Chapter II. Human Stem-cells research. Their relation with Patent Law[49]

II.1. Introduction: The direct effects of patents on biotechnological research

The question as whether patents that fall on basic biotechnological tools should or should not be public domain has been raised[50], because many of the most important genetic research act as platforms or launch pads to open areas of investigation. The patents of these basic resources are perceived as a point of

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[50] Richard GOLD, Yann JOLY, Tomoyhy CAULFIELD: "Genetic Research Tools. The Research Exception and Open Scienze", in GenEdit, 2005, Vol III, No.2. From an ethical standpoint see Göran HERMERÉN: "How could the concepts of 'ordre public' and 'morality' be Interpreted? What ethical considerations are relevant in the Patenting of Human DNA?" in "The ethics of human Patenting genes and stem cells. "Conference Report and Summaries. Held in Copenhagen 28 September 2004, Organized by The University of Copenhagen. The Danish Council of Ethics Biotika. www.biotik.dk/sw293.asp. (Published by The Danish Council of Ethics)

deceleration in investigative activity, because of increasing costs that delay the publication of the conclusions and suffocate the collaboration in this area of biomedicine[51]. It is necessary to sustain non-commercial public investigation[52] and to foment the politics of the sanitary research even though they fall over abnormal illnesses.

From this perspective, the patent system produces two direct effects over biotechnological research: firstly, the difficulty of open access to the research and the technology, and secondly, the increase of sanitation costs[53]. To alleviate them one needs to play a decisive role, for example, the creation of registrations of unmodified stem cells lines, that included information about the embryonic stem cells, germs, and embryonic cells, that guarantee the transparency and facilitate access of the scientific community to the research, and in

[51] The negative consequences of patents in biomedical research, see Richard GOLD et al, Genetic Research Tools. The research Exception and open Scienze, op. cit., pp. 6 and 2. See also Thomas G. JENSEN: "What problems does Patenting pose to fundamental biomedical research-and possible solutions?, in The Ethics of Patenting human genes and stem cells." Conference Report and Summaries. Held in Copenhagen 28 September 2004, Organize by The University of Copenhagen. The Danish Council of Ethics Biotika. www.biotik.dk/sw293.asp (Published by The Danish Council of Ethics).

[52] Thomas G. JENSEN, op. cit. See section 2 of the summary of the meeting.

[53] In this sense, Opinion No. 16 of the European Group on Ethics (EGE) referred to concerns that the overcharge would prevent access to health care. The EGE considers it essential, in addition to academic exemption, that patents are not too broad, as this could have adverse effects on the objective of supporting innovation in health benefits (EGE 2002, p. 18, section 2.7). See Göran Hermerén, How could the concepts of "ordre public" and "morality" be Interpreted? What ethical considerations are relevant in the Patenting of Human DNA? art. cit.

this way the necessity, world renowned, of public human embryonic stem cell banks[54]. Thirdly, with the ends of assuring that the titles of the patents don't have an abusive use of their rights through the cost of excessive fees, it should be fomented the resource of obligatory licenses, when access to the diagnostic and the treatment are blocked by the inappropriate use of the patents, allowing the equal access to sanitary attention when this process is justified.

II.2. Patent of Human Embryonic Stem cells

II.2.1. The status of the issue: The clause of public order

In the period before the Directive 1998/44/CE about patentability of biotechnological inventions the problem had still not come up. European national regulations in this subject were coordinated by European patent Convention October 5th, 1973, ratified by Spain on July 10th, 1986. New events on biotechnological and genetic engineering were acquiring a growing function in the industrial activities. This placed Europe at a disadvantage in front of the USA and Japan[55].

[54] In Spain the National Stem Cell Bank is attached to the General Office of Research on Cell Therapy and Regenerative Medicine of the Carlos III Health Institute. See http://www.isciii.es/htdocs/terapia/terapia_bancocelular.jsp

[55] We refer in particular to the American patent application for the testing of oncogenes on mice, on 24 June 1985, which was granted on 12 April 1988. See GÓMEZ SEGADE, J. A.: "Decisión de la División de Examen de la Oficina Europea de Patentes de 3 de abril de 1992", in Gómez Segade, Tecnología y Derecho. Estudios jurídicos del Prof. Dr. H.C., José Antonio Gómez Segade recopilados con ocasión de la conmemoración de los XXV años de ...

The first proposition, October 20th, 1988, signaled that live organisms could be patented. Nevertheless, it was criticized ferociously because of the lack of references to the ethical question. After a political battle, the result is a final text of a compromise between the diverse ethical opinions about the way to protect this delicate sector of discoveries and inventions[56].

The Directive 98/44, as the European internal regulations and the European Group of Ethics admit the patentability of the processes surrounding human stem cells, with general requirements (development, the inventive activities, and industrial application). If these requirements are not met the human stem cells cannot be patented. Under the budget if the stem cells have been invented, and

cátedra, Madrid 2001, pp. 723 to 732. See also in the same work by the same author the following articles: "Patentes y bioética en la encrucijada: del onco-ratón al genoma humano" pp. 955-961; "Decisión de la Cámara de Recursos Técnica de la Oficina Europea de Patentes de 3 de octubre de 1990. Patentabilidad de los animales: el ratón transgénico", pp. 689-708. Besides this fact, there were many patent applications on the human genome in the USA and UK. The height of the crisis occurred in 1991 when the U.S. National Institute of Health (Craig Venter) applied for 3.000 patents on gene sequences with no known biological application, which caused the reaction of the UK's Medical Research Council to request, in turn, 1.000 patents.

