



Research project summary

Cell volume regulatory mechanisms in oocytes and preimplantation embryos and their role in development and embryo health

- Principal Investigator: Jay Baltz
- Awarded \$881,280 from the Canadian Institutes of Health Research (CIHR) in May 2017
- Summary reproduced from the CIHR website in the language provided

Early embryos are extremely sensitive to conditions that disturb their cells' size. This implied that regulation of cell size is critical to early embryo development. We previously found, using the mouse as our model, that early embryos have a unique mechanism for maintaining cell size that relies on accumulation of high levels of the amino acid glycine inside embryonic cells. Glycine is needed to replace some of the salts that the embryos, like other cells, routinely take up to quickly correct deviations from their preferred size. Embryos appear to be very sensitive to having too much salt inside them, and need to replace it with something benign like glycine. We also found that cell size regulation first arises in the egg, beginning when they are ovulated from the ovary. We do not know how the glycine mechanism is turned on at ovulation or how these processes are regulated in eggs and embryos. We also have little information about the effects of disruptions of these normal processes on the health of later embryos and the resulting offspring. In this project, using the mouse model, we will determine how the egg switches on the mechanism that uses glycine. Finally, we will find how disruptions of the unique cell size-regulatory mechanisms in eggs and embryos affect the health of offspring. Increasingly, infertile couples (more than 15% of couples in Canada) are treated by assisted reproduction technologies (ART) that include in vitro fertilization (IVF) and the extended culture of eggs and embryos outside the woman's body. Fertility preservation for cancer patients similarly relies on ART. In addition to important knowledge about eggs and embryos, our project will potentially lead to better understanding of what can go wrong during ART and effects on the health of the children that are born, and lead to safer ART techniques.

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