National Project Funding of Gene- and Cell-Based Therapies

2026

SPARK BIH

SPARK-BIH

Charité BIH Innovation SPARK-BIH
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Berlin Institute of Health at Charité

GCT
National Strategy
Gene- and Cell-Based Therapies
Project Funding

Beauftragt durch:

Bundesministerium
für Forschung, Technologie
und Raumfahrt

SPARK-BIH National GCT Overview

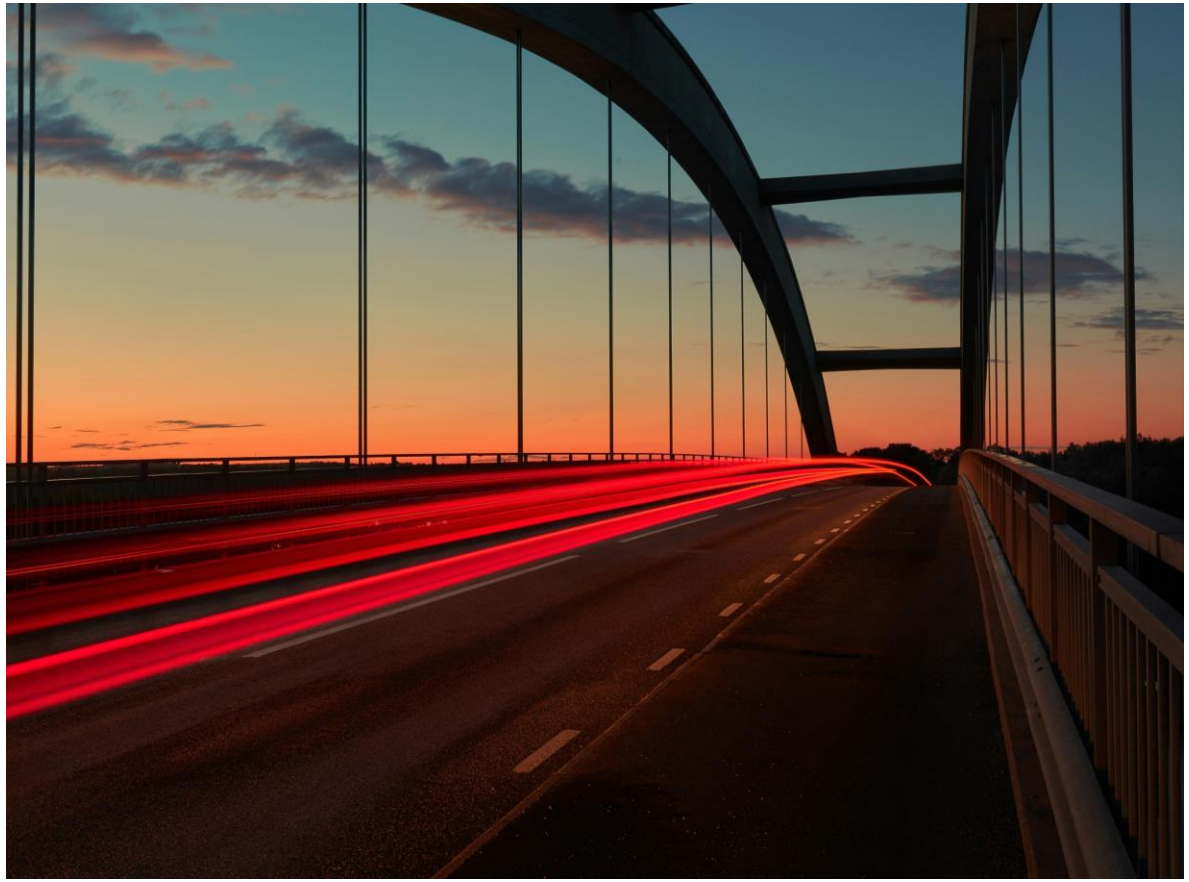
SPARK-BIH: Bridging Biomedical Research and Clinical Application

At the core of biomedical research lies the challenge and necessity of translating scientific discoveries into clinical applications. This process, known as "**Medical Transfer**", is crucial for transforming innovative research into meaningful benefits for patients, society, and the economy. However, only a small fraction of biomedical discoveries is developed into new products, often due to a lack of funding, expertise, or a transfer-oriented mindset among academic researchers.

