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Chapter 1 : Stem Cell Basics III. | calendrierdelascience.com

Human embryo experimentation has been usedâ€"and is continuously pursuedâ€"to expand our knowledge of the human embryo, improve con- traception and fertility treatments, and develop prenatal screening for ge-.

December In the ongoing debate about cloning human embryos for research, and about destroying them in order to harvest their stem cells, it is important to keep some basic facts in mind. Our moral analysis must be built upon fundamental scientific truths. If we obscure the facts, then we will not think clearly or act responsibly about these issues. Every human being begins as a single-cell zygote, grows through the embryonic stage, then the fetal stage, is born and develops through infancy, through childhood, and through adulthood, until death. Each human being is genetically the same human being at every stage, despite changes in his or her appearance. Embryologists are united on this point. Consider the following statements from standard textbooks: Normally, the embryo comes into being through sexual conception, in which the female egg cell is fertilized by a male sperm cell. In sexual reproduction the new individual gets half of its chromosomes from the nucleus of the sperm cell and half from the nucleus of the egg cell. The new organism thus produced is genetically distinct from all other human beings and has embarked upon its own distinctive development. In addition to this normal process, we have developed laboratory techniques with which to manipulate the procreation of new human organisms. This is in vitro fertilization IVF. Another technique is an asexual one in which no sperm is involved. The egg is then stimulated by an electrical charge, creating a living human zygote. This is cloning, a process in which the body cell that donated the replacement nucleus supplies the chromosomes of the new human organism. Whether the new organism is produced by fertilization or by cloning, each new human organism is a distinct entity. Twins are genetic duplicates of each other, but no one would deny that each is a distinct human individual. Similarly, a clone would be a genetic duplicate of another human being, but there is no denying that it would also be a separate individual. From its first moment, supplied with its complete set of chromosomes, each new zygote directs its own integral functioning and development. It proceeds, unless death intervenes, through every stage of human development until one day it reaches the adult stage. It will grow and it will develop and it will change its appearance, but it will never undergo a change in its basic nature. It will never grow up to be a cow or a fish. It is a human being from the first moment of its existence. Unfortunately, the denial of inconvenient facts has become quite common during the past several decades. Consider, for example, an editorial published in the September issue of California Medicine , which was then the journal of the California Medical Association. The term referred to the embryo before its implantation in the womb. If the embryo does not implant, it will die; if it implants, it will receive nutrition and a suitable environment in which to live, grow, and develop. Every human being at every stage of life similarly requires nutrition and a suitable environment. But the critical question is: Does implantation effect a change in the nature of the thing that implants? It is clear from basic facts of embryology that it does not. Princeton biology professor Lee Silver, a noted advocate of all the new biotechnologies, supplies the answer in his Remaking Eden The term pre-embryo has been embraced wholeheartedly by IVF practitioners for reasons that are political, not scientific. The new term is used to provide the illusion that there is something profoundly different between a six-day-old embryo and a sixteen-day-old embryo. In other words, it is already an embryo, and all embryos are, at first, unimplanted. An embryo subsequently implants unless something or someone interferes or the embryo is defective. Its life is continuous from its first moment whether through fertilization or through cloning until death. It has led to a confused jurisprudence that treats the embryo, in certain contexts, more like property than like a human being. It is part of the debate over human cloning and human embryonic stem-cell research. First, proponents of cloning tried to deny that cloning creates a human embryo. Some have asserted that the location of the thing in a Petri dish or in an IVF clinic i. They assert that since it will never be implanted in a womb, it can never be a human being. Therefore, because the cells are never transferred to a uterus they cannot develop into a human being on their own. It is disingenuous for those who would deprive the embryo of the chance to be born to claim that their action changes the nature and status of the thing considered. This is like the Nazis claiming that concentration camp inmates are not human beings

because the Nazis intend to destroy them during lethal experiments. But the fact is that every human being, including every embryo, is full of inherent potential by virtue of being human. That potential may never be realized or it may be impeded in particular cases. This is a scenario that many people fear. Therapeutic cloning, we are assured, would never approach anything like reproduction: But this distinction is groundless. Thus, all human cloning is reproductive cloning. To drain me of my blood in order to stock a blood bank may eventuate in some therapeutic results for someone, but it is not therapeutic for me. Medical ethics have always insisted that there be greater protection for the subject when the subject is not himself benefited by the procedure. Cloning is a laboratory procedure in which the nucleus from a somatic body cell is transferred or transplanted into an egg cell from which the original nucleus has been removed. The attempt to use five long words instead of one short one and to pretend that the five words denote something different is linguistic mischief, not science. Whatever the purpose of any act of embryo-creation may be, whether eventual birth or eventual disaggregation, it is a human embryo and thus a human being that is being produced and killed. Human stem cells have indeed proven to have great value in the invention of new medical treatments, though it is significant that the only treatments developed to date have involved stem cells acquired nondestructively from nonembryonic sources, including adult donors. Therapies involving the use of adult stem cells are already numerous, whereas therapies derived from embryonic stem cells are still only theoretical see, for example, Maureen L. Nonetheless, the public is becoming aware that stem cells can be obtained, nondestructively, from adults. My hope is that we come to understand clearly that it is a matter of scientific fact, and not of opinion, that the embryonic organisms we are being urged to exploit and discard are, like us, human beings.

Chapter 2 : Human Embryo and Fetal Research: Medical Support and Political Controversy | Guttmacher I

The embryo research does not involve research in reproductive cloning, transferring an altered embryo to a woman's uterus, or use of a human embryo in combination with other human or animal embryos. A limit on the stage of development after which the use of human embryos is not allowed, such as that suggested by the NIH panel, is necessary.