[56] In this regard, certain statements contained in the preamble may provide guidance to understand the various interests at stake, -the patent holder to profit on the promotion of biotechnology research, and health and welfare of humanity-, and the difficulty of reconciling both of them in the rules of patents.

not simply discovered or found, nevertheless not all the human embryonic stem cells can be patented[57].

The Directive refers explicitly to the germinal cells in order to exclude them from the patentability, but there is nothing that is

[57] Article 3: "1. For the purposes of this Directive, inventions which are new, which involve an inventive step and which are susceptible of industrial application shall be patentable even if they concern a product consisting of or containing biological material or a process by means of which biological material is produced, processed or used. 2. Biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature".

Given these requirements, the Preamble 20 says: "Whereas, therefore, it should be made clear that an invention based on an element isolated from the human body or otherwise produced by means of a technical process, which is susceptible of industrial application, is not excluded from patentability, even where the structure of that element is identical to that of a natural element, given that the rights conferred by the patent do not extend to the human body and its elements in their natural environment"; and 21: "Whereas such an element isolated from the human body or otherwise produced is not excluded from patentability since it is, for example, the result of technical processes used to identify, purify and classify it and to reproduce it outside the human body, techniques which human beings alone are capable of putting into practice and which nature is incapable of accomplishing by itself". Assuming that patent rights do not extend to the human body and its elements in their natural environment, the Preamble reaffirms that (16): "Whereas patent law must be applied so as to respect the fundamental principles safeguarding the dignity and integrity of the person; whereas it is important to assert the principle that the human body, at any stage in its formation or development, including germ cells, and the simple discovery of one of its elements or one of its products, including the sequence or partial sequence of a human gene, cannot be patented; whereas these principles are in line with the criteria of patentability proper to patent law, whereby a mere discovery cannot be patented".

written about embryonic stem cells. The question will be then if they can be patented without any ethical obstacle that would stop it[58].

The answer needs to be brought forth about Article 6.2 c) Directive 98/44, the public order clause, which excluded the patentability of inventions whose commercial exploitation would be contrary to public order or to the morality, and in particular, the uses of human embryos with commercial or industrial ends. This norm generates transcendent economic consequences in the European economic context, and also brings forth important problems with interpretation[59]. For example, if we make reference to the future acts of economic exploitation of the invention, or if the experimental acts that have preceded the request are understood; if we make reference to the use on the research of excess embryos, or also to the embryos created for the means of the investigation; if it makes sense to distinguish between the ends of the research or the

[58] Geertrui VAN OVERWALLE raises the question. "Patentability of human stem cells and cell lines", in "The Ethics of Patenting human genes and stem cells." Conference Report and Summaries. Held in Copenhagen 28 September 2004, Organized by The University of Copenhagen. The Danish Council of Ethics Biotika. www.biotik.dk/sw293.asp.

[59] Gerard PORTER, Chris DENNIGN, Aurora PLOMER, John SINDEN & Paul TORREMANS: "The patentability of human embryonic stem cell in Europe. Applicants in Europe are left CITH fez options for the patent of hES cell-related technology", in Nature Publishing Group 2006, vol.24, No.6, June 2006. http://www.nature.com/naturebiotechnoloy Just think that as U.S. Patent and trademark Office has granted many patents claiming human embryonic stem cells in their titles (including the patent in the methods of differentiation of such cells), while the European Patent Office (EPO) does not grant patents claiming such cells.

commercialization[60]; without forgetting to remember that complexities of the problem of how to define what an embryo actually is.

Without coming to a finite closure, we can say now that inventions with human embryonic stem cells will be patentable if the employed method doesn't destroy them, in a strict sense, and if the ends are in accordance with the national regulations. So we will continue explaining these specific circumstances.

II.2.2. Relevance of techniques of Embryonic Stem cells research as regards patentability of results

It's a premise in the European context that the method to create the embryonic stem cells cannot destroy the cells, for the patentability of the invention[61]. To this effect, it's necessary to question if the term "commercial exploitation" used on art. 6.2 c) of the Directive and in the national patent laws, we make reference only for the future economic uses of the invention, or if the experimental

[60] Problems studied by Geertrui VAN OVERWALLE: "Patentability of human stem cells and cell lines", op.cit. www.biotik.dk/sw293.asp.

[61] This has been confirmed by the EPO in the WARF case. Distinctly the office has a very broad concept of embryo and has not clarified the meaning of the term. The procedure for making decisions that this office performs has been criticized. The procedure to certify that inventions do not violate public order or morality has been accused of irregularities; and that they should have been established by a group of experts in the field of ethics that could provide a clear and consistent jurisprudence. Richard GOLD and Alain GALLOCHAT, op. cit., p. 360. Patents are considered by people with little experience, although the topics to be addressed are very important, and can result in denial of the patent.

acts that have preceded the request of the patent are understood[62]. The subject has practical transcendences, because if it is the first case, the inventions could be patented when the development of the inventive activity is to be created illegally, although its repetition would not be necessary in order to commercially exploit the invention[63]; in the second case, if the development of the inventive activity were realized contrary to public order it could not be patented.

The question is how far a patent which claims a product, such as an embryonic stem cell line may be withheld if the invention has been obtained through procedures that are contrary to the public order, although the procedure is not the subject of the claim. The EPO has given its answer, including under the blanket of public order (ex Art. 6.2.c) carrying out the invention of the claimed cell line[64].

