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*Human Cloning and International Governance:
Draft Report of IBC*

1. Prof. (Mr) Toivo Maimets
Director, Institute of Molecular and Cell Biology, University of Tartu, Estonia, Vice-Chairperson of IBC, Chairperson of the IBC Working Group
Title of presentation: **“Human cloning and international governance”**



United Nations
Educational, Scientific and
Cultural Organization



International Bioethics
Committee (IBC)

HUMAN CLONING AND INTERNATIONAL GOVERNANCE

Toivo MAIMETS, chair, IBC Working Group

TASK of the UNESCO Director General to the IBC (2007):

“...to explore whether there is any scientific, social or political change that would justify a new initiative at the international level...”



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REPORT OF IBC ON HUMAN CLONING AND INTERNATIONAL GOVERNANCE

This Report has been drawn up by the International Bioethics Committee (IBC) on the basis of the reflection carried out in 2008 on the issue of human cloning and international governance: in particular, the deliberations of its working group on this issue and discussions held during the fifteenth session of IBC and the joint session of IBC and the Intergovernmental Bioethics Committee (IGBC) in October 2008.

36. On the basis of reflection and debate held in 2008-2009, IBC has been able to identify the following:

- **Changes have occurred** in the last three years that may have an impact on future development of international governance of cloning: new scientific developments such as research on induced Pluripotent Stem (iPS) cells and its application; increased international exchange (both legal and illegal) of embryos, eggs and stem cells; increased public sensitivity and awareness together with the development of national regulations of governance of human cloning and embryo research in general (see Section V of this draft report). In particular, scientific developments in areas such as iPS cells open new possibilities of research and, at mid term, of therapeutic applications, but they also bring new ethical challenges and problems requiring further reflection and debate.

- **The terminology** used in the bioethical debates is misleading and does not adequately describe the technical procedures used (or potentially to be used) today. An in-depth analysis aiming at re-defining this terminology according to the new developments in human embryo research would be highly beneficial.

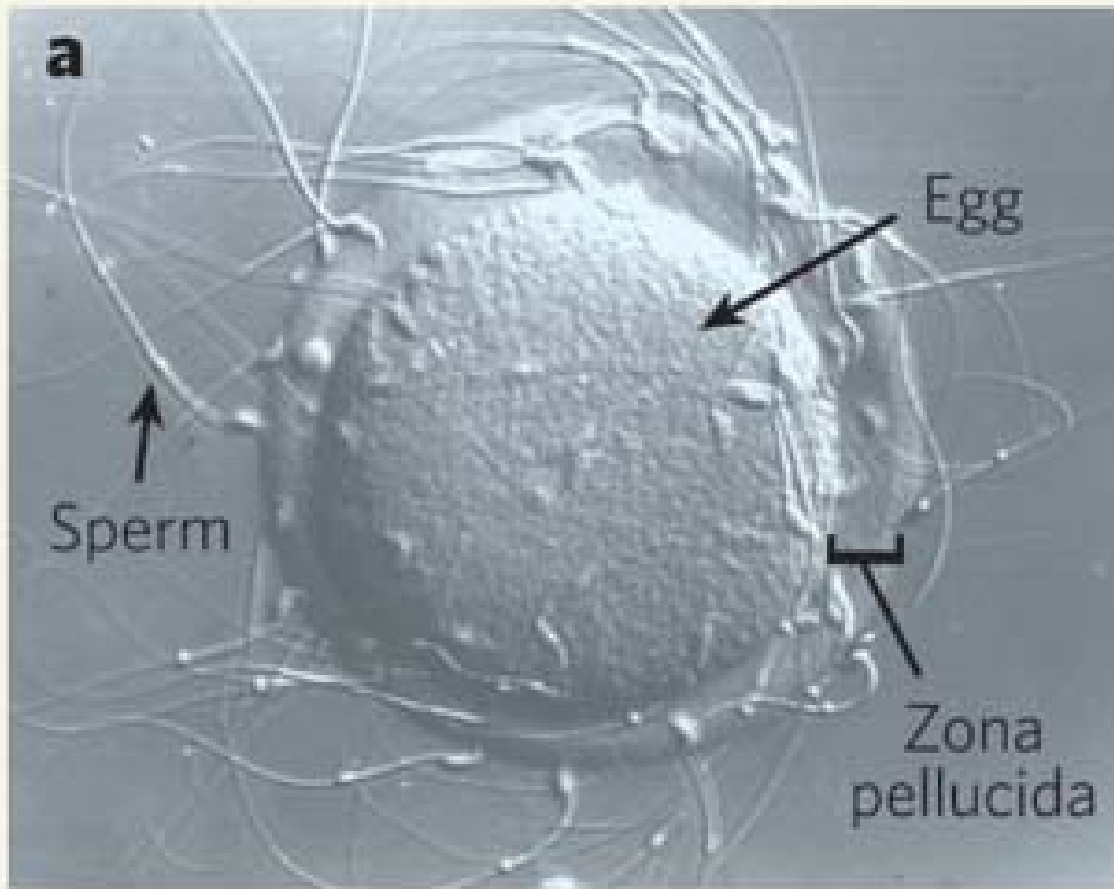
- **National regulations** of governance of human cloning and embryo research in general adopted so far confirm the **convergence of views** on the refusal to adopt legislation or guidelines permitting reproductive cloning, while they still show variations on the legitimacy of human cloning carried out as part of research agendas.