Stem cell For many decades, stem cells have played an important role in medical research, beginning in when Ernst Haeckel first used the phrase to describe the fertilized egg which eventually gestates into an organism. The term was later used in by William Sedgwick to describe the parts of a plant that grow and regenerate. Further work by Alexander Maximow and Leroy Stevens introduced the concept that stem cells are pluripotent. This significant discovery led to the first human bone marrow transplant by E. Donnal Thomas in , which although successful in saving lives, has generated much controversy since. This has included the many complications inherent in stem cell transplantation almost allogeneic marrow transplants were performed in humans, with no long-term successes before the first successful treatment was made , through to more modern problems, such as how many cells are sufficient for engraftment of various types of hematopoietic stem cell transplants, whether older patients should undergo transplant therapy, and the role of irradiation-based therapies in preparation for transplantation. The discovery of adult stem cells led scientists to develop an interest in the role of embryonic stem cells, and in separate studies in Gail Martin and Martin Evans derived pluripotent stem cells from the embryos of mice for the first time. This paved the way for Mario Capecchi , Martin Evans , and Oliver Smithies to create the first knockout mouse , ushering in a whole new era of research on human disease. Salhan, Sudha August Bharadwaj, Aditya; Glasner, Peter E. Local Cells, Global Science: Matapurkar gets US patent for surgical procedure for organ regeneration - Patents". In , James Thomson and Jeffrey Jones derived the first human embryonic stem cells, with even greater potential for drug discovery and therapeutic transplantation. However, the use of the technique on human embryos led to more widespread controversy as criticism of the technique now began from the wider non-scientific public who debated the moral ethics of questions concerning research involving human embryonic cells. Treatments that have been proposed include treatment for physical trauma, degenerative conditions, and genetic diseases in combination with gene therapy. Yet further treatments using stem cells could potentially be developed due to their ability to repair extensive tissue damage. In early , the FDA approved the first human clinical trials using embryonic stem cells. Only cells from an embryo at the morula stage or earlier are truly totipotent , meaning that they are able to form all cell types including placental cells. Adult stem cells are generally limited to differentiating into different cell types of their tissue of origin. However, some evidence suggests that adult stem cell plasticity may exist, increasing the number of cell types a given adult stem cell can become. Points of controversy[edit] Many of the debates surrounding human embryonic stem cells concern issues such as what restrictions should be made on studies using these types of cells. At what point does one consider life to begin? Is it just to destroy an embryo cell if it has the potential to cure countless numbers of patients? Political leaders are debating how to regulate and fund research studies that involve the techniques used to remove the embryo cells. No clear consensus has emerged. Other recent discoveries may extinguish the need for embryonic stem cells. I believe we have been given the capacity and will to pursue this research and the humanity and conscience to do so responsibly. Foremost among these was the discovery in August that adult cells can be reprogrammed into a pluripotent state by the introduction of four specific transcription factors, resulting in induced pluripotent stem cells. The extraction of this fluid is not thought to harm the fetus in any way. He hopes "that these cells will provide a valuable resource for tissue repair and for engineered organs, as well". They believe that embryonic stem cell research profits from and violates the sanctity of life and is tantamount to murder. The view of those in favor is that these embryos would otherwise be discarded, and if used as stem cells, they can survive as a part of a living human being. A portion of stem cell researchers use embryos that were created but not used in in vitro fertility treatments to derive new stem cell lines. Most of these embryos are to be destroyed, or stored for long periods of time, long past their viable storage life. In the

United States alone, an estimated at least , such embryos exist. Medical researchers widely report that stem cell research has the potential to dramatically alter approaches to understanding and treating diseases, and to alleviate suffering. In the future, most medical researchers anticipate being able to use technologies derived from stem cell research to treat a variety of diseases and impairments. Fox , who have lived with these conditions, respectively. The anticipated medical benefits of stem cell research add urgency to the debates, which has been appealed to by proponents of embryonic stem cell research. In August , The U. The NIH believes the potential medical benefits of human pluripotent stem cell technology are compelling and worthy of pursuit in accordance with appropriate ethical standards. Another technique announced in may also defuse the longstanding debate and controversy. Research teams in the United States and Japan have developed a simple and cost-effective method of reprogramming human skin cells to function much like embryonic stem cells by introducing artificial viruses. While extracting and cloning stem cells is complex and extremely expensive, the newly discovered method of reprogramming cells is much cheaper. However, the technique may disrupt the DNA in the new stem cells, resulting in damaged and cancerous tissue. More research will be required before noncancerous stem cells can be created. The interest in these two treatments derives from recent reports indicating that umbilical cord blood stem cells may be beneficial for spinal cord injury and that lithium may promote regeneration and recovery of function after spinal cord injury. Both lithium and umbilical cord blood are widely available therapies that have long been used to treat diseases in humans. Endorsement[edit] Embryonic stem cells have the potential to grow indefinitely in a laboratory environment and can differentiate into almost all types of bodily tissue. This makes embryonic stem cells a prospect for cellular therapies to treat a wide range of diseases. Embryos are not equivalent to human life while they are still incapable of surviving outside the womb i. More than a third of zygotes do not implant after conception. Blastocysts are a cluster of human cells that have not differentiated into distinct organ tissue, making cells of the inner cell mass no more "human" than a skin cell. Using them for scientific research uses a resource that would otherwise be wasted. It would be wasteful not to continue to make use of these cell lines as a resource. Embryonic stem cells make up a significant proportion of a developing embryo, while adult stem cells exist as minor populations within a mature individual e. Thus, embryonic stem cells are likely to be easier to isolate and grow ex vivo than adult stem cells. In contrast, adult stem cell might not divide fast enough to offer immediate treatment. Allogeneic embryonic stem cell transplantation i. Individuality[edit] Before the primitive streak is formed when the embryo attaches to the uterus around 14 days after fertilization, two fertilized eggs can combine by fusing together and develop into one person a tetragametic chimera. Those who subscribe to this belief then hold that destroying a blastocyst for embryonic stem cells is ethical. Embryos used in medical research for stem cells are well below development that would enable viability. Alternatives[edit] This argument is used by opponents of embryonic destruction, as well as researchers specializing in adult stem cell research. Pro-life supporters often claim that the use of adult stem cells from sources such as the umbilical cord blood has consistently produced more promising results than the use of embryonic stem cells. In the past, it has been a necessity to research embryonic stem cells and in doing so destroy them for research to progress. Because many of the restrictions placed on stem cell research have been based on moral dilemmas surrounding the use of embryonic cells, there will likely be rapid advancement in the field as the techniques that created those issues are becoming less of a necessity. Stated views of groups[edit].

