Adoptive cell therapy (ACT) has been successful in tumor regression (50% of patient with metastatic melanoma (Rosenberg et al.)), and eradication. In ACT, a small number of a patient’s own T lymphocytes; lowering the risks of immune response, with the appropriate properties are expanded in the lab. A chimeric antigen receptor which helps the T cells to attach to a specific cancer cell antigen is added. Prior to be reinjected, the patient can be conditioned through lymphodepletion to increase infused cell persistence. ACT technics challenges are:

* It is personalized for each patient slowing down development process and delaying treatments for patient in critical needs.
* Target selection is difficult with risk of insufficient targeting efficacy or off-target effects (Magalhaes et al.).
* It requires rigorous quality control during production, and choice of cytokines during cell culture is critical for T cell potency in vivo (Magalhaes et al.).
* Cells can persist for a long time in the host requiring long patient monitoring

Mesenchymal stem cells (MSCs) are characterized to home towards cancer cells. MSCs can be modified to over express cytotoxic proteins against tumors after specific homing. Mediated cell rolling with adhesion ligand can enhance MSC homing (Sarkar et al.). However, MSC integration with inflamed endothelial cells and migration mechanisms are not fully understood (Vicinanza et al.). Its role towards cancer cells, is controversial, favoring metastasis, promoting drug resistance or counteracting cancer expansion (Vicinanza et al.). Compared to ACT, manufacturing requirements for clinical grade production have yet to be defined and honed.\