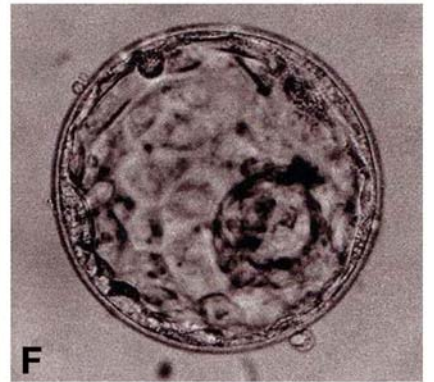
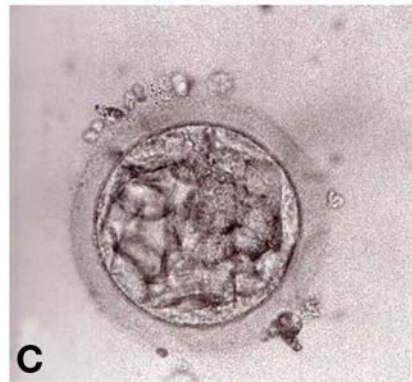
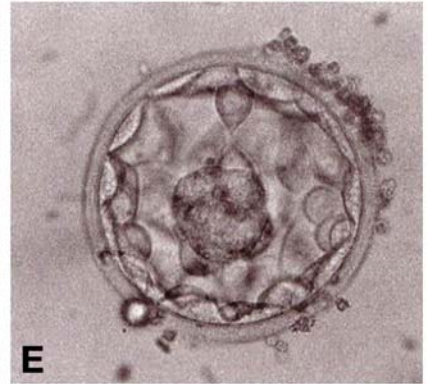
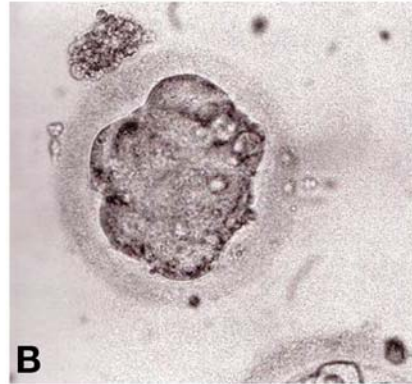
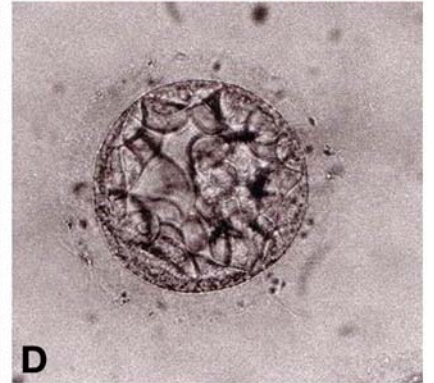
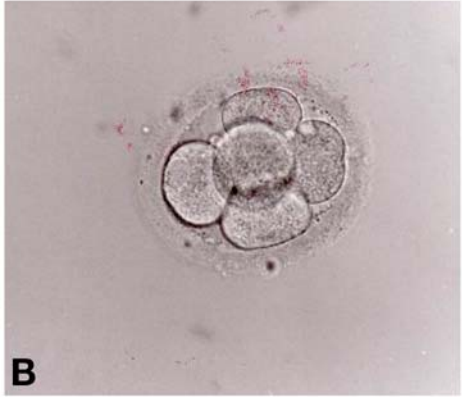
- Many countries, [in particular developing ones](#), still lack specific regulations on human cloning. A clear and effective regulation of reproductive human cloning at the international level would greatly benefit the safeguarding of the interests of these nations and their peoples.
- While the technology required to give birth to a human being by cloning is not yet available, it could be developed in the near future and [the existing international non-binding texts relevant to human cloning](#) (i.e. the UNESCO Universal Declaration on the Human Genome and Human Rights of 1997 and the UN Declaration on Human Cloning of 2005) [are not sufficient to prevent human reproductive cloning](#).
- [The dissemination, discussion and debate](#) on cloning issues at the international level remain essential to foster public sensitivity and awareness-raising, so that all countries, including the developing and least developed countries, can participate and put forward their concerns regarding this new technology. These activities are very important and should be actively pursued in parallel with the other possible normative developments.

