Combinig RIG-I-targeted immune activation with CAR T cell therapy induces efficient tumor control in murine pancreatic cancer models

AM Senz*, SL Formisano, B Cadilha, T Lorenzini, S Endres, S Kobold, M Schnurr, LM König, Klinikum der universität münchen, München, Germany

10.1136/jitc-2021-ITOC8.50

Background The efficacy of chimeric antigen receptor (CAR) T cells against solid tumors remains unsatisfactory due to impaired trafficking of the CAR T cells into the tumor microenvironment (TME) and the presence of immunosuppressive factors and cells. 5′- triphosphate double-stranded RNA (3p-RNA) is recognized by the intracellular pattern recognition receptor retinoic acid-induced gene I (RIG-I). RIG-I activates a downstream signaling cascade, triggering the expression of type I interferons (IFN), proinflammatory cytokines and chemokines enhancing immune surveillance in the TME. We hypothesized that priming the TME with RIG-I ligands increases the efficacy of CAR T cell therapy.

Materials and Methods T110299 pancreatic tumor cells (derived from a genetically-engineered Kras and p53 mutant murine PDAC model) were engineered to express murine epithelial cell adhesion molecule (EpCAM) and used to induce subcutaneous or orthotopic tumors in C57BL/6J female mice. Mice bearing T110299 EpCAM+ tumors were treated with intratumoral or i.v. injections of 3p-RNA followed by i.v. injection of syngeneic murine T cells that were retrovirally transduced to express anti-EpCAM CARs. Three days after CAR T cell injection, immune cell composition and CAR T cell infiltration in the TME were assessed by flow cytometry. Additionally, tumor growth and survival were monitored.

Results Intratumoral injections of 3p-RNA reshaped the myeloid immune compartment in the TME by significantly reducing suppressive polymorphonuclear-MDSC and macrophages while increasing Ly6Chigh inflammatory monocytes. Moreover, antigen-presenting cells, such as dendritic cells and macrophages, were activated as evidenced by increased MHC-I expression levels. This was paralleled by a significant increase in the infiltration of CAR T cells into the TME in the combination therapy group. Interestingly, anti-EpCAM CAR T cells alone failed to control the tumor growth of T110299 EpCAM+ tumors, while monotherapy with 3p-RNA slightly delayed tumor growth in the subcutaneous model. Combination of 3p-RNA with anti-EpCAM CAR T cells induced a significant clinical benefit with tumor regression in 50% of the treated mice in the subcutaneous tumor model and prolonged survival in an orthotopic model.

Conclusions Remodeling the immunosuppressive TME using RIG-I ligands is a promising strategy for overcoming therapeutic resistance of CAR T cells in solid tumors, such as pancreatic cancer.

Disclosure Information M. Seifert: None. M. Bennebarek: None. B. Cadilha: None. J. Jobst: None. J. Dörr: None. T. Lorenzini: None. D. Dhoqina: None. J. Zhang: None. J. Zhang: None. U. Schindler: E. Ownership Interest (stock, stock options, patent or other intellectual property); Modest; Amgen Inc., Arcus Biosciences. Other; Significant; Arcus Biosciences. S. Endres: None. S. Kobold: B. Research Grant (principal investigator, collaborator or consultant and pending grants as well as grants already received); Significant; Arcus Biosciences.

P09 Young researcher session

The use of FDA approved JAK, mTOR and SRC inhibitors to regulate T cell-bispecific antibody-induced cytokine release while not preventing T cell cytotoxicity

1G Lederca*, 1H Haegel, 1A Schneider, 1A Giusti, 1V Pulko, 2A Toso, 2T Zimmermann, 3L Greer, 4N Steinhoff, 5J Sam, 5M Bacac, 6P Umania, 7C Klein. 1Roche Innovation Center Zurich, Schlieren, Switzerland; 2Roche Innovation Center Basel, Basel, Switzerland

10.1136/jitc-2021-ITOC8.51

Background T cell bispecific antibodies (TCBs) are potent T cell engagers, harboring a 2+1 format with one binder to the CD3ε chain and two binders to specific tumor antigens. Crosslinking of CD3 with tumor antigens triggers T cell activation and proliferation, cytokine release and tumor cell killing. TCB treatment is sometimes associated with safety liabilities due to on-target on-tumor or on-target off-tumor cytokotoxicity and cytokine release. Off-tumor activity of the TCB may occur if the targeted tumor antigens are expressed on healthy cells, which may potentially result in tissue damages and compromise the patient’s safety. Patients treated with TCBs may also experience a Cytokine Release Syndrome (CRS), characterized by fever, hypotension and respiratory deficiency and associated with the release of pro-inflammatory cytokines such as IL-6, TNF-α, IFN-γ, and IL-1β. Tyrosine kinases such as Src, mTOR and JAK1/2 are involved in downstream signaling pathways after engagement of the T cell receptor.

Materials and Methods 52 FDA approved kinase inhibitors were screened in the presence of T cells activated on CD3 coated plates, mimicking TCB stimulation. Src, mTOR and JAK inhibitors were selected based on their capacity to prevent both, cytokine release and T cell proliferation. Using an in vitro model of target cell killing by human peripheral blood mononuclear cells stimulated with TCBs, we validated the effects of mTOR, JAK and Src kinase inhibitors on TCB-induced T cell activation, tumor cell killing and cytokine release. In vivo, the effect of mTOR, JAK and Src kinase inhibitors on TCB-induced cytokine release was confirmed in humanized NOD scid gamma (NSG) mice engraved with human hematopoietic stem cells and treated with CD19-TCB.