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## Embryonic Stem Cell Patents and Human Dignity

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### Abstract

This article examines the assertion that human embryonic stem cells patents are immoral because they violate human dignity. After analyzing the concept of human dignity and its role in bioethics debates, this article argues that patents on human embryos or totipotent embryonic stem cells violate human dignity, but that patents on pluripotent or multipotent stem cells do not. Since patents on pluripotent or multipotent stem cells may still threaten human dignity by encouraging people to treat embryos as property, patent agencies should carefully monitor and control these patents to ensure that patents are not inadvertently awarded on embryos or totipotent stem cells.

### Keywords

Human embryonic stem cell patents; Human dignity; Morality; Human embryo; European patent office; Wisconsin Alumni Research Foundation

### Introduction

As predicted in this journal in 2002, the policy battles concerning human embryonic stem cells have shifted from controversies concerning research on human embryos to skirmishes related to intellectual property rights [36]. In the United States (US), the Wisconsin Alumni Research Foundation (WARF) owns three patents on human embryonic stem cells based on University of Wisconsin scientist James Thomson's pioneering research. The US Patent and Trademark Office (USPTO) granted the patents in 1998 and 2001, and they are due to expire in 2015 and 2018. The patents involve claims on human embryonic stem cells as well as certain processes used to make such cells [40]. WARF has allowed two affiliated companies, Geron and Wicell, to license its patents to various users, including the National Institutes of Health (NIH) [40]. An agreement with the NIH allows the NIH, the Food and Drug Administration (FDA), and the Centers for Disease Control (CDC) to use human embryonic stem cells in research [25]. The agreement also allows the NIH to distribute embryonic stem cells to academic institutions. Both of WARF's patents are very broad and have kept competitors out of the US' market so far [25]. Some commentators are concerned that the breadth of WARF patents may stifle innovation in stem cell research [47]. It remains to be seen whether the courts will allow WARF's broad claims or narrow their focus. A lawsuit filed by Plurion in 2003 may have a major impact on the human embryonic stem cell patenting in the United States. To date, the US has granted 41 patents on embryonic stem cells or process for isolating, purifying, or culturing embryonic stem cells [33].

While the controversies related to embryonic stem cell patents in the US center on scientific and economic issues, the situation in Europe is very different, as moral issues have taken top billing. In 1999, the European Patent Office (EPO) issued the University of Edinburgh a patent for isolating and purifying human embryonic stem cells, but the patent was soon met with fierce

opposition. Fourteen parties objected to the patent on moral grounds, and the EPO reversed its decision [13]. The University of Edinburgh appealed the decision, but the case is still pending [13]. The EPO has now imposed a moratorium on human embryonic stem cell patents and has put all such patent applications on hold [38]. The EPO administers patent rules for the European Patent Commission, an organization representing thirty-one European nations. Members of Commission must recognize patents granted by the EPO, and they must not grant patents that are not recognized by the EPO. Patents granted by the EPO must also conform to policies set by the European Patent Convention (EPC) and the European Union (EU) [37].

The EPO has refused to grant human embryonic stem cell patents based on its interpretation of the “European Directive on the Legal Protection of Biotechnological Inventions,” adopted by the European Parliament in 1998 [37]. The Directive sets various policies with implications for stem cell patents including the assertion that the human body or its parts cannot be patented, even though parts of the body that have been isolated and purified by technical processes can be patented; the declaration that inventions whose commercialization is contrary to the public morality, such as those that offend human dignity, cannot be patented; and that commercial or industrial uses of embryos are against the public morality [15]. The net effect of these different policies is that the EPO regards patents on human embryonic stem cells as illegal because they are (1) patents on a human body or human body part, or (2) they offend human dignity, or (3) they involve commercial or industrial uses of embryos. Not all European countries have followed the EPO’s moratorium, however [33]. The United Kingdom, for example, will grant patents on pluripotent and multipotent human embryonic stem cells but not on totipotent embryonic stem cells, which have the potential to develop into human beings [45]. Sweden, which has some of the most liberal embryonic stem cell research laws in Europe, also allows patents on human embryonic stem cells [20,33]. It is also worth noting that Canada has so far refused to grant patents on human embryonic stem cells [7].

