Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

Monsieur Mathieu SOETENS

Master en sciences chimiques

Pour l'obtention du grade de Docteur en sciences

« Development of transition metal catalysts for bioorthogonal reactions»

qui se déroulera
le lundi 29 avril 2019 à 16h
Auditoire LAVO 51
Place Louis Pasteur, 1
1348 Louvain-la-Neuve

Membres du jury :

Prof. Olivier Riant (UCLouvain), supervisor
Prof. Yann Garcia (UCLouvain), chairperson
Prof. Michael Singleton (UCLouvain), secretary
Prof. Sébastien Papot (Université de Poitiers, France)
Prof. Annemieke Madder (UGent, Belgique)
Prof. Raphaël Frédéric (UCLouvain)

UCLouvain

Cancer is a metabolic disease characterized by immortal cells which develop in a non-controlled and anarchic fashion after undergoing mutations and alterations in their DNA. These cells tend to grow in masses which are called tumours. It has emerged as one of the ten main causes of mortality along with cardiovascular diseases. A lot of effort has been put both into academia and into industry to respond to this societal challenge in order to both understand their biology and to find a way to selectively kill these cells.

A lot of cytotoxic agents and metallodrugs target DNA as cancer cells divide faster than healthy cells, but severe side effects are observed on patients. The next generation of chemotherapy will be more selective to avoid side effects. Our response to this challenge is to use transition metal catalysis to selectively activate anti-cancer molecules inside cancer cells.

Initially, iridium catalysts capable of reducing imines with the metabolic cofactor NADH were developed. Following this, palladium catalysts capable of deprotecting allyl carbamates in a buffered aqueous medium using the glutathione cofactor were developed. We showed that we were able to activate fluorescent molecules selectively inside cancer cells. Our best candidates were stable, cell permeable and non-toxic in addition to remaining active in the cellular medium.

Then, with satisfactory catalysts in hand, we moved on to therapeutical applications. In one hand, we attempted to catalytically inhibit enzymes using our catalysts and in the other hand, we tried to gain selectivity by making prodrugs capable of recognizing cancer-specific proteins at the cell surface.