

INTERNSHIP PROPOSAL

Institute and Group: BIG/BCI/BAL

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Research project title:

Characterization of BMP9/10 knockout mouse models

5 Keywords to describe the project:

Cardiovascular system, rare genetic diseases, mouse models, imaging, omics

Description of the project (aims, experimental techniques, recommended background):

BMP9 and BMP10 are circulating factors that bind to the receptor ALK1, which is predominantly expressed by endothelial cells. Mutations in genes involved in the BMP9/BMP10/ALK1 pathway are associated with two rare vascular genetic diseases (Hereditary hemorrhagic telangiectasia and pulmonary arterial hypertension). In order to study the roles of BMP9 and BMP10 *in vivo*, our team has generated knockout mouse models for BMP9 and/or BMP10. The goal of the project is to study the effects of the loss of BMP9 and/or BMP10 on the cardiovascular system and more precisely on the morphology and functionality of blood vessels using imaging techniques such as confocal microscopy and lightsheet microscopy. In order to study the underlying mechanisms, proteomic and transcriptomic studies will be performed on endothelial cells from different organs.

Recommended background: Cell biology, Animal physiology

Justification that the internship's subject fits with the general theme of GRAL:

The project aims at understanding the role of two proteins, BMP9 and BMP10, in vascular remodelling in order to propose new treatments in cardiovascular diseases in line with the creation of the health department in the IRIG institute.

Relevant publications of the team:

Ouarné M, Bouvard C, Boneva G, Mallet C, Ribeiro J, Desroches-Castan A, Soleilhac E, Tillet E, Peyruchaud O and Bailly S

BMP9, but not BMP10, acts as a quiescence factor on tumor growth, vessel normalization and metastasis in a mouse model of breast cancer.

[Journal of Experimental & Clinical Cancer Research](#), 2018, **37**(1): 209

Levet S, Ouarne M, Ciais D, Coutton C, Subileau M, Mallet C, Ricard N, Bidart M, Debillon T, Faravelli F, Rooryck C, Feige JJ, Tillet E and Bailly S

BMP9 and BMP10 are necessary for proper closure of the ductus arteriosus.

[Proceedings of the National Academy of Sciences](#), 2015, **112**(25): E3207-3215

Goumans MJ, Zwijsen A, Ten Dijke P and Bailly S

Bone morphogenetic proteins in vascular homeostasis and disease.

[Cold Spring Harbor Perspectives in Biology](#), 2018, **10**(2): a031989