Chapter 3 : NPR Choice page

Human 'Embryoids' And Other Embryo Research Raises Concern: Shots - Health News Researchers who study developing human embryos have long limited their experimentation to lab embryos that are no.

FAQs Embryo Abuse In Britain embryo experimentation involves research carried out on human embryos up to 14 days after conception. The law in Britain requires that all embryos used in research be destroyed. The embryos come from left-over embryos created in the laboratory for fertility treatment, or embryos specially created from donor eggs and sperm are used in research, where both parents have given their permission. Human Fertilisation and Embryology Act In the Human Fertilisation and Embryology Act was passed to allow research on embryos for the following purposes: Since research has also been permitted for: However, the only major development that has resulted from embryo research into disability is pre-implantation genetic diagnosis PGD. PGD is used to screen embryos in the laboratory to see if they are free from genetic or sex-related disability before they are implanted in the womb for development and birth. Embryos which are not chosen for implantation in the womb are discarded. The life of the human embryo is sacrificed through embryo experimentation in the name of scientific progress. The humanity of embryos is recognised by scientists. It is by virtue of their humanity that embryos are considered so valuable. This discrimination results in the killing of the embryo. Each of us was once an embryo, including the doctors and scientists who experiment on embryos. However, if there was a true recognition of the wrongness of experimenting upon human beings, all embryo research would be banned. Eugenic screening Since hundreds of thousands of human embryos have been used in research and no significant cures for disability have been found. Instead techniques such as PGD have been discovered which rather than preventing disability, result in affected embryos being discarded. Many individuals living with disabilities do not accept that human lives should be sacrificed in their name. They recognise that their own lives are no more and no less valuable than those of the embryos destroyed in research. Whatever we do to early embryos today, others will do to later embryos in the future. Ultimately, vulnerable humans at any stage of their lives could fall victim to destructive medical research. There is no essential difference between a day embryo and a day embryo.

Chapter 4 : Embryonic and Fetal Research Laws

HUMAN EMBRYO EXPERIMENTATION expanding research needs.'" Despite considerable public concern,19 however, there are currently no national standards to limit how scien-.

Description[edit] For thousands of years, these hybrids have been one of the most common themes in storytelling about animals throughout the world. The lack of a strong divide between humanity and animal nature in multiple traditional and ancient cultures has provided the underlying historical context for the popularity of tales where humans and animals have mingling relationships, such as in which one turns into the other or in which some mixed being goes through a journey. The mischievous yet cheerful character is a Satyr who has the hindquarters, legs, and horns of a goat while otherwise being essentially human in appearance, with stories of his encounters with different gods, humans, and others being retold for centuries on after the days of early Greece by groups such as the Delphian Society. Possibly, a real-world human-animal hybrid may be an entity formed from either a human egg fertilized by a nonhuman sperm or a nonhuman egg fertilized by a human sperm. While the state of Arizona banned the practice altogether in , a proposal on the subject that sparked some interest in the United States Senate from to ended up going nowhere. Bush even speaking on the subject in his State of the Union , [10] the concept of humanoid creatures with hybrid characteristics from animals, played in a dramatic and sensationalized fashion, has continued to be a popular element of fictional media in the digital age. Examples include Splice , a movie about experimental genetic research, [2] and The Evil Within , a survival horror video game released in in which the protagonist fights grotesque hybrid creatures among other enemies. List of hybrid creatures in mythology and Mythological hybrid Beings displaying a mixture of human and animal traits while also having a similarly blended appearance have played a vast and varied role in multiple traditions around the world. In "successive traditions they may change in meaning but they still remain within spiritual culture", Gaietto has argued, when looking back in an evolution -minded point of view. The beings show up in both Greek and Roman mythology , with various elements of ancient Egyptian society ebbing and flowing into those cultures in particular. Prominent examples in ancient Egyptian religion , featuring some of the earliest such hybrid beings, include the canine -like god of death known as Anubis and the lion-like Sphinx. A deity that rules over and symbolizes the untamed wild, he helps express the inherent beauty of the natural world as the Greeks saw things. He specifically received reverence by ancient hunters , fishermen, shepherds, and other groups with a close connection to nature. Pan is a Satyr who possesses the hindquarters, legs, and horns of a goat while otherwise being essentially human in appearance; stories of his encounters with different gods, humans, and others have been a part of popular culture in several different cultures for many years. After causing a disturbance in heaven from his licentious actions, he is exiled to Earth. With the head and ears of a pig coupled with a human body, his already animal-like sense of selfishness from his past life remains. Killing and eating his mother as well as devouring his brothers , he makes his way to a mountain hideout, spending his days preying on unwary travelers unlucky enough to cross his path. Mair has commented that "[p]ig-human hybrids represent descent and the grotesque, a capitulation to the basest appetites" rather than "self-improvement". Several hybrid entities have long played a major role in Japanese media and in traditional beliefs within the country. For example, a warrior god known as Amida received worship as a part of Japanese mythology for many years; he possessed a generally humanoid appearance while having a canine-like head. The fox-like creatures known as Kitsune also possess similar powers, and stories abound of them tricking human men into marriage by turning into seductive women. The latter region has had the tradition of a malevolent human-animal hybrid deity in Pazuzu , the demon featuring a humanoid shape yet having grotesque features such as sharp talons. The movie, regarded as one of the greatest horror films of all time , has a prologue in which co-protagonist Father Merrin Max von Sydow visits an archaeological dig in Iraq and ominously discovers an old statue of the monstrous being. In the opinion of popular educator Lucy Sprague Mitchell , the appeal of such mythical and fantastic beings comes from how children desire "direct" language "told in terms of imagesâ€” visual, auditory, tactile, muscle images". Another author has remarked that an "animal costume" provides "a way to emphasize or even