The differences between the stem cell patenting policy debates in the US and Europe are due, in part, to differences between the patent laws in the US and Europe. Most European nations have a “morality clause,” which allows the government to refuse to issue patents on moral grounds, and the EPC’s policies reflect this legal tradition [33]. The US has no such clause. Although various patents granted in the US have generated strong moral opposition, moral evaluation has no formal place in US patent law. Patent examiners focus on technical questions concerning novelty, non-obviousness, utility, and disclosure, while the courts focus on policy questions related to economic development, competition, and scientific and technical innovation [30]. Most of the moral opposition to human embryonic stem cell patents in Europe is based on the belief that these patents offend, devalue, infringe, or otherwise violate human dignity [6]. This article will examine the human dignity concerns related to embryonic stem cell patenting.

## Moral opposition to embryonic stem cell patents

To understand the moral opposition to embryonic stem cell patents, it will be useful to review, briefly, the controversies surrounding biotechnology patents. Moral opposition to biotechnology patents predates human embryonic stem cell research by over a decade. In *Diamond v. Chakrabarty* [14], a landmark case that established the patentability of living organisms in the US, parties who opposed Chakrabarty’s patent on genetically engineered bacteria filed an amicus brief warning of the dire consequences of allowing patents on life forms. The brief argued that patents on life forms would encourage genetic engineering of plants, animals, and human beings, which would lead to a loss of genetic diversity, degradation of the value of human life, pollution, and disease. During the 1980s, various political groups also raised moral objections to other prominent biotechnology patents, such as the patent awarded to Stanley Cohen and Herbert Boyer in 1980 for the polymerase chain reaction (PCR),

and the patent awarded to Philip Leder and Timothy Stewart in 1988 for a genetically engineered mouse. During the 1990s, opposition to biotechnology patents continued. In 1994, over thirty organizations representing indigenous peoples passed formal declarations against patents on life forms and indigenous knowledge. During the following year, biotechnology critic Jeremy Rifkin organized a protest in Washington, DC by 180 religious leaders against human and animal patenting [37].

In Europe (and Canada), environmentalist, consumer, and religious groups also opposed biotechnology patents during the 1980s and 1990s. In 1995, critics of biotechnology patents argued, unsuccessfully, that the EPO should reject patents on human DNA sequences because these patents compromise human dignity. In its response to the critics, the EPO explained that DNA patents do not compromise human dignity because they do not imply property rights over DNA in its natural state [6]. In 1998, after over ten years of controversy and debate, the European Parliament of the EU adopted the “European Directive on the Legal Protection of Biotechnological Inventions” in attempt to harmonize European laws and polices relating to biotechnology patents. The Directive gave explicit endorsement to some types of patents, such as patents on isolated and purified genes, while rejecting others, such as patents on genes in their natural state. As noted earlier, the Directive also prohibits patents on human embryos, human bodies, or human body parts [37].

While moral opposition to biotechnology patents had some effect on European patenting policies, it had little effect on patenting policies in the US. The USPTO continued to issue thousands on patents on genes, proteins, plants, and animals. One of the most significant changes in US patent policy occurred in 1999, when the USPTO decided to raise the bar on DNA patents by issuing more stringent utility guidelines. However, this change in policy resulted not from moral opposition to biotechnology patenting, but in response to concerns raised about the adverse scientific and economic impacts of loose interpretations of patenting criteria. Biomedical researchers were worried that the USPTO’s lax practices could stifle scientific innovation and discovery by granting patent holders broad control over basic knowledge and research tools. Some clinicians, researchers, and consumer groups opposed patents on genes used to diagnose genetic diseases, such as BRCA1/BRA2, on the grounds that the patents were excessively broad in scope, and that licensing fees would be so high that patients and researchers would not have access to diagnostic tests and research tools [37].