**ANIMAL REPRODUCTIVE CLONING =
producing another animal with identical
(nuclear) DNA of an existing one.**



Shin *et al*, Nature 415, 859 (2002)







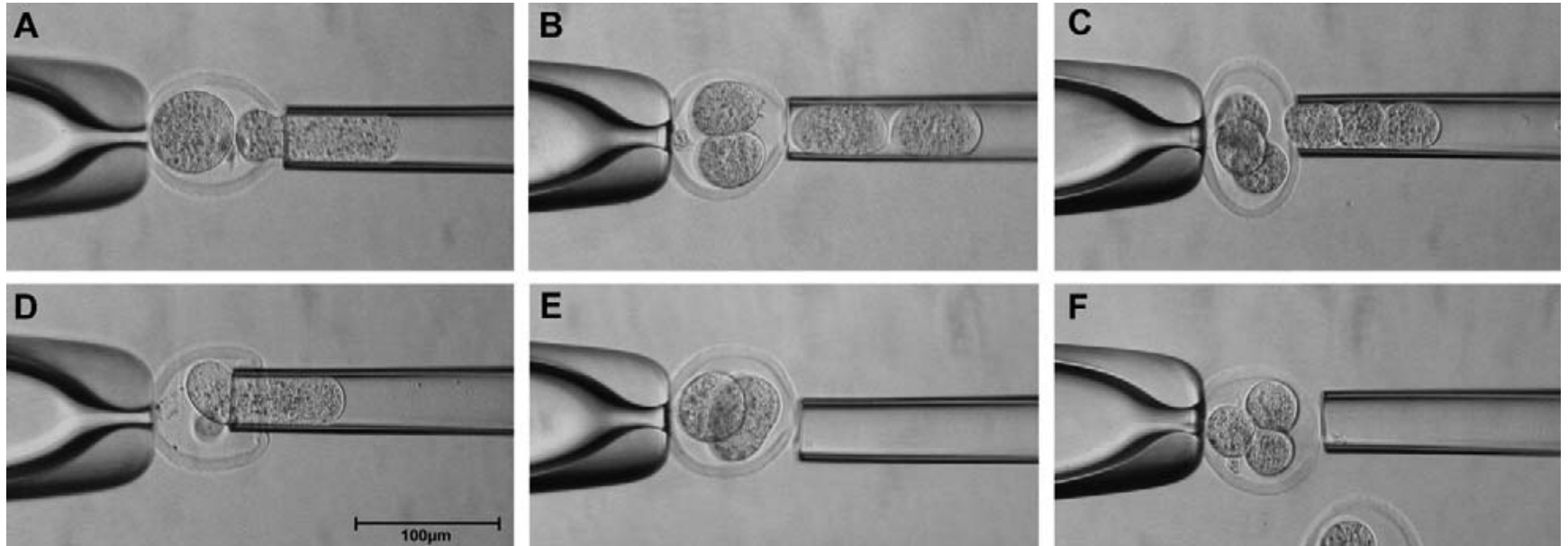
Human blastocyst, discovered by Rauber 1881

