



Technology for Reprogramming of Adult Bone Marrow Stromal Cells into Colonies of Universal Stem Cells “Quark Cells” through Ooplasm of Living *Xenopus Laevis* Oocytes

Background:

Stem cell research is currently a hotly debated topic and research has been limited to existing stem cell lines. In light of this contentious environment, the ability of adult human cells to be reprogrammed into embryonic stem cells is a promising development since no embryos have to be created or destroyed in the process. Previous techniques of reprogramming involved transfer of genetic information between donor and recipient, creating genetic hybrids unsuitable for human use. Techniques developed to minimize this problematic “genetic swap” involve removal of cytoplasmic and nuclear material from the donor and recipient, a process that may disrupt important biochemical pathways necessary for reprogramming of adult donor cells. These biochemical pathways, if left intact, can be an important factor in creating a viable adult stem cell line.

Description:

The method of the present invention allows scientists to reprogram adult cells without genetic manipulation of donor or recipient. This involves injecting a suspension of viable adult differentiated cells into the cytoplasm of *Xenopus laevis* (fig. 1) oocytes, creating a “cell within a cell.” Cells up to 15 μm can be successfully delivered into the cytoplasm without significant damage to the integrity of the injected cells or the recipient oocytes. After 24 to 48 hours of incubation, the transplanted cells are still viable and can be successfully removed from oocyte and transferred into appropriate media for culturing. The cultured cells show signs of reprogramming into universal stem cells or “quark cells” (fig. 2), which can proliferate in the undifferentiated state. These cells are thus useful for such therapeutic applications as cell therapy.

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Advantages:

- Cells (up to 15 μm in diameter) can be safely injected into cytoplasm of living oocyte.
- Injected cells can proliferate *in vitro* in auto-stabilized pluripotent mode for long periods of time.
- Rapid and effective reprogramming of adult cells.
- Unlimited and inexpensive source of species-specific, undifferentiated “quark cells”.
- Unique chance to manipulate with biochemical machinery of encapsulated cells through the biochemical machinery of hosting oocyte, thus leaving communication mechanisms intact for both types of cells.
- For pharmacological industry opens opportunity to investigate mechanisms of actions of new drugs, right in vicinity of encapsulated target cells.

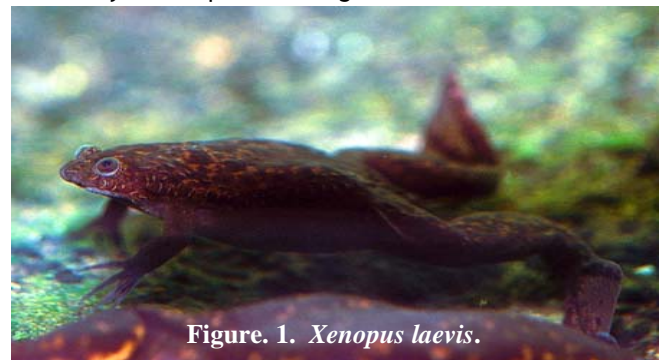


Figure 1. *Xenopus laevis*.

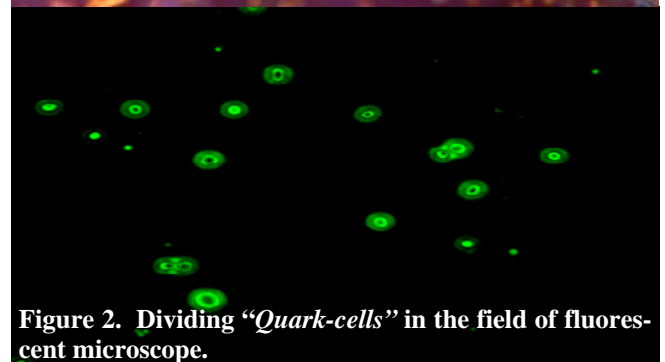


Figure 2. Dividing “Quark-cells” in the field of fluorescent microscope.

contact

University of South Florida | Division of Patents and Licensing
3802 Spectrum Blvd., Suite 100, Tampa, Florida 33612-9220
813.974.0994 (office) | 813.974.8490 (fax)
patents@research.usf.edu | <http://www.research.usf.edu/pl/>
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