Chapter 7

GENETIC ENGINEERING AND REPRODUCTION

The field of genetic engineering encompasses the seemingly insurmountable gap between technological progress and the inability of the ethics dictionary to respond to issues that arise in the wake of these developments in technology. The immense implications of genetic engineering on our moral thinking is so intense that according to Jurgen Habermas, it "changes the overall structure of our moral experience."[1] Habermas cites Ronald Dworkin's explanation for this change, as "the change of perspective which genetic engineering has brought about for conditions of moral judgment and actions that we had previously considered unalterable."[2] The quotation he brings from Ronald Dworkin stresses the dramatic implications that genetic engineering has for our traditional moral thinking.

> "We distinguish between what nature, including evolution, has created . . . and what we, with help of these genes do in this world. In any case, this distinction results in a line being drawn between what we are and the way we deal, on our own account, with this heritage. This decisive line between chance and choice is the background of our morality . . . We are afraid of the prospect of human beings designing other human beings, because this option implies shifting the line between chance and choice which is the basis of our value system."[3]

1 Habermas Jurgen. *The Future of Human Nature.* Polity press, Cambridge, UK, 2003, p. 28.
2 ibid.
3 ibid. This idea is also presented. In: Dworkin R. "Playing God: Genes, Clones and Luch." In: Dworkin R. *Sovereign Virtue: The Theory and Practice of Equality*, Harvard University Press, Cambridge, 2000, pp. 427–452.

The most far-reaching debates in this area have to do with human reproductive cloning and stem-cell research. The conflicts between scientific demands and political or philosophical misgivings and qualms, sometimes make the issue intractable. We try to offer guidelines for therapeutic stem-cell research while, at the same time, banning human reproductive cloning, thereby attempting to address both sides of the dilemma consistently. A related issue, also discussed in this chapter, refers to some advantageous consequences of genetic engineering and stem-cell research in curing or preventing diseases. It is clear that future scientific/technological developments may, nevertheless, obligate us to rethink our own judgments—in this, as in all other issues in this section.

Before turning to the ethical discussion about possible benefits and dangers of stem-cell research, I want to briefly survey the three areas of research where stem-cells can be used. Stem-cells are found in certain body tissues and organs from the earliest stages of development [embryonic stem-cells (ES cells)] to adulthood (adult stem-cells). What makes them unique is that they can reproduce themselves infinitely and generate more specialized cell types such as muscle, nerve, or bone cells. ES cells are responsible for generating all tissues necessary for a baby's growing body, and adult stem-cells act as a repair system, continually replenishing ageing tissues with healthy cells. This ability to create new body tissues is what makes stem-cells such an exciting prospect for medical science. They offer the possibility of generating new cells to replace diseased and damaged body tissues in illnesses such as Parkinson's, diabetes, cancer, and Alzheimer's.[4]

There are basically three types of ES cells. The first type is the zygote itself and the first eight cells created by its three cell divisions; these are called totipotent stem-cells that generate the 216 different cell types that comprise the entire human body. Thus totipotent stem-cells are capable of developing into a complete human being. The second category are those cells created during the first 5 days of the growth of the original cells; these are called pluripotent ES cells which create a cluster of around 50 cells that form the tissues of the embryo. They can create most embryonic cell types but not all the tissues required for complete development. The third category are the partially differentiated cells called differentiated multipotent stem-cells; these persist in small numbers in some adult tissues and are capable of forming a limited number of specialized cell types, thus able to replace fully differentiated cells that are lost by depletion or damage. These cells can create bone-marrow, or replace injured limbs.

Stem-cell research uses mostly the ES cells because of their relatively large numbers and because they are much easier to manipulate than adult cells. This type of research aims to use stem-cell transplants to repair damaged and diseased body parts with healthy new cells. There are three potential methods of obtaining human pluripotent ES cells. The first method is by isolating them from surplus

4 http://www.mrc.ac.uk/index/public-interest/public-topical_issues/public-stem_cells.htm