[62] It follows ROMANDINI: "Comment to the Legge 22 febbraio 2006, n.78 sulle invenzioni biotecnologiche" in Marchetti-Ubertazzi, Commentario alle leggi brief intellettuale and its owner to concorrenza, 4th ed., Milano 2007, pp. 1367 et seq., op. cit., p. 1377.

[63] As examples, inventions improved by an illegally derivative of human biological material, violating the rules on informed consent, or through an act of biopiracy.

[64] This is the position of EPO of 25 November 2008, in the case WARF, G0002/06, which claimed a culture of human embryonic cells, which was rejected because the method described enveloped the destruction of embryos. See press release: http://www.epo-org/about-us/press/releases/archieve/2008.html See the comment that STERCKX made, "The Warf / Stem Cells before the EPO Enlarged Boad of Appeal", in European Intellectual Property Rewiew, Volume 30, Issue 12, 2008, pp. 535-537. See also on the topic GÓMEZ-SALVAGO SÁNCHEZ: "El marco europeo de la protección juridical de los resultados de la investigación biomedical sobre clonación terapéutica: implicaciones para los investigadores andaluces", in Daniel GARCÍA SAN JOSÉ (ed.) Régimen jurídico de la investigación ...

But the problem is that the concept of "public order" does not exist for all the European states, except the preconception that is used by EPO.

An example of a country that adopted this initial positioning was Belgium that with regard to the exemption of public order and morality was not confined to commercial exploitations and extended them to the inventions produced by means contrary to public order or morality[65], however, present legislation in this country has been overtaken by a new one[66].

Another problematic situation arises when the invention has been initiated in accordance with the standards of a system but seeks to extend the exclusivity in the context of other domestic legislation, which is understood in another sense as the clause of "public order" and would cause the rejection of the claimed patent. Let us start with an example. The system in the United Kingdom, which allows the creation of embryos for research (for IVF and nuclear somatic

biomédica en Andalucía. En el marco de la legislación nacional e internacional, ed. Laborum, 2009.

[65] Richard GOLD and Alian GALLOCHAR, op. cit., p. 350. They criticize these authors because they do not seem to fit neither the Directive nor the Trips agreement.

[66] At present, the Law on research on human embryos in vitro (April 2003) expressly permits the derivation of HESTCs coming from the surplus embryos in vitro reproduction and the creation of human embryos for research using SCNT. See the overall picture available at www.stemcellconsortium.org

transfer)[67], and derives stem cells from surplus embryos for assisted reproduction, their Patent Office recognizes consistently, that the commercial exploitation of inventions concerning human embryonic pluripotent stem cells is not contrary to public order or morality[68] in the UK. The achieved English patent would be rejected in Italy, because the Italian legislation prohibits the creation of embryos for research, including transfer nuclear somatic stem cells, and cell lines derived from human embryonic cells[69]. The same result would occur if the patent was requested in Austria, which also voted against research with human embryonic stem cells and maintains today the same regulation[70].

[67] The Human Fertilization and Embryology (HFE) Act (2008). See http://www.opsi.gov.uk/acts/acts2008/ukpga_20080022_en_1 See also www.dh.gov.uk/en/Publicationsandstatistics/PublicationsLegislation/DH_080205

[68] http://www.ipo.gov.uk/pro_types/pro-patent/p-law/p-pn-stemcells-2009203.htm

[69] In the words of the Directive (14) "...patent law cannot serve to replace or render superfluous national, European or international law which may impose restrictions or prohibitions or which concerns the monitoring of research and of the use or commercialization of its results, notably from the point of view of the requirements of public health, safety, environmental protection, animal welfare, the preservation of genetic diversity and compliance with certain ethical standards".

[70] We follow the overall picture provided by the International Consortium of Stem cell networks, available in www.stemcellconsortium.org. In the case of Austria refers to the following address on-line: www.ris.bka.gv.at / Bundesrecht Designed is also used at the following web address: http://www.bionetonline.org/castellano/Content/sc_leg2.htm # Q2 This table has been verified with the legal situation at present (February 2010). Also been taken into account the regulations offered at the following addresses: www.stemcellconsortium.org (last entry 18 September 2008)

The disparity between member countries is a consequence of the freedom that applies to every state in the determination of rules that should govern the field of scientific research on stem cells (Oviedo Convention, art. 18). Consequently, the conflict is served, to be very different regulation of embryonic stem cell research in Europe.

For example, in regard to the creation of embryos for research, it is permitted in the UK (both IVF and nuclear transfer)[71], in Belgium (including SCNT)[72] and in Spain[73]. It is forbidden, however,

[71] The Human Fertilization and Embryology (HFE) Act (2008). See http://www.opsi.gov.uk/acts/acts2008/ukpga_20080022_en_1 You can see also www.dh.gov.uk/en/Publicationsandstatistics/PublicationsLegislation/DH_080205

[72] The Law of 11 May 2003 Concerning research on embryos in vitro states in Article 6: "Human reproductive cloning is prohibited". Article 3 allows research on embryos in vitro for therapeutic purposes as well as for scientific research only where no other method of comparable efficacy is available and under strict conditions, notably if research takes place in laboratories accredited university with local and federal oversight on embryos within their first 14 days of development. Article 4 prohibits the creation of embryos for research purposes, except where supernumerary embryos will not meet research objectives, and subject to the same strict conditions applicable to embryos in vitro under Article 3. See http://unesdoc.unesco.org/images/0013/001342/134277e.pdf

