

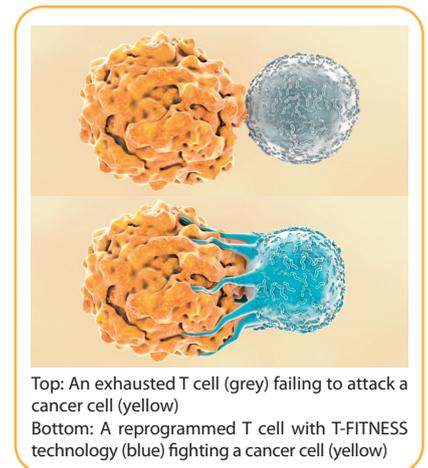
September 1st marks the official start of **T-FITNESS**, a four-year international project coordinated by the Leibniz Institute for Immunotherapy (LIT). T-FITNESS is one of 39 projects -out of 403 proposals- to have been selected for funding by the European Innovation Council (EIC) in the 2021 Pathfinder Challenge call. With its Pathfinder program, the EIC supports visionary thinking and interdisciplinary cutting-edge science collaborations to explore bold ideas for **radically new technologies**. In this context, T-FITNESS aims to **revolutionize** current T cell immunotherapies by developing an innovative platform to overcome T cell exhaustion.

The challenge

Immunotherapies based on the transfer of tumor infiltrating lymphocytes (TILs) and T cells engineered with tumor-reactive chimeric antigen receptors (CAR) or T cell receptors (TCR) are transforming medical oncology. These treatment modalities have shown remarkable efficacy against different types of blood cancer, such as leukemia and lymphoma, but their effectiveness against solid tumors remains disappointing. A major obstacle to successful T cell therapies against solid tumors is the so-called "*T cell exhaustion*": during a protracted battle with tumor cells, T cells can become fatigued and are no longer able to function properly and to fight tumor cells efficiently.

Our goal

Our ambitious EIC Pathfinder project aims to overcome this challenge by developing microRNA-based synthetic circuits capable of rewiring the gene expression programs promoting T cell exhaustion.



Top: An exhausted T cell (grey) failing to attack a cancer cell (yellow)
Bottom: A reprogrammed T cell with T-FITNESS technology (blue) fighting a cancer cell (yellow)

Overall societal impact

Despite Europe's efforts to significantly improve the healthcare for its citizens, curative options remain limited for most tumor types. A new transformative technology with curative potential is needed to increase the survival and well-being of 2.7 million Europeans who each year are newly diagnosed with cancer. The T-FITNESS approach to boost the performance of anti-tumor T cells is a universal platform that can be adapted to current and future cellular immunotherapies, including TIL, CAR-T and TCR-T therapies, to treat all types of malignancies, and therefore is expected to have a major impact on society.

The consortium

T-FITNESS is a multidisciplinary consortium of academic and industry partners from five European countries that combines unique expertise in T cell therapy and immunology, synthetic biology, genome editing, cGMP manufacturing, bioinformatics, and communication.

- 1 LIT Stiftung Leibniz-Institut für Immuntherapie; Regensburg, Germany
- 2 IDIBAPS Consorci Institut d'investigacions Biomediques August Pi I Sunyer; Barcelona, Spain
- 3 CNRS Centre National de la Recherche Scientifique; Paris, France
- 4 IIT Fondazione Istituto Italiano di Tecnologia; Genova, Italy
- 5 MILTENYI MILTENYI Biotec BV & CO KG; Bergisch Gladbach, Germany
- 6 INN-ACTA Innovation Acta S.R.L.; Siena, Italy
- 7 ETHZ Eidgenössische Technische Hochschule Zürich; Zurich, Switzerland (Associated Partner)

T-FITNESS Kick-off meeting will be held in Regensburg on October 6th, 2022

Bringing innovation into clinical and commercial applications is at the heart of our project.
Let's make the promise of curative cancer immunotherapies become a reality.

T-FITNESS at a glance

Full Project Title: FINE-TUNING T CELL NETWORKS OF EXHAUSTION BY SYNTHETIC SENSORS

Start Date: 01/09/2022

Duration: 48 months

Total cost: 3.789.472 €

Project Coordinator: Luca Gattinoni - LIT