exaggerate a particular characteristic". The anthropomorphic characters in the seminal works by English writer Beatrix Potter in particular live an ambiguous situation, having human dress yet displaying many instinctive animal traits. Writer Lisa Fraustino has cited on the subject R. Or is it the other way aroundâ€" humans are so rabbit? Wells created his famous work The Island of Doctor Moreau , featuring a mixture of horror and science fiction elements, to promote the anti- vivisection cause as a part of his long-time advocacy for animal rights. Moreau, a morally depraved scientist who has created several human-animal hybrids even by combining parts of other animals. The story has been adapted into film several times, with varying success. The most acclaimed version is the black-and-white treatment called Island of Lost Souls. Challenging the Victorian era viewpoints of its time, the work presents a complex situation in which enhancing animals into hybrids involves both terrifying violence and pain as well as appears essentially futile, given the power of raw instinct. A pessimistic view towards the ability of human civilization to live by law-abiding , moral standards for long thus follows. The horror film The Fly features a deformed and monstrous human-animal hybrid, played by actor Jeff Goldblum. Brundle experiences drastic mutations as a result that horrify him. Movie critic Gerardo Valero has written that the famous horror work, "released at the dawn of the AIDS epidemic ", "was seen by many as a metaphor for the disease" while also playing on bodily fears about dismemberment and coming apart that human beings inherently share. Lovecraft inspired movie Dagon , released in , additionally features grotesque hybrid beings. In those comics, a set of teenagers in a s era town become afflicted by a bizarre disease; the sexually transmitted affliction mutates them into monstrous forms. For instance, the survival horror release The Evil Within includes grotesque hybrid beings, looking like the undead , attacking main character Detective Sebastian Castellanos. With partners Joseph Oda and Julie Kidman, the protagonist attempts investigate a multiple homicide at a mental hospital yet discovers a mysterious figure who turns the world around them into a living nightmare, Castellanos having to find the truth about the criminal psychopath. The English language version of the film features Anne Hathaway and Cary Elwes in the main roles, respectively. Scientific research and related issues[edit] Background and technological analyses[edit] These blue-colored tomatoes are an example of a genetically modified food. Broadly speaking, a hybrid being has one cell line throughout its entire body and came originally from a mix of entities, with different species involved to make a new genetic combination. For instance, a liger has a lion father and a tigress mother, such a creature only existing in captivity. Such hybridization has frequently caused difficult health problems that caregivers for the captive animals struggle with. The entity does not exist as a member of a separate species but has differing elements inside of it. An animal that has experienced an organ transplant or related surgery involving tissues from a different species is an example. However, mixing between species in the wild both now and through natural history have generally resulted in sterile offspring , thus being a kind of dead end in reproductive terms. This has changed significantly over the past few decades such that a number of plants and animals are commonly subject to genetic engineering for commercial purposes. The embryos formed reportedly were the first stable human-animal chimeras in existence. Research in similar areas continued into and , with the topic picking up coverage from publications such as National Geographic News. The National Academy of Sciences soon began to look into the ethical questions involved. Patent and Trademark Office additionally stirred interest into the topic by granting a patent request for a genetically modified mouse with a human immune system. The embryo consisted mostly pig cells and some human cells. Scientists stated that they hope to use this technology to address the shortage of donor organs. Bioethics and Regulation of genetic engineering Advances in genetic engineering have generally caused a large amount of debates and discussion in the fields related to bioethics , and research relating to the hypothetical creation of human-animal hybrids in the future has been no exception. The technical analyses of intermingling human-based and animal-based genetic material are ongoing; the ethical, moral, and legal issues arising from actual research using chimeras rather than hybrids per se at the moment also touch more speculative concerns as well. While laws against the creation of hybrid beings have been proposed in U. Congress , several scientists have argued that legal barriers might go too far and prohibit medically beneficial studies into human modification. While animals having one percent or less of their cells originally coming from humans may clearly appear to be in the same boat as other animals, no consensus exists on how to think about beings in a genetic middle ground that have something like

an even mix. Patent and Trademark Office and the U. Congress , motivated by his moral and scientific opposition to the notion that living things can be patented at all. Prior legal precedent had established that genetically engineered entities in general could be patented, even if they were based on beings occurring in nature. The legal process had created a paper trail of arguments, giving Newman what he considered a victory. The Washington Post ran an article on the controversy that stated that it had raised "profound questions about the differences-- and similarities-- between humans and other animals, and the limits of treating animals as property. Bush brought up the topic in his State of the Union Address , in which he called for the prohibition of "human cloning in all its forms", "creating or implanting embryos for experiments", "creating human-animal hybrids", and also "buying, selling, or patenting human embryos". He argued, "A hopeful society has institutions of science and medicine that do not cut ethical corners and that recognize the matchless value of every life. Congress and signed into law by President Bush contained specific wording forbidding any patents on humans or human embryos. The text of the proposed act stated that "human dignity and the integrity of the human species are compromised" if such hybrids exist and set up a punishment of imprisonment for up to ten years as well as a fine of over one million dollars. Pitts , and Rick Renzi among others, the Act failed to get through Congress. The proposal was signed into law by then Governor Jan Brewer. Its sponsor stated that it was needed to clarify important "ethical boundaries" in research.

Chapter 5 : First experiment 'editing' human embryos ignites ethical furor | Reuters

Embryo Abuse. In Britain embryo experimentation involves research carried out on human embryos up to 14 days after conception. The law in Britain requires that all embryos used in research be destroyed.