The Mission of SPARK-BIH

At SPARK-BIH, our mission is to accelerate the translation of academic research into clinically relevant therapies, diagnostics, and medical devices, addressing unmet medical needs.

In order to achieve this, we support researchers and clinicians with milestone-based funding, mentoring and education, fostering a collaborative and supportive environment. Our aim is to turn innovative ideas into impactful solutions that benefit patients and society.



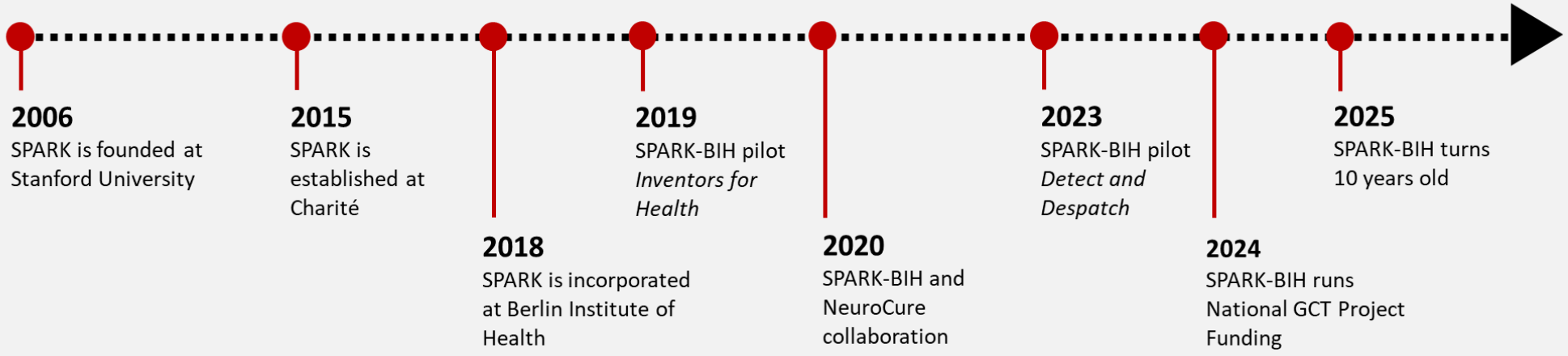
Our Journey

Founded in 2006 at **Stanford University**, SPARK has evolved into a global network comprising over 60 participating institutions worldwide.

SPARK-BIH was established in Berlin in 2015 by Prof. Dr. Craig Garner and Prof. Dr. Ulrich Dirnagl, with the support of **Stiftung Charité**. In 2018, the program became an integral part of the **Berlin Institute of Health (BIH)**, which is focused on medical translation. In 2021, the BIH was integrated into the **Charité - Universitätsmedizin Berlin**, the joint medical faculty of Freie Universität Berlin and Humboldt-Universität zu Berlin and one of Europe's largest university hospitals.

Today, SPARK-BIH is part of **Charité BIH Innovation (CBI)**, the joint technology transfer of BIH and Charité.

Furthermore, SPARK-BIH has established a long-term collaboration with NeuroCure, has developed two programs to promote early innovation and, as part of BIH, runs the project funding within the National Strategy for Gene- and Cell-Based Therapies (GCT), which is the focus of this booklet.



SPARK concept rolls out in Germany in the context of Gene- and Cell-Based Therapy

In March 2023, the Federal Ministry for Research, Technology, and Space (BMFTR, formerly BMBF) commissioned the Berlin Institute of Health (BIH) to coordinate the National Strategy for Gene- and Cell-Based Therapies (GCT).

