

Licence Master 1 Master 2 Fin d' tudes

Nom du laboratoire / Laboratory name :

Code d'identification : UMR8578 Organisme / Institution : CNRS / UPSaclay

Adresse / Adress : LPGP, B t. 210, rue Henri Becquerel

Universit  Paris-Saclay, 91405 Orsay

Site Internet / web site : www.lpgp.universite- paris-saclay.fr

Lieu de stage / Internship place : LPGP, B timent 210, Campus Orsay Vall e

Responsable de stage / Internship supervisor :

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Autres contacts / Other contacts :

Stage / InternshipDur e/duration : 5/6 mois   partir de mi-mars Prise en charge du transport / Payment for transport :
OUI

R mun ration / Scholarship OUI

Intitul  du stage : Traitement th ranostique d clench  par plasma froid

R sum  / Summary :

 tude d'une th rapie anticanc reuse combinant prodrugs GdAzo et plasma froid, bas e sur la g n ration de ROS

Sujet de stage / Internship

Cancer is a leading cause of death worldwide and its incidence rate increases with the age of the population, the exposure to carcinogens and the modern lifestyle of the population. About two thirds of patients defeat their disease, and the combined action of surgery, radiotherapy and chemotherapy accounts for most cured cases. Alongside with these classical therapies, new therapies have emerged, such as anti-angiogenic therapy and immunotherapy. However, therapy resistance has been observed with every type of therapy that is available today, including poly-chemotherapy, radiotherapy, immunotherapy, and molecular targeted therapy. Accordingly, many new avenues have been explored in the last decades to battle this disease. One of them is the utilization of reactive oxygen species (ROS) as signalling and damaging agents. ROS are not only generated as metabolic by-products but also in many physical therapies for medicine such as ionization radiation and photodynamic therapy. A recently emerging technology for ROS-based therapy is cold atmospheric plasma (CAP). Electromagnetic radiation-triggered therapeutics are suffering from no translation into wide clinical applications for many years. By the association of approaches from photoactivation and radiotherapy, theranostic prodrugs adapted for MRI imaging and activation into deep-tissues have recently been developed. Gadolinium-modified azobenzene prodrugs (GdAzo) revealed efficient activation through cis-trans isomerization switch of the azobenzene moiety leading to an anti-tumor effect upon different types of ionizing radiations (photon, electron, proton). Mechanism investigations of this “radioswitch” activation pointed out the central role of the hydroxyl radicals (OH^\bullet) implying that multiple stimuli could be suitable for this activation concept as far as hydroxyl radicals are generated, which is the case during radiotherapy or CAP treatment. This project aims at investigating the anti-cancer efficacy of a combination of GdAzo prodrugs with plasma therapy. During the M2 internship, the candidate will essentially use human and mouse tumor cell lines *in vitro* (pancreas, lung, colon, Head & Neck, ovarian), in order to establish the optimal conditions of the combined treatment to further use these conditions *in vivo* on xenograft mouse models. This project is interdisciplinary, involving researchers in physics (LPGP, UMR8578, UPSaclay), biology (Institut Curie, UMR3347, UPSaclay) and chemistry (Institut Curie, UMR9187, UPSaclay). The work will be performed at the LPGP and Institut Curie (both in Orsay).