However, one important change did occur in US law and policy as a result of moral opposition to biotechnology patents. In 2003, Congress passed an amendment sponsored by Congressman Dave Weldon (Rep.-FLA) which made it illegal for the USPTO to grant patents on human organisms, including fetuses and embryos. The amendment, which became law in 2004, arose as a part of the Congressional debate about cloning and stem cell research. Although Congress failed to pass any bills banning human cloning, it did pass the Weldon amendment. The amendment is consistent with the USPTO’s policy of not granting patents on human beings, which it formulated when Stewart Newman filed a patent on a human-animal chimera [37].

When the first human embryonic stem cell patents were awarded in 1998, there was little moral protest. Opposition to these patents did not start to gear up until the early part of the 21st century, when human embryonic stem cell research began to generate a great deal of commercial interest, and it became apparent that intellectual property rights would play an increasingly important role in research and development. Opponents of human embryonic stem cell research have attempted to use the patent system to stop what they consider to be unethical research [49]. Moral opposition to human embryonic stem cell research is based on the methods used to derive stem cells, which involve the destruction of the human embryo. Researchers are working on methods to derive stem cells that do not involve the destruction of human embryos, but those methods have not been perfected yet [39]. In Europe, environmentalist, religious and

other groups have put political pressure on the EPO to not approve embryonic stem cell patents [33]. This is similar to what happened in the early 1980s, when opponent of genetic engineering argued against patents on genetically modified organisms in order to stop (or slow down) genetic engineering.

## Human dignity

The main moral argument critics have marshaled against embryonic stem cell patents has been that these patents offend, compromise, go against, or violate human dignity. To understand this critique, it is important to explicate the concept of “human dignity” used in bioethical debates. Since the 1970s, human dignity has been invoked in debates about the morality of cloning, stem cell research, genetic engineering, abortion, bio-banking, commerce in human organs, the production of human-animal chimeras, preconception genetic testing, pornography, torture, death and dying, research on human subjects, and patents on human genes [1,6,11]. In recent years, a number of different scholars have attempted to analyze or explicate the concept. Some, such as Macklin [26], argue that human dignity is a poorly defined and muddled concept. At best, the concept adds nothing of substance to bioethics debates; at worst, it obfuscates them. Others, such as Bostrom [2], Brownsword [3] and Resnik [35], think that the concept can play an important role in bioethical discussion, provided that it is carefully defined.

While I agree with Macklin [26] that people and organizations often use the concept of human dignity without defining it clearly, I do not think the concept should be discarded for the simple reason that it is now an integral part of many laws, agreements, and guidelines. As mentioned earlier, the concept occurs in the “European Directive on the Legal Protection of Biotechnological Inventions.” The United Nations Educational, Scientific, and Cultural Organization (UNESCO), uses human dignity in several declarations, such as the Universal Declaration on the Human Genome and Human Rights [43] and the Universal Declaration on Bioethics and Human Rights [44]. The United Nations Declaration on Cloning calls for the prohibition of cloning or genetic engineering technologies that are contrary to human dignity [42], and the United Nation’s Universal Declaration of Human Rights states the all human beings have equal dignity and rights [41]. Since human dignity is not likely to disappear from the conceptual landscape any time soon, the most realistic approach is to try to define and clarify the concept.

### What is human dignity?

Human dignity is the idea that human beings have inherent moral value or worth. The 18th century German philosopher Immanuel Kant, who has developed the most influential view of human dignity, distinguished between two types of things in the world: things with a price and things with a dignity. Things that have dignity have a moral value that cannot be measured in terms of a price [22]. Human beings are morally different from other things in the world, such as animals, plants, rocks, and buildings, because human beings have dignity. The Judeo-Christian and the natural law approaches also accept this view of human dignity [16,32]. This paper will focus on the Kantian, Judeo-Christian, and natural law approaches to human dignity, but there are other approaches (see Nordenfelt [31], Jacobson [21]).

