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Adoptive immunotherapy for acute leukemia: new insights in chimeric antigen receptors

Maël Heiblig, Mohamed Elhamri, Mauricette Michallet, Xavier Thomas

Abstract

Relapses remain a major concern in acute leukemia. It is well known that leukemia stem cells (LSCs) hide in hematopoietic niches and escape to the immune system surveillance through the outgrowth of poorly immunogenic tumor-cell variants and the suppression of the active immune response. Despite the introduction of new reagents and new therapeutic approaches, no treatment strategies have been able to definitively eradicate LSCs. However, recent adoptive immunotherapy in cancer is expected to revolutionize our way to fight against this disease, by redirecting the immune system in order to eliminate relapse issues. Initially described at the onset of the 90's, chimeric antigen receptors (CARs) are recombinant receptors transferred in various T cell subsets, providing specific antigens binding in a non-major histocompatibility complex (MHC) restricted manner, and effective on a large variety of HLA-divers cell populations. Once transferred, engineered T cells act like an expanding 'living drug' specifically targeting the tumor-associated antigen, and ensure long-term anti-tumor memory. Over the last decades, substantial improvements have been made in CARs design. CAR T cells have finally reached the

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