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Marie Curie Action: International Outgoing Fellowship

Light-CORM-CaT

Project title: **Development of novel Near-infrared Light-triggered CORMs for Cancer Treatment**

Project coordinator: **Helmholtz-Zentrum Dresden-Rossendorf e.V. Germany**

Partner institution: **Monash University, Australia**

Starting date: **13.04.2015**

Duration (months): **36**

Summary

The capacity for imaging and treatment with a single assembly (“theranostic”) is a promising advance that seeks to further improve personalised cancer treatment. This project aims to contribute a revolutionary step to this field through the development of near-infrared light-activated carbon monoxide-releasing molecules (NIRA-CORMs). Carbon monoxide plays an important role in the regulation of stress response and in cell adaption to injury.

Moreover, pre-clinical trials applying this gas as a therapeutic agent have already shown that it has therapeutic effects. As a consequence, the development of molecules that can release CO in a highly controlled fashion (CORMs) under physiological conditions has therefore become a major field of scientific and medical interest. So far, very little is actually known about the interaction of CORMs with living cells, both before and after release of CO. This represents a major barrier to their progression into clinical trials.

To overcome these obstacles, a combination of new methodology and novel CORMs will not only provide a new non-invasive technology to elucidate the interaction of CO and CORMs with living organisms, but also deliver agents that can be used to simultaneously monitor and treat diseases in a specific and safe manner with optical-based techniques. This approach consists of upconverting nanoparticles (UCNPs), which harvest NIR light and emit visible light, decorated with ruthenium based, visible light-activated CORMs and a tumour-targeting peptide.

It will be the first study of its kind to probe in detail the uptake, trafficking and light-triggered activation of photo-CORMs in cells using a suite of high-resolution spectroscopic techniques in the multidisciplinary environment at Monash University and Helmholtz-Zentrum Dresden-Rossendorf. The applicant has the opportunity to learn a lot of new research methods in the field of cancer theranostics, and it is a crucial step in developing her independent carrier.