### What rights does human dignity entail?

According to Kant, dignity entails special treatment: one should not treat humanity (whether in one’s own self or in another person) as having only an instrumental (market) value but always as a having inherent, moral worth [22]. Thus, one should not murder, rape, maim, torture, harm or exploit human beings. One also should not lie, deceive, break promises, or steal. One should help people and promote their well-being. These moral duties toward human beings imply moral rights: human beings have rights to life, liberty, property, due process, and so on [19].

Other approaches to human dignity also accept this Kantian view: dignity implies special treatment, which implies rights [8,16].

### **What is the basis for human dignity?**

Although the different approaches to human dignity agree on the answers to the first two questions, they disagree about the third question. According to Kant, the basis for human dignity is freedom of the will (or autonomy), which Kant understands as the ability to develop (or legislate) moral laws and follow those laws [22]. This ability, which contemporary Kantians refer to as moral agency, also requires rationality: only rational beings can develop universal rules and make their conduct conform to those rules [19]. Although Kantianism has had a tremendous influence over Western moral philosophy, one might argue that this view places too much emphasis on rationality. Other human qualities, such as emotions, language, and sociality, also characterize human dignity [18].

According to the Judeo-Christian view, human dignity is based on mankind's connection to God: human beings are created in the image of God [10,21]. Human beings reflect the image of God insofar as they can enter into relationships with one another and with God. Indeed, God created human beings, according to this tradition, so that He could have relationships with human beings [4,8,32]. While the Judeo-Christian view has considerable popularity, it makes religious and theological assumptions that many people (e.g. Atheists, Muslims, Buddhist, and Hindus) do not accept. The Judeo-Christian view may provide some insight into the nature of human dignity and can play a role in policy debates, because actions taken by governments, such as refusing to grant patents, should have a secular, rather than religious justification [34].

The natural law approach holds that human nature is the basis for human dignity. Human nature consists of the biological, psychological, and social characteristics that distinguish human beings from other animals, such as reasoning, language, morality, aesthetic appreciation, and religious conviction [16]. Fukuyama holds that human nature itself has inherent value and should not be changed:

What is it that we want to protect from any future advances in biotechnology? The answer is, we want to protect the full range of our complex, evolved natures against attempts at self-modification. We do not want to disrupt the unity of continuity of human nature [16, p. 172].

The main problem with the natural law approach is that human nature is not entirely good. Human nature includes many tendencies that people would consider undesirable, such as aggression, selfishness, cowardice, prejudice, and so on. We need a moral theory that is independent of human nature to decide which human tendencies ought to be cultivated and which ones ought to be muted, and we need a basis for human dignity that transcends human nature.

Since none of these theories have the complete answer to what constitutes human dignity, we should take the best that each has to offer. We should say that human dignity consists of those characteristics of human beings that are worth pursuing and cultivating, such as intelligence, morality, emotion, socialization, aesthetic appreciation and religious belief. Our dignity is inherent in our capacity to strive for and express these desiderata.

### **Who/what has human dignity?**

The final question is the central issue in the abortion debate and the source of most of the controversy surrounding scientific research and intellectual property related to human embryonic stem cells. Lay people, politicians, and scholars disagree about what counts as a

human life. Even people who accept the same approach to human dignity (i.e. Kantian, Judeo-Christian, or natural law) may disagree about this issue. Many Christians believe that human life begins at conception, while others believe that it begins sometime during gestation; some Kantians believe that humanity exists whenever a human body exists, while others believe that humanity exists only in a body that houses an autonomous person [9,10,17]. There are three basic approaches to the issue of when human life beings.