Possible ways of human reproductive cloning – *anno* 2011

- Embryo splitting
- SCNT – somatic cell nuclear transfer
 1. FUSION of enucleated egg and somatic cell
 2. DIRECT INJECTION of a nucleus into enucleated egg
- Tetraploid complementation with EMBRYONIC STEM CELL
- iPS - Induced Pluripotent Cells. Generation of EMBRYONIC STEM CELL – like cells
 1. Tetraploid complementation
 2. Direct derivation of sperm and egg cells

EMBRYO SPLITTING

(in humans - Kolberg 1993)

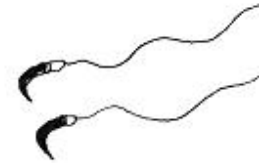
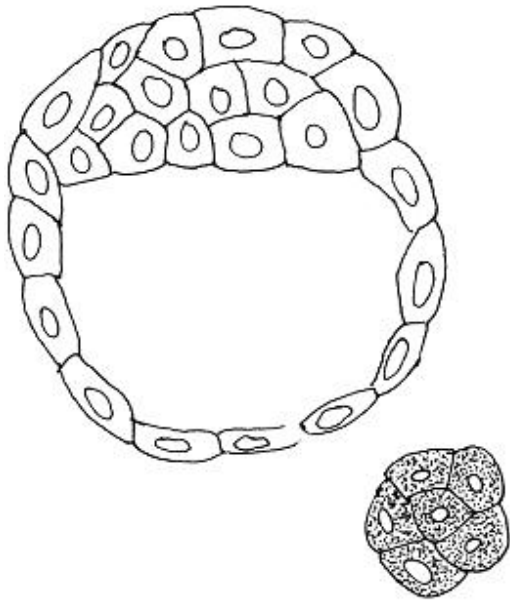


By micromanipulation, half of the cells from 2-stage, 4-stage and 6-stage mouse embryos (A-C) are separated and injected into empty *zona pellucida* recipients (D-F) . (Illmensee et al 2005).

TETRAPLOID COMPLEMENTATION:

