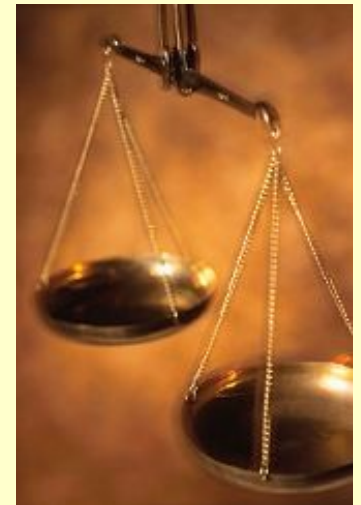


**Scientific, Political, Legal and
Ethical Issues
around
Embryonic Stem Cells,
Cloning
&
IVF**

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- How useful?
- How Safe?
- How ethical in derivation?
 - e.g. sourcing eggs
 - Destroying embryos
- How ethical in use?
 - Health of clones
 - Psychology

Bioethics

- Should scientists do everything they can do?
- Who decides – scientists, politicians, society as a whole?
- Historical abuses of human rights in biomedical research.
- Euthanasia
- BioEdge e-newsletter

Potential of Embryonic Stem Cells

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- Merely theoretical potential or real therapeutic potential / practical obstacles
- Hazards? (HGH / CJD precedent)
- Tumour risk (e.g. fetal neural stem cells transplanted in child's brain caused tumours – N.Amariglio et al. (2009). PLOS Medicine 6, 221-231.
- Exploitation of patient lobby groups?
- When does an individual human life begin?

Cloning Organisms

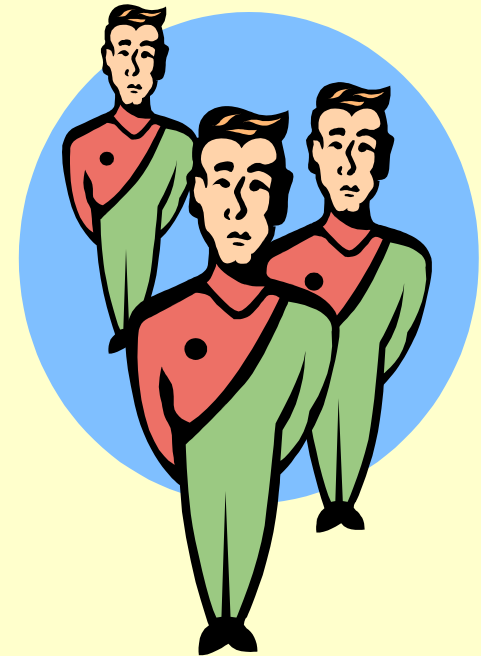
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- Reproductive cloning
- “Therapeutic” cloning (SCNT)
- Safety?
- Cruelty?
- Integrity of Species?

Reproductive Cloning

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- Success Rate very low
- Premature ageing
Short telomeres
- Psychology
- Kazuo Ishiguro
“Never let me go”



Therapeutic Cloning

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- Not therapeutic?
- Not cloning?
- Mitochondrial DNA
- Spare parts
- Is your clone an individual?
- Safety?

IVF-Source for Stem Cells & Therapeutic Cloning

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- IVF - Spare / supernumerary embryos
- Freezing, storage
or destruction, stem cell research, adoption
- Acceptable experimentation with balls of cells

or

Destruction of human individuals on a large scale

- Potential for exploitation of female egg donors

Persons & Individuals - 1

“Personhood” may not be a useful term in discussing status of embryos. Term long predates current scientific knowledge

Persons & Individuals - 2

- Role of Science – what is an individual human?
- Role of Philosophy, Religion, Ethics
 - What is the value of an individual human?

Persons & Individuals - 3

- At fertilisation, a new unique human individual comes into existence. Destroying an embryo destroys the life of that individual. Does this matter?

