

Research title

Dissecting the factors and mechanisms controlling cell division during early embryogenesis

Meccanismi e fattori implicati nel controllo della divisione cellulare nell'embrione pre-impianto

Tutor

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State of the art and aims of the project

Embryonic development centers around the process of cell division, which, after fertilization, produce small blastomeres. Symmetrical divisions characterize the first mitotic divisions until cell polarity at the time of embryo compaction is established. Disturbance of these highly ordered processes leads to alteration of cell polarity, aneuploidy and embryo death. The cytoskeleton, made up of microtubules, actin filaments and associated proteins drive early embryonic divisions. The overall goal of the present project is to study the molecular determinants of early embryonic development and, in particular, to assess the hypothesis that Progesterone Receptor Membrane Component 1 (PGRMC1) functions as a regulator of the cytoskeletal elements remodeling in early embryos. In particular we will assess whether disturbance of PGRMC1 expression and function impairs the developmental capacity of bovine embryos. Both pharmacological (PGRMC1 inhibitors) and genetic (CRISPR/Cas9) tools will be used to perturb PGRMC1 activity. The study will be conducted in collaboration with Dr Bermejo-Alvarez, INIA, Spain

Recent publications of the tutor in the field

1. Terzaghi L, Tessaro I, Raucci F, Merico V, Mazzini G, Garagna S, Zuccotti M, Franciosi F, Lodde V. PGRMC1 participates in late events of bovine granulosa cells mitosis and oocyte meiosis. *Cell Cycle* 2016; 15:2019-2032.
2. Luciano AM, Franciosi F, Lodde V, Tessaro I, Corbani D, Modena SC, Peluso JJ. Oocytes isolated from dairy cows with reduced ovarian reserve have a high frequency of aneuploidy and alterations in the localization of progesterone receptor membrane component 1 and aurora kinase B. *Biol Reprod* 2013; 88:58.
3. Peluso JJ, Lodde V, Liu X. Progesterone regulation of progesterone receptor membrane component 1 (PGRMC1) sumoylation and transcriptional activity in spontaneously immortalized granulosa cells. *Endocrinology* 2012; 153:3929-3939.
4. Lodde V, Peluso JJ. A novel role for progesterone and progesterone receptor membrane component 1 in regulating spindle microtubule stability during rat and human ovarian cell mitosis. *Biol Reprod* 2011; 84:715-722.
5. Luciano AM, Lodde V, Franciosi F, Cecilian F, Peluso JJ. Progesterone receptor membrane component 1 expression and putative function in bovine oocyte maturation, fertilization, and early embryonic development. *Reproduction* 2010; 140:663-672.