European School of Molecular Medicine

2025 summer call PhD selections

AVAILABLE POSITIONS

Principal Investigator	Beatrice Zitti
Affiliation	IFOM ETS - The AIRC Institute of Molecular Oncology
Title of the proposed project:	Leveraging T_{RM} cells in the tumor microenvironment for improved immunotherapy
Short description of the project	Immunotherapy using checkpoint blockade revolutionized the management of previously incurable malignancies, significantly increasing overall and progression-free survival. However, a substantial proportion of patients either fail to respond or ultimately relapse, highlighting the urgent need to elucidate the mechanisms underlying durable responses and resistance. Increasing evidence demonstrate that the composition, spatial organization, and functional state of immune infiltrates within the tumor microenvironment (TME) are critical determinants of tumor progression and immunotherapy efficacy. Yet, the mechanisms that orchestrate effective anti-tumor immunity within the TME remain incompletely defined. We propose that tissue-specific immune programs—particularly those mediated by tissueresident memory T (Trm) cells— represent a crucial, yet underexplored, component of the local immune architecture within tumors that can be leveraged to improve immunotherapy outcomes. The successful PhD candidate will contribute to a project focused on uncovering and therapeutically targeting the mechanisms by which Trm cells shape anti-tumor immune responses within the TME, with the ultimate goal of improving immunotherapy efficacy. We hypothesize that Trm cells serve as critical in situ sentinels of malignant transformation, orchestrating local immune responses through the integration of innate and adaptive signals to promote durable anti-tumor immunity. Elucidating their functional role will pave the way for novel, actionable strategies to reprogram the TME and enhance immunotherapeutic outcomes for long-term tumor control.
Main research area for the project	Immunology
Second research area for the project	Cancer Biology
3 key words for project	Tumor microenvironment; immunotherapy; melanoma
Main topic/s of the lab	Tumor microenvironment and immunotherapy
Short description of the lab activity	The research activity of the lab focuses on understanding how spatial and functional interactions among immune cells within tissues influence anti-tumor immunity, with the goal of identifying novel strategies to improve immunotherapeutic outcomes. Specifically, we use patient derived samples and mouse tumor models, integrating high-dimensional spectral flow cytometry, spatial analyses, single-cell transcriptomics and intravital imaging to dissect the cellular and molecular mechanisms that orchestrate effective immune responses within the tumor microenvironment.

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Recent bibliography	Bill R, Wirapati P, Messemaker M, Roh W, **Zitti B**, Duval F, Kiss M, Park JC, Saal TM, Hoelzl J, Tarussio D, Benedetti F, Tissot S, Varrone M, Ciriello G, McKee TA, Monnier Y, Mermod M, Blaum EM, Gushterova I, Gonye ALK, Hacohen N, Getz G, Mempel TR, Klein AM, Weissleder R, Faquin WC, Sadow P, Lin D, Pai SI, Sade-Feldman M, Pittet MJ. *CXCL9:SPP1+ macrophage polarity identifies a network of cellular programs that control human cancers.* ***Science*** (2023) 381(6657):515-524 **Zitti B**, Hoffer H, Zheng W, Pandey RV, Schlums H, Perinetti Casoni G, Fusi I, Nguyen L, Kärner J, Kokkinou E, Carrasco A, Gahm J, Ehrström M, Happaniemi S, Keita AV, Hedin CRH, Mjösberg J, Eidsmo L, Bryceson YT. *Human skin-resident CD8+ T cells require RUNX2 and RUNX3 for induction of cytotoxicity and expression of the integrin CD49a.* ***Immunity*** (2023) 56:1-18 Helm EY, Zelenka T, Cismasiu VB, Islam S, Silvane L, **Zitti B**, Holmes TD, Drashansky T, Kwiatkowski AJ, Tao C, Dean J, Obermayer AN, Chen X, Keselowsky BG, Zhang W, Huo Z, Zhou L, Sheridan B,Conejo-Garcia JR, Shaw TI, Bryceson YT, Avram D. *Bcl11b sustains multipotency and restricts effector programs of intestinal-resident memory CD8+ T cells.* ***Sci Immunol*** (2023) 8(82):eabn0484 Gallais Sérézal I, Hoffer E, Ignatov B, Martini E, **Zitti B**, Ehrström M, Eidsmo L. *A skewed pool of resident T cells triggers psoriasis-associated tissue responses in never-lesional skin from patients with psoriasis.* ***J Allergy Clin Immunol*** (2019) 143(4): 1444-1454
Group composition	Beatrice Zitti, PhD – Principal Investigator Eleonora Russo, PhD – Postdoctoral Fellow
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