**The biological-genetic approach**—The biological approach equates humanity with membership in the biological species *Homo sapiens*. All individuals of our species are human beings, including individuals at the earliest stage of biological development. As soon as human gametes form a zygote, that individual is a member of our species in virtue of its possession of the genetic information necessary to develop into an adult member of our species. Many Christian sects, such as the Catholic Church and the Southern Baptist Convention, adopt this approach to defining humanity [9]. The problem with the biological approach is that there are some moral differences between embryos, fetuses, infants, children and adults. Most people would be more distraught by the death of a child, an infant, or even a 6-month old fetus than the death of an embryo. Given the choice between saving the life of an embryo and saving the life of a child, most people would prefer to save the life of a child. The biological approach does not have a satisfactory way of drawing moral distinctions between different stages of human life, because all stages are members of our species.

It is worth noting that some prominent Catholic theologians and ethicists do not accept the idea that the early embryo has a right to life [48]. McCormick [27] has argued, for example, that an embryo does not have a right to life until it has developed to the point where it can no longer divide spontaneously into twins or merge with another embryo, which usually occurs at about 14 days. The embryo does not have a right to life prior to 14 days of development because it is not yet a unique individual, and the right to life protects the interests of a unique individual [17]. The early embryo still has moral value that should be respected, but it does not have a moral right to life.

**The psychosocial approach**—The psychosocial approach defines humanity by the cognitive and behavioral characteristics that normal members of the species *Homo sapiens* develop by adulthood, such as reasoning, emotions, language, sociality, and morality [46]. Only beings that have these characteristics should be considered human. Not all members of the species *Homo sapiens* would be considered human, according to this approach. People who have severe mental disabilities, such as anencephalic newborns or adults in a permanent vegetative state, are not human. Moreover, beings that are not members of the species *Homo sapiens*, such as dolphins, might deserve to be considered human if they have these human capabilities. Children, fetuses, embryos, and zygotes have human potentiality, but they are not fully human. One problem with the psychosocial approach is that it provides an unsatisfactory account of the moral value of infants, who lack most of the cognitive and behavioral abilities that people achieve by adulthood. Most people would consider infants to be human, even if their human capacities are not fully developed.

**The developmental approach**—The developmental approach asserts that the humanity of an individual develops as the individual develops biologically, psychologically, and socially [17]. As an individual becomes more humanlike, we should treat it with greater respect. Individuals also acquire rights and duties as they develop and mature. For example, young children have the right to life but they do not have the right to vote or marry. The developmental approach is able to deal with some problems that bedevil the other approaches. Unlike the psychosocial approach, the developmental approach holds that infants are human. Unlike the biological approach, the developmental approach holds that there are moral differences between different stages of human life.

A key problem with this approach is how to determine when an individual is developed enough to have a right to life. Since development is a continuous process, and moral value increases with development, then even an embryo has some moral value. If this moral value is enough to entitle an embryo to a right to life, then the developmental approach merges with the biological approach, since the right to life would begin at conception. I think that the embryo does have moral value, but its value does not imply a right to life. An embryo acquires a right to life only after it implants in the womb, about 8–10 days after ovulation [5]. Aborting an implanted embryo is *prima facie* morally wrong and requires substantial justification (i.e. such as to protect the life or health of the mother or the child will have severe birth defects).

There are several arguments for the claim that the un-implanted embryo does not have a right to life. First, implantation is a biologically significant milestone in development. If an embryo does not implant in the womb, it cannot be born, under current technology. During normal human reproduction, only 50% of embryos implant in the womb. More than 90% of those that do implant will be born [28]. Second, since implantation usually occurs before the 14th day of development, most un-implanted embryos have not developed to the point where they are unique individuals. According to the viewpoint discussed earlier, if an embryo is not a unique individual, it does not have a right to life. Third, if all embryos had a right to life, then couples that create embryos for *in vitro* fertilization attempts would have an obligation to secure surrogate mothers for all of the embryos that they do not implant. Finding wombs for several hundred unused embryos is an unreasonable burden to impose on couples seeking *in vitro* fertilization. This third argument is a practical, rather than moral concern, but it is still an important one, given the pervasiveness and social acceptance of *in vitro* fertilization.

