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SPatial Omics Consortium & Bern Center for Precision Medicine present:

Spatial omics: The Discussion Sessions

When: Thursday, May 16th, 2024, 16:00 CET

Where: online via Zoom. To register, please scan the QR-code

Title: "Multiscale microscopy to study systemic immunotherapy response"

Speaker: Gina Dunkel, WSIC Werner Siemens Imaging Center, Radiological University Hospital Tübingen and the Medical Faculty of the University of Tübingen, Germany

Bio:

Gina Dunkel, M.Sc. in Biomedical Science, is a PhD Candidate at the Werner Siemens Imaging Center at the University Hospital of Tübingen. She did her Bachelor's in Molecular Medicine in Göttingen and studied Biomedical Science in Nijmegen (NL) for her Master. During her master´s internship at the MD Anderson Cancer Center in Houston (USA) she developed her interest in immunotherapy and microscopy and extended her knowledge during her master thesis in the group of Prof Dr. Peter Friedl at the Radboud Institute for Molecular Life Sciences, before starting her PhD in December 2019 in the Preclinical Imaging of the Immune System Group of Prof. Dr. Bettina Weigelin in Tübingen. In her current research, she is focusing on understanding immunoresistance in metastatic cancer to develop systemically effective immunotherapies using light-sheet microscopy and high-dimensional spatial tissue analysis.

Abstract:

Immunotherapeutic targeting of advanced cancer holds promise for long-lasting remission, but effective treatments are often limited by the heterogenous response of metastatic lesions in diverse organ niches. To understand organ-specific immune evasion mechanisms and to develop systemically effective combination therapies, we established a breast cancer metastasis model and multiscale microscopy readout using whole-organ light-sheet microscopy (LSM) and multiplexed immunofluorescence analysis (IF) of cellular neighborhoods. Systemic metastases were generated using intracaudal artery injection which allowed to monitor metastatic outgrowth and immunotargeting in the lung, liver, and bones. Using LSM, we mapped CD8 T cell infiltration, blood vessel density, tumor cell proliferation, and apoptosis in relation to anatomical organ niches. We found multiple immune resistance mechanisms, including immune exclusion, immunosuppression and Immune evasion to co-exist in the same animal with intra- and inter-organ-specific patterns and frequency. To analyze the cellular composition of immuno-responsive and non-responsive sites, we are developing a workflow to extract tissue cylinders delineated in 3D LSM volumes using a milling robot and created tissue arrays for CO-Detection by IndExing (CODEX) analysis with >30 markers. The multiscale information on immunotherapy response and resistance will help to better understand the resistance mechanisms observed in cell-based immunotherapies and facilitate the design of systemically effective combination therapies for metastatic cancer.