



RESEARCH TOPIC DASMEN4

Applying high dimensional single cell technologies to the analysis of the interaction between the tumor and its microenvironment

Curriculum DASMEN Standard

Laboratory name and address

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Abstract

Immune surveillance limits cancer onset and progression. In order to develop, cancers establish mechanisms to avoid immune recognition and to hamper the immune response. Moreover, cancer cells are able to reprogram the immune response and to get support from immune infiltrating cells. Immunotherapies, including immune checkpoint blockades and vaccines, have thus been developed to restore an efficient immune response against cancer. Indeed immunotherapies have revolutionized cancer outcomes, yet these therapies are ineffective in most patients and predicting which patients will respond and how to enhance efficacy remain significant challenges. Main scope of the present proposal is an in depth investigation of the immune composition in cancer patients. We will apply high dimensional approaches, including single cell RNA sequencing, to dissect the transcriptional profile of tumor infiltrating immune cells. Moreover, we will perform a spatial analysis of the tumor microenvironment by mean of Imaging Mass Cytometry and spatial transcriptomics. Myeloid and lymphoid cells dynamics will be investigated and cell to cell interactions established between cancer cells, stromal cells and immune subsets will be analyzed. Then project will determine if immune sub-populations act as determinants of tumor progression and therapy efficacy and will unveil mechanisms underlying the origin and function of infiltrating immune subsets. Main scope of the proposal is the application of bioinformatic approaches to derive genetic signatures that predict therapy response/resistance in cancer patients and to identify targets that can be exploited to improve the efficacy of immunotherapies.

Main technical approaches

Bioinformatic approaches to analyze data from scRNAseq, spatial scRNAseq (10X platform), Imaging Mass Cytometry (Hyperion system)

**Scientific references**

Di Mitri D et al, Cell Reports 2019

Masetti M and Carriero R et al, JEM 2021

Zhang L et al, Cell 2020

Cheng S et al, Cell 2021

Giesen C et al, Nature methods 2014

Type of contract

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