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

FIELD: Life sciences

Thesis subject title: **Study of the properties of the antiviral human interferon-induced transmembrane protein 3 (IFITM3) in cancer metastasis *in vivo***

Name of the French doctoral school : Integrative cellular and molecular biology (BMIC)
Name of the Research team : Laboratory of Primate Lentiviruses Lyon (LP2L*)*
Website : https://ciri.ens-lyon.fr/teams/lp2l
Name of the Supervisor : Andrea CIMARELLI
Email : acimarel@ens-lyon.fr
Lab Language : English

Research Proposal Abstract :
The Interferon-induced transmembrane proteins (IFITMs) belong to the family of dyspanins, family that is conserved across mammals and that includes several membrane vesicles regulators. IFITMs have been well characterized by a number of laboratories, including ours, as innate immune factors that inhibit a broad range of viruses by rigidifying membranes and by impairing the fusion between viral and cellular membranes. Outside the context of viral infection little is known about these proteins, although few observational studies suggest a potential involvement in the process of tumorigenesis.
Using injection in mice of tumoral cells with variable levels of expression of IFITMs, we have gathered data that strongly support a role for IFITMs in the regulation of tumor metastasis. Using a series of complementary approaches in cell biology and mouse immunology, this PhD project aims at understanding how IFITMs and in particular IFITM3, which is the prototype of the family, regulates the process of tumorigenesis in vivo. Given that IFITMs work by altering the behavior and rigidity of membranes, our results may in the long run pave the way to alternative approaches in cancer treatment that based on membrane fluidity modulation. The candidate will be directly tutored by the head of the lab and will be formed to the latest techniques in cell imaging, cell biology and mouse immunology.

References : 1. Song. Trim69 is a microtubule regulator that acts as a pantropic viral inhibitor. PNAS 2022. **2.** Zhong et al. A novel domain within the CIL regulates egress of IFITM3 from the Golgi and prevents its deleterious accumulation in this apparatus. *Life Science Alliance*, 2022. **3.** Marziali. Functional heterogeneity of mammalian IFITM proteins against HIV-1. *Journal of Virology,* 2021. **4.** Wu. The interferon stimulated gene 20 protein (ISG20) is an innate defense antiviral factor that discriminates self versus non-self translation. *PLoS Pathog* 2019. **5.** Tartour. Interference with the production of infectious viral particles and bimodal inhibition of replication are broadly conserved antiviral properties of IFITMs *PLoS Pathog* 2017.

Type of PhD :
1.Full PhD
- Joint PhD/cotutelle (leading to a double diploma) NO
- Regular PhD (leading to a single French diploma) : YES

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