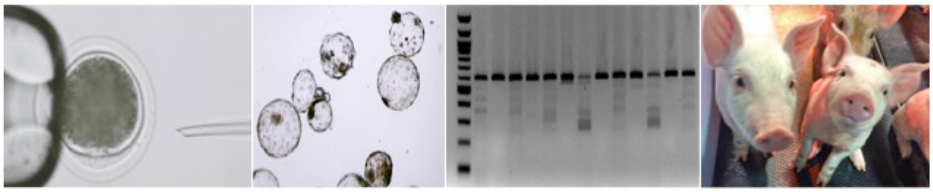

Refinement of CRISPR/Cas9 gene editing efficiency and its application to the study of porcine early embryo development

Oral Defence by PhD Candidate Karina Gutierrez

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Abstract

Pigs are considered valuable biomedical models due to their anatomical, physiological, metabolic and genetic similarities with humans. Genome manipulation is often required to create new experimental animal models and to study gene functions. New techniques have been developed to facilitate the specific manipulation of the genome in eukaryotes. The most recent one is based on the bacterial CRISPR/Cas9 system. The injection of the CRISPR/Cas9 editing system has proved effective in creating animals with targeted modifications in the genome in one single generation. The goals of my research project were to refine the CRISPR/Cas9 genome editing efficiency in porcine embryos and study the effects of manipulating specific genes during early embryo development. An improved protocol for editing of the pig genome is proposed based on the results obtained by combining the zygote stage of CRISPR/Cas9 system microinjection and use of a DNA repair inhibitor. Using this new protocol, specific genes related to lipid metabolism and cellular stress response were manipulated during porcine embryo development. The findings from this thesis show improvement of CRISPR/Cas9 gene editing efficiency in porcine embryos and provide new insights into the regulation of lipid metabolism and endoplasmic reticulum stress during early development of porcine embryos.

About the Candidate

Karina Gutierrez holds a BS.C in Biology and Masters in Animal Science by the Federal University of Santa Maria, Brazil. In 2014 she joined Dr. Bordignon's Lab and Dr. Agellon's Lab at McGill University to pursue her Ph.D. Her research focuses on porcine genome editing and study of gene function during embryo development.