Subject for internship, master and DES (Diplôme d'Etude Spécialisée) thesis

Title: microRNA as a biomarker in tuberculosis associated immune reconstitution inflammatory syndrome in HIV-tuberculosis co-infection

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Duration: 6 - 12 months

Description of the project

MicroRNAs (miRNAs) are a small non-coding RNAs that play important role as regulators of gene expression in living cells. miRNAs have been detected in variety of biological fluid such as plasma/serum, cerebrospinal fluid etc. During the course of many diseases including infectious disease, extracellular circulating miRNA are aberrantly expressed in biological fluid. Although, the biological function of miRNAs remains controversial, several report demonstrated that miRNA (free or exosome associated) can participate in cell-cell communication during viral infection, immune response, cancer progression and neurological processes[1]. In HIV infection, host miRNAs can affect the life cycle of HIV such as the blockade of HIV viral replication and viral assembly. A role of miRNA has been also suggested in host immunity against tuberculosis[2]. TB-IRIS in HIV-TB confection is the clinical deterioration in severe immuno-suppressed HIV patients initiating antiretroviral treatment, is the common complication of ART initiation. They affect around 18 to 52 % of all HIV infected patients starting ART during TB therapy, causing substantial morbidity and mortality[3]. Although clinical presentation of paradoxical TB-IRIS is relatively well described, the biomarkers for prediction or diagnosis and specific treatment for TB-IRIS are lacking. Our aim is to characterize miRNA expression profile in a cohort of patients with HIV and tuberculosis infection and correlate it with their clinical evolution by using state-of-the-art multicolor flow cytometry and molecular biology technique

Competence and skill needed: The level required for the training is for the students who have previous working experience in laboratory environment, have experiences in basic laboratory technique such as pipette handling and the knowledge of infectious risk in sample handling and laboratory safety. In addition, the basic knowledge in immunology and microbiology, particularly in HIV and tuberculosis pathogenesis is also desirable.

Skill acquired after training.

After completion of the project, the student will be able to do some laboratory techniques like flow cytometry and molecular techniques (e.g. PCR). They will acquire the basic knowledge of scientific article analysis, data interpretation and analysis.

References

1. De Toro J, Herschlik L, Waldner C, Mongini C. Emerging roles of exosomes in normal and pathological conditions: new insights for diagnosis and therapeutic applications. Front Immunol 2015;6:203.
2. Mehta MD, Liu PT. microRNAs in mycobacterial disease: friend or foe? Front Genet 2014;5:231.
3. Lai RP, Meintjes G, Wilkinson RJ. HIV-1 tuberculosis-associated immune reconstitution inflammatory syndrome. Semin Immunopathol 2016;38:185-98.