PhD Research Proposal Form
China Scholarship Council (CSC) - ENS Group

FIELD: Biology

Thesis subject title:
Deciphering the molecular cues underlying the activity of YAP and TAZ during osteoblast differentiation

Name of the French doctoral school : BMIC

Name of the Research team : Ontogenesis and Molecular Interactions
Website : http://igfl.ens-lyon.fr/equipes/s.-merabet-ontogenesis-and-molecular-interactions

Name of the Supervisor :
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Lab Language : English

Research Proposal Abstract :
The formation and homeostasis of bone tissue depend on a subtle balance between resorption and regeneration imputed respectively to osteoclasts and osteoblasts. Many pathologies grouped under the term “osteoporosis” correspond to a set of disorders affecting the balance between these two types of cells, leading to an overall loss of bone tissue with a consequent increase in the risk of fracture. Osteoporosis and the fractures associated with it represent a major public health problem. Despite this, osteoporosis remains an underdiagnosed and undertreated disease, the causes of which are still far from fully elucidated. In addition, current treatments all have side effects that limit their long-term therapeutic application.
All these issues underline the importance of understanding the molecular bases of bone formation, or osteogenesis, in order to be able to offer new promising therapeutic tools. Our project is fully in line with this problem by proposing to identify the molecular cues underlying the activity of two major regulators of osteogenesis: TAZ and YAP. More precisely, we propose to capture interactomes, genome-wide binding sites and target genes of activate and inactive TAZ and YAP at different time points during stem cell to osteoblast differentiation.
The project is based on innovative proteomics, genomics and imaging tools developed under conditions similar to the physiological environment of bone. The results obtained will make it possible to identify new molecular actors that can participate in the stimulation of osteogenesis, and will thus serve as a novel support for therapeutic development.

References :

Bimolecular Fluorescence Complementation (BiFC) and Multiplexed Imaging of Protein-Protein Interactions in Human Living Cells.
Jia Y, Bleicher F, Reboulet J, **Merabet S.**Methods Mol Biol. 2021;2350:173-190. doi: 10.1007/978-1-0716-1593-5_12.PMID: 34331286

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Paul R, Giraud G, Domsch K, Duffraisse M, Marmigère F, Khan S, Vanderperre S, Lohmann I, Stoks R, Shashidhara LS, **Merabet S.**Nat Commun. 2021 May 17;12(1):2892. doi: 10.1038/s41467-021-23293-8.

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Bischof J, Duffraisse M, Furger E, Ajuria L, Giraud G, Vanderperre S, Paul R, Björklund M, Ahr D, Ahmed AW, Spinelli L, Brun C, Basler K, **Merabet S.**Elife. 2018 Sep 24;7:e38853. doi: 10.7554/eLife.38853.

Human HOX Proteins Use Diverse and Context-Dependent Motifs to Interact with TALE Class Cofactors.
Dard A, Reboulet J, Jia Y, Bleicher F, Duffraisse M, Vanaker JM, Forcet C, **Merabet S.**Cell Rep. 2018 Mar 13;22(11):3058-3071. doi: 10.1016/j.celrep.2018.02.070.

Type of PhD :

1.Full PhD

- Joint PhD/cotutelle (leading to a double diploma) : YES
- Regular PhD (leading to a single French diploma) : NO

2. Visiting PhD (for students enrolled at a Chinese institution who will be invited to a French institution to carry out a mobility period) : NO