Boonstra ,Guttmacher Institute First published online: February 1, Scientists have long recognized the promise of research involving human embryos and fetuses for the advancement of basic science as well as for the development of lifesaving vaccines and therapies. But government funding for human embryo and fetal research is another matter altogether, one that as a political issue is inextricably linked to the controversy over abortion. This political linkage has resulted in a confusing patchwork of federal policies that ban federal support for some types of research but endorses it for others see table. Already, President George W. Bush has plunged into this issue, over the question of federal funding for research involving human stem cells. While Bush has passed on the opportunityâ€”at least for nowâ€”to issue an executive order banning the use of federal funds for stem cell research, he has said he will stand behind his campaign promise to oppose it. Researchers and patient advocacy groups worry that the federal government, as it has at times in the past, will succumb to pressure from the most extreme elements of the antiabortion lobby and step back from its involvement in this area, leaving morally complex research to the unregulated private sector and likely slowing major scientific and medical breakthroughs. Wade decision in legalizing abortion nationwide, right-to-life leaders seized upon research involving human fetuses about to be aborted or following an abortion as a weapon in the war against the right to choose, arguing that such research "dehumanizes unborn children" and gives abortion an aura of legitimacy. The timing of events could not have been more ideal for abortion opponents, for at that time, debate was beginning to rage in Congressâ€”largely as the result of revelations concerning the infamous Tuskegee syphilis experimentsâ€”over the protection of human subjects in research. The National Research Act joined the two issues; among its provisions was a temporary moratorium on federally funded fetal research, "before or after abortion. The centerpiece of the regulations is the principle that all fetuses in utero should be treated equally, with no distinction between those intended to be carried to term and those intended to be aborted; in either case, funding for research that poses more than a "minimal risk" to a fetus is almost never permitted. Although the first so-called test-tube baby, Louise Brown, was not born until , the regulations also addressed the issue of in vitro fertilization IVF research. Although the EAB in approved IVF research as a permissible use of federal funds, the board itself was disbanded in without approving any specific applications, thereby creating a de facto moratorium on federal funding for IVF research and other studies of early human embryos that remains in effect even today. IVF research continued and, in fact, blossomed in the private sector, although without the federal oversight or ethical review that is required when research is funded with public dollars. Fetal Tissue Transplantation Research In contrast to the protracted debate over research on fetuses and embryos, research involving fetal tissue has been a mainstay of modern medicine, funded in large part with federal dollars without controversy. Dating back to the s, scientists have used tissue from aborted fetuses as a means of understanding cell biology and as an important tool in the development of vaccines. The Nobel Prize for Medicine, for example, was awarded to American immunologists who developed the polio vaccine based on cultures of human fetal kidney cells. This new developmentâ€”in which fetal tissue is not used simply as a research tool but as a source for cells and tissue for transplantationâ€”prompted the Reagan administration to declare a temporary moratorium on all federal funding for fetal tissue transplantation research. Despite the recommendation of a specially created National Institutes of Health NIH review panel to support federal funding for fetal tissue transplantation research, the moratorium remained in place until , when it was lifted by executive order of the newly elected President William J. Later that year, Congress enacted the NIH Revitalization Act, which permits federal funding of fetal tissue transplantation research, but only under certain conditions. Little more than a year later, however, Congress retreated from that position and imposed a new ban on federal funding for research in which human embryos are destroyed, discarded or knowingly subjected to serious riskâ€”a ban that effectively blocks funds for IVF research once again. That ban also quickly collided with a long sought-after scientific breakthrough in

stem cell research. In , two groups of scientists announced that they had successfully isolated and cultivated stem cells, which are widely considered to hold enormous promise in treating a range of human diseases. According to former NIH Director Harold Varmus, these breakthroughs in stem cell research could very well bring medical research to the edge of a new frontier. Armed with an opinion from the DHHS general counsel that the congressional ban applied to embryos themselves but not to the material derived from embryos, NIH has cautiously moved toward funding research involving stem cells. However, while standards have been promulgated and applications accepted, no projects have yet been funded. Medical and Political Opportunities The long history of research involving human embryos and fetal tissue shows that major scientific advancements, rather than leading to greater government involvement in this area, have often prompted the government to cut off federal research dollars. But critics argue that government "neutrality" has its shortcomings and that federal withdrawal can have grave implications, not only slowing scientific progress but also depriving privately funded research of government oversight. In the absence of government oversight, for example, there is concern that infertile persons or couples may be vulnerable to exploitation or that embryos may be used without consent or sold for profit. Funding advocates contend that government involvement creates a more open research environment, ensures that complex research is carried out in an ethically acceptable way and enables the government to respond to situations in which federal regulation is neglected or lacking. These advocates worry that history is about to repeat itself, and, indeed, it would appear that society once again may be standing on the same horizon it has in the past, this time with stem cell research. Under-standing the scientific and therapeutic promise, NIH has cleared the way for federal funding. These advocates believe that embryo and fetal tissue researchâ€”in the words of Ken Connor, president of the Family Research Councilâ€”are tantamount to "taking a human being and sacrificing it to benefit others" and that "people should not be discriminated against based on age or location in the petri dish. In his first days in office, Bush, through his spokesman, Ari Fleischer, declined to clarify what policy changes, if any, the president intends to make. Research and medical groups, advocates on both sides of the abortion issue, and afflicted individuals and their families across the country will be watching closely for his decision.

Chapter 6 : Human embryo: a biological definition | Human Reproduction | Oxford Academic

The Right to Life Australia Inc. defends the right to life of all human beings from conception until natural death. We lobby government for legal protection of the most vulnerable in society - the unborn baby, elderly, sick and those with disabilities.

