What ends will or should the new technology serve?
What values should guide society’s adjustments?
By what standards should the assessment agencies assess?
What do we mean by the betterment of humanity?
What is a good person?
What is a good life?
What is a good community?

“...we may be rapidly acquiring the power to modify and control the capacities and activities of men by direct intervention and manipulation of their bodies and minds.”

Biomedical technology may make it possible to change the inherent capacity for choice itself...humans can for the first time recreate themselves.”

What is Death?

“The absence of life”
“The permanent end of all life functions in an organism or part of an organism”
“Cessation of all vital functions without the capability of resuscitation”
“The irreversible loss of all brain function”

“Biomedical technology may make it possible to control death, control of life, control of human (genetic) potential, and control of human achievement.”

Karen Ann Quinlan
1975; mixed alcohol & tranquilizers; passed out; aspirated vomit
“persistent vegetative state”
Parents fought to remove life support
After removing support, she lived another 10 years

Terry Schindler-Schiavo
1990; K deficiency; coma
Woke a few weeks late in a “locked state”
Receives food and water via gastric feeding tube
In 1998 Terri’s husband asked to have the food tube removed; parents fought; still pending

Euthanasia
Fundamentalists
Catholics
Moderate Protestants
Liberal Protestants

Percent Affirmative Responses (%)

Strong
Moderate
Minimal

Euthanasia

Infant Mortality
Worldwide Infant Mortality Rates (per 1000)

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>3.44</td>
</tr>
<tr>
<td>Iceland</td>
<td>3.53</td>
</tr>
<tr>
<td>Singapore</td>
<td>3.60</td>
</tr>
<tr>
<td>Finland</td>
<td>3.76</td>
</tr>
<tr>
<td>Japan</td>
<td>3.84</td>
</tr>
<tr>
<td>Angola</td>
<td>191.66</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>144.76</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>144.38</td>
</tr>
<tr>
<td>Mozambique</td>
<td>138.55</td>
</tr>
<tr>
<td>Liberia</td>
<td>130.21</td>
</tr>
</tbody>
</table>

US Infant Mortality by ‘Race’

<table>
<thead>
<tr>
<th>Year</th>
<th>WHITE</th>
<th></th>
<th>BLACK</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>2001</td>
<td>6.2</td>
<td>5.1</td>
<td>15.5</td>
<td>12.5</td>
</tr>
<tr>
<td>1995</td>
<td>7.0</td>
<td>5.6</td>
<td>16.3</td>
<td>13.9</td>
</tr>
<tr>
<td>1990</td>
<td>8.5</td>
<td>6.6</td>
<td>19.6</td>
<td>16.2</td>
</tr>
<tr>
<td>1985</td>
<td>10.4</td>
<td>7.9</td>
<td>20.8</td>
<td>17.2</td>
</tr>
<tr>
<td>1980</td>
<td>12.1</td>
<td>9.5</td>
<td>24.2</td>
<td>20.2</td>
</tr>
</tbody>
</table>

* US infant mortality rate is 6.80/1000; 41st in the world
** UK infant mortality rate is 5.45/1000; 25th in the world
Which organs?
- Kidney
- Heart
- Liver
- Lung
- Pancreas
- Intestine
- Cornea
- Skin
- Bone
- Bone Marrow

Survival Rates --
- 98% kidney
- 95% liver
- 85% heart
- 79% pancreas
- 70% small intestine
- 70% multi-organ
- 65% lungs
- 65% heart/lungs

Patients on wait list at end of year
Number of transplants

UK Organ Donors
[as of Dec 31, 2002]
Registrants (millions)
- < 0.30
- 0.30 - <0.60
- 0.60 - <0.70
- 0.70 - <0.80
- 0.80 - <0.90
- 0.90 - <1.0
- ≥ 1.0

Who Gets the Transplants ??
- Young, white, boys
- Wealthy individuals
- Shortage of available organs = lucrative black market trade
- Cycle of transplant access = rich to poor; black to brown to white; female to male
Organ Transplants

Suggested Solutions
- Education programs to elicit more donors
- Futures market -- financial incentive donor’s kin
- Use organs from executed prisoners
- Regulated transplant centers
- Non-human sources
- Mandatory donation

Fetal Tissues

- Undifferentiated cells that can be easily manipulated
- Cannot become a fetus

Undifferentiated cells:
- In Vitro Fertilized Egg
- Blastocyst Stage
- Inner Stem Cell Mass
- Undifferentiated Cells
- Specialized Cells
- Neural cells
- Blood cells
- Muscle cells

