E

Appendix E - Glossary of terms[1]

Androgenesis:	the production of male parthenotes
Antigen:	substance (eg. toxin) that stimulates the production of antibodies when introduced into the body[2]
Asexual reproduction:	a reproductive process which is not dependent on the fusion of male and female gametes
Autosome:	any chromosome that is not a sex chromosome and that appears as a homologous pair in the somatic cells. Humans have 22 pairs of autosomes which are involved in transmitting all genetic traits and conditions other than those that are sex-linked
Blastomere:	one of the cells which are first formed at the time of division of the fertilised ovum and which, with further cell divisions, become the constituent cells of the morula
Blastocyst:	a ball of cells with a central, fluid-filled cavity (blastocele) surrounded by two layers of cells. The outer layer (trophoblast) later forms the placenta; the inner layer (embryoblast) later forms the embryo. Implantation of the human embryo in the wall of the uterus usually commences at this stage, on approximately the eighth day after fertilisation
Cellular cloning:	the process by which cells derived from the body ('soma') and are grown in tissue culture in a laboratory.

---

1 This Glossary is based on that used in the AHEC report with the addition of some terms developed by the Academy of Science. A few definitions of basic terms are from the Collins *Dictionary of Biology*, Hale, WG, and Margham, JP, Glasgow, 1988

2 *Human Stem Cell Research,* 18 April 2001, Australian Academy of Science, Glossary p.27

	The genetic make up of the resulting cloned cells (the 'cell line') is identical to that of the original cell
Chimaera:	an organism with cells from two or more different zygotes
Chromosomes:	any one of the threadlike structures in the nucleus of a cell that function in the transmission of genetic information. A normal human somatic cell contains 46 chromosomes; a normal human gamete cell contains 23 chromosomes
Cloning:	asexual propagation without altering the nuclear genome
Cumulus cells:	cells which surround the developing egg in the ovary and remain attached to it after its release. They represent the female homologue of Sertoli cells
Cytoplasm:	the contents of a cell other than the nucleus. Cytoplasm consists of a fluid containing numerous structures eg mitochondria that carry out essential cell functions
Dedifferentiation:	a new concept in mammalian embryology describing the process whereby a fully differentiated cell regains totipotency
Deoxyribonucleic acid:	(DNA) a large nucleic acid molecule, found principally in the chromosomes of the nucleus of a cell, that is the carrier of genetic information
Differentiation:	an increase in complexity and organisation of cells and tissues during development[3]
Differentiated cell line:	a line of cells that is committed to producing one type of cell, eg, skin cells
Diploid:	a cell such as a somatic cell having two chromosome sets, as opposed to the haploid situation of eggs and sperm which have only one chromosome set
DNA:	deoxyribonucleic acid, found primarily in the nucleus of cells (some DNA is also found in the mitochondrion). DNA carries the instructions for making all the structures and materials that the body needs to function

3 *Human Stem Cell Research,* 18 April 2001, Australian Academy of Science, Glossary p.27

Egg:	the mature female germ cell; also called the 'ovum' or 'oocyte'
Ectoderm:	that one of the three primary germ layers of the embryo which forms its outer covering
Embryo:	the developing organism from the time of fertilisation until significant cellular differentiation has occurred, when the organism becomes known as a 'fetus'
Embryoid body:	a term used to describe a structure with characteristics resembling embryos
Embryonic stem cell:	an undifferentiated cell which is a precursor to a number of differentiated cell types
Embryonic stem (ES) cell line:	cultured cells obtained by isolation of inner cell mass cells from blastocysts or by isolation of primordial germ cells from a fetus. ES cells will not give rise to an embryo if placed in the uterus[4]
Endoderm:	one of the primary germ layers of the embryo which lies deep to the ectoderm. It forms the lining of the primitive gut cavity
Endometrium:	the mucous membrane lining of the uterus
Enucleated egg:	an egg from which the nucleus has been removed
Fertilisation:	the process whereby male and female gametes unite, beginning when a sperm contacts the outside of the egg and ending with the formation of the zygote
Fetus (foetus):	the term used for a human embryo after the eighth week of development until birth
Gamete:	a mature male or female germ cell; a sperm or ovum
Gene:	a working length of a chromosome composed of DNA. Each of the body's one hundred thousand genes carries the instructions that allow the cell to make one specific product such as a protein
Genome:	the complete genetic make up of a cell or organism
Genotype:	the genetic make up of an individual

