duration of the first cytokinesis is 0 to 30 minutes; (b′) the time interval between the resolution of cytokinesis 1 and the onset of cytokinesis 2 is 8—15 h; or (c′) the time interval between the onset of cytokinesis 2 and the onset of cytokinesis 3 is 0—5 h. [*sic*] wherein said cellular parameters are measured by time-lapse microscopy.' (Wong et al., 2013)

Thus, what Stanford has been granted a patent for is a 'method for assessing good or poor developmental competence' by measuring one or more of three particular parameters by TLM and, if the measured value is within the specified range, 'determining that the human embryo has good developmental competence', i.e. is a suitable candidate for implantation. The claim granted to Stanford is in practice a very broad one within the field of reproductive medicine since, to be infringed, it only requires one parameter to be determined by time-lapse microscopy.

The exclusion from patent-eligibility of diagnostic methods practised on the human body

On the face of it, the method patented by Stanford might seem to be a straightforward laboratory technique, much like many other medical diagnostic tests, and thus eligible for patenting in Europe. European patent law, however, contains a number of exclusions, i.e. types of subject-matter that are excluded by statute from patent-eligibility. One such exclusion is found in Art. 53(c) of the European Patent Convention (EPC):

> 'European patents shall not be granted in respect of ... diagnostic methods practised on the human ... body...' (European Patent Office, 2010)

During examination of the patent application, Art. 53(c) EPC was not raised by the European Patent Office, the body responsible for granting European Patents. This, although clearly worrying, is not all that surprising, for it happens frequently that patents are granted which contravene certain requirements of the European Patent Convention and that this only becomes clear during opposition proceedings. Interestingly, the Danish company Unisense FertiliTech, so far the only party that has opposed Stanford's European patent, has not raised Art. 53(c) EPC either in its Notice of Opposition. We will come back to this.

The highest tribunal of the European Patent Office, the Enlarged Board of Appeal, has considered the question what is or is not 'a method of diagnosis practised on the human body' in its 2005 opinion G-1/04 Diagnostic methods (Enlarged Board of Appeal, 2006). In this opinion, the Board considered diagnosis to be a two-stage procedure, involving an evidence-gathering step and a step of diagnosis, i.e. a decisional step. The Board concluded that a method as claimed must include the actual decisional step before it can be excluded under Art. 53(c) EPC. Likewise, it concluded that the preceding evidence-gathering steps must necessitate the presence of the human body in order for it to be practised *on* that body and so be excluded from patentability (Sterckx and Cockbain, 2012).

Thus, in relation to Stanford's European Patent, four crucial questions arise:

(a) Is 'assessing good or poor developmental competence of a human embryo' a *diagnostic* method?
(b) Is the claimed method practised *on* a human embryo?
(c) Does the claim include the *step* of diagnosis?
(d) Is a human embryo a *human body*?

The method patented by Stanford is a diagnostic method practised on the human body

Since assessing whether or not a body is healthy (i.e. in this case whether or not it has good developmental competence) seems clearly to be a diagnostic method, since the TLM technique requires the embryo to be present for the evidence-gathering step, and since Stanford's claim recites the actual decisional step of diagnosis (i.e. *determining* that the human embryo *has* good developmental competence *when* a certain condition is satisfied), it would appear that the answers to questions (a), (b) and (c) mentioned above are undoubtedly 'yes'.

This leaves open only question (d), i.e. the question as to whether a human embryo is a human *body*. The answer, as with the answer of the Court of Justice of the European Union in the human embryonic stem cell case *Brüstle vs. Greenpeace* (Court of Justice of the European Union, 2011), concerns the definition of an embryo *only for the purposes of patent law*, in this context the European Patent Convention. To this end, clear guidance is given in Rule 29(1) of the EPC:

> The human body, *at the various stages of its formation and development ... [our italicization]* cannot constitute [a] patentable [invention]. (European Patent Office, 2010)

In addition, Rule 26(1) EPC can be mentioned:

> For European patent applications and patents concerning biotechnological inventions, ... Directive 98/44/EC of 6 July 1998 on the legal protection of biotechnological inventions shall be used as a supplementary means of interpretation [of the European Patent Convention].

This EU Directive, commonly known as the European Biotech Directive, makes things even clearer in its Recital 16, which notes that: