Adoptive cell therapy for the treatment of solid tumors with T cells and Cytokine- Induced Killer (CIK)

Cancer immunotherapy has shown promising results against different tumors, and the last few years are witnessing a sort of cancer immunotherapy *Renaissance* based on a solid and growing body of evidence, collectively indicating that different immunological strategies can indeed target and eliminate cancer. Apart the immune checkpoint inhibitors, the other major arm of cancer immunotherapy is represented by adoptive cell transfer (ACT) therapies. The term Adoptive Cell Therapy (ACT) currently refers to all those anti-tumor approaches, which are based on the collection of immune cells from patients, their transfer to a laboratory for the expansion in high quantities and often their genetic modification to endowed them with the capacity to better specifically recognize the tumor. The project aims to study a new ACT approach based on enhancing the cytotoxicity of T cells and Cytokine-Induced Killer cells (CIK) with chimeric receptors (CARs) and with different "Immunotools" against several solid tumors. In particular, lentiviruses will be used to transduce T cells to express CARs against BARF-1 for gastric and nasopharyngeal carcinomas (GC, NPC), or against PSMA, PSCA or dual PSMA/PSCA for prostate cancer (PCa) and will be tested for lytic activity against tumor cell lines *in vitro* and *in vivo.* In the other hand, CIK cells will be generated, expanded and antigen-specific retarget with clinical-grade mAbs, Fc-engineered mAbs to increase the antibody-dependent cell–mediated cytotoxicity (ADCC), bsAb and immunoligands, depending the tumor histotype and antigen expression, without any need to genetically modify the cells. The production of different cytokines upon stimulation will be measured and the effector cells interaction with cells from the tumor microenvironment *in vitro* and in mouse models will be evaluated. This project involves the development of molecular and cellular biological techniques, flow cytometry and quantitative fluorescence multiplex immunohistochemistry tissue staining techniques and *in vivo* imaging to study in real-time the progress of the different therapies in mouse models.