Designed in collaboration with multiple stakeholders, it aims to develop safe and effective therapies and diagnostics for severe, currently incurable diseases, enhance collaboration across Germany's strong research landscape, and accelerate the translation of research findings into clinical application. At the same time, it seeks to strengthen Germany's international competitiveness in the field of gene- and cell-based therapies (GCT).

One aspect of the National GCT Strategy is Project Funding.

BIH decided to use the SPARK concept — so far established locally for Charité-centric projects — and expand it to a nationwide program in the field of gene- and cell-based therapies as well as associated diagnostics. This decision was driven by SPARK's ability to provide not only financial support but also a wide range of non-monetary services essential for strengthening the gene- and cell-based therapy ecosystem in Germany.

Currently, 36 projects from across Germany are participating in the program, benefiting from financial support as well as mentorship, and educational opportunities from GCT experts.

For more details on this program click here or visit this website.

GCT
National Strategy
Gene- and Cell-Based Therapies
Project Funding

The national SPARK-BIH GCT Selection Process

The national SPARK-BIH GCT team invites applications for funding from public and private (state-recognized) universities in Germany for individual and coordinated projects with designated project leaders, coordinators and/or partners. Non-university research institutes and companies may apply only as partners within a consortium.

Applications are welcomed for innovative projects in the fields of gene- and cell-based therapies, as well as associated diagnostics. Proposals will be evaluated based on the level of innovation, the significance of the unmet medical need and the patient engagement strategy, competitive advantages over existing solutions, data quality, and the likelihood of translational success, including the regulatory plan. Currently there is no open call.

The program funding in two tracks:

- **Track 1** supports **early-stage** projects with up to €50,000 for one year.
- **Track 2** funds more **advanced** projects with amounts exceeding €50,000, available for up to two years.

All funding is **milestone-based**, with close monitoring and tailored support from the SPARK team to ensure progress and effective resource use, accelerating the translation of biomedical research into clinical applications.

SPARK-BIH National GCT Team

Dr. Tanja Rosenmund
Director of SPARK-BIH

Dr. Sharesta Khoenkhoen
Project Manager

Dr. Marialucia Massaro
Project Manager

Dr. Stefan Köster
Project Manager

Dr. Josephine Kemna
Project Manager

Dr. César Cordero Gómez
Project Manager

Rosa Montserrat Xifré
Team Assistant of SPARK-BIH

SPARK-BIH National GCT Program in Numbers

Applications received from all over Germany

In two calls for applications, an increased number of submissions from across Germany was received, with Track 1 and Track 2 applications almost evenly distributed.