[73] Art. 33 Law 14/2007, July 3 of Biomedical Research, vetoed the establishment of pre-embryos and human embryos solely for experimental purposes, but allows the use of any technique for obtaining human stem cells for therapeutic or research which does not involve the creation of a pre-embryo or an embryo solely for this purpose, as defined by law, including activation of eggs by nuclear transfer.

in Austria[74], Denmark (including SCNT)[75] and France[76]. It is also prohibited the creation of embryos for research in Germany (including the technique of SCNT)[77] while the investigation is allowed under certain criteria; it is allowed under requisites in Greece (including SCNT), Ireland (including SCNT), Italy (including SCNT),

[74] In Austria the embryonic stem cell research is not permitted, and is regulated by legislation on assisted reproduction. See the following address: www.ris.bka.gv.at / Bundesrecht

[75] Act on Medically Assisted Procreation 1997, as amended in 2003. See the following address: www.biokemi.org/biozoom/issues/498/articles/2060. They have a Centre for Stem Cell Research, see http://dasc.dk/

[76] France began to legislate before the Directive was adopted, in July 1994 with a law prohibiting patenting the human body or any of its parts, components or products, for reasons of public order and morality. See Richard GOLD and Alain GALLOCHAT: "The European Biotech Directive: Past and Prologue", op. cit. p. 340. In vitro fertilization could have only one purpose: to help a couple have a son. Embryos left over were stored in a frozen state for five years for possible later implantation in the uterus of the mother. Parents could also decide to donate to another couple or to have them destroyed. After this period of five years, they had to be destroyed. Currently, the new French law on bioethics passed with the end date of February 6, 2006 continues to prohibit the creation of embryos for research (including the technique of SCNT), while the situation has changed in other ways: allows licenses to import human embryonic stem cell lines, for a period of 5 years. See www.stencellconsortium.org. See also www.agence-biomedecine.fr

[77] Under the terms of paragraph 1 of "Embryo" (Embryo Protection Act) 1991 in Germany any person could be prosecuted if an egg is fertilized for any purpose other than to cause a pregnancy in the same woman who donated the egg. Thus, it was illegal to create an embryo for medical research purposes. Currently research is permitted under HESTCs using criteria set by the German Stem Cell Act of 2002, with the amendments introduced in 2008. Accordingly, only those stem cell lines created before 1 May 2007 may be used for research. It also allows the import of HESC lines.

Netherlands and Portugal. Finland has no law allowing or banning the technique of somatic nuclear transfer, but allows the derivation of stem cells from leftover embryos in vitro.

Regarding the use of embryos for research is allowed in countries like Belgium, France, Spain and the United Kingdom. It is fforbidden, by contrast, in Austria. Finally, the derivation of embryonic stem cells is allowed for surplus embryos from assisted reproduction in Finland[78], Greece, Holland, Sweden, United Kingdom, Belgium, Denmark, France, and Spain. Forbidden, but permitted the importation of cell lines in Germany and Italy.

II.2.3 Significance of research purposes as regards patentability of results

For the purposes of patentability, there is unanimity in the idea that the purpose of the invention must be lawful. The importance of the purpose intended is critical from the standpoint of protecting the results obtained. It now is part of the public policy clause of Art. 6.2.c) of the Directive and has a greater importance.

From the perspective of general interest pursued by the use of embryonic cells, it can improve the health of people (speaking, then,

[78] Under the Act, the embryos remaining in the fertilization treatments can be used for research, provided that donors have given their written consent. The embryos are not implanted into an organism and must be destroyed within 14 days after fertilization. The eggs and sperm can be stored in liquid nitrogen for 15 years, for example in cases where a disease at an early stage of adulthood is causing infertility. After the period of 15 years, the eggs and sperm can no longer be used in the investigation and must be destroyed.

for therapeutic use), or the reproduction of the species (called, in this case, reproductive purposes) when they are intended to be implanted in the uterus for a natural birth). Observing the public policy clause from this point of view, only the first destination is deemed admissible. There is a unanimous rejection of the second destination. Thus, the so-called "cloning" reproduction is considered contrary to human dignity, and as such, contrary to public order and morality. The therapy, however, enjoys in the Directive a broad scope of freedom for each of the Member States designed in its policy, according to internal public order. It is therefore left to each State to decide on stem cell research (given the pluralism of society) with two conditions: where it is permitted, ensure the protection of the embryo, and prohibit the creation of embryos for research purposes[79] because according to the European Group of Ethics, the creation of embryos for research represents a disturbing step in the use of human life like an instrument.

If the optics of the general interest is passed to the particular interest of those who financed the activity, the patent by its very nature is directed at the commercialization of the results. It is

[79] The general rule, under which states in Article 15 of the Oviedo Convention of 4 April 1997 for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, is that scientific research in the field of biology and medicine are carried out freely, "subject to the provisions of this Agreement and other legal provisions ensuring the protection of human beings". Art.18 under the heading "Research on embryos in vitro, provides: "1. When experimentation on embryos in vitro is permissible under the law, it shall ensure adequate protection of the embryo. 1. It prohibits the creation of human embryos for experimental purposes".

undeniable that the interest of funded research activity in a field like biotechnology, which requires large financial resources to invest, is to obtain a monopoly on the patented results and commercially exploit the invention, either directly, or after licensing to a third party - so as to recover the costs invested. In this sense, despite the present economic interests in this area, the public policy clause would prevent the commercialization of the results, which is a political triumph against the big biotech companies, at least for now, as a disincentive to research[80].

