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Eggs from embryonic stem cells could benefit sterile women

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Monash researchers have developed a process that causes embryonic stem (ES) cells to develop into ovarian structures containing eggs.

The process could in future be used to develop eggs for sterile women that contain the women's own genetic material.

In 2003, international scientists demonstrated that ES cells could spontaneously develop into structures containing eggs when maintained in a culture containing foetal calf serum. However the result has not been able to be replicated.

In response, Dr Orly Lacham-Kaplan from the Monash Immunology and Stem Cell Laboratories has developed a simple, repeatable system to support the development of ES cells into ovarian structures containing eggs. The system has involved only mouse ES cells.



Dr Orly Lacham-Kaplan

She presented her findings today at the annual meeting of the European Society for Human Reproduction and Embryology.

"At this stage the eggs obtained from the process are at an early stage of development," Dr Lacham-Kaplan said. "Further studies are required to explore whether they're normal and able to mature and participate in fertilisation and embryo development."

Dr Lacham-Kaplan's ultimate goal is to find ways for infertile couples to have children. "Some people just don't have eggs or sperm and there's little we can do for them except use donor material. The ability to develop eggs in vitro could primarily assist sterile women but could also reduce the ongoing strain on donor egg programs." It could also help create a 'bank' of eggs that could be used for nuclear transfer -- where an egg's genetic material is removed and replaced with that of a sterile woman.

For eggs, or oocytes, to develop from ES cells, proteins called growth factors are required. The testis is a good source of growth factors, acting as a nursery for the development of eggs and sperm.

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It is now Tue July 12, 2005,
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Knowing this, Dr Lacham-Kaplan prepared a growth medium conditioned with testicular cells. Embryoid bodies -- aggregates of cells derived from embryonic stem cells -- were cultured in the medium and, after seven days, had transformed into ovarian-looking structures containing follicles.

"Further studies revealed that two genes specific to eggs were indeed expressed in the structures so we believe it is an ovary-type structure that contains oocytes," she said.

"Once the embryoid bodies were in an environment with growth factors sufficient for differentiation and they were not exposed to the factors responsible for the differentiation into male reproductive cells, they spontaneously differentiated into female reproductive cells even though they were originated from male ES cells."

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