As an objection to the idea that there is a moral distinction between implanted embryos and un-implanted embryos, one might argue that implantation is an arbitrary milestone because an implanted embryo is not physiologically different from an un-implanted one. Implantation only seems like an important event to us because we cannot grow embryos outside of a woman's uterus. If scientists ever develop an artificial womb, implantation would lose its moral significance.

As a reply to this objection, I admit that an implanted embryo is physiologically identical to an un-implanted one, if both embryos have not reached the 14th day of development. What is different about an implanted embryo is that it is receiving a form of life-support that will eventually lead to its maturation and birth. Once that type of life-support is in place, there is an obligation to continue providing it. If an artificial womb is ever developed, I would argue that embryos that are situated in artificial wombs are different from embryos in culture, because embryos in artificial wombs would be receiving a form of life-support that will lead to normal development. Pre-implantation embryos are also receiving a form of life support, but it is the type of life support that maintains life but does not lead to maturation and birth. To have a reasonable chance of developing into an infant, an embryo must implant in a womb.

If an un-implanted embryo does not have a right to life, does it have any rights at all? One might argue that the right to life is the most basic of all rights, so that if an entity does not have that right, it has no rights whatsoever. However, I think that the right to respectful treatment is more basic even than the right to life. A moment's reflection will help to prove this point. The right to life is a right not to be killed. If someone has a right to life, then other people have a moral duty not to kill that person. Let us imagine a situation in which someone faces execution for committing a heinous crime, and suppose that capital punishment, which is legal in many countries, is morally acceptable. The criminal facing execution does not have a right to life. Indeed, some people have an obligation to kill him. Even so, the criminal facing execution still has a right to respectful treatment. For example, the people carrying out the execution should not torture, abuse or taunt him in the process of killing him. They should respect his humanity

even though he does not have a right to life. The practice of giving a prisoner his last meal, last cigarette, or last rites, reflects the general acceptance of the idea that even convicted murderers still have some dignity.

For an additional argument that it is possible to respect an embryo while killing it, consider the tradition of respectful killing found in some Native American religions [29]. Native American hunters would show respect for a buffalo by saying a prayer and thanking the buffalo for his meat and fur, making good use of the buffalo's body, and killing only the sick and weak buffalos. The Native American hunters showed much more respect for the buffalo than the white men, who shamelessly slaughtered buffalo by the thousands to tame the western US and make room for the railroads. Likewise, it may be possible to show respect for the embryo while killing it.

So, if the un-implanted embryo has a right to respectful treatment, what does that right imply? I think it entails at least (1) a right not to be killed for a frivolous reason; (2) a right not be treated as mere property. Embryos should be killed only to help other human beings to live. For example, although many embryos leftover from *in vitro* fertilization attempts are allowed to die, their lives are not in vain if they have helped to bring about the birth of a healthy child. Likewise, if an embryo dies in order to produce a stem cell line that can be used in medical research or therapy, the embryo's life would not be in vain. In US legal cases involving the disposition of frozen embryos following a divorce, courts have refused to treat embryos as mere property, even though they have also not treated them as human beings with a right to life [12]. Many states in the US have laws banning the sale of human embryos, as do many countries in Europe [24].

**Violations vs. threats**—As noted earlier, the dialogue about human dignity in bioethics includes a number of different verbs that express some relationship between actions or policies and human dignity, such as “offend,” “harm,” “compromise,” “go against,” “undermine,” “debase,” “devalue,” and “violate.” It is important to clearly distinguish between these different relationships. Verbs like “harm” or “violate” express a greater degree of moral wrongfulness than verbs like “offend” or “devalue.” To help clarify debates that involve use of the term “human dignity,” it will be useful to distinguish between two very different concepts: violations of human dignity and potential violations (or threats) [35]. Verbs like “offend,” “debase,” and “devalue,” express potential violations of human dignity, while verbs like “harm” and “violate” express violations of human dignity. Actions that violate human dignity are immoral and usually illegal. Some of these include: murder, rape, torture, assault, harm, theft, fraud, betrayal, exploitation, and so on. Actions may threaten human dignity by directly or indirectly causing people to violate human dignity.

