

1. Institution

INRA UMR 1198 Biologie du développement et reproduction, F-78350 Jouy en Josas, France.

2. Principal investigator and contact person team "egg activation and Ca²⁺ signalling".

Jean-Pierre Ozil

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3. Key personnel

Bernadette Banrezes	Bernadette.Banrezes@jouy.inra.fr	Ca ²⁺ imaging, ICSI, Nuclear transfer
Thierry Sainte-Beuve	thierry.sainte-beuve@jouy.inra.fr	Micro structures, Micro assemblies,
Eugénie Canon	eugenie.canon@jouy.inra.fr	Gamete manipulation and surgical transfer.

4. Research profile

We are interested in controlling the developmental processes of fertilized eggs during the early steps in-vitro. We develop methods and tools that make it possible to intervene directly inside the egg, at the level of the ER, to drive or inhibit the transient release of Ca²⁺ ions in real time with no deleterious effects. We have provided evidence that gene expression and the extent of development correlate with the total of the periods of Ca²⁺ elevation. At the moment we are refining our methods and tools in order to stop and start again the developmental processes at will. We would like to better understand how the system puts things right after perturbation. We are interested in developing ideas, methods and collaboration aimed at controlling the dynamics of a biological system such as an egg, to better understand how the environment can impact the variance of its viability.

Several related aspects including the nuclear physiology or the cell differentiation might be studied with colleagues in the INRA campus.

Nathalie Beaujean (nathalie.beaujean@jouy.inra.fr) is interested in the early embryonic events occurring upon fertilization, during the preimplantation stages, especially in nuclear remodeling and epigenetic gene expression regulation. We indeed know that the nuclear organization in the early mouse embryo displays particular features that are dynamic and dramatically distinct from somatic cells.

Philippe Andrey (philippe.andrey@jouy.inra.fr) is interested in the modeling of the Ca²⁺ response in order to detect any hidden variables associated with the Ca²⁺ signal that might correlate with the long term developmental impact.

5. Key technologies and tools

Micro techniques and prototypes that make it possible to design an artificial cell environment in vitro that is completely controlled by a set assuring advanced computer driven microfluidic multi channel perfusion.

Equipment for ICSI, SCNT, and fluorescent imaging system.

6. Selected publications (max. 5)

Ozil JP, Banrezes B, Toth S, Pan H, & Schultz RM (2006). Ca²⁺ oscillatory pattern in fertilized mouse eggs affects gene expression and development to term. *Dev Biol* **300**, 534-544.

Martin C, Beaujean N, Brochard V, Audouard C, Zink D, Debey P. Genome restructuring in mouse embryos during reprogramming and early development. *Dev Biol*. 2006 Apr 15;292(2):317-32.

Toth S, Huneau D, Banrezes B, & Ozil JP (2006). Egg activation is the result of calcium signal summation in the mouse. *Reproduction* **131**, 27-34.

Ozil JP, Markoulaki S, Toth S, Matson S, Banrezes B, Knott JG, Schultz RM, Huneau D, & Ducibella T (2005). Egg activation events are regulated by the duration of a sustained [Ca²⁺]_{cyt} signal in the mouse. *Dev Biol* **282**, 39-54.