Fetal Tissues

- Treatable Disorders
  - Understand human growth and development
  - Pharmacology
  - Restore any cell type

Fetal Tissues

- Spinal cord injuries
- Parkinson’s
- Alzheimer’s

Infectious Disease

Infectious Disease Rates, US

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>3.83</td>
<td>0.51</td>
<td>0.21</td>
<td>&gt;0.005</td>
<td>&gt;0.005</td>
<td>&gt;0.005</td>
</tr>
<tr>
<td>Mumps</td>
<td>-</td>
<td>-</td>
<td>55.55</td>
<td>3.86</td>
<td>2.17</td>
<td>0.13</td>
</tr>
<tr>
<td>Measles</td>
<td>211.01</td>
<td>245.42</td>
<td>23.23</td>
<td>5.96</td>
<td>11.17</td>
<td>0.03</td>
</tr>
<tr>
<td>TB</td>
<td>-</td>
<td>30.83</td>
<td>18.28</td>
<td>12.25</td>
<td>10.33</td>
<td>6.01</td>
</tr>
<tr>
<td>Syphilis</td>
<td>146.02</td>
<td>68.78</td>
<td>45.26</td>
<td>30.51</td>
<td>54.52</td>
<td>11.23</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>192.50</td>
<td>145.40</td>
<td>297.22</td>
<td>445.10</td>
<td>277.45</td>
<td>129.04</td>
</tr>
</tbody>
</table>

CDC Control & Prevention, (2001). Summary of notable diseases, Morbidity and Mortality Weekly, 50(53)

Infectious Disease Rates

- same trends to not appear in all segments of US society
- same trends to not appear worldwide
- increased virulence of once ‘conquered’ diseases
- emerging pathogens
Degeneration

<table>
<thead>
<tr>
<th>Worldwide Life Expectancy Rates (in yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andorra: 83.49</td>
</tr>
<tr>
<td>Macau: 81.87</td>
</tr>
<tr>
<td>San Marino: 81.43</td>
</tr>
<tr>
<td>Japan: 80.93</td>
</tr>
<tr>
<td>Singapore: 80.42</td>
</tr>
</tbody>
</table>

* US life expectancy = 78.16 years  
** UK life expectancy = 77.14 years

Control of Life

“Test-Tube Babies”

- In vitro fertilization
- 1978; Edwards & Steptoe
- Baby Louise Brown
- Common practice today especially for older women
- Not sanctioned by the Catholic church

Human Potential

- 6% of consultations with doctors are related to genetic disorders
- 26% of all institutional beds are occupied by patients with genetic disorders
- 8.5% of all infant deaths are the result of a single gene defect
- Over 600 single gene defects are known, another 800 suspected
- On average, we all carry 6-8 defective genes
Negative Eugenics -- identify & eliminate unwanted genetic traits

- Ultrasound
- Chorionic villi testing
- Amniocentesis
- Genetic counseling
- Sterilization

Ultrasound

- uses sound waves
- detects visible defects

Amniocentesis

- Combined with ultrasound
- fetal waste products

Chorionic Villi Testing

- Microscopic projections lining the outermost layer of the embryonic sac
- same genetic material as fetus
- sampled at 10-12 weeks gestation
- fast turnaround time

Genetic Counseling

Sterilization

Carrie Buck case
Human Potential

Positive Eugenics

Neurological, psychological and physiological manipulation
- Mood altering & enhancing medications
- Cosmetic endochronology

Cryobanks

Valium
- most widely prescribed drug worldwide in the 60s & 70s
- marketed to our desire for a ‘good life’
- prescribed for anxiety, depression, insomnia, and anxiety
- caused depression, anxiety, and insomnia

Growth Hormones

Growth Hormone
- given to normal but small kids
- add 6” height, 50% muscle mass
- recombinant DNA technology

 Diazepam (Valium)

- diazepam
- addictive potential high - 2 wks
- birth defects - ‘floppy child’ syndrome
- ‘for relief of psychic tension and its somatic symptoms’
- females outnumber users 2.5 to 1
Rational or Rationed Medicine?

- Control of infertility, increase in life expectancy, reduction in infant mortality, reduced infectious disease = diminished limits on population growth
- Should everyone have access to care, regardless of ailment?

Biomedical Ethics

- Derek Roberts
- Peter Singer

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