



Marta PEREZ LLORET

Technology Centre: Pharmaceutical Manufacturing Technology Centre (PMTC), UL
Academic Mentor: Dr. Andrea Erxleben
Company Partner: Helsinn Birex Pharmaceuticals
Company Mentor: Eithne McNeela

Dr. Marta Pérez Lloret obtained her MCs in Chemistry in 2014 at the University of Zaragoza, Spain. From 2014 to 2017 she was a PhD student in Chemical Sciences at University of Catania, Italy, in the frame of the European Project Marie Curie Network for Initial Training – ITN Cyclon-Hit funded by the Seventh EU Framework Program. Titled “Photoactivable Multimodal Antimicrobial Nanoconstructs”, her thesis focused on the design and fabrication of innovative nanocarriers presenting antibacterial activity under light stimulation. Unconventional therapeutics such as heat, reactive oxygen and nitrogen species have been used for this aim since they do not suffer multidrug resistance problems in contrast to “conventional” drugs.

Dr. Andrea Erxleben

Dr. Andrea Erxleben, has been leading research groups and training MSc and PhD students at the University of Dortmund, Germany, Vienna and at NUI Galway, Ireland. Her 20 years long research experience as independent PI covers various aspects of bioinorganic and pharmaceutical chemistry, including anticancer metallodrugs, metal complexes with receptor-specific carrier ligands, metal complexes as DNA cleavage agents, particle and crystal engineering, particle size and particle morphology control. She has published close to 100 research papers and review articles in renowned peer-reviewed journals with >2100 citations. She currently supervises a group of six PhD students, one MSc student, four visiting students and one postdoctoral researcher. She is an seasoned mentor for experienced researchers, having supervised and trained seven postdoctoral researchers including two Marie Curie fellows (average duration of stay: 23 months). Four of her former postdoctoral mentees are pursuing academic careers. Dr. Erxleben has a large network of collaborators in Europe, Asia and America (details available in capacity table in B2-5). Dr. Erxleben is experienced in project management. She has been / is involved in various externally funded projects with a total grant income of 2.57 M € (incl. overheads) since 2007 e.g. SFI, IRC. The most significant current project participation is her involvement in SSPC.

Eithne McNeela

Eithne McNeela is the Senior Manager in the department of Technical Affairs at Helsinn Birex Pharmaceuticals (HBP). Her educational background includes a BSc in Biochemistry from University College Galway (now NUI Galway) followed by a MSc in Chemistry from University College Galway. Eithne is a collaborator with academic institutions such as PMTC, University College Dublin and has access to the facilities of Trinity College Dublin for supportive testing of new products. Within her role in HBP, she is the person responsible for implementing and developing new products and is also the Chemistry, Manufacturing and Controls (CMC) within the Global Helsinn Group. In her capacity as senior manager, working as part of the Global Research team representing CMC, she has developed, supplied to clinical and submitted dossiers to European Medicines Agency/US Food and Drug Administration (EMA/DFA) and Worldwide. In 2008 she submitted and secured financial approval to implement an Oral Solid Dosage development unit in HBP with the aim of being the centre of excellence for the group. In 2009 the project started and in 2010 this area was fully equipped and approved by the Health Products Regulatory Authority (HPRA) to start manufacturing clinical supplies.

PMTC

The PMTC is hosted at the University of Limerick with core funding from the Irish Government, supplemented with co-funding from industry and leveraging further research funding. The PMTC is co-ordinated by an industry–academia advisory committee with an industrially driven research programme. Indigenous SMEs along with MNCs access the PMTC to inform the research agenda. Company engagement allows the PMTC to execute world-leading, industry-relevant research in advanced technology solutions to address contemporary manufacturing issues across the pharmaceutical sector. Members benefit by having access to core capability and skills in continuous processing, mathematical modelling, statistics and process optimization, and unrivalled awareness of research programme outputs. Other benefits include: pre-agreed project agreements, professionally managed, timely access to IP and research outputs, opportunities to identify talent for future recruitment; and, access to members only networking forums with key industry players, academia, regulators and government agencies. The Centre accesses state-of-the-art research facilities capable of delivering molecule to patient solutions through its Irish academic members.

Helsinn Birex Pharmaceuticals

Helsinn is a privately owned pharmaceutical group with an extensive portfolio of marketed cancer care products and a broad development pipeline. Since 1976, Helsinn, focused on the development of new treatments to fulfil more medical needs by supporting research studies that advance medical and scientific knowledge about their products. The Group works across pharmaceuticals, biotechnology and medical devices and has expertise in research and development, manufacturing and commercialisation of therapeutic and supportive care products for cancer, pain, inflammation and gastroenterology. Helsinn Group operates through a unique business model of Integrated Licensing, focused on the in-licensing of Novel Chemical Entities (NCE) from R&D partners, and the out-licensing of its entire pipeline of products to a wide network of commercial partners. The company is headquartered in Lugano, Switzerland, with operating subsidiaries in Ireland, the US, Monaco and in China as well as a product presence in about 190 countries globally. With more than 700 employees, Helsinn is a modern Group focused on growth and development but also tied to tradition and on the values of a family business. This company seeks to improve not only health, but also the quality of life, especially in cancer patients. Additionally, Helsinn's extensive network of partners who commercialize the group's products around the world has been built and constantly expanded over several decades. Over the past five years they reinvested 25% of their profits into facilities and research and development. Their R&D capabilities are recognized worldwide, from pre-clinical research through all phases of clinical development with proven expertise and focus in cancer care. Besides the people working in manufacturing, Helsinn has its own team of researcher and intersectoral collaborations to ensure the ongoing of new products.

Marta's project

Cancer is one of the leading causes of death around the world despite the progress achieved in developing new strategies to defeat it. The discovery of cisplatin, an antitumor agent, marked a turning point in chemotherapy. However, due to cisplatin's severe side effects and the resistance towards platinum drugs frequently developed by cancer cells the attention is shifting to other and less exploited metallodrugs, such as gold-containing compounds like Auranofin, and novel modes of action. Originally prescribed for rheumatoid arthritis, Auranofin was shown to also have anticancer activity by inducing controlled cell death, a process known as apoptosis, through a specific enzyme mediated pathway. This outcome repurposed Auranofin as an anti-cancer drug which is now in clinical trials. Despite the promising properties, gold complexes present drawbacks including broad toxicity, as well as poor bioavailability, stability and selectivity, that are hampering their implementation in clinical use. To overcome these disadvantages, gold complexes could be encapsulated in a thin shell (nanohydrogel) made from complex sugars. Such an approach also offers a wide range of selective targeting possibilities. One such complex sugar, hyaluronic acid (HA), binds to a receptor protein that is present in over-abundance at the surface of cancer cells, thus making cancer cells highly efficient at capturing the HA coated drug complex. This research project focuses on the design of HA-based nanohydrogels and nanoparticles loaded with Auranofin and similar gold complexes drugs with highly effective anticancer activity. The use of target-selective nanohydrogels will reduce the side effects of this family of metallodrugs that result from poor selectivity and bioavailability.