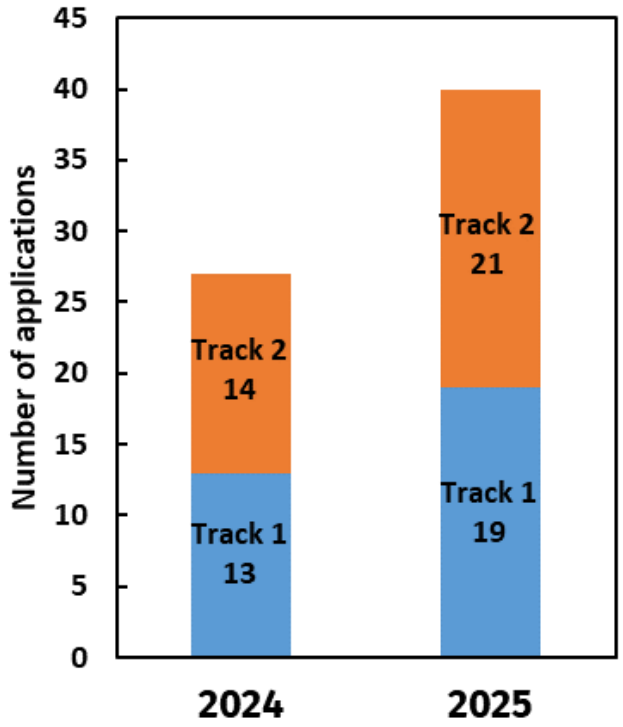
67 Project proposals received

17 Projects funded from Call 2024

23 Projects funded from Call 2025

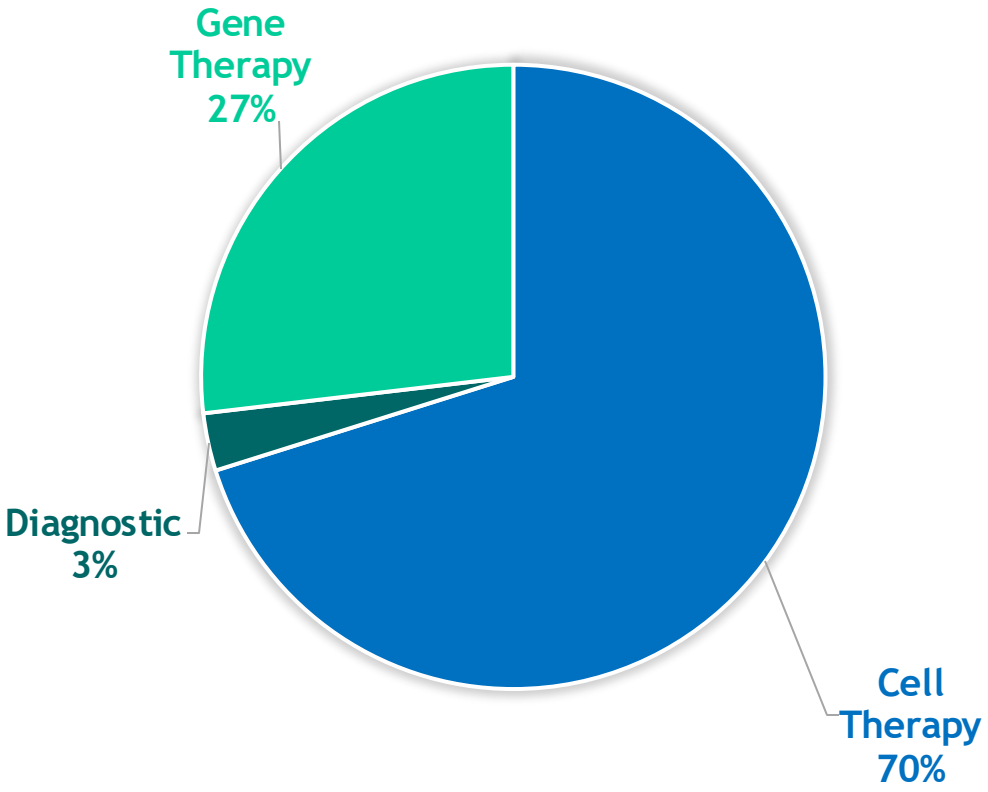
7.7 Mio € Funds provided (Call 2024)