First Human Embryos Edited in U. Researchers have demonstrated they can efficiently improve the DNA of human embryos. Until now, American scientists have watched with a combination of awe, envy, and some alarm as scientists elsewhere were first to explore the controversial practice. To date, three previous reports of editing human embryos were all published by scientists in China. Now Mitalipov is believed to have broken new ground both in the number of embryos experimented upon and by demonstrating that it is possible to safely and efficiently correct defective genes that cause inherited diseases. Although none of the embryos were allowed to develop for more than a few daysâ€”and there was never any intention of implanting them into a wombâ€”the experiments are a milestone on what may prove to be an inevitable journey toward the birth of the first genetically modified humans. In altering the DNA code of human embryos, the objective of scientists is to show that they can eradicate or correct genes that cause inherited disease, like the blood condition beta-thalassemia. Better technique The earlier Chinese publications, although limited in scope, found CRISPR caused editing errors and that the desired DNA changes were taken up not by all the cells of an embryo, only some. That effect, called mosaicism, lent weight to arguments that germline editing would be an unsafe way to create a person. Embryos at this stage are tiny clumps of cells invisible to the naked eye. MIT Technology Review could not determine which disease genes had been chosen for editing. They significantly reduced mosaicism. That concept is similar to one tested in mice by Tony Perry of Bath University. Perry successfully edited the mouse gene for coat color, changing the fur of the offspring from the expected brown to white. Then, in , he created human embryos through cloning, as a way of creating patient-specific stem cells. National Academy of Sciences in February that was widely seen as providing a green light for lab research on germline modification. The report also offered qualified support for the use of CRISPR for making gene-edited babies, but only if it were deployed for the elimination of serious diseases. The advisory committee drew a red line at genetic enhancementsâ€”like higher intelligence. Despite such barriers, the creation of a gene-edited person could be attempted at any moment, including by IVF clinics operating facilities in countries where there are no such legal restrictions. Steve Connor is a freelance journalist based in the U.

Chapter 7 : Humanâ€“animal hybrid - Wikipedia

A person familiar with the research says "many tens" of human IVF embryos were created for the experiment using the donated sperm of men carrying inherited disease mutations.

Stem Cell Research Recent scientific advances in human stem cell research have brought into fresh focus the dignity and status of the human embryo. These developments require that the legal, ethical, and scientific issues associated with this research be critically addressed and articulated. Our careful consideration of these issues leads to the conclusion that human stem cell research requiring the destruction of human embryos is objectionable on legal, ethical, and scientific grounds. Moreover, destruction of human embryonic life is unnecessary for medical progress, as alternative methods of obtaining human stem cells and of repairing and regenerating human tissue exist and continue to be developed. If this were not so, the medically accepted and legally required practices of informed consent and of seeking to do no harm to the patient could be ignored whenever some "greater good" seems achievable. Likewise, the international structure of human rights law-one of the great achievements of the modern world-is founded on the conviction that when the dignity of one human being is assaulted, all of us are threatened. The duty to protect human life is specifically reflected in the homicide laws of all 50 states. Whereas researchers using fetal tissue are not responsible for the death of the fetus, researchers using stem cells derived from embryos will typically be implicated in the destruction of the embryo. This is true whether or not researchers participate in the derivation of embryonic stem cells. As long as embryos are destroyed as part of the research enterprise, researchers using embryonic stem cells and those who fund them will be complicit in the death of embryos. Therefore, the opinion that human embryonic stem cell research may receive federal funding appears to violates both the language of and intention behind the existing law. Initially, this was because a federal regulation of prevented government funding of IVF experiments unless such experiments were deemed acceptable by an Ethics Advisory Board. After this regulation was rescinded by Congress in , 20 the Human Embryo Research Panel recommended to the National Institutes of Health NIH that certain kinds of harmful nontherapeutic experiments using human embryos receive federal funding. Since , those norms have been applied to unborn children at every stage of development in the womb, and since they have been applied to the human embryo outside the womb as well. Accordingly, members of the human species who cannot give informed consent for research should not be the subjects of an experiment unless they personally may benefit from it or the experiment carries no significant risk of harming them. Only by upholding such research principles do we prevent treating people as things-as mere means to obtaining knowledge or benefits for others. It may strike some as surprising that legal protection of embryonic human beings can co-exist with the U. Most of these provisions prohibit experiments on embryos outside the womb. Consequently, the human embryo must not be subject to willful destruction even if the stated motivation is to help others. Therefore, on existing legal grounds alone, research using stem cells derived from the destruction of early human embryos is proscribed. Human Embryonic Stem Cell Research Is Unethical The decision to federally fund research involving the destruction of human embryos would be profoundly disturbing even if this research could result in great scientific and medical gain. The prospect of government-sponsored experiments to manipulate and destroy human embryos should make us all lie awake at night. That some individuals would be destroyed in the name of medical science constitutes a threat to us all. Recent statements claiming that human embryonic stem cell research is too promising to be slowed or prohibited underscore the sort of utopianism and hubris that could blind us to the truth of what we are doing and the harm we could cause to ourselves and others. Human embryos are not mere biological tissues or clusters of cells; they are the tiniest of human beings. An international scientific consensus now recognizes that human embryos are biologically human beings beginning at fertilization, and acknowledges the physical continuity of human growth and development from the one-cell stage forward. Finally, the historic and well-respected Ramsey Colloquium statement on embryo research acknowledges that: The [embryo] is human; it will not articulate itself into some other kind of animal. Any being that is human is a human being. If it is objected that, at five days or fifteen days, the embryo does not look like a human being, it