Size and Appearance

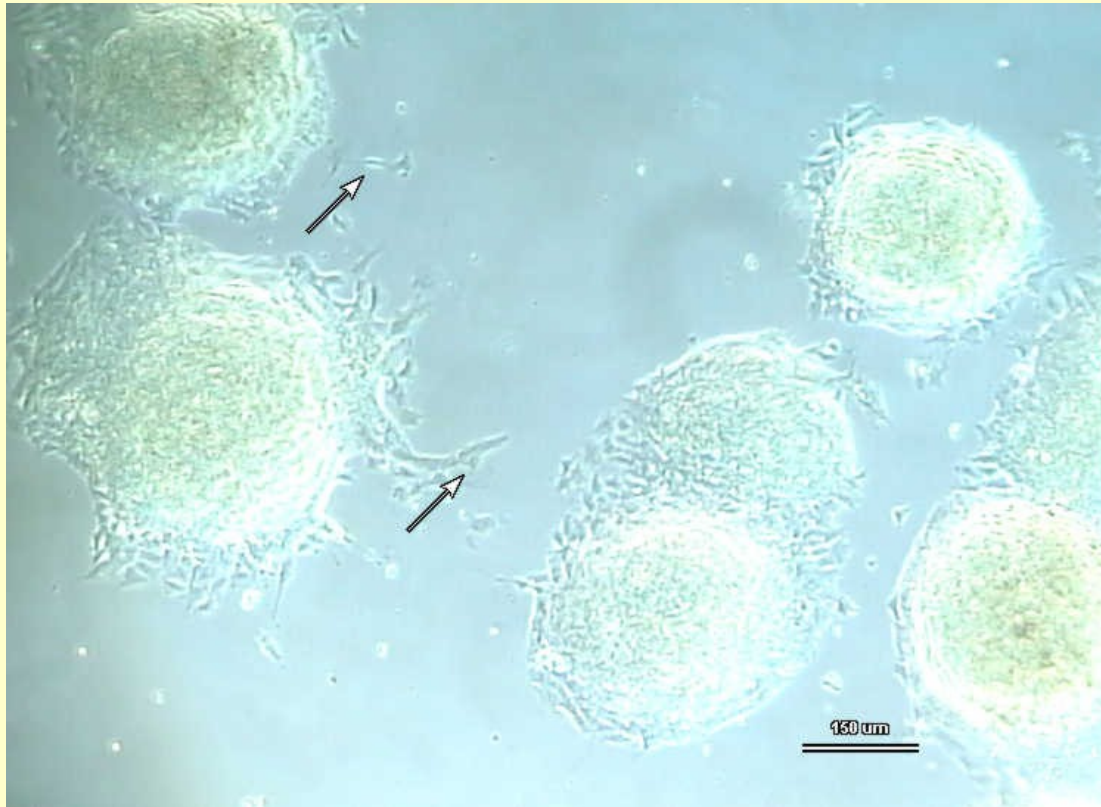
An early embryo doesn't look like a human person; it's just a small ball of cells.

Why should individual human rights depend on size and appearance – and who decides the exact parameters?

Early embryos look exactly as a human being should look at the early embryo stage!

Embryoid Bodies

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Mouse Embryonic Stem Cells grown as Embryoid Bodies

Location

Embryos can't develop properly until they implant in the mother's womb.

Implantation should be the point at which rights are conferred

Why should location be a basis for an individual's human rights?

Twins

A single embryo can cleave into identical twins up to about 14 days. Therefore, before that time an 'individual' can't exist.

If you destroy an early embryo which was going to divide into twins, you have destroyed two individual human lives.

Human Chimeras - I

- Cells with different DNA profiles in same individual
- Forensic implications
- Transplant patients, twins, triplets
- Child to mother & vice-versa
- Early embryo fusion: “Vanishing twin”

Human Chimeras - 2

- Rubocki, RJ et al. (2001). J. forensic Sci. 46, 120 – DNA mixtures in fraternal twins
- Milde, A., et al. (1999). Int. J. Legal Med. 112, 333.
- Karen Keegan (Transplant)
- Yu, N., et al. (2002), NEJM 346, 1545.
- Lydia Fairchild (2+1)
www.mymultiplesclerosis.co.uk/misc/chimera.html
- Review: Yunis et al (2007), Immunol. Res. 38, 213-236.

Human Chimeras - 3

- If early embryos can fuse to form chimeras they can't have been individuals prior to fusion.
- Transplant patients
- Maternal cells in children & vice versa
- “There are more things in Heaven and Earth than are dreamt of in your philosophy” (Hamlet)

Natural Death of Early Embryos

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A huge proportion of embryos die pre-implantation or early in embryonic life. If nature is so careless, why should we worry about destroying a few IVF embryos?

A lot of adults die prematurely too. This doesn't lessen their value or rights as individuals.

Hyatididiform Moles

Some embryos don't develop properly and instead form tumours e.g. hyatididiform moles.

Therefore all embryos aren't persons.

Until there is a diagnostic test to tell which embryos will do this, this point is irrelevant, as the vast majority of embryos don't do this.

When Does human Life Begin?

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Discussion on history and current debates, somewhat biased in favour of embryo research but presents all sides.

www.devbio.com

(unit 2.1)

Books presenting case against destructive embryo research

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- R.P. George & C. Tollefsen
Embryo-A Defense of Human Life
(Doubleday 2009)
- Dr. A. Jones “The Soul of the Embryo” Continuum (2004)

The Morning-After Pill in Danger?

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If we recognise rights of early embryo, do we have to ban the morning-after pill.

Firstly, impractical

Secondly, multiple mechanisms of action of many types of morning-after pill (impossible to determine mechanisms in individual cases)

Is this the Abortion Debate in Another Guise?

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No. Some issues in common but fundamental difference.

In IVF, no conflicting rights of mother. IVF embryo totally under the control of scientists and clinicians.

Supernumerary Embryos

Unused IVF embryos will be disposed of anyway.