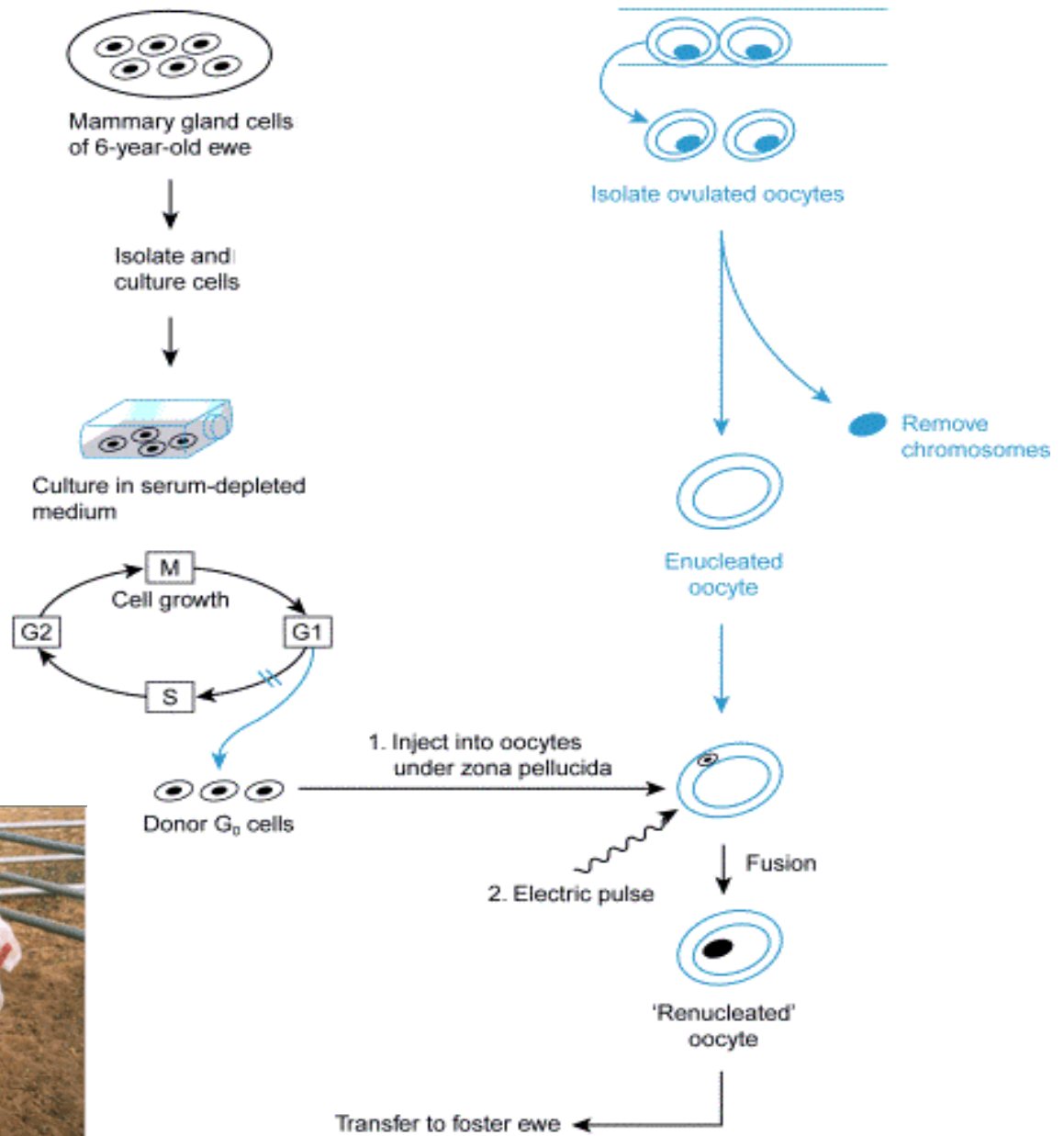
at 2-cell stage, the blastomeres are fused with electrical impulse. The resulting 1-cell tetraploid embryo is transferred into recipient (Kaufman and Webb 1990).

ES cells combined with tetraploid embryo develop normally, whereas tetraploid cells give only extraembryonic tissues.