The fact of recognizing an area of freedom for each of the Member States to design its internal policy on embryonic stem cell research should not mislead the normative level of research activity with the patentability of the results. In other words, freedom is left to each State to design its policy on stem cells research; another thing is that, although allowed the research, the patentability and the commercialization of the results would be prohibited. The fact that the Directive classifies non-patentable inventions contrary to public order causes not only that national regulations draw up a list of the same classifications, but also a list of prohibited commercial exploitations. In other words: they cannot establish a list of patenting

[80] The Warf case drew international attention as it could reduce substantially the opportunities for companies to commercialize stem cell related inventions through patent monopolies. Remarks by Gareth MORGAN, a lawyer specializing in intellectual property from Taylor Wessing LLP (London). Font used: Biotech Business Week, July 7, 2008, "Stem cell research; EPO highest authority to consider stem cell patents", Section: EXPANDED REPORTING; p.2563. See also The Scotsman, May 19, 2008, Monday, 1 Edition. "Stem cell sector awaits patent ruling", by Peter Ranscombe Business Reporter. Section: p. 28.

prohibitions for reasons of public order if not accompanied by a sanction of the exploitation of these inventions in their respective territories.

However, some European legal systems distinguish the effects of patenting on the basis that embryonic cells have been created for research purposes or for marketing purposes, accepting the patentability of the former and excluding the latter. Is there any point for distinguishing between commercial or industrial purposes and research purposes, to exclude from patentability the first, and accept patents on embryonic stem cells that are directed to research? Does it make sense to patent a non-market outcome after the invention? What advantage carries patent ownership of the invention if it cannot be marketed for reasons of public policy? In my view, this can only be understood as a key claim to acquire the rights to payment of royalties arising from the ownership of research for when, in the future marketing is allowed.

The Directive 44/98 prohibits the patenting of inventions that have used human embryos for industrial or commercial purposes. In general, the prohibition of patenting may be due to two legislative policy objectives, which I consider necessary to clarify: they can prohibit the patenting of discouraging research and production of a certain field, or leave it to individuals building processes of the invention when they are very cheap, without forcing them to pay royalties. Which one of these objectives should be banned? The answer is none other than the first, discouraging research and

production, because it is known that the Directive represented a new configuration of a European patent in ethical issues but it is only the beginning and not the end of the discussions[81]. The public order clause that prohibits the patenting of the human embryos with commercial purposes was established in the Directive to discourage research and production in this area. However, it is not clear that all countries will remain consistent with this legislative policy.

Firstly, the prohibition of the use of human embryos for research or therapeutic purposes doesn't always go together with the prohibition of marketing. Germany, for example, prohibits the derivation of hESCs (except those created before 1 May 2007), but allows the importation (as much as the commercialization) of HESC lines[82], and the same happens in Italy.

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[81] Richard GOLD and Alain GALLOCHAT, op. cit., p. 347

[82] In Germany studies in the field of human embryonic stem cell research are regulated by the Embryo Protection Act (EschG) from 1990 and the Stem Cell Act ("Law to Ensure the Protection of Embryos in Connection with the Importation and Use of Human Embryonic Stem Cells" [StZG] from 2002, modified in 2008). According to the Embryo Protection Act, the establishment of human embryonic stem cell (hESC) lines in Germany is prohibited by criminal sanctions. As an exception, hESC lines that were established in foreign countries before 01 May 2008 may be imported to Germany for research purposes (regulated by the Stem Cell Act). Such lines must have been established from "supernumerary" IVF embryos. This means from such embryos that were generated for purposes of reproduction, but no longer can be transferred to a woman. The evaluation is undertaken by an interdisciplinary "Central Ethics Committee for Stem Cell Research (ZES) composed of natural scientists, medical researchers and humanities scholars. It proceeds In accordance with the StZG and the resulting opinions are forwarded to the Robert Koch Institute which makes the final decision concerning the applications. On 10 November 2006 DFG released its statement "Stem Cell Research in Germany - Possibilities and Perspectives" with the aim To improve

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Moreover, some jurisdictions that allow the derivation of embryos for scientific purposes and for ethical reasons prohibit the marketing, according with the literal sense of the Directive. Would it make sense then that the results of research could be patented with the means to achieve a monopoly of ownership of research even if the commercialization was prohibited? Of course this does not seem very encouraging from the standpoint of investment, but in any case, there are jurisdictions that expressly permit it. Switzerland, for example, where the public order clause does not apply if the exploitation of embryos has research purposes (and expressly recognized this in their patent law)[83]. The patent is excluded only when the operation has commercial or industrial purposes. In my opinion, the commercialization of the invention is a natural element

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the basic conditions for stem cell research. On 14 August 2008 the German Parliament modified the stem cell act and made the following changes: - The qualifying date (deadline) for the import of hES cell lines was moved from 01 January 2002 to 01 May 2007, Allowing the import of hESC lines generated before May 2007. - The threat of criminal sanctions for German scientists and the scope of the Stem Cell Act has been limited to activities Carried out in Germany. Since the Stem Cell Act has come into force, 40 research applications (7 April 2009 status) for the importation of hESC lines have been approved (current list at http://www.rki.de). Nine of these hESC applications included the use of which would not have been permitted by the old 2002 version of the Stem Cell Act with the old qualifying date 01. January 2001. DFG is continuing its support for stem cell science. This year there is a joint call between the Chinese NSFC and DFG being evaluated addressing basic principles of stem cell biology. Information obtained from www.stemcellforum.org/about_the_iscf/members/deutsche_forschungsgemeinschaft.cfm

