

CONTRATOS PREDOCTORALES 2022 SEVERO OCHOA

PROJECT TITLE / JOB POSITION TITLE:

Novel fluorescent nanoparticle formulations for image guided surgery of ovarian cancer

JOB POSITION RESEARCH LINE:

RL5- BIOACTIVE MATERIALS FOR THERAPY AND DIAGNOSIS

RESEARCH PROJECT / RESEARCH GROUP DESCRIPTION:

Ovarian cancer is the fourth most common cause of cancer deaths in women in the developed world, and remains the leading cause of death from gynaecologic cancer in Spain. Advanced ovarian cancer treatment relies on surgery, which is pivotal in the treatment of solid cancers. Optimal cytoreductive surgery, for which precise tumour margin detection is crucial, is the most relevant prognostic factor. Fluorescence-based image-guided surgery has shown great potential to detect tumour tissue intraoperatively with high sensitivity, low cost, and real-time capabilities. However, currently available contrast agents present important drawbacks, such as a lack of specificity towards tumour tissue, as well as instability in aqueous media and photobleaching.

In this doctoral thesis project, novel fluorescent nanoparticles will be developed, to be used as contrast agent in image guided surgery of ovarian cancer, for enhanced tumour margin detection. The fluorescent nanoparticle formulations will be optimized for increased brightness and photostability, while at the same time presenting enhanced selectivity towards ovarian cancer cells. The fluorescent nanoparticles will be prepared using a green and scalable process based on compressed CO₂, and an in-depth characterization of their physico-chemical and optical properties will be carried out, partially in collaboration with internationally renowned experts and in collaboration with a team of biologists and surgeons of the Hospital Germans Trias i Pujol (Barcelona). Furthermore, explorative work will be performed using next-generation dyes synthesized by collaborators, in the frame of the MSCA RISE project Micro4Nano.

The Nanomol-Bio group of ICMAB (<https://icmab.es/mnom/nanomol-bio>) is devoted to the synthesis, physico-chemical characterization and development, up to pre-clinical regulatory phases, of molecular and polymeric (nano)materials for biomedical therapeutic and diagnostic applications, and forms part of the Spanish network CIBER-BBN (<https://www.ciber-bbn.es/en>).

JOB POSITION DESCRIPTION:

The main responsibilities within this project consist in the preparation and characterization of fluorescent nanovesicles for usability tests in image-guided surgery to treat ovarian cancer. Specifically, to transform highly colloidal stable nanoparticles into new fluorescent contrast agents for this application, they must be functionalized with molecules that facilitate targeting to tumor tissue. The PhD-student will develop the main part of the work at Nanomol-Bio group at ICMAB, but will also be in close contact with our collaborators of the *Hospital Germans Trias i Pujol*, and will participate in in vitro cell assays to evaluate the selectivity towards ovarian cancer cells. Some research stays abroad within the MSCA RISE project Micro4Nano (<https://www.micro4nano.unipr.it/>) are envisioned.

The preparation and characterization of said nanoparticles requires good knowledge in biochemistry and in the processing and characterization of nanoparticulate molecular materials, for which a BSc degree in Biomedicine and additional skills in Biochemistry are required.

GROUP LEADER:

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Research project / Research Group website <https://icmab.es/mnom/nanomol-bio>