Normal Reproduction/IVF

Intent: Normal pregnancy

Permitted under current legislation

Derivation of Stem Cell Lines

Intent: Normal tissues for repair

Permitted under licence in accordance with current legislation

Somatic Cell Nuclear Transfer (SCNT)

Intent: Disease-specific stem cell lines; detection and treatment of disease

Proposed and supported by Lockhart with appropriate safeguards

Ovum (egg) → Sperm → Fertilised ovum → Early cell division → Blastocyst (5 days) – pre implantation in uterus → Embryonic stage 3-8 weeks → Full term baby

Early cell division (unused donated IVF embryos) → Inner cell mass containing stem cells identified and removed → Blastocyst (5 day development) → Stem cells are cultured in the laboratory → Stem cell line is banked and distributed to scientists

For repair and replacement of diseased or damaged tissues

Drug Discovery

Diseased cell → Egg → Nucleus removed → Egg’s nucleus is removed and discarded and the outer case of the egg is fused with the nucleus of the diseased cell → Early cell division → Inner cell mass containing nuclear transfer stem cells identified and removed → Blastocyst (5-7 days in culture) Legislation to prohibit a pregnancy → Stem cells are cultured in the laboratory → Stem cell line would then be distributed to scientists

Diagnosis, Therapies, Drug discovery

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Explanatory notes for the schematic

Panel 1 (left): IVF is used to assist an infertile couple to achieve a pregnancy. The embryo generated in the course of the treatment is generated by the union of a sperm and an egg and has the potential to create a genetically unique individual.

Panel 2 (middle): At the completion of their IVF treatment, some patients have 'excess' embryos that they no longer require. These embryos are usually in frozen storage. Under the current legislation, a patient can donate their 'excess' IVF embryos to a specific, NHMRC licensed research project where embryonic stem cells can be generated. These normal embryonic stem cells can then be used in research.

Panel 3 (right): The technique of SCNT involves generating an embryo from a patient's somatic cell. Such an embryo is distinct from an embryo generated by IVF. SCNT does not involve the union of an egg and sperm and the creation of a new individual. SCNT involves taking a patient's cell and reverting it back to a stem cell. It does not create a new individual but expands a patient's diseased cells in a laboratory. It is a very important means of better understanding and developing treatments for complex diseases. Concerns about the technology can be effectively addressed by appropriate regulation as is the case in the UK.