

IBEC-VHIR INTERNATIONAL PhD PROGRAMME

Position

1. Project Title/ Job Position title:

A 3D Bioprinted Tumor Model to Demonstrate the Effectiveness of a New Therapy Applicable to HNSCC Patients

2. Research project / Research Group description (max. 2.000 characters)

Head and neck squamous cell carcinomas (HNSCC) are the 6th most common cancer type worldwide and are particularly aggressive tumors. Current chemotherapies have barely changed in the last 50 years, with fewer than 5% of patients being suitable candidates for immunotherapy. Additionally, 40% of HNSCC cases are diagnosed at an advanced stage and are treated with chemoradiotherapy, which is often associated with side-effects and poor response rates.

The first novelty of this project lies in creating the first *in vitro* model in 3D mimicking the HNSCC tumor microenvironment (TME). For this, we will use advanced 3D bioprinted tumor model both off-chip and in chip where cancer cells (derived from HNSCC patient biopsies) coexist with other tumor associated cells like immune cells and cancer associated fibroblast to reproduce accurately the TME. Regarding immune cells, monocytes and dendritic cells will be considered. The second novelty yields in the novel drug D14-3, patented by us (Ref. EP23383269), against TSPAN1, a membrane receptor overexpressed in resistant cells and several human cancers. We have observed that mice tumors formed by HNSCC human cells treated with D14-3 are smaller and have less metastasis vs controls. To achieve lethal therapeutic effects while minimizing side effects, we will combine the novel drug D14-3 with current chemotherapy (Cisplatin [CDDP] or Docetaxel [DTX]), to eliminate both resistant cells and bulk cancer cells.

Later, this 3D bioprinted tumor model will be used in *in vivo* experiments. 3D bioprinted tumor model will be inoculated subcutaneously in mice to reproduce real tumors and demonstrate the effects of D14-3 in combination with CDDP or DTX in HNSCC tumors as observed in nude mice. We envision that the demonstration of the therapeutic effect in this model will transform cancer treatments by providing a potent therapy adaptable to various cancer types.

3. Job position description

The offered position will be framed within a collaboration between the groups of VHIR and IBEC to speed up the arrival of potential cancer therapies to the patient. Having this as a ultimate goal, the candidate will employ the biofabrication techniques and protocols developed at IBEC to produce novel models to test the promising drug candidates developed at VHIR at the preclinical stage. At IBEC, the candidate will work in an interdisciplinary environment, supported by a team of engineers, physicists, chemists and biologist. Meanwhile, at VHIR, the candidate will work in a highly stimulating environment that is known to bridge basic and clinical Research. The VHIR group is a translational laboratory composed of biologists, pathologists, surgeons and oncologists. Senior researchers at the VHIR have large experience in animal models, especially mice, therefore the candidate will have a perfect environment to carry out animal experiments.

The candidate will acquire high experience in cellular (tissue culture) and molecular biology techniques (DNA, RNA and protein extraction, PCR, qRT-PCR, western-blot, immunohistochemistry...) including the already established bioprinted model for other types of cancer (different than HNSCC).

Tasks and responsibilities:

- Set-up a new bioprinted model from biopsies derived from chemoresistant HNSCC patients
- Set-up such model in mice to reproduce real human tumors and demonstrate the effectiveness of the novel 14-3 drug (D14-3)

Requirements for candidates:

- Degree in Biology, Biomedicine or related
- Previous experience in cellular and molecular biology techniques will be a value.
- Medium/High level of English.
- Self-critical, capacity to learn and bring knowledge.
- High motivation and ability to be involved in an international multidisciplinary team.
- Excellent team working and communication skills.

We Offer:

- Four year contract.
- Stimulating, interdisciplinary research and high quality international scientific environment.
- Salary in agreement with Spanish PhD grants.

Group Leader at IBEC

1. Title: Dr.
2. Full name: Elena Martinez Fraiz
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4. Research Group: Biomimetic Systems for cell Engineering.

The Biomimetic systems for cell engineering group focuses its research on the development and application of new artificial systems that mimic tissue micro- and nano-features to produce complex 3D tissue models for in vitro assays. The group's research ambition is to develop better engineering tools for organotypic cell culture models, easy to implement in cell culture routines to have a meaningful impact in the biotechnological arena. Those will impact applications in basic cell research, disease modelling and regenerative medicine. The main focus is the development of epithelial barriers (gut and skin), blood vessels and cardiac tissue-like constructs.

Group Leader at VHIR

1. Title: Dr.
2. Full name: Matilde E. LLeonart Pajarín
3. Email: matilde.lleonart@vhir.org
4. Research Group: Head and neck cancer: Biomedical Research in tumor stem cells