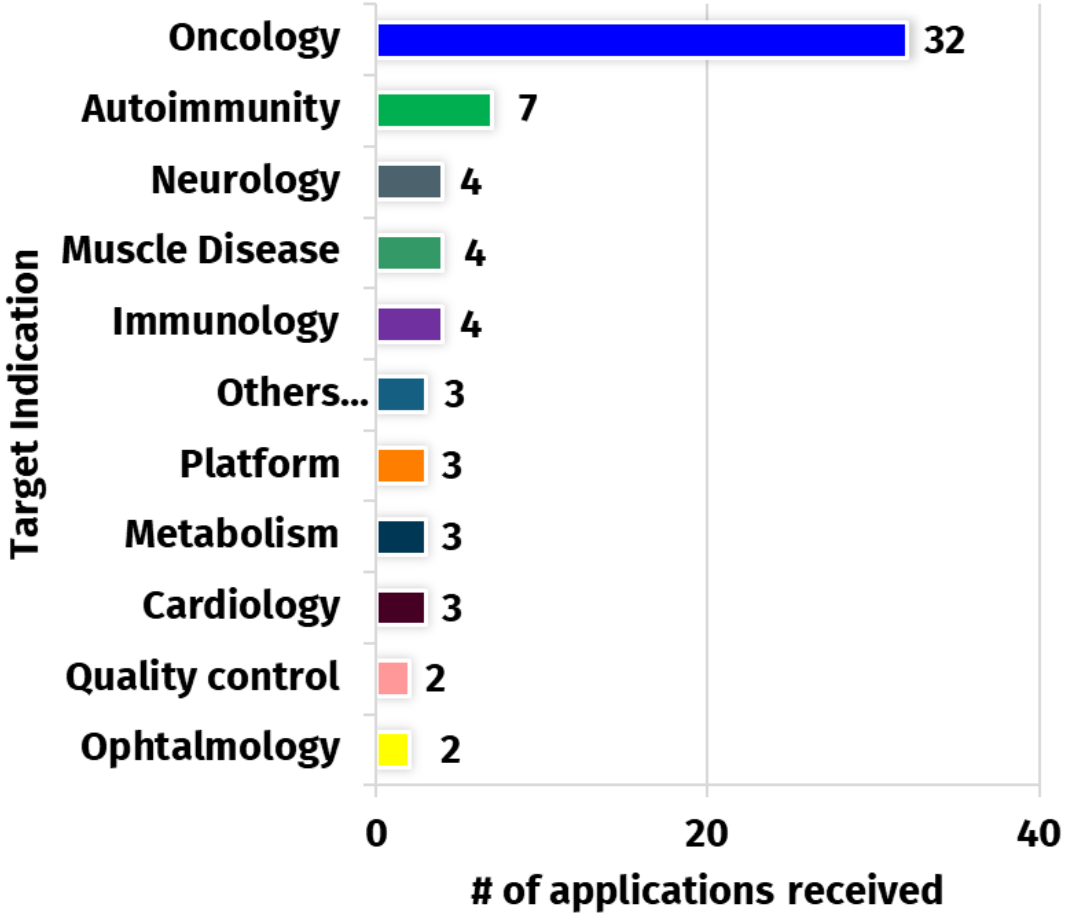
10 Mio € Funds will be provided (Call 2025)



Cell Therapy is the lead modality among the submitted applications from both calls 2024/2025

