Abstract
Embryonic stem cell technology could potentially allow the artificial production of transplantable organs and offer hope to people who suffer from a wide variety of degenerative diseases. The ethics of its use, however, is very complicated and touches upon moral and philosophical issues at the very basis of any society. Such issues include the status accorded to the human embryo, the ethical costs of not developing this technology, and the practical effect that a prohibition on research will have. This article is intended as an introduction to both the technical and ethical issues relevant to this debate.

Embryonic stem cell research was in the news this past August as American President George W. Bush announced his government’s new policies concerning this issue. From this time on, it was determined that no federal funding would exist for stem cell derivation from human embryos, with the exception of those cell lines which were previously established. He did not, however, ban research in stem cells outright nor did he introduce legislation to ban embryonic stem cell research that was funded from private sources.1 Reaction from around the world was swift, ranging from those who felt the regulatory burden would prove insuperable to future research, to those who thought that the restrictions did not go far enough.2

In May, Canadian Health Minister Alan Rock proposed wider-based legislation that included a ban on the creation of embryos solely for research, providing criminal sanctions of up to $500,000 and 10 years in prison. At the time of President Bush’s announcement, Mr. Rock’s legislation was before the Commons Health Committee, with a projected completion date of January 2002.2 At this time, the bill would be presented to Parliament.

To better understand the often complex controversy surrounding stem cell research, an overview of the technical issues as well as the major viewpoints should be outlined. These are the general aims of this article.

The human fetus originates from a fertilized ovum, which may be thought of as a single cell capable of producing every cell and cell type in the adult body (it is ‘totipotent’). During development, human cells progressively differentiate; thus, the number of cell types which can be derived from these latter-stage cells becomes reduced (these cells are termed ‘pluripotent’). Germ cells in the embryo give rise to mature cells in the gonads (sperm and ova) that have the potential to form an entire human in the form of future offspring. However, research is currently directed at the highly versatile embryonic stem cells (ESCs) that develop into the remainder of the organism, excluding the germ cells. The appropriately chosen ESCs have the potential to form virtually any somatic cell in the human body. If research can overcome the large remaining technical hurdles, this could theoretically allow these cells to produce, for example, transplantable organs in vitro.4

Embryonic stem cells are collected from embryos that are left over from in vitro fertilization procedures (which subsequently are destroyed) and from fetuses aborted for unrelated reasons. Tissues grown from these cells would produce the same risks of rejection that adult organs face in genetically different recipients. Nevertheless, by removing the nucleus of the ESC and replacing it with one from the recipient and subsequently stimulating these cells to divide, it would be possible to grow organs genetically identical to the intended recipient. Diseased portions of existing recipient organs could be replaced, rather than a whole organ, such as pancreatic islet cell transplants for those with type I diabetes. Additionally, such tissue derived from ESCs could be antigenically altered to be free of markers which cause rejection. This would allow for a given cell line to allow transplants to many possible patients. In such a case, immunosuppressive drugs would no longer be needed, reducing the risk of opportunistic diseases.5

Often, a distinction is made between so-called “therapeutic cloning”, which produces antigenically similar cloned cells or whole organs for transplant, and so-called “reproductive cloning”, which is meant to duplicate entire humans. Even so, whether the result is a cloned cell line or a cloned infant, both processes begin with the production of a human embryo. In the latter case, the embryo implants in a host womb. In the former, the embryo is dissolved and only the primordial stem cells are retained and grown.

This is equally true for the derivation of antigenically neutral, uncloned stem cells for therapy – the process is hardly therapeutic for the embryonic clone. In ethical terms, should it matter that the resultant tissue from stem cell lines are produced from human embryos created only for that purpose, rather than recovered from...
those that are destined by nature to die? Regardless of the argu-
ments of either sides, one point is clear: the deliberate creation of
embryos for the single purpose of obtaining stem cells cannot
claim the merit of “finding good in tragedy” of the kind that
applies in collecting stem cells from unrelated abortions or from
embryos destined to be destroyed in vitro fertilization. The
broad consensus is that a higher level of justification must be met
in this case. To meet this standard, proponents of therapeutic
cloning need to satisfactorily justify the legitimacy of initiating and
then terminating development so that another may live.5

The solutions to these dilemmas ultimately depend on the moral sta-
tus accorded to the human embryo. Resolution of this question is
no easy task and is an issue upon which different philosophical and
religious traditions take strong positions. Although all sides of the
debate attempt to justify their positions with human embryology, sci-
entific opinion is in this case neither definitive nor perhaps even re-
levant. Biology can identify a species (e.g., human), the physiological
activity of that species (i.e., alive), and define specific developmental
landmarks. However, the implications of these facts remain a mat-
ter for religious conviction and social and philosophical values.

