Human Embryonic Stem Cells

Introduction

- Components of organs
  - Parenchyma: functional cells
  - Stroma: connective tissue
- Regeneration vs. repair
  - Regeneration: replacement from parenchyma
  - Repair: filling in the gap by fibrous scar tissue

Regeneration

- Labile tissues
  - High rate of cell loss, therefore constant turnover by mitosis
  - Red bone marrow, lymphoid tissues, some epithelial tissues
  - Means simply increasing the normally high mitotic rate
  - Many precursor cells (stem cells) present in tissues

Regeneration (cont.)

- Stable tissues
  - Cells function throughout life, high mitosis rate not normally required
  - But these tissues can increase their mitotic rate if the need arises
  - Examples: some glands, liver

Regeneration (cont.)

- Permanent tissues
  - Lose mitotic activity shortly after birth (come from differentiation of stem cells)
  - Example: nervous, cardiac, skeletal
  - When cells destroyed, lost tissues replaced by scarring

Human embryonic stem cells

- Pluripotent cells: not yet differentiated into mature cells
- Still mitotic and undifferentiated
- Advantages of using stem cells:
  - Can be programmed along one developmental pathway
  - Not likely to be rejected immunologically (fewer surface markers)
  - May perhaps grow into new nerve or muscle cells

The Utilitarian Medical Case

- Chronic diseases that might be helped:
  - Diabetes mellitus
  - Spinal cord injury
    - Replace neurons
    - Replace glial cells
  - Parkinson's disease
  - Heart disease (heart muscle does not regenerate)
- Frozen embryos available (will be discarded anyway)

Ethical Issues

- Sanctity of Life
  - If frozen embryos are persons, then using them = abortion
  - Not life or death decision (most diseases that are candidates for procedure not immediately life-threatening)
- Moral Conflict:
  - Beneficence to the sick (relieving suffering)
  - Non-maleficence (destroying embryonic human life)
  - Justifying the taking of human life for a “greater good” is a high moral burden
  - No moral basis beyond simple utilitarianism.

Moral Accountability

- Since the embryos are going to be “thrown away” anyway, might as well “do some good.”
  - Denies inherent dignity
  - If a person consents to the destruction of human embryos to meet a medical need of his own (or for someone he loves), he is morally accountable for that act, even if he personally does not perform the action himself

Moral Accountability Analysis

- If *not* human persons: not much debate
  - Moral accountability is shared with lab tech who flushes them down the drain
  - Moral culpability:
    - "Disrespect for valuable property,"
    - "Negligent disregard for biological tissue," etc.

Moral Accountability Analysis (cont.)

- If embryos *ARE* human persons: serious moral dilemma
- Moral accountability
  - Shared with the lab tech or doctor
  - Involves the taking of innocent human life, which would
  - In a legal sense = a capital crime
- Remaining question:
  - Grant personhood for sake of argument
  - What if they are going to be destroyed anyway?

Summary of Moral Issues in Stem Cell Research

- Sanctity of life
  - Destroying embryos is destroying a person
  - No “greater good” can justify this (strictly utilitarian)
- Moral complicity
  - BOTH person who destroys the embryo,
  - AND those who receive treatment from it
  - are morally culpable for taking a life
- Moral facilitation
  - Producing a market for a product by using it
  - Comparable to buying Nike sneakers
  - Admittedly indirect moral complicity