

# Embryonic Stem Cells

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**Abstract**—*Embryonic Stem Cells (ES cells) are pluripotent stem cells derived from the inner cell mass of a blastocyst, an early-stage preimplantation embryo. Human embryos reach the blastocyst stage 4–5 days post fertilization, at which time they consist of 50–150 cells. Isolating the embryoblast or inner cell mass (ICM) results in destruction of the blastocyst, which raises ethical issues, including whether or not embryos at the pre-implantation stage should be considered to have the same moral or legal status as more developed human beings. Human ES cells measure approximately 14  $\mu\text{m}$  while mouse ES cells are closer to 8  $\mu\text{m}$ . Embryonic stem cells, derived from the blastocyst stage early mammalian embryos, are distinguished by their ability to differentiate into any cell type and by their ability to propagate. Embryonic stem cell's properties include having a normal karyotype, maintaining high telomerase activity, and exhibiting remarkable long-term proliferative potential. The major concern with the possible transplantation of ESC into patients as therapies is their ability to form tumors including teratoma. Safety issues prompted the FDA to place a hold on the first ESC clinical trial (see below), however no tumors were observed. Embryonic stem cells of the inner cell mass are pluripotent, that is, they are able to differentiate to generate primitive ectoderm, which ultimately differentiates during gastrulation into all derivatives of the three primary germ layers: ectoderm, endoderm, and mesoderm.*

**Keywords:** *Embryonic Stem Cells, Blastocyst, Mammalian Embryos, Teratoma. Pluripotent, karyotype.*