



RESEARCH TOPIC MECM9

Identification of prognostic and predictive biomarkers of therapeutic response in cancer MECM standard

Research Area

Immunology

Laboratory name

Tumor Microenvironment Unit

Research Supervisor

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Abstract

Recent advances in cancer immunotherapy have improved the prognosis for certain subgroups of patients with solid tumors. However, a substantial proportion of patients still do not benefit from these therapies. Understanding the complex interaction between tumor cells and the immune microenvironment is therefore crucial for identifying predictive biomarkers and developing effective treatments. Innovative approaches, such as cell population culture techniques on chips, now make it possible to reconstruct the heterogeneity of the tumor microenvironment and to incorporate components such as bacterial species or elements of the extracellular matrix into the system. In this context, high-dimensional imaging techniques, such as Imaging Mass Cytometry (IMC), enable detailed spatial and phenotypic characterization of the tumor ecosystem and represent powerful tools for biomarker discovery. This project will use these new approaches to study different tumor types, with the goal of identifying biomarkers associated with disease progression and therapy resistance.

Main technical approaches

The project offers a hybrid training experience, combining wet-lab activities with data analysis. It is therefore well-suited for candidates with a background in biomedical sciences, bioengineering, or data science, with a strong interest in translational cancer research and the integration of experimental and computational approaches.

Scientific references

1. Sex hormones, the anticancer immune response, and therapeutic opportunities. Conforti F, Pala L, Di Mitri D, Catania C, Cocorocchio E, Laszlo D, Ceresoli G, Locatelli M, Facella F, De Pas T, Rambaldi B, Rambaldi A, Viale G, Bagnardi V, Giaccone G, Mantovani A. *Cancer Cell*. 2025 Mar 10;43(3):343-360. doi: 10.1016/j.ccell.2025.02.013.

2. Primary, Adaptive, and Acquired Resistance to Cancer Immunotherapy. Padmanee Sharma, Siwen Hu-Lieskovan, Jennifer A Wargo, Antoni Ribas Cell 2017. PMID: 28187290
3. Lipid-loaded tumor-associated macrophages sustain tumor growth and invasiveness in prostate cancer. Masetti M, Carriero R,Di Mitri D. J Exp Med. 2022 Feb 7;219(2):e20210564. doi: 10.1084/jem.20210564. Epub 2021 Dec 17. PMID: 34919143
4. Single-cell spatial landscapes of the lung tumour immune microenvironment. Mark Sorin, Morteza Rezanejad,... Daniela F. Quail, Philippe Joubert & Logan A. Walsh. Nature volume 614, pages548–554 (2023)
5. Ali, H. R. et al. Imaging mass cytometry and multiplatform genomics define the phenogenomic landscape of breast cancer. Nat. Cancer 1, 163–175 (2020).

Type of contract

PhD scholarship of € 21.000 gross per year awarded by Humanitas University. This sum is exempt from IRPEF income tax according to the provisions of art. 4 of Law no. 476 of 13th August 1984, and is subject to social security contributions according to the provisions of art. 2, section 26 and subsequent sections, of Law no. 335 of 8th August 1995 and subsequent modifications.

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