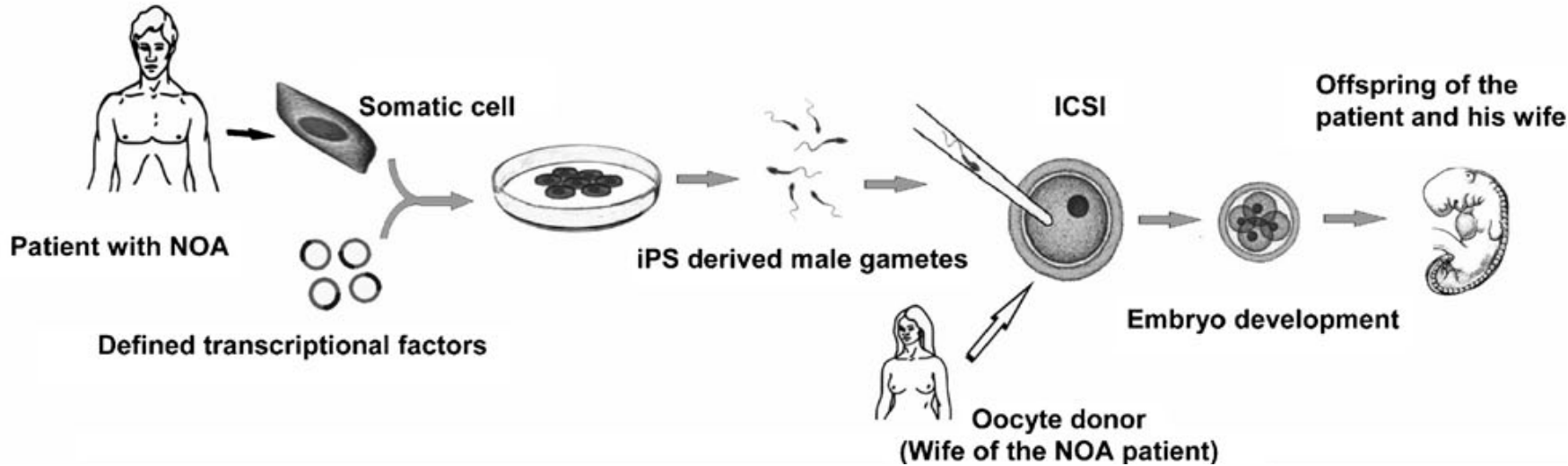
SCNT

(A)



Direct derivation of sperm cells through iPS technique

D. Spermatozoa derived from iPS cells



First notion:

Many other methods of human reproductive cloning, in addition to SCNT, are already available

Second notion:

There are already around several methods of mammalian reproductive cloning, which DO NOT REQUIRE DESTRUCTION OF ANY EMBRYOS:

- * embryo splitting
- * tetraploid complementation (either single cell from blastocyst or pluripotent iPS cell)
- * direct production of sperm and (soon) egg cells from somatic cells

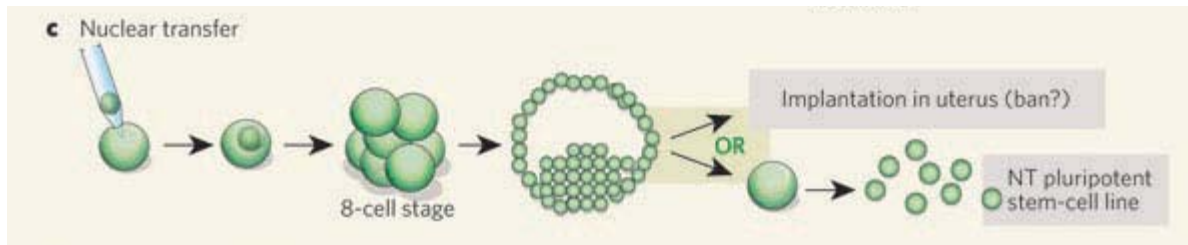
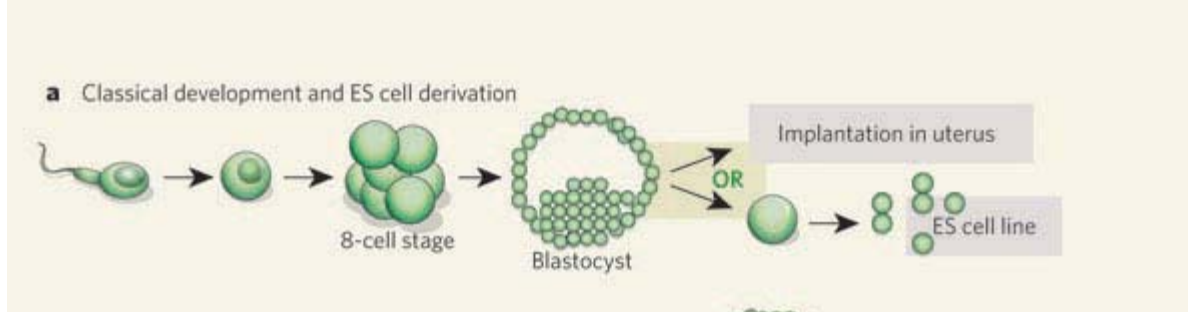
Final conclusions of IBC 2011

