



MASTER'S DEGREE IN BIOMEDICAL RESEARCH
Research Project Proposal
Academic year 2024-2025

Project Nº 29

Title: Development of sensibilizing therapies for the treatment of radioresistant NSCLC tumors.

Department/ Laboratory Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.

Program in Solid Tumors, CIMA, Laboratory 202

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Summary Short summary of the project with a maximum extension of 250 words, including the goals and the methodology that will be used

Lung cancer remains as the leading cause of cancer death in Europe and the United States. It is estimated that more than half of stage I-III Non-Small Cell Lung Cancer (NSCLC) patients will require curative or palliative-intent radiotherapy during their disease. Unfortunately, radiation resistance occurs in up to 40% of patients.

Cancer cells can exploit intrinsic factors to overcome DNA damage caused by radiation. Certain subpopulations of the tumor with intrinsic resistance to radiation can evade growth suppressing signals, reprogram their metabolism and alter DNA repair mechanisms. The contribution of extrinsic factors (immune system) to radiation resistance is not fully understood. It is unclear whether re-irradiation should be combined with systemic treatments and how patients could benefit from radiosensitizer and immunomodulatory strategies.

To address these issues, we developed NSCLC mouse models to study the intrinsic factors of radiotherapy resistance in a context of complete immunity, which could be highly valuable to study possible synergistic effects of radiotherapy and immunotherapy of re-irradiated NSCLC.

We have already identified cellular pathways responsible for this resistance and components of the immune system that protect cells from radiation. Specifically, the goals of this projects are: 1) to develop inhibitory strategies to sensitize NSCLC to radiotherapy, 2) to develop immunomodulatory approaches to reduce the radioprotection of NSCLC by the immune system.

The candidate will learn molecular and cellular techniques, such as cell culture, western blot, PCR, flow cytometry, multiplex immunohistochemistry. He/she will participate in animal work related to immunotherapy treatments. The project will be carried out with help of members of the laboratory and results will be discussed in group meetings.

Table with 2 columns and 2 rows: yes, X; no,

Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator? YES