[83] The possibility of patenting the uses of embryos for research is complemented by an open system of the obtained results to the public, establishing the need to publish the results of research carried out in subordinate employment and public funds.

of the patent to recover the costs for investment, so it makes no sense to patent only for the purposes of research[84]. The only consistent explanation I can find is the allowing of patenting of ownership of research, and therefore we have an eye on possible future changes in the rule allowing the marketing of embryos, and eventually, having acquired the rights to payment of royalties for the licensing of exploitation.

II.3. Ethical implications

The real problem as regards the public order clause acting as a limitation for the patentability is to identify what exactly an embryo is.

Obtaining stem cells from human embryos creates the ethical problem that the embryo must be destroyed to extract its inner cell mass, because so far science has failed to obtain cells from the blastocyst without destroying the structure that surrounds it[85]. The problems about what it means to be human in a pluralistic society

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[84] The distinction between research and marketing does not make sense for EPO. The reason is that just as he holds a patent for a product has the right to third parties shall not use or produce the product without its consent, the claim of the product involves its possible commercial or industrial exploitation, notwithstanding the intent of the patent applicant may be another, like using the product for future research. EPO decision, Case G 0002/06: "... as someone having a patent application with a claim directed to this product has on the grant of the patent the right to exclude others from making or using such product, ... making the commercial or industrial product remains exploitation of the invention even where there is an intention to use that product for further research. ...".

[85] BERIAIN, La clonación, diez años después, Granada 2008, op. cit.

like Europe are large, as noted by Geertrui VAN OVERWALLE. Some authors consider that non-viable embryos, which do not lead to a birth, such as those created by parthenogenesis, or by somatic cell nuclear transfer (cloning) are not covered by the exclusion. Others believe that the use of embryos that involves their destruction is contrary to human dignity[86].

There are also those who oppose to the creation of surplus embryos with the means of investigation but don't find a problem using the surplus embryos from IVF, or importing cell lines produced in other countries, or simply the extraction, if possible, the cells from the blastocyst for this purpose[87]. The issue is the question. BERIAIN[88], quoting two major supporters of this thesis: United States of America and Germany: "In both cases the moral background becomes the same: it is wrong to destroy embryos to create stem cells, but once they exist, it would be a gross irresponsibility not to benefit from them for the advancement of life sciences. In USA, the ban on embryo experimentation using public funds did not extend to the embryonic cell lines already in existence,

[86] VAN OVERWALLE, G.: "Patentability of human stem cells and cell lines", in "The Ethics of Patenting human genes and stem cells." Conference Report and Summaries. Held in Copenhagen 28 September 2004, Organized by The University of Copenhagen. The Danish Council of Ethics Biotika. www.biotik.dk/sw293.asp. p. 21.

[87] BERIAIN, La clonación, diez años después, op. cit., p. 104.

[88] An example: the WARF arguments before the EPO, which stated that the patents that claim the current use of human embryos should be rejected as contrary to morality, but not claiming a product derived from human embryonic cells, although primordial origin wrap isolate the product destroys the embryo.

nor to those created through private funding. In Germany, meanwhile, though it is forbidden to create embryos for these purposes, it is possible, although subject to many restrictions, to import cell lines obtained in other countries"[89].

Opponents to this argument think that the two events are inseparable from a moral standpoint, because they belong to a single set: If one creates embryo cell lines it's only because he wants to use them for research, and vice versa, if one uses these lines, he knows that they have been generated for this purpose. If Germany prohibits the destruction of embryos, but allows the import of lines created in other countries it is because they think that would be enough to continue with their research. In the U.S the possibility of the public research projects to buy cell lines generated with private funding hidden in the investment of the creation of these lines[90].

[89] BERIAIN, La clonación, diez años después, op. cit., pp. 106 y 107: The advocates of this hypothesis argue that if a teenager is killed, that should not stop us when we need to use their organs to save other lives, because nobody in their right mind would believe that this will increase violence against adolescents. His view therefore is that one can distinguish between two different acts, destruction of the embryo and the use of their cells, and both are likely to be classified as morally independent.

[90] On August 9, 2001, President Bush banned the expenditure of public funds for research in HESTCs from that date on the basis that blastocysts have a moral equivalent of people. For Russell KOROBKIN, ("Recent Development in the "Stem Cell Century: Implications for Embryo Research, Egg Donor Compensation, and Stem Cell Patents in Jurimetrics, Vol 49, No .1, 2008, pp. 51-71, op. cit. pp. 53, 56) the potential of embryonic stem cell research justifies the investment of public funds, regardless of the consequences that arise for embryos used in the creation of cell lines and the circumstances in which such embryos were created, unable to defend the position that blastocysts have a moral equivalent to that

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II.4. Towards a redefinition of Human embryos

On the other hand, new biotechnological inventions have helped to focus the terms of debate, not on whether or not the embryo is a person, but whether the technique is able to generate embryos.