New scientific developments and the ethical dimension

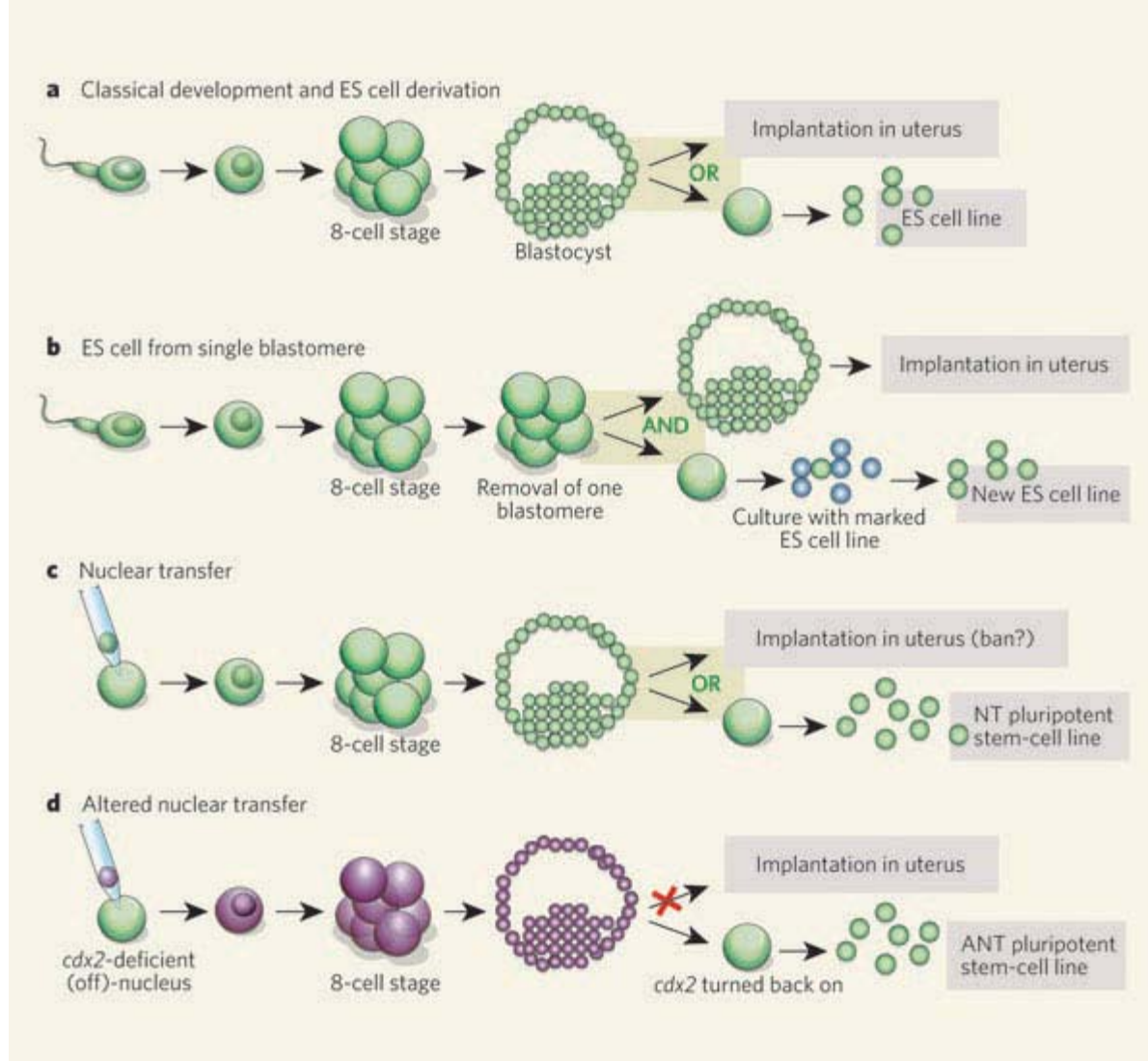
Terminology

International governance

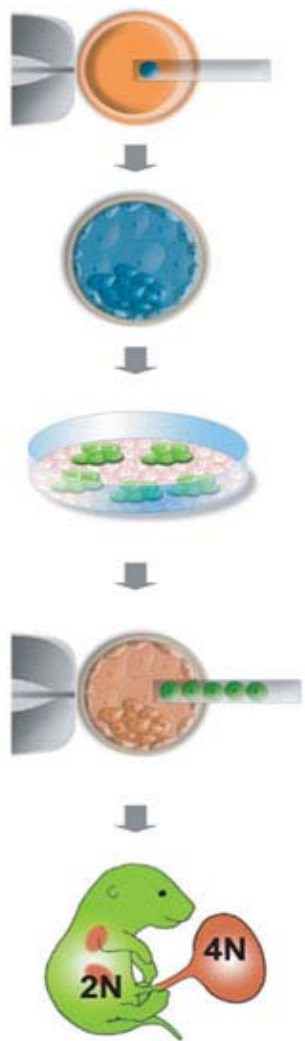
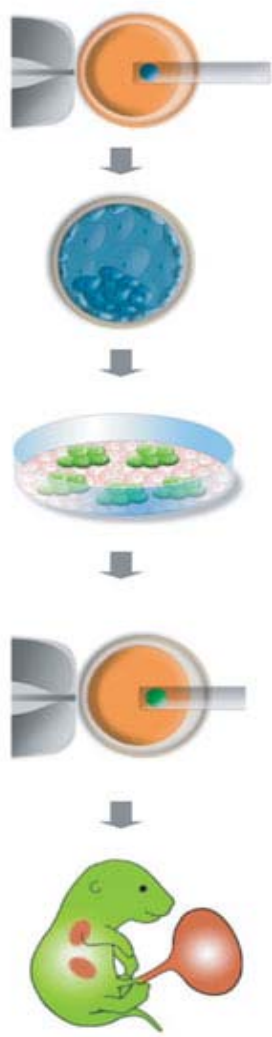
Dissemination

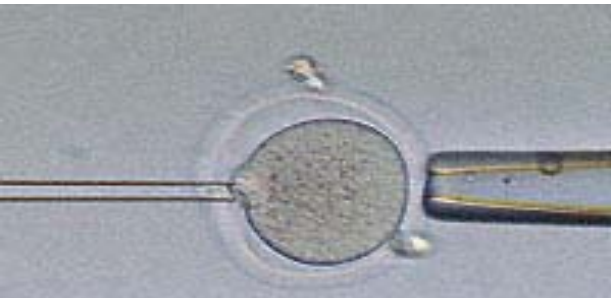


a, The classical derivation of embryonic stem (ES) cells destroys the embryo from which they are derived. **c**, Donor-specific pluripotent stem cells can be made using nuclear transfer (NT) techniques.



a, The classical derivation of embryonic stem (ES) cells destroys the embryo from which they are derived. **b**, **Lanza and colleagues** have used a modified method that does not compromise the embryo, but is not donor-specific. **c**, Donor-specific pluripotent stem cells can be made using nuclear transfer (NT) techniques. **d**, An altered nuclear transfer (ANT) method developed by **Meissner and Jaenisch** blocks expression of the *cdx2* gene until the blastocyst stage, making it unable to implant.

a**b****c**



Joonis 5. Nõelaga eemaldatakse munarakust tuum (Kim ja Lensch 2005)



Joonis 6. Munarakku sisestatakse mikrosüstimisega somaatilise raku tuum (märgitud noolega) (Kim ja Lensch 2005).