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European Society of Cardiology
The European Heart House
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Boston, 23th September 2014

Aim: Report for the ESC First Contact Initiative Grant

Criteria for eligibility: Member of the working group Cellular Biology of the Heart

Dear Council Members,

I would like to thank the European Society of Cardiology for awarding me the First Contact Initiative Grant in February 2014. This grant gave me the opportunity to visit and collaborate with Dr. Bernhard Kühn Laboratory in Boston Children's Hospital – Harvard Medical from March 2014 to August 2014. Dr. Bernhard Kühn's group has a strong experience in cardiomyocyte proliferation and heart regeneration. His group has published high impact publications over the past 10 years.

During my stay, I gave a presentation about my previous work as a PhD student in Pr Michel Ovize lab to Dr. Bernhard Kühn and his team. I benefited from their experience and we discuss about my results. They help me to define new experiments for my future research. I had an individual interview with each lab member. We discuss on their projects and about my possible research project in their lab. Furthermore, I have discovered their specific techniques developed to study cardiomyocyte cytokinesis and in particular their models available in the lab from genetic mouse models to human sample. They work with extended

imaging techniques from laser image videomicroscopy to confocal microscopy and performed single cell sorting by flow cytometry for transcriptomic and proteomic analysis.

After two weeks of visit in Dr. Bernhard Kühn's lab, he offered me a postdoctoral position in his team until August 2014 in Boston Children's Hospital and offered me to follow him into his new lab facilities in Children's Hospital in Pittsburgh from September 2014. I made the decision to stay in his lab in Boston during 6 months until the relocation of the lab in Pittsburgh was effective.

During my stay in Bernhard Kühn's lab, I was working in collaboration with another postdoc and we were studying the developmental mechanisms for terminal differentiation of cardiomyocytes. We used a single-cell transcriptome profile from fetal, neonatal and adult mice cardiomyocyte, isolated from the Fucci cell cycle reporter mice model developed by the RIKEN institute in Japan, to assess gene expression of cycling and non-cycling cardiomyocytes at different developmental stages.

My collaborator, Cheng-Hai Zhang found a gene which expression was specifically expressed in cycling cardiomyocyte at fetal and neonatal stage and completely repressed at the adult stage. The protein coding for this gene is involved in the last step of cell division: the cytokinesis. He made the hypothesis that this gene is developmentally repressed in cardiomyocyte, conducing to cell cycle arrest and formation of binucleated cardiomyocytes. We were working on cardiomyocyte-targeted and inducible loss of function of this gene using α-MHC Mer-Cre-Mer and flox/flox mice to assess the effect of knocking out this gene on heart development. On the other hand, we were working on the gain of function of this gene to assess whether its overexpression can enhance cardiomyocyte proliferation *in vitro* and therefore heart regeneration *in vivo*.

It was a very enriching experience since it helps me to broaden and develop my skills in imaging and molecular techniques combining my previous research background in cardioprotection. It also allowed me to create a collaborative scientific network in the area

of Boston. Indeed, I had the opportunity to take part in larger meetings between labs whose research are focused into the cardiovascular field and especially on heart regeneration in the Harvard Medical School–Longwood Medical Area.

During those 6 months, I really enjoyed working in Boston in this great research environment provided by all universities and I went interviewing for another postdoc in the cardiovascular research field. I am, since September 2014, a postdoctoral fellow in Caroline and Geoffrey Burns laboratory in the Cardiovascular Research Center of the Massachusetts General Hospital – Harvard Medical School.

To conclude, I would like to thank once again the European Society of Cardiology for its support for this enriching experience. I also want to thank Dr. Bernhard Kühn and all his lab members for their great welcoming during my stay.

Best regards,

Maryline Abrial