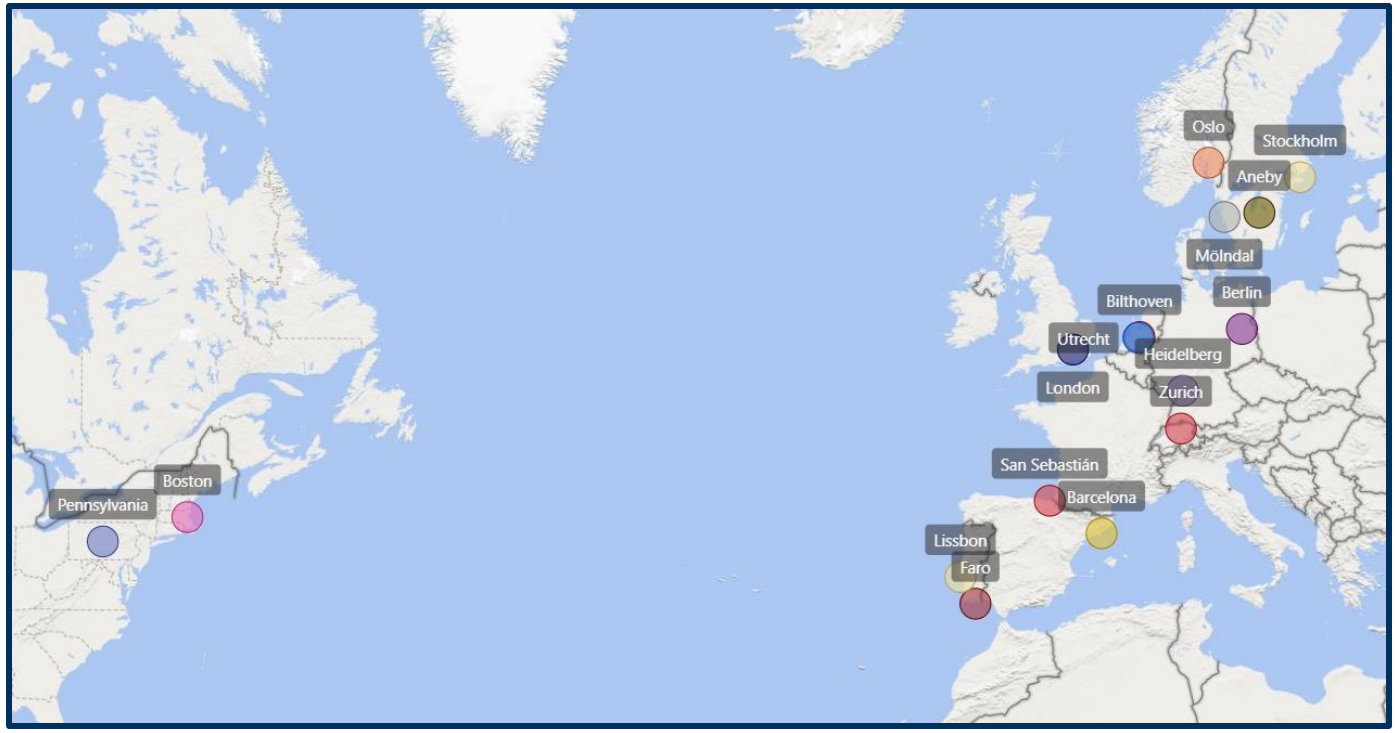
Most projects are centered on somatic cell therapies, with a focus on oncological indications





SPARK-BIH GCT connects teams with global expertise

29 international experts in the field of gene and cell therapies have joined regular meetings as advisors.



Our global jury and advisor network brings together experienced experts who guide and support funded teams. The advisor network provides interdisciplinary insights, expert feedback, and experience-driven support, helping teams improve, overcome challenges, and accelerate progress for greater impact.

*If you are interested to join the program as an advisor, please contact us!

Educational Program – 360° Overview of GCT Development

Program Structure

9 Expert Webinars in 2025
Coaching Sessions
Online Format
446 Participants

Expert-led to advance knowledge professional excellence

Internationally recognized experts
Academic & clinical leaders
Multidisciplinary perspectives

The educational series is open to anyone interested in developing gene and cell therapy products: spark-bih.de/education/lecture-series

SPARK-BIH National GCT Projects

Stromal cell micropellets for accelerated tissue regeneration

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. Gayathri Kilayilthodiyil Guruvayurappan, Prof. Dr. med. Susanne Mayer, Prof. Dr. med. Wolfgang Böcker, Prof. Dr. rer. nat. Torsten Blunk
LMU University Hospital Munich in cooperation with Uniklinikum Würzburg

Cell Therapy

Orthopedics

2025

TRACK 1

SUMMARY

Autologous chondrocyte implantation (ACI) is the most commonly used technique in cartilage repair. The harvest of autologous chondrocytes is a complex clinical procedure with several drawbacks such as donor site morbidity, limited tissue yield, limited application in older patients and those with degenerative diseases. Mesenchymal stromal cells (MSCs) have emerged as a promising alternative, with allogeneic MSCs-derived chondrogenic pellets enabling off-the-shelf availability for orthopedic clinical applications.