must be pointed out that this is precisely what a human being looks like--and what each of us looked like--at five or fifteen days of development. The last century and a half has been marred by numerous atrocities against vulnerable human beings in the name of progress and medical benefit. In the 19th century, vulnerable human beings were bought and sold in the town square as slaves and bred as though they were animals. These unspeakably cruel and inherently wrong acts against human beings have resulted in the enactment of laws and policies which require the protection of human rights and liberties, including the right to be protected from the tyranny of the quest for scientific progress. The painful lessons of the past should have taught us that human beings must not be conscripted for research without their permission-no matter what the alleged justification-especially when that research means the forfeiture of their health or lives. We are aware that a number of Nobel scientists endorse human embryonic stem cell research on the basis that it may offer a great good to those who are suffering. Of all human beings, embryos are the most defenseless against abuse. A policy promoting the use and destruction of human embryos would repeat the failures of the past. The intentional destruction of some human beings for the alleged good of other human beings is wrong. Therefore, on ethical grounds alone, research using stem cells obtained by destroying human embryos is ethically proscribed. Human Embryonic Stem Cell Research Is Scientifically Questionable Integral to the decision to use federal funds for research on human embryonic stem cells is the distinction between stem cells and embryos. HHS has stated that federal funds may be used to support human embryonic stem cell research because stem cells are not embryos. A statement issued by the Office of the General Counsel of HHS regarding this decision asserts that "The statutory prohibition on the use of [government] funds When a scientific study is published, the first part of the article details the methods and materials used to conduct the research. Ethical and scientific evaluation of an experiment takes into account both the methods and materials used in the research process. Therefore, the source of stem cells obtained for research is both a scientifically and ethically relevant consideration. Some evidence suggests that stem cells cultured in the laboratory may have a tendency to recongregate and form an aggregate of cells capable of beginning to develop as an embryo. In , Canadian scientists reported that they successfully produced a live-born mouse from a cluster of mouse stem cells. While it is true that these stem cells had to be wrapped in placenta-like cells in order to implant in a female mouse, it seems that at least some doubt has been cast on the claim that a cluster of stem cells is not embryonic in nature. It would be irresponsible for the HHS to conduct and condone human embryonic stem cell research without first discerning the status of these cells. Their use in any research in which they could be converted into human embryos should likewise be banned. Methods of Repairing and Regenerating Human Tissue Exist Which Do Not Require the Destruction of Human Embryos While proponents of human embryonic stem cell research lobby aggressively for government funding of research requiring the destruction of human embryos, alternative methods for repairing and regenerating human tissue render such an approach unnecessary for medical progress. For instance, a promising source of more mature stem cells for the treatment of disease is hematopoietic blood cell-producing stem cells from bone marrow or even from the placenta or umbilical cord blood in live births. These cells are already widely used in cancer treatment and in research on treating leukemia and other diseases. For example, given the right environment, bone marrow cells can be used to regenerate muscle tissue, opening up a whole new avenue of potential therapies for muscular dystrophies. This is true whether the unborn child is the donor or the recipient-that is, fetal cells can be used to treat adults, or adult bone marrow cells can be used to treat a child in the womb without the usual risk of harmful immune reactions. For example, scientists have isolated an enzyme, telomerase, which may allow human tissues to grow almost indefinitely. Although this enzyme has been linked to the development of cancer, researchers have been able to use it in a controlled way to "immortalize" useful tissue without producing cancerous growths or other harmful side effects. Thus, cultures of non-embryonic stem cells may be induced to grow and develop almost indefinitely for clinical use. Researchers believed that only embryonic stem cells retained the capacity to form all kinds of tissue in the human body. Conversely, neural stem cells might be used to produce needed blood and bone marrow. However, his own claim that human embryonic stem cell research can produce treatments for diabetes and other diseases is also based solely on experimental success in mice. One approach to tissue regeneration that does not rely on stem cells at all, but on somatic cell

gene therapy, is already in use as an experimental treatment. In early trials, this type of therapy saved the legs of patients who would have otherwise undergone amputation. The above recent advances suggest that it is not even necessary to obtain stem cells by destroying human embryos in order to treat disease. A growing number of researchers believe that adult stem cells may soon be used to develop treatments for afflictions such as cancer, immune disorders, orthopedic injuries, congestive heart failure, and degenerative diseases. Such researchers are working to further research on adult, rather than embryonic, stem cells. However, even if such methods do not prove to be as valuable in treating disease as are human embryonic stem cells, use of the latter in the name of medical progress is still neither legally nor ethically justifiable for the reasons stated in this document. Conclusion We believe that an examination of the legal, ethical, and scientific issues associated with human embryonic stem cell research leads to the conclusion that the use of federal funds to support any such research that necessitates the destruction of human embryos is, and should remain, prohibited by law. Therefore, we call on Congress to 1 maintain the existing ban against harmful federally-funded human embryo research and make explicit its application to stem cell research requiring the destruction of human embryos and 2 provide federal funding for the development of alternative treatments which do not require the destruction of human embryonic life. If anything is to be gained from the cruel atrocities committed against human beings in the last century and a half, it is the lesson that the utilitarian devaluation of one group of human beings for the alleged benefit of others is a price we simply cannot afford to pay. Johannes, "Adult stem cells have advantage battling disease," Wall Street Journal, April 13, , p. Researchers grow cells that form the basis of human life," U. See also Clarke D. Forsythe, "Homicide of the Unborn Child: Massachusetts, Michigan, Minnesota, New Hampshire, North Dakota, and Pennsylvania all have laws which specifically protect vulnerable human embryos from harmful experimentation. Report and Recommendations Washington, D. Report of the Ethics Advisory Board, 44 Fed. Office of the Press Secretary. Reproductive Health Services, U. Andrews cites ten states whose laws on fetal research generally prohibit experiments on human embryos ex utero: Warwick, Nomina Anatomica, 3rd ed. Churchill Livingstone , [the 6th ed. Wiley-Liss , ; William J. Larsen, Human Embryology New York: Churchill Livingstone , ; Bruce M. Mosby , ; Keith L. Persaud, The Developing Human: Clinically Oriented Embryology, 6th ed. Williams and Wilkens , Choosing Human Futures New York: Basic Books , Wiley-Liss , op. Ward Kischer, "The big lie in human embryology: NIH , November It is named after Paul Ramsey , the distinguished ethicist. Annas and Michael A. Basic Issues in Medical Ethics, 5th ed. Free Press , Rabb, General Counsel of the U.

Chapter 8 : Embryonic Stem Cell Research: An Ethical Dilemma

This paper defines a human embryo from a biological standpoint that takes into account emerging technologies in reproductive science. The paper does not consider legal, moral, religious or social views. As the definition of a human embryo must reflect the multifactorial processes of development, an.

