Internship offer
M2 Musculo-Skeletal system, Locomotion, Exercise (MuSkLE)

Title of the Internship: Extracellular matrix function in motor nerve regeneration in zebrafish

Laboratory (name, n°, website): Institut de Génomique Fonctionnelle de Lyon
ENS de lyon - CNRS UMR5242 – INRAE USC 1370
http://igfl.ens-lyon.fr/accueil-igfl?set_language=en&cl=en
Research team (name, website): Florence Ruggiero
http://igfl.ens-lyon.fr/equipes/f.-ruggiero-matrix-biology-and-pathology

Supervisor to contact (name, email address): Sandrine Bretaud
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Project description including a short introduction, aim/objectives and methods/approach to be used

During development and nerve regeneration, axons of motoneurons (MN) follow stereotypical trajectories to innervate their muscle targets, guided by various molecular cues including extracellular matrix (ECM) proteins. We previously showed that collagen XV-B (ColXV-B) is produced by muscle progenitor cells and deposited in the motor axon path in the zebrafish embryo to guide motor axons by organizing the matrix protein tenascin c topology and by acting on the stiffness of the environment [1,2].
Zebrafish is a powerfull model to study peripheral nerve regeneration *in vivo* thanks to transgenic fish (such as *mnx1 :gfp*) allowing to visualize by fluorescence motor nerve. In early larvae, after transection, motor nerve undergoes wallerian degeneration in few hours followed by a functionnal regeneration by 48 h[3]. We previously observed that ColXV-B is also involved in regeneration as in development. It's absence leads to regeneration defect of motor nerve. The master 2 project aims at carrying on this work by analyzing the regeneration process of motor nerve *in vivo* by time lapse after laser ablation (platim imaging facility) in *mnx1 :gfp* transgenic line and assessing the involvement of muscle function. We will determine when and how absence of ColXV-B affects nerve regeneration by studying degeneration process, inflammation, nerve navigation using *col15a1b* KO lines crossed with different transgenic lines to visualize motor neuron, Schwann cells and immune cells.
Technics used : laser ablation, time-lapse, confocal microscopy, image analysis, immunofluorescence, force measurement[4].

References:

[1]Guillon et al, 2016. J Neurosci, 36(9):2663-76. doi: 10.1523/JNEUROSCI.2847-15
[2]Nemoz-Billet et al, 2024. PNAS 121(13):e2314588121. doi: 10.1073/pnas.2314588121
[3]Nemoz-Billet et al, 2021. Med Sci. 37 Hors série n° 1:11-14. doi: 10.1051/medsci/2021183.
[4]Charvet et al, 2013. 140(22):4602-13. doi: 10.1242/dev.096024.

Skills required:

This internship requires a background in microscopy and cell biology