Why not use them?

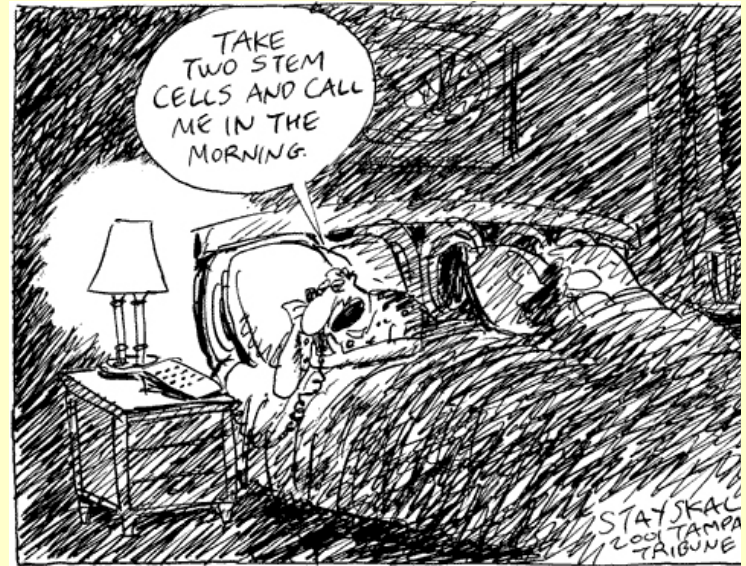
No need to have left-over viable embryos. Can achieve this, without subjecting mothers to multiple super-ovulation treatment by –

- Consent to adoption
- Egg Freezing

Potential Therapies

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- In theory a small vial of ES cells could be turned in enough tissues to treat 1,000s of patients supplying immune cells, neurons, or liver tissue, etc.
- Coupled with other aspects of tissue engineering, this could provide surgeons with an unlimited supply of tissue for transplantation and hence avoid current shortages.



Are human embryonic stem cells needed to cure disease?

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- Currently no effective treatments and no clinical trials using human embryonic stem cells (one trial due to start in 2009)
- iPS cells may be equally useful, with individualisation and without ethical issues
- Many promising clinical trials using adult human stem cells
- ES Cells – Genetic instability, chromosome aberrations, tumour formation

Individual's Rights vs Ideology

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- Nazi Germany
- Stalinist Russia
- Cambodia
- Rwanda
- Yugoslavia
- Northern Ireland
- U.S. – vaccination of prisoners

Does it matter if human IVF
embryos are destroyed?

Historical Record: sub-groups of humans don't merit individual rights

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- Religion
- Race
- Colour
- Gender
- Caste
- Sexual Orientation

Medical Research in Nazi Germany

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Leo Alexander

“Medical Practise under a dictatorship”. New Engl. J. Med. (1949), July 14, 241, 39-47.

www.physiciansforlife.org/content/view/1333/33/

Could today's mistake be
discrimination on the basis
of developmental stage?

Many other issues

- Human/animal chimeras. (human nuclei in animal oocytes – don't survive beyond 16 cells, lack of pluripotency – associated gene expression – Y.Chung, et. al., (2009) – Cloning Stem Cells, Feb. 2).
- Respect for living things.
- Loss of biodiversity.
- Value of the individual.

Irish Reports

CAHR

(not minority report Dr. Gerry Whyte)

Irish Council for Bioethics

Where there are no definite answers, err on the side of respect for the individual and respect for living things?

“I do want to avoid the use of embryos if possible. Ultimately I think that patients’ lives are more important than embryos, but I do appreciate that embryos can become beautiful babies as well”

Shinya Yamanaka (New Scientist: Dec. 15, 2007).

**“Before I formed you in the
womb, I knew you”**

Jeremiah 1, 5

**“ For it was you who created my inmost
being,
You knit me together in my mother’s
womb
When I was made in the secret place,
When I was woven together in the
depths of the earth
Your eyes saw my unformed body”**

Psalm 139

Julian of Norwich (c. 1388)

**“He showed me something small,
No bigger than a hazelnut,
Lying in the palm of my hand,
I looked at it with the eye of my
understanding, and thought:
What can this be?”**

**“I was amazed that it could last,
For I thought that because of its
littleness it would suddenly fall
into nothing.**

**And I was answered in my
understanding**

**It lasts and always will,
Because God loves it”**

“A person is not someone who has a certain set of capacities; a person is a someone who has a history. That story, for each of us, begins before we are conscious of it, and, for many of us, may continue after we have lost consciousness”.

“It is nonetheless our personal history even when we lack awareness of it, even when we have lost certain capacities characteristics of the species”

Gilbert Meilaender

“I am less likely to look for a saving solution if I have told myself beforehand that there can be none, or have made advance provision for an easy, brutal one”

John Howard Yoder

“All grown-ups were once children, although few of them remember it”

(Antoine de Saint-Exupery)