Health Program State laws regarding embryonic stem cells vary widely, with some restricting their use and others permitting certain activities. Research Restrictions on Aborted Fetuses and Embryos. Many states restrict research on aborted fetuses or embryos, but research is often permitted with consent of the patient. Almost half of the states also restrict the sale of fetuses or embryos. Louisiana specifically prohibits research on in vitro fertilized IVF embryos. Illinois and Michigan also prohibit research on live embryos. Several states have laws that prohibit or restrict fetal experimentation. The below examples are also included in Table 2, which summarizes various state laws relating to research, sale and experimentation. Indiana Prohibits experiments aside from pathological examinations on an aborted fetus. Also bars transporting a fetus across state lines for the purpose of experimentation. Prohibits the use of fetal organ or tissue from an abortion for any research, experiment or study. Prohibits abortion for the purpose of transplantation, experimentation, or research or study. Prohibits experimenting or conducting research on a "live human embryo, fetus, or neonate. A No person shall experiment upon or sell the product of human conception which is aborted. B Whoever violates this section is guilty of abortion trafficking, a misdemeanor of the first degree. No person shall sell a child, an unborn child or the remains of a child or an unborn child resulting from an abortion. No person shall experiment upon a child or an unborn child resulting from an abortion or which is intended to be aborted unless the experimentation is therapeutic to the child or unborn child. No person shall experiment upon the remains of a child or an unborn child resulting from an abortion. The term "experiment" does not include autopsies performed according to law. South Dakota A Prohibits research on or transplantation of an "unborn or newborn child who has been subject to an induced abortion" except when the abortion is necessary to protect the life of the woman. Restrictions on State Funds. Several states limit the use of state funds for cloning or stem cell research. Arizona law prohibits the use of public monies for reproductive or therapeutic cloning. State funding available under Illinois Executive Order 6 may not be used for reproductive cloning or for research on fetuses from induced abortions.

Chapter 9 : BBC - Ethics - Animal ethics: Human-animal hybrid embryos

The term "pre-embryo" was developed and used largely, if not exclusively, to mislead: to hide scientific facts about the beginnings and unity of human life; to bolster support for a new reproductive technology; and to obtain funding for experiments on human embryos.

What are embryonic stem cells? What stages of early embryonic development are important for generating embryonic stem cells? Embryonic stem cells , as their name suggests, are derived from embryos. Most embryonic stem cells are derived from embryos that develop from eggs that have been fertilized in vitro â€"in an in vitro fertilization clinicâ€"and then donated for research purposes with informed consent of the donors. How are embryonic stem cells grown in the laboratory? Growing cells in the laboratory is known as cell culture. The cells divide and spread over the surface of the dish. This coating layer of cells is called a feeder layer. The mouse cells in the bottom of the culture dish provide the cells a sticky surface to which they can attach. Also, the feeder cells release nutrients into the culture medium. This is a significant scientific advance because of the risk that viruses or other macromolecules in the mouse cells may be transmitted to the human cells. The process of generating an embryonic stem cell line is somewhat inefficient, so lines are not produced each time cells from the preimplantation-stage embryo are placed into a culture dish. However, if the plated cells survive, divide and multiply enough to crowd the dish, they are removed gently and plated into several fresh culture dishes. The process of re-plating or subculturing the cells is repeated many times and for many months. Each cycle of subculturing the cells is referred to as a passage. Once the cell line is established, the original cells yield millions of embryonic stem cells. Embryonic stem cells that have proliferated in cell culture for six or more months without differentiating, are pluripotent , and appear genetically normal are referred to as an embryonic stem cell line. At any stage in the process, batches of cells can be frozen and shipped to other laboratories for further culture and experimentation. What laboratory tests are used to identify embryonic stem cells? At various points during the process of generating embryonic stem cell lines, scientists test the cells to see whether they exhibit the fundamental properties that make them embryonic stem cells. This process is called characterization. However, laboratories that grow human embryonic stem cell lines use several kinds of tests, including: Growing and subculturing the stem cells for many months. This ensures that the cells are capable of long-term growth and self-renewal. Scientists inspect the cultures through a microscope to see that the cells look healthy and remain undifferentiated. Using specific techniques to determine the presence of transcription factors that are typically produced by undifferentiated cells. Transcription factors help turn genes on and off at the right time, which is an important part of the processes of cell differentiation and embryonic development. In this case, both Oct 4 and Nanog are associated with maintaining the stem cells in an undifferentiated state, capable of self-renewal. Using specific techniques to determine the presence of particular cell surface markers that are typically produced by undifferentiated cells. Examining the chromosomes under a microscope. This is a method to assess whether the chromosomes are damaged or if the number of chromosomes has changed. It does not detect genetic mutations in the cells. Determining whether the cells can be re-grown, or subcultured, after freezing, thawing, and re-plating. Testing whether the human embryonic stem cells are pluripotent by 1 allowing the cells to differentiate spontaneously in cell culture; 2 manipulating the cells so they will differentiate to form cells characteristic of the three germ layers ; or 3 injecting the cells into a mouse with a suppressed immune system to test for the formation of a benign tumor called a teratoma. Teratomas typically contain a mixture of many differentiated or partly differentiated cell typesâ€"an indication that the embryonic stem cells are capable of differentiating into multiple cell types. How are embryonic stem cells stimulated to differentiate? As long as the embryonic stem cells in culture are grown under appropriate conditions, they can remain undifferentiated unspecialized. But if cells are allowed to clump together to form embryoid bodies , they begin to differentiate spontaneously. They can form muscle cells, nerve cells, and many other cell types. Although spontaneous differentiation is a good indication that a culture of embryonic stem cells is healthy, the process is uncontrolled and therefore an inefficient strategy to produce cultures of specific cell types. So, to generate cultures of specific types of

differentiated cellsâ€”heart muscle cells, blood cells, or nerve cells, for exampleâ€”scientists try to control the differentiation of embryonic stem cells. They change the chemical composition of the culture medium, alter the surface of the culture dish, or modify the cells by inserting specific genes. Through years of experimentation, scientists have established some basic protocols or "recipes" for the directed differentiation of embryonic stem cells into some specific cell types Figure 1. For additional examples of directed differentiation of embryonic stem cells, refer to the NIH stem cell report. Directed differentiation of mouse embryonic stem cells. Click here for larger image.