If we look at the Spanish legislation, it's noted that they sought to carefully preserve the traditional biological definition of embryo, considering as such the result of the fertilization. While it's true that opting for the unorthodox way of dividing this figure in two different concepts, that of the pre-embryo and the embryo itself[91] Thus the concept is limited to the entity resulting from the merger of male and female gametic material until 56 days later[92].

It has been emphasized the need to promote a new definition of human embryo and characterize them not only by their origin but

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of humans. They have none of the attributes that give people a unique morality. Certainly worth a deference of treatment compared with adult tissues, but not as individuals. At this point, about respect and deference they deserve treatment, the blastocyst, it is worth noting the distinction between reality that destroys human embryos and research using cell lines derived from destroyed embryos. Just as the distinction between research on embryonic stem cell lines when derived from surplus embryos from in vitro fertilization (line respects are accepted), and the creation of embryos solely for research purposes (via less respectful of the blastocyst).

[91] BERIAIN, La clonación. Diez años después, op.cit., pp. 108-109.

[92] BERIAIN, "The concept of embryo in the Law 14/2007 of 3 July, biomedical research," in Salome ADROHER, Federico MONTALVO BIOSCA and JÄÄSKELÄINEN (Directors): Los avances del Derecho ante los avances de la Medicina, ed. Aranzadi, 2008, pp. 991 and on.

by their inner qualities, namely its potential to become a person, as has been reflected in some laws, such as Germany, Belgium, the Netherlands, and Japan. Moreover, the prospect of cell structure, as pluripotent or totipotent is the decisive criterion for the purpose of research and patentability in the intellectual property office of the United Kingdom[93].

German law provides in its paragraph 3.4 a definition of embryo: "an embryo is any human totipotent cell that has the ability to divide and become a human individual provided that the required necessary conditions are met"[94]. In Belgium, the embryo is defined as a "cohesive cell or cell system with capacity to develop and lead to a human person"[95]. In the Netherlands as a "cell or group of cells with capacity to develop and become a human being"[96]. In Japan as "a cell - except a germ cell- or cells that can become an individual through their development

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[93] Go to the following address: http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-pn-stemcells/2009203.htm

[94] Act respecting the protection of the embryo in relation to the importation and use of embryonic stem cells of human origin (Law of stem cells) of 28 June 2002.

[95] See Belgian Chamber of Representatives, Bill Concerning Research on Embryos in vitro, December 23, 2002.

[96] See Kingdom of the Netherlands, Embryo Act, September 1, 2002.

in vitro of a human or animal, and has not yet begun the formation of the placenta"[97].

In summary, given the need to redefine the concept of embryo, the formula that has more adherences is using the concept of potentiality[98], although, to avoid counter-intuitive (and impractical) ideas that sperm and human eggs are also people[99], it is necessary to distinguish between the ideas of potentiality and possibility, and even, following BERIAIN, going beyond, it is feasible to differentiate, in fact, up to three concepts: active power, passive power and possibility. In this way, and using his words, an embryo in vitro has active power because simply it's not necessary to intervene, and it's enough to let nature take its course and develop into a person ...An embryo in vitro, in contrast, has only passive power because even if it contains sufficient information to create a human being is not in the right environment to do so. Finally, a embroider body, i.e. the result of failed fertilization, would have neither power nor possibility of creating a human being.

Furthermore, the invention of the technique of somatic nuclear transfer has previously required stating if these nuclei of an

[97] The author, BERIAIN, op.cit.,1005, uses the translation text from the Inter-University Chair BBVA Foundation-Provincial Government of Biscay in Law and Human Genome, Código de Leyes sobre Genética (II), Bilbao-Granada, ed. Comares, 2007.

[98] See BERIAIN, La clonación, diez años después, op.cit, pp.113 and 117-120 for theories of the supporters of the ontogenesis and epigénesis.

[99] BERIAIN, op.cit., pp. 124 and on.

egg are human embryos or not. What kind of potential would they have? It appears that the current state of the ontological structure responds to a pluripotent cell, not totipotent, and therefore, "the vast majority of them do not have any potential to develop as individuals"[100]. So, they are not an embryo in a strict sense.

One argument that has been recurrently used against techniques of nuclear stem cell transfers come from the need they have to use vast quantities of human eggs as the only means to create human cell lines. But the problem that arises is that it is too complicated to get the number of eggs needed because the removal from a woman's body is no longer just painful and uncomfortable, but also dangerous[101].

Two possible alternatives are mentioned by BERIAIN: Allow the economic consideration of the eggs (although in his view women would be subjected to unlawful harassment, even if they gave their informed consent).[102] Another alternative would be the use of eggs

[100] BERIAIN, op.cit., pp. 125-126, and 128. See also Osuna CARRILLO DE ALBORNOZ / Andreu MARTÍNEZ, "Investigación con preembriones. Comentario a los arts. 15 y 16 de la LTRHA", in Corbacho GOMEZ (dir.), Iniesta DELGADO (coord.) Comentarios a la Ley 14/2006 de 26 Mayo de Técnicas de Reproducción Humana Asistida, Navarra 2007, pp. 483 to 511.

[101] BERIAIN, La clonación, diez años después, op.cit., pp. 133 and on.