4 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.27

Germ cell:	a sexual reproductive cell. All other body cells are known as 'somatic' cells
Gynogenesis:	the production of female parthenotes
Haematopoiesis or haemopoiesis:	the process leading to red blood cell production[5]
Haploid:	the single chromosome set carried by the sperm and egg cells which are recombined after fertilisation to create the diploid chromosome set present in every cell of the body except sperm and eggs
Hermaphrodite:	animals which contain both ovarian and testicular tissue so that each gonad may be an ovary or a testis or, more commonly, an ovotestis
Histocompatibility:	the acceptance by a recipient of tissue transplanted from a donor, a state that is determined by histocompatibility antigens[6]
Human reproductive cloning:	the creation of human beings genetically identical to one another or to any other human being
In vitro:	in glass; referring to a process or reaction carried out in a test-tube or culture dish[7]
In vitro fertilisation	(IVF): a technology by which eggs and sperm are collected and put together to achieve fertilisation outside the body
In vivo:	(of biological processes or experiments) occurring in the living organism[8]
Meiosis:	the division of a sex cell, as it matures, into two and then four gametes with halving of the chromosome complement
Mesenchyme:	loose, cellular animal tissue that arises from the embryonic mesoderm, and functions as packing around internal organs[9]

5 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988
6 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988
7 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.28
8 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988
9 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988

Mesoderm:	one of the primary germ layers of the embryo which lies between ectoderm and endoderm
Mitochondria:	cellular organelles that provide energy to the cell. The mitochondrion contains a small number of genes
Monozygotic:	formed from a single fertilised egg
Morula:	a solid, spheric mass of cells resulting from the cleavage of the fertilised ovum in the early stages of embryonic development. It represents an intermediate stage between the zygote and the blastocyst and consists of blastomeres that are uniform in size, shape and developmental capabilities
Multipotent stem cells:	are differentiated cells (that is, their possible lineages are less plastic / more determined) and thus can give rise to a limited number of multiple tissue types[10]
Mutation:	a change in the genetic material of an organism[11]
Neuron:	the basic nerve cell of the nervous system
Nuclear replacement:	a technique which involves fusing the nucleus from a diploid cell or another egg, with an egg from which the nucleus has been removed. The DNA of the transplanted nucleus thus directs the development of the resulting embryo, or egg
Nucleus (*pl* nuclei):	the cell structure that houses the chromosomes, and thus the genes
Oocyte:	the mature female germ cell; the egg
Parthenote:	an individual who has been derived exclusively from a single germ cell, female or male
Phenotype:	the complete observable characteristics of an organism or group, including anatomic, physiologic and biochemical features, as determined by the interaction of both genetic makeup and environmental factors
Placental mammal:	this includes all mammals other than the marsupials and monotremes
Pluripotent:	describes a cell or group of cells that can produce many types of tissues

10 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.28

11 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988

Polar body:	one of the small cells produced during the two meiotic divisions in the maturation process of female eggs, or ova. It contains a haploid set of chromosomes identical with that of the oocyte produced by the same cell division
Primitive streak:	a line of cells in the centre of the embryonic disc of reptiles, birds and mammals that forms the future axis of the embryo[12]
Primordial germ cells:	precursor reproductive cells in an embryo or fetus[13]
Pronucleus:	the nucleus of the ovum or the sperm after fertilisation but before the fusion of the chromosomes has occurred to form the nucleus of the zygote
Reproductive cloning:	to produce a human fetus by nuclear replacement[14]
RNA:	ribonucleic acid
Sertoli cells:	elongated cells within the testicular tubules to which the spermatids become attached and from which they derive nourishment. They are the male homologue of the cumulus cells that nourish ova
Somatic cells:	any cell of an embryo, fetus, child or adult not destined to become a sperm or egg cell
Stem cell:	an undifferentiated cell which is a precursor to a number of differentiated (specialised) cell types. Stem cells may be totipotent, pluripotent, or committed to a particular cell lineage (eg. neural stem cell)[15]
Syngamy:	the fusion of gametes[16]
Therapeutic cloning:	medical and scientific applications of cloning technology which do not result in the production of genetically identical fetuses or babies[17]
Teratoma:	a tumour composed of different kinds of tissue, none of which normally occur together or at the site of the

12 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988

13 *On Human Cloning*, Australian Academy of Science, 4 February 1999, Glossary p.30

14 *On Human Cloning*, Australian Academy of Science, 4 February 1999, p.8

15 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.28

16 Hale, WG, and Margham, JP, *Dictionary of Biology*, Collins, Glasgow, 1988; see Chapter 2, footnote 7, of this report for further definitions

17 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.28

	tumour. Teratomas are most common in the ovaries or testes
Tetraploid blastocyst:	a blastocyst where each cell has four sets of chromosomes. Such blastocysts are not viable
Totipotent:	describes a cell or structure that can produce all cell types including placentas
Transdifferentiation:	(full or partial reversal of differentiation) is the process of taking an adult cell of one tissue type and, through a cellular process yet to be understood, reprogramming it to form a different type of tissue for transplantation[18]
Transgenic:	containing a gene or genes introduced from another individual
Trophoblast:	the layer of tissue that forms the wall of the blastocyst in the early stages of embryonic development. It functions in implanting the blastocyst in the uterine wall and in supplying nutrients to the embryo
Xenotransplantation:	a transplant from one species to another[19]
Zygote:	the single-celled fertilised egg[20]

18 See paragraphs 2.27 and 3.66 of this report

19 *Human Stem Cell Research*, 18 April 2001, Australian Academy of Science, Glossary p.28

20 See footnote 7, Chapter 2