OVERVIEW

Our laboratory is focused on understanding metastatic progression. During this process, tumour cells communicate actively with the tumour microenvironment. Among all factors involved in metastasis, our laboratory is specifically interested in defining the role of secreted exosomes during pre-metastatic niche formation. Exosomes are actively involved in cell-cell communication during both physiological and pathological processes. Our data support that tumour-secreted exosomes are involved in: 1) pre-metastatic niche formation and metastatic organotropism depending on the integrin expression profile on involved tissues; and 2) stromal cell reprogramming by horizontal organotropism depending on the integrin expression profile on involved tissues.

Role of tumour-derived exosomes in lymph node metastasis

Melanoma-secreted exosomes have been shown to home to specific niches in lymph nodes. We are studying how tumour-secreted exosomes promote cellular and molecular alterations in the lymph node microenvironment, fostering metastasis (FIGURE A). The goal of the current project is to determine the mechanisms through which tumour-derived exosomes promote lymph node and distal metastasis. Our studies in melanoma patients will be the first ones evaluating the use of circulating vesicles in lymphatic fluid as biomarkers to predict relapse and metastatic potential.

新型 pathways involved in neurofibromatosis progression

Although neurofibromatosis is a genetic disorder, in this project we aim to develop a very innovative concept, which focuses on unveiling unknown pathways involved in exosome secretion during neurofibromatosis progression. We are investigating the molecular signature of exosomes secreted from highly malignant neuroblastoma cells. Our data support that tumour-secreted exosomes carry a specific signature that can be detected in the circulation. This approach will result in the development of new diagnostic tests and therapies to block neurofibromatosis progression.

Novel pathways involved in neurofibromatosis progression

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“Exosome secretion by metastatic cells is an adaptive strategy for tumour cells to corrupt the surrounding microenvironment, thereby favouring tumour progression.”

PUBLICATIONS


AWARDS AND RECOGNITION

- XVII FERF Oncology Research Award (2016), Spain.
- FERO Grant for Translational Research in Oncology (2016), FERO Foundation for Oncology Research, Spain.

Figure (A) Analysis of exosome distribution in sentinel lymph nodes. Green-labeled exosomes from B16-F1R2 melanoma cells were injected in the footpad and followed for 16 hours. Analysis of lymph nodes demonstrates that exosomes reach the popliteal (sentinel) lymph nodes with a specific distribution found mainly in subcortical areas co-localizing with lymphatic endothelial cells (in red).

Figure (B) Metastasis of breast cancer cell lines in lung metastatic niches. Tumour breast cancer cell lines (in red) were injected by tail vein in mice, in combination with platelets. Analysis of metastasis demonstrates that tumour cells reach metastatic lungs in areas surrounding terminal bronchioles, formerly known as areas where pre-metastatic niches were formed.