Brain metastasis is the most common neurological complication of cancer. When metastatic cells reach the brain, prognosis is poor given that local therapies (i.e., surgery and radiation) have limited benefit for patients, and the disease inevitably progresses. The rise in the number of patients with brain metastasis is partially due to the increasing number of systemic therapies that work extra-cranially but are unable to provide metastases and patient-derived organotypic cultures, which we have used in our projects.”

“We have established a nation-wide network of hospitals (RENACER) to generate a large repository of brain metastases and patient-derived organotypic cultures, which we have used in our projects.”

We have applied single cell technology (scRNAseq) both within the cancer cell and the non-cancer cell (microenvironment) compartments of brain metastasis in our experimental models, identifying previously unknown subpopulations that we are currently evaluating functionally.

We have confirmed that our drug-screening platform (METPlatform) could be exploited clinically as a patient-derived assay, being potentially transformative for the future design of clinical trials. We have initiated a novel research line to evaluate the influence of metastases in neural circuits and brain function in order to elucidate the molecular mechanisms underlying neurocognitive deterioration in patients.

We are developing a new drug-screening platform based on organotypic cultures that identifies vulnerabilities to prevent and treat brain metastasis. (PMID: 35174975. (*) Corresponding author.)

**PUBLICATIONS**
- Francesc Montesi, Marina At-Massumil, Lluís Cordon (since May), Neibla Priego (until September)
- Laura Adriana Álvarez, Ana De Pablo, Angelone, Pedro García, Carolina Fernández, Hernández, Lucía Zhu (until September)
- We have confirmed that our drug-screening platform (METPlatform) is a novel drug-screening strategy using live organs with metastases. (A, B, C) Selected drugs can be translated to patient-derived organotypic cultures. (D, E) METPlatform has the potential to predict within days the response of a patient to a given therapy.

**AWARDS AND RECOGNITION**
- Manuel Valiente: Co-founder of the National Network of Brain Metastases (RENACER), Spain.
- Finalist, Dr Josef Steiner Cancer Research Award, Switzerland.
- Laura Priego: Invited talk at the 16th EANO Meeting (European Society for Medical Oncology ); selected oral presentation at the 16th EANO Meeting (European Society for Medical Oncology ); selected oral presentation at the 3rd Annual SNO Conference on Brain Metastases (Society for Neuro-Oncology).
- Lluís Cordon was awarded a “CNIO Friends” Postdoctoral Contract.
- Laura Zhu: “Best Talk Award”, OAN/PDN Research Symposium in Health Sciences and Biomedicine; selected oral presentations at the 16th EANO Meeting (European Association of Neuro-Oncology ) and the 3rd Annual SNO Conference on Brain Metastases (Society for Neuro-Oncology).
- Neibla Priego: Invited talk at the 5th National Congress of the Italian Society for Neuroscience.

**OVERVIEW**
Brain metastasis is the most common neurological complication of cancer. When metastatic cells reach the brain, prognosis is poor given that local therapies (i.e., surgery and radiation) have limited benefit for patients, and the disease inevitably progresses. The rise in the number of patients with brain metastasis is partially due to the increasing number of systemic therapies that work extra-cranially but are unable to provide the same therapeutic benefit in the brain. Consequently, cancer cells present at this secondary site have additional time to evolve and to grow into clinically detectable lesions. In the laboratory, we study why and how cells from different cancer types (breast cancer, lung cancer and melanoma) are able to access the brain, survive and colonise this vital organ. We dissect the biology of these processes in vivo using experimental models in order to challenge the current status of this unmet clinical need.

**RESEARCH HIGHLIGHTS**
We have confirmed that our drug-screening platform (METPlatform) could be exploited clinically as a patient-derived assay, being potentially transformative for the future design of clinical trials. We have initiated a novel research line to evaluate the influence of metastases in neural circuits and brain function in order to elucidate the molecular mechanisms underlying neurocognitive deterioration in patients.

**FIGURE**
(A) METPlatform is a novel drug-screening strategy using live organs with metastases. (B, C) Selected drugs can be translated to patient-derived organotypic cultures. (D, E) METPlatform has the potential to predict within days the response of a patient to a given therapy.

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