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

FIELD: Biology
(eg: Mathematics, Physics, Sociology, ….)

Thesis subject title:
Study of the innate immunity factors of the interferon-induced transmembrane protein family (IFITMs) at the crossroads between antiviral functions and lipid homeostasis

Name of the French doctoral school : BMIC

Name of the Research team : *Host-Pathogen Interactions during Lentiviral Infection*
Website : http://ciri.inserm.fr/en/team/all-teams/host-pathogen-interaction-during-lentiviral-infection/themes-research/

Name of the Supervisor : Andrea CIMARELLI
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Lab Language : English, French

Research Proposal Abstract :
Innate defense factors are cellular proteins that can inhibit viral replication according to different mechanisms. Members of the interferon-induced transmembrane proteins family (IFITMs) belong to a peculiar defense mechanisms that can broadly inhibit a number of viruses as diverse as HIV-1 or Ebola virus, by affecting the ability of viral and cellular membranes to fuse with each other. An increasing number of evidence indicates that IFITMs may play additional and yet uncharacterized, roles in the cell physiology and recent data from our laboratory indicates that IFITMs may act as cellular regulators of the Golgi organelle. Using high resolution cell imaging, lipidomics as well as cell biology and virology techniques (applied to HIV-1, VSV and SARS-CoV2 as model viruses), the PhD project will study the connections between these cellular regulatory functions of IFITMs and how they intersect their known antiviral properties. A particular emphasis will be put to changes in the overall lipid composition of membranes that our recent results suggest as important in its functions. The overall aim of the project will be to uncover novel functions of IFITMs and to determine their potential involvement in a number of processes of interest including viral infection, diabetes or carcinogenesis.

References (3 recent from the lab) :

-The interferon stimulated gene 20 protein (ISG20) is an innate defense antiviral factor that discriminates self versus non-self translation. Wu et al. Plos Pathogens 2019.

-Functional Mapping of Regions Involved in the Negative Imprinting of Virion Particle Infectivity and in Target Cell Protection by Interferon-Induced Transmembrane Protein 3 against HIV-1. Appourchaux et al. JVI 2019.

-Interference with the production of infectious viral particles and bimodal inhibition of replication are broadly conserved antiviral properties of IFITMs. Tartour et al. Plos Pathogens 2017.

Type of PhD :

Full PhD :
Regular PhD (leading to a single French diploma)