For a topic as controversial as this one, it is perhaps unsurprising
that there are strong supporters of each end of the spectrum—from
the doctrine that gives human embryos all the moral rights and
protections of adult persons from the “moment of conception” to
those who would withhold “personhood” until well after birth.8
Nevertheless, the last decades have seen biomedical ethics and
broad-based public policy commissions working towards a position
that has become widely seen as ethically defensible: the so-called
“developmental view” of moral status.9 The developmental view
posits that each individual acquires rights and privileges as that
individual develops sentience, awareness and relationships with
others that justify protections. At every stage of development, by
virtue of this projected path and the symbolic value of embryos as
the beginning of human life, embryos deserve status as a “poten-
tial person”. What this consensus means in the context of using
ESCs for therapeutic cloning remains unresolved.

One interpretation of this idea is respect for the “cellular dignity”
as symbolic of the personal autonomy that our society already hon-
ours for adult individuals. This line of reasoning implies that, in
the same manner that disabling mutilation and slavery are arche-
typal offenses to human autonomy, the act of intentional concep-
tion and then termination of human embryos to serve the needs of
the medically ill should be regarded as a violation of this respect.
If it is wrong for a woman to purposely become pregnant only to
abort the fetus so as to harvest the cells for her own use, in a simi-
lar manner it would be symbolically disrespectful to conceive one’s
own embryonic twin in vitro to use its stem cells. Recovering
organs from the dead is one matter, but arranging a death to
obtain better matched organs is another. From this viewpoint,
organogenic cloning is more analogous to the latter.8

One must not, however, forget to address the equally important
issue of not using ESCs. Consider the following hypothetical cases:
In the first case, a boy dies in 1915 because there is no treat-
mant for type I diabetes. In the second, in present times, a boy
of the same age dies for the same reason — because the use of
insulin is legally restricted. Medically, the result is the same and
both occur because of “natural” causes. The ethical circumstances,
however, are vastly different. If any individual or society would
restrict access to life-saving therapy, responsibility must be shoul-
dered for the deaths that result. In this discussion, if religious lead-
ers and philosophers wish to restrict the use of ESCs, they must
then be willing to bear the responsibility for those that may have not
been saved.

At the present time, Canadian patients risk death waiting for trans-
plantable organs, simply because there are not enough.11 There is
no moral guilt in this situation, since physicians have no control over
this situation. However, if stem cell research can provide the ability
to address this need, then this argument cannot be ignored. The eth-
ical danger of eroding the respect of human life must be countered
with the real needs of real patients. The task is to strike the balance.
Ethical decisions cannot be limited by intention, but rather must
include all consequences, even those that seem unpleasant. By con-
sidering these other arguments, the ethical task becomes more com-
plete and satisfying, though unfortunately far more difficult.

This particular aspect becomes critical when one considers the
repercussions of that decision based upon the impact that this the-
ory will have on the “real world”, and also the ethical derivatives
of these decisions. If ESC therapy is banned, then living patients
are implicitly devalued by weighing the scale against their needs and
wishes. In doing so, a prohibition may encourage illegal activity
resulting in unregulated treatments and a corrosion of the very logic
behind the prohibition. Conversely, if a medical treatment based
upon an unethical source is accepted, the consequences may be
even more severe. If, as mentioned in the previously cited exam-
ple, physicians are permitted to produce cloned embryos to create
organs (and to be remunerated for their services), would it be
acceptable to prohibit women from conceiving and subsequently
aborting an early fetus for an identical purpose?23 Consideration of
all these implications are required for any complete response.

The ethical arguments regarding the use of ESCs are complex, but
must be dealt with as this technology is inevitably developed. For
those who argue that embryos have all the rights and protections
that adult humans have, the use of embryonic sources will always
be difficult to accept. For those who accept the current consensus
on the developmental view, difficult moral issues still exist with
regards to the respect due to human embryos, which must be
weighed against the needs of real living patients, and the ethical
effects of prohibition. While the hypothetical technological devel-
opment of non-embryonic sources of stem cells will end the
debate, the issues raised in this article are nevertheless relevant
until and if these sources become available.

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