PROJECT GOALS

- Developing a standardized, reproducible, and scalable high-throughput manufacturing process for allogeneic MSCs-derived chondrogenic pellets that can be cryopreserved for off-the-shelf availability

LONG-TERM GOALS

- GMP compliant high scale manufacture of the CMPs - clinical trial for efficacy evaluation - commercialization with industrial collaboration.

Nanoparticle-functionalization of CAR-T cells for targeted tumor enrichment and reduction of inflammatory side effects

PRINCIPAL INVESTIGATORS:
PD Dr. rer. nat. Christina Janko, Lucas R. Carnell M.Sc.
Department of Otorhinolaryngology, Head and Neck Surgery, Section of Experimental Oncology and Nanomedicine (SEON), Universitätsklinikum Erlangen

Cell Therapy

Oncology

2025

TRACK 1

SUMMARY

The Nano-FunCARs project aims to develop a new type of cell therapy using chimeric antigen receptor T cells (CAR-T cells). These cells are loaded with superparamagnetic iron oxide nanoparticles (SPIONs), which make them magnetically controllable. This enables the magnetic enrichment of the CAR-T cells in the tumor tissue.

PROJECT GOALS

- Characterize the immune response induced by nanoparticle-loaded CAR-T cells after antigen exposure

LONG-TERM GOALS

- Develop a magnetically steerable CAR-T cell therapy to reduce side effects and improve anti-tumor efficacy

Engineering Tissue-Specific CAR-Tregs for Targeted IBD Therapy

PRINCIPAL INVESTIGATOR:
PD Dr. Laura Elisa Buitrago Molina
Department of Gastroenterology, Hepatology, Infectiology, and Endocrinology
Hannover Medical School

Cell Therapy

Autoimmunity

2025

TRACK 1

SUMMARY

Regulatory T cells (Tregs) can control excessive immune responses without compromising systemic host defense, for example in chronic inflammatory bowel diseases (IBD) such as Crohn's disease and ulcerative colitis. In this project, we will engineer Tregs to express a chimeric antigen receptor (CAR) that recognizes an inflammation-associated antigen in the intestinal mucosa, enabling the *local* release of anti-inflammatory mediators.

PROJECT GOALS

- Engineer and validate gut-tissue-specific CAR-Tregs with enhanced stability and function in preclinical IBD models.

LONG-TERM GOALS

- Prepare translation into clinical application through GMP-compliant manufacturing, regulatory development and industry partnerships.

CRISPR-optimized allogeneic non-viral BCMA-CAR NK cells to overcome loss-of-target in multiple myeloma

PRINCIPAL INVESTIGATOR and PROJECT PARTNER :
Dr. med. Tobias Bexte[1,2], Prof. Dr. med. Evelyn Ullrich[1]
[1] Goethe University Frankfurt; [2] German Red Cross Blood Service Baden-Württemberg – Hessen, Institute for Transfusion Medicine and Immunohematology

Cell Therapy
Oncology

2025

TRACK 1

SUMMARY

Despite significant advances in therapy, multiple myeloma (MM), a malignant disease of the bone marrow remains incurable. The development of resistance mechanisms limit the effectiveness of current treatments. This project seeks to identify resistance mechanisms that allow MM cells to evade the immune response using a genome-wide CRISPR screen. Building on these insights, a non-viral and specifically optimized “off-the-shelf” CAR-NK cell product will be developed.

PROJECT GOALS

- Identification of novel genes/pathways regulating the resistance and sensitivity to CAR-NK cell mediated killing in therapy resistant multiple myeloma

LONG-TERM GOALS

- Adoptive cell therapy product
- Clinical translation (Phase I/II)
- Commercial distribution (license or Spin-Out)

Cellular responses to CAR T cell therapy and their effect on outcomes in patients with aggressive B-cell lymphomas

PRINCIPAL INVESTIGATORS:
Dr. med. habil. Vladan