Exploring, exploiting and imaging the tumor microenvironment

Our laboratory has been studying myeloid cells with immune suppressive ability in cancer patients in the last ten years, and more recently focused on primary brain tumors, such as meningiomas and gliomas. These tumors present a heterogeneous microenvironment in which different cell types interact influencing tumor growth and response to therapy. Of note, during tumor growth, the immune landscape of the brain drastically changes with the infiltration of myeloid cells, endowed with immunosuppressive function. In this respect we have shown the heterogeneity of tumor microenvironment (TME) in gliomas, and demonstrated that blood-derived monocytes in glioma patients are responsible for the strong immunosuppression exerted in the TME. The constant recruitment of myeloid cells from bone marrow into the TME is an obstacle that limits treatment efficiency, and we are studying new strategies to restrain myeloid recruitment or to eliminate them in TME. To this aim we have multiple projects focused on exploring the TME of gliomas to identify new target of intervention in myeloid suppressive cells. In addition, we exploit the use of new nanotechnologies to reprogram or modulate the immune response by precisely targeting biological pathways.

A new line of research concerns the possibility of i**maging immune suppression in glioma patients.** Patients undergoing neurosurgery are studied before surgery, with a combined PET/MRI scan. This technology offers the opportunity to combine and integrate data obtained from immunophenotyping, obtained from the study of the tumor microenvironment, with quantitative neuroimaging measures. Preliminary analysis show that metabolic and vascular information derived from the quantification of PET and MRI images supports an association between neuroimaging biomarkers and immune contexture, containing a myeloid suppressive signature.