Clarifying the stem cell debate

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Genomics and Medicine

Stem cell basics

- Stem cells
  - Capable of dividing and renewing themselves for long periods without differentiating
  - Not fully specialized
  - Can give rise to specialized cells
- Sources
  - Embryonic stem cells
  - Adult stem cells
  - Umbilical cord
  - Amniotic fluid

Potential Uses

- Knowledge of development from single cell to multi-cell
- Knowledge of tissue repair
- Therapeutic implications - most debated
- Important to recognize that these technologies are very far off in the future; least known about, most debated

Stem cell derivation

- IVF - must be removed at the blastocyst stage

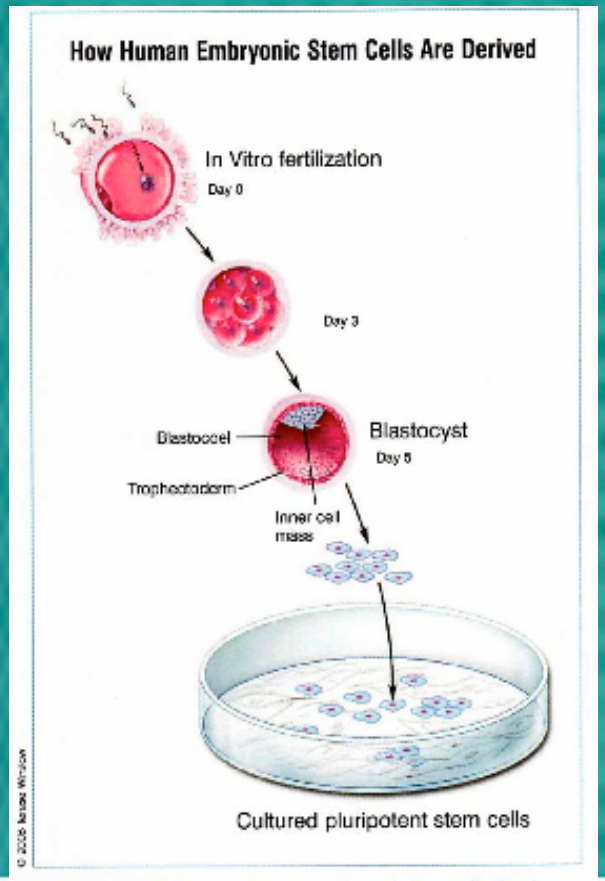
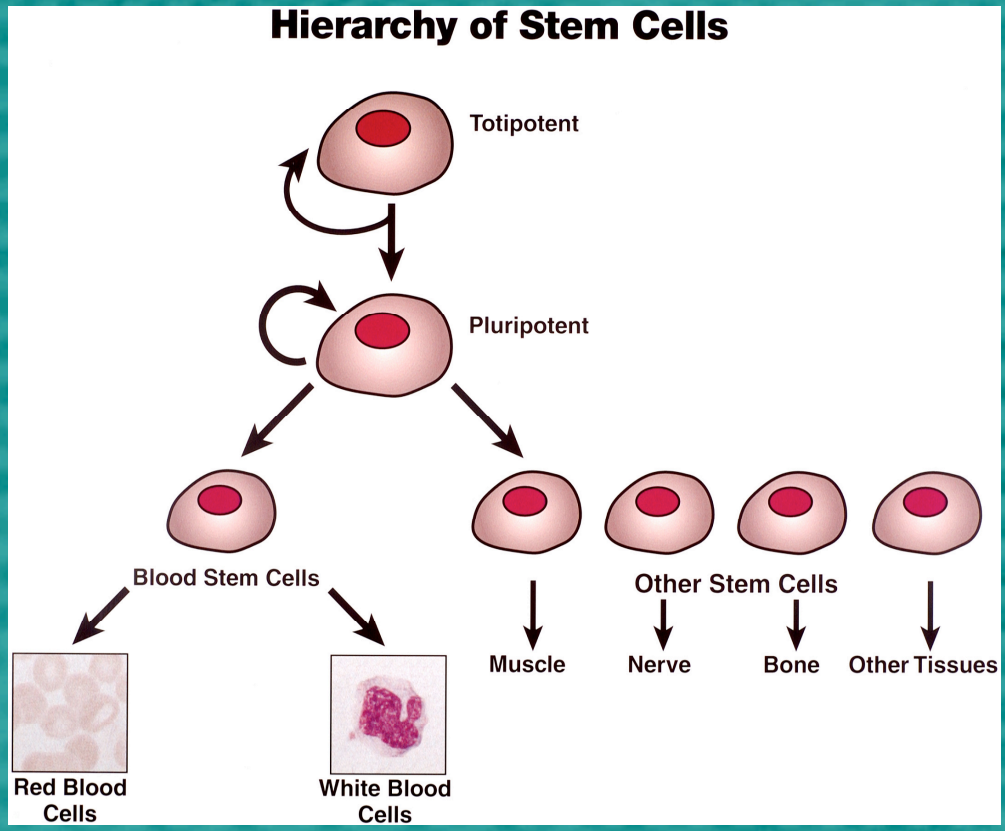


Figure 1.1. How Human Embryonic Stem Cells are Derived



Legislative History

- 1994: Congress blocks federal funding of embryo research
- 1998: First isolation of human ES (using private funding)
- 2001: President Bush makes federal funding available for human ES cell research (only for currently existing lines - limited, defective)
- 2004: NJ includes stem cell research funds in budget
- 2004: Proposition 71 approved in CA
- 2005-2007: Legislation considered in other states (DE, MA, IN, MD)
- April 11, 2007: Senate passed bill to expand federal funding for ES cell research (Bush promises to veto)
- June/July 2007: Prop 71 funds