[102] In the U.S., given the narrow legal confines (The Human Cloning Prohibition Act, 2001) the technique could be illegal, regardless of funding source, but the Senate failed to clarify so that there is no federal legislation banning the cloning therapy, although some states have enacted laws expressly prohibiting it. The problem is different: since the technique ...

from other species through the creation of chimeras and hybrids between humans and animals[103]: "The problem with this solution is, however, that in the opinion of many, would be a serious attack on the dignity of the human species as a whole, and would most likely be rejected by the majority. From the opposite point of view however, it is conceivable that prohibiting this kind of research would be, at a time, a serious attack against the principle of beneficence, as it would deprive thousands of people the possibility of benefiting from their results. In another view, a loss of valuable opportunities to improve our understanding of how biological embryo and gamete mechanisms function. These arguments, in fact, have a very substantial importance that made the British government, after announcing its intention to prohibit the application of this kind of technology, to decide to turn back, and finally, to permit this kind of experiment, but subject to strict controls[104].

With respect to the use of other techniques, we must agree, following BERIAIN that creation of unfertilized egg cells and subsequent destruction for obtaining stem cells does not have any problem from an ethical standpoint[105]. In contrast, ANT, (Altered

requires egg donation, experience shows that women are not willing to donate for free, since the law in many of these States consider it unethical to pay for the eggs.

[103] BERIAIN, La clonación, diez años después, op. cit., p.135.

[104] Cfr. http://www.hfea.gov.uk/en/1517.html

[105] BERIAIN, op. cit., p. 129. See pp. 48-49 for an explanation of the experiment.

Nuclear Transfer)[106] to alter the structure of the resulting cell when it was set up as such, what it does is to destroy the once already constituted embryos, rather than avoid that they come to exist[107].

As regards the OAR (Oocyte Assisted Reprogramming)[108], if this technique prevents the embryo from coming into being, the effect caused is to eliminate any potential before the appropriate conditions for the development. This fact removes all reasonable ethical doubt. Finally, the technique of iPS[109] doesn't generate any serious ethical problems, because this technique relies on the alteration of genes in a somatic cell, in a way that it behaves as if it were a pluripotent cell[110].

II.5. Conclusion

In the way of concluding ideas, summing up the questions analysed in this Chapter, we can put forward the following:

First. The disparity of rules and criteria as to what can be patented, and with respect to embryonic stem cell research originates several implications. The first is that notwithstanding that there are alternative routes to European patent application, as demonstrated

[106] For an explanation of the method, pp. 49-51.

[107] Beriain, op.cit., p. 130.

[108] For a detailed explanation of the method, see pp. 51 and on.

[109] Description of the method on pp. 52 and on.

[110] BERIAIN, op.cit., p. 131.

by the UK - although rarely used, given the irony that the original motivation of the Directive, which was to ensure the hospitality of the laws of European patents for biotechnological inventions from other countries, not only has not been accomplished, but quite the opposite: the patents in USA, Korea, Japan and other countries outside Europe, cannot find a place in Europe. The question then is whether a single system would be desirable for biotechnology patents throughout Europe. Undoubtedly yes, but poor countries' firms in the sector (including Spain), are not in favor because by retaining the power to decide what is patentable and what not in this area, protects their own businesses, which would not be forced to pay large sums for the assignment of licenses for the exploitation of inventions in these areas.

Second. It seems evident the need for common ground for a proper definition of the term "embryo", which is a priority both for the legal practitioners as for researchers. This would clarify further the regime of patentability, which in my opinion, should not be excluded when embryonic stem cells have been created according to a method that has not destroyed embryos strictly, in order to improve the health of population. The patent can be extended to research and/or marketing[111].

[111] One of the challenges posed to the EPO, not explicitly resolved yet, had to do with technological innovations. Methods for generating stem cells from "non-viable" "triploid zygotes", the nuclear transfer technique abnormally creating blastocysts which can not implant in the uterus, but are capable of generating stem cells, or finally, the technique to produce stem cells through biopsy of an embryo in its own right, without interfering with the process their development, in recent years they raised the need to overcome the ethical ...

Third. The need for an international code of stem cell research is the situation in Europe regarding standards for research on embryos and embryonic stem cells highlighting the great disparity in this field and the result of cultural diversity that exists in Europe. This should lead us to conclude the need to encourage a public debate on these issues. In this sense, it has been highlighted by Professor Bartha Maria KNOPPERS, the need for an international code of stem cell research, to help overcome the ethical barriers in this field of research[112]. Renowned scientists and organizations have signed the Charter of stem cells, writing that refers to the Charter of the World Health Organization 1946, which stipulates that "enjoyment of the highest attainable state of health is one of the fundamental rights of every human being without distinction of race, religion, and political belief, economic or social condition". To that end, the Stem Cell Charter upholds the following principles:

1. Responsibility to maintain the highest level of scientific quality, safety and ethical probity.
2. Protection of citizens from harm and safeguarding of the public trust and values.

issues related to stem cell research and whether if the viability of the organism, id est, its potential to develop during pregnancy, is a necessary condition for classification as an embryo for that purpose, or whether the destruction of the embryo in the proper sense is a necessary condition to reject the patent. See "The patentability of human embryonic stem cells in Europe. Applicants in Europe are left with few options for the patent protection of hEScell-related technology", Nature Biotechnology, vol. 24, No 6, June 2006.

[112] See the text of the declaration www.stemcellecharter.org

3. Intellectual Freedom to exchange ideas in the spirit of international cooperation.
4. Transparency through the disclosure of results and of possible conflicts of interest.
5. Finally, Integrity in the promotion and advancement of stem cell research and therapy for the betterment of the welfare of all human beings.