Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2023-2024

Laboratory/Institute: BioSanté/iRiG
Director: Catherine Picard
Team: Mechanisms of Angiogenesis of Biological Barrier (MAB2)
Head of the team: Nadia Alfaidy

Name and status of the scientist in charge of the project: Mohamed Benharouga, MCU
HDR: yes ☒ **no** ☐

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Program of the Master's degree in Biology:

☒ Microbiology, Infectious Diseases and Immunology ☐ Structural Biology of Pathogens
☒ Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology

Title of the project:
Effect of nicotine on cellular prion protein (PrP^C) expression and function in lung endothelial and epithelial cells.

Objectives (up to 3 lines):

Among proteins that bind Cu and ensure cellular protection against oxidative stress is the cellular prion protein (PrP^C), a GPI-anchored glycoprotein.
Hence, the aims of this project is to investigate the effect of nicotine on the intracellular copper concentration, oxidative stress and inflammation of lung endothelial and epithelial cells, and characterize their proliferation, migration and invasion profile in relation-ship to PrP^C expression level (normal and *PrP*-knockout gene)

Abstract (up to 10 lines):

Cigarette smoking contributes to the development of lung cancer, and pathogenesis of other diseases. Many chemicals have been identified in cigarettes that have potent biological properties. Nicotine is especially known for its role in addiction and plays a role in other physiological effects of smoking and tobacco use. Recent studies have provided compelling evidence that in the lung, nicotine modulates the level of oxidative stress and inflammatory processes leading to cell damage. Both these processes have been convincingly shown to be associated to metal deregulation, such as copper (Cu), and were tightly linked to the development of lung inflammation. However, the mechanism by which nicotine in relationship to PrP^C protein contributes to these processes is still unclear.

Methods (up to 3 lines):

Cell Culture, Molecular Biology, Biochemistry, cell imaging.

Up to 3 relevant publications of the team:

1. Kouadri A, El Khatib M, Cormenier J, Chauvet S, Zeinyeh W, El Khoury M, Macari L, Richaud P, Coraux C, Michaud-Soret I, Alfaidy N, Benharouga M. Involvement of the Prion Protein in the Protection of the Human Bronchial Epithelial Barrier Against Oxidative Stress. Antioxid Redox Signal. 2019 Jul 1;31 (1): 59-74.
2. Alfaidy N, Chauvet S, Donadio-Andrei S, Salomon A, Saoudi Y, Richaud P, Aude-Garcia C, Hoffmann P, Andrieux A, Moulis JM, Feige JJ, Benharouga M. Prion protein expression and functional importance in developmental angiogenesis: role in oxidative stress and copper homeostasis. Antioxid Redox Signal. 2013 Feb 1;18 (4): 400-11.

Requested domains of expertise (up to 5 keywords):

Cell culture, Molecular biology, cell biology and biochemistry