Issues

- Adult vs. embryonic
- Status of embryos - definitions of life (conception, survival, religious)
- Cloning fears
- Family
- Media battle
- IVF
- Regulation

- Care vs. Cure; ends vs. means; protecting vs. improving life - which is more important?
- Irony - If we never research, we will never find out

Therapeutic vs. Reproduc

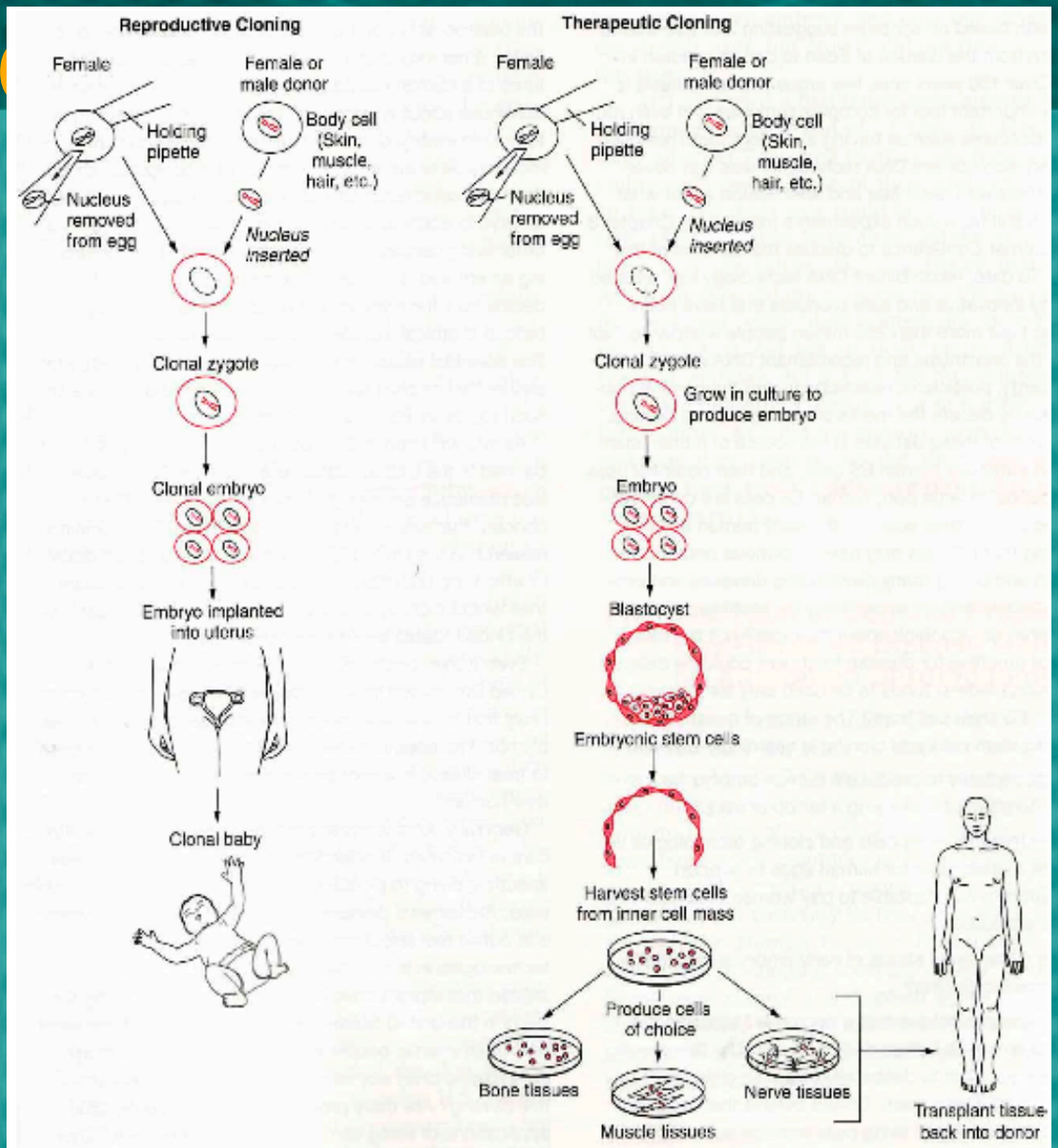


Figure 11.20 Reproductive Cloning and Therapeutic Cloning In reproductive cloning, the goal is to produce a cloned baby. In therapeutic cloning stem cells that are genetically identical to the cells taken from a patient are produced to provide patient-specific stem cell therapy.

What next?

- Research in US, limited because of funding
- Headlines: Italian Doctor Uses Stem Cells to Construct Vagina(05/30/2007, Reuters Health)
  - Cord Blood Stem Cells Produce Insulin(05/25/2007, Reuters Health)
  - Human Bone Marrow Used to Create Early Stage Sperm Cells(04/13/2007, HealthDay)
- Lung, muscle, neural tissue
- Internationally - UK, Italy, Australia, Canada, China, Israel,
- Tremendous potential - cancer, heart disease, diabetes, Parkinson's, Alzheimer's and many others
- We only have what we're born with. Stem cells can change that.

Works Cited

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