Myeloid cells are abundant in solid tumours. While their heterogeneity has been widely described, efficient ways of manipulating these cells are scarce. My laboratory focuses on the identification and therapeutic targeting of myeloid checkpoint programmes in cancer. By studying the microenvironment in which lung, ovarian, and breast cancer emerge, we examine how macrophages crosstalk with the stroma and how they modulate their malignant conversion.

Ovarian tumours are massively infiltrated by macrophages, yet their origin and expansion remain unexplored. Clonal haematopoiensis is known to confer the advantageous expansion of certain haematopoietic stem or progenitor clones, and its presence correlates with increased inflammatory output from mutated cells. Interestingly, tumours in which WT and Tet2-deficient clones cohabit display increased macrophage numbers, as opposed to macrophages derived from a fully WT haematopoietic environment. These macrophages express higher levels of immunosuppressive molecules (PD-L1, Arg1, among others) and a significant expansion at the tumour site. Given these observations, we are currently modulating BMAL1-controlled programmes in particular subsets of myeloid cells.

To understand ways to design time-based therapies to harness anti-tumour immunity and break time-dependent immune suppression, we are pursuing an approach based on the hypothesis that manipulating circadian programmes in the immune system could be a potential strategy to enhance anti-tumour activity. We are currently exploring how this occurs mechanistically.

During 2023, my Group successfully incorporated 3 new Ph.D. students: Mariola Muniñíriz and Eduardo Garvin, funded by “Severo Ochoa” Excellence and Retos del Conocimiento programmes, respectively, and Jan Hochstad, funded by “La Caixa” Foundation Health Research Grant. Their projects are starting to bloom, and their work has already been presented at national symposia (ASECICA 40th Anniversary Meeting and the Annual Sociedad Española de Inmunología Congress). In addition, a new lab manager (Mónica Gómez) and 2 postdoctoral fellows joined the team: Alba de Juan (funded as a Ramón y Cajal Junior Fellow) and Sarai Martínez Pacheco (funded by the H2020 Transcan Network).

During 2023, we also obtained funding from the European Research Council (ERC StG2021). In this project, we are uncovering the mechanisms by which circadian rhythms of the immune system become dysfunctional in tumours. Our goal is to leverage this knowledge to develop new therapeutic strategies that target the circadian clock in cancer.