Joint research unit

Animal Genetics and Integrative Biology

Animal Models for the Differentiation of Tissues

Team leader

Jean-Luc Vilotte

UMR 1313 GABI

Equipe MoDiT

INRA Jouy en Josas
Domaine de Vilvert
F-78350 Jouy en Josas
www. jouy.inra.fr/gabi

Team

Christian Beauvallet, Maud Bertaud, Johan Castille, Edmond Cribiu, Amandine Duchesne, Sandrine Floriot, Pascal Laurent, Samira Makhzami, Katayoun Moazami-Goudarzi, Bruno Passet, Jean-Luc Vilotte, Marthe Vilotte.

Team's field of research

The MoDiT team, created in January 2014, analyzes the biological function of genes acting on tissue development and/or differentiation of genes that are associated with early developmental abnormalities that may affect the nervous system. These genetic diseases include ataxias and axonopathies that are identified through our involvement in the ONAB (National Observatory of Bovine Anomalies).

Most of these genes have unknown functions and are expressed in various tissues, if not ubiquitously. Our studies are based on the production of mouse transgenic models. We produce these animals through gene over-expression, gene knockout or gene mutation produced by homologous recombination.

Scientific questions

Our research projects use transgenic models and involve the entire MoDiT team. The names mentioned are those of the "corresponding" scientists.

- **Analysis of the biological role of prion proteins, link with multiple developmental abnormalities:** Bruno Passet, Katayoun Moazami-Goudarzi.

Results from these studies suggest a redundant biological role for several proteins of this gene family during mammalian development.

- **Analysis of the CEP250 function and link with the SHGC pathology**: Sandrine Floriot, Edmond Cribiu.

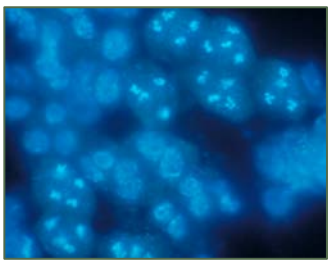
The CEP250 protein is involved in the cohesion of the centrioles. Although the observed mutation induces centriole splitting, it does not seem to affect cell division. The biological mechanism that links the mutation and the observed phenotype is investigated by developing mouse models.

- **Analysis of the SLC25a46 function, link with distal and peripheral axonopathy:** Amandine Duchesne.

The SLC25a46 protein belongs to a protein family of trans-membrane mitochondrial transporters but its precise biological role remains unknown.

- **Search for and analysis of the locus responsible for progressive ataxia in the Charolais breed:** Sandrine Floriot, Amandine Duchesne.

Identification of the underlying mutation is based on classical genetic analyses



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Experimental facilities

- Experimental Unit of Infectiology of Rodents and Fish (IERP), INRA, Jouy-en-Josas

Collaborations and partnerships

Placental developmental abnormalities: role of Stox1. Daniel Vaiman (INSERM, U1016)

Doridot L, Passet B, Rigourd V, Méhats C, Barbaux S, Mondon F, Vilotte M, Castille J, Breuiller-Fouche M, Jacques S, Daniel N, Le Provost F, Bauchet AL, Hertig A, Buffat C, Simeoni U, Germain G, Vilotte JL, Vaiman D: Mice overexpressing STOX1 are preeclamptic. *Hypertension* 2013, 61:662-668.

PrP Proteins, stem cells and pathologies. Sophie Mouillet-Richard (INSERM, UMRS-747), Vincent Béringue et Sophie Halliez (INRA, UMR1157).

Béringue V, Herzog L, Jaumain E, Reine F, Sibille P, Le Dur A, Vilotte JL, Laude H : Facilitated cross-species transmission of prions in extraneural tissue. *Science* 2012, 335:472-475.

Major loci involved in gonadic differentiation. Eric Pailhoux (INRA, UMR1198)

Boulanger L, Kocer A, Daniel N, Pannetier M, Chesné P, Heyman Y, Renault L, Mandon-Pépin B, Chavatte-Palmer P, Vignon X, Vilotte JL, Cotinot C, Renard JP, Pailhoux E: Attempt to rescue sex-reversal by transgenic expression of the *PISRT1* gene in XX PIS goats. *Sex Dev* 2008, 2:142-151.

Major loci involved in muscular development. Véronique Blanquet (INRA, UMR1061).

Monestier O, Brun C, Heu K, Passet B, Malhouroux M, Magnol L, Vilotte JL, Blanquet V: Ubiquitous Gasp1 overexpression in mice leads mainly to a hypermuscular phenotype. *BMC Genomics* 2012, 13:541.

Major publications

Chadi S, Young R, Le Guillou S, Tilly G, Bitton F, Martin-Magniette ML, Soubigou-Taconnat L, Balzergue S, Vilotte M, Peyre C, Passet B, Béringue V, Renou JP, Le Provost F, Laude H, Vilotte JL: Brain transcriptional stability upon prion protein-encoding gene invalidation in zygotic or adult mouse. *BMC Genomics* 2010, 11:448.

Khalifé M, Young R, Passet B, Halliez S, Vilotte M, Jaffrezic F, Marthey S, Béringue V, Vaiman D, Le Provost F, Laude H, Vilotte JL: Transcriptomic analysis brings new insight into the biological role of the prion protein during mouse embryogenesis. *PLoS ONE* 2011, 6:e23253.

Passet B, Young R, Makhzami S, Vilotte M, Jaffrezic F, Halliez S, Bouet S, Marthey S, Khalifé M, Kanellopoulos-Langevin C, Béringue V, Le Provost F, Laude H, Vilotte JL: Prion protein and Shadoo are involved in overlapping embryonic pathways and trophoblastic development. *PLoS ONE* 2012, 7:e41959.

Passet B, Halliez S, Béringue V, Laude H, Vilotte JL: The prion protein family: Looking outside the central nervous system. *Prion* 2013 7:127-130.

A complete list of publications is available at: www.jouy.inra.fr/gabi