Actions that threaten human dignity may or may not be immoral, and often are not illegal, because making these actions illegal would violate or interfere with other important values, such as human freedom. Regulations should be designed to protect human dignity without undermining the values that conflict with human dignity. For example, many people find pornography offensive, but many do not. Pornography threatens human dignity because it may encourage people to perform actions that violate human dignity, such as rape or sexual assault, or it may help to cause people to have an attitude of disrespect for the human body and human sexuality, which could lead to violations of human dignity. Making all pornography illegal is not an acceptable way of dealing with pornography's impact on human dignity, since making it illegal would interfere with freedom of expression. One man's pornography, as they say, is another man's work of art. To protect freedom of expression, most societies regulate but do not ban pornography involving consenting adults. Other types of actions that threaten but do not violate human dignity include gambling, alcohol consumption, violence on television,



participation in medical research, commerce in gametes or human tissues, and some forms of athletic competition, such as boxing.

To summarize the position on human dignity developed in Section 3 of this article, human dignity is the idea that human beings have inherent moral worth and should be treated differently from animals or inanimate objects. Human beings have rights and duties. Human dignity is founded upon the human capacities that are worth cultivating, such as intelligence, morality, language, sociality, aesthetic appreciation, and religiosity. Human beings deserve to be treated differently as they develop and mature: a child does not have as many rights as an adult. Human beings have dignity from the moment of conception, but they do not have a right to life until implantation. An embryo in a Petri dish has a right to respectful treatment, but not a right to life. Actions may violate or threaten human dignity. Actions that violate human dignity are immoral and usually illegal, but actions that only threaten human dignity are usually legal and regulated.

### **Conclusion: Human dignity and embryonic stem cell patents**

We can now apply the insights about human dignity developed in the previous section to the controversy surrounding patents on human embryonic stem cells. Human embryos are human lives and have moral value. Embryos that have implanted in the womb have a right to life, and should not be aborted, except for a compelling reason, such as to protect the life or health of the mother. Embryos that have not been implanted in a womb do not have a right to life, but they still have a right to respectful treatment. Un-implanted embryos should not be killed for a frivolous reason and they should not be treated as property. They should not be bought, sold, or patented. A patent on a human embryo would violate its dignity. Patents on human embryos are immoral and ought to be illegal. However, patents on processes for creating, culturing, preserving, or testing human embryos do not treat embryos as property and do not violate their right to respectful treatment. Hence, patents on these and other processes are morally acceptable and ought to be legal.

Totipotent human embryonic stem cells, which, like the embryo, have the potential to develop into adult human beings, are also human life and have moral value. Totipotent embryonic stem cells have rights similar to those possessed by un-implanted embryos: they should not be killed for a frivolous reason or treated as property. A patent on a totipotent stem cell would violate its dignity. Pluripotent human stem cells, which can develop into any tissue type in the body but cannot become an adult human being, are not human beings at all and do not have any moral rights. Pluripotent stem cells can be bought, sold, and patented. Likewise, multipotent stem cells, which can develop into several different tissues types, are not human beings and have no rights. These cells can also be bought, sold, and patented.

Even though patents on pluripotent or multipotent stem cells do not violate human dignity, they do pose a threat human dignity in that they can encourage people to treat embryos or totipotent embryonic stem cells as property. For example, someone applying for an embryonic stem cell patent might inadvertently (or perhaps intentionally) include claims on human embryos or totipotent stem cells. To avoid this predicament, patent agencies should make sure that he patents on pluripotent or multipotent stem cells do not include any claims on totipotent stem cells or human embryos. Agencies should also keep accurate records of the types of embryonic stem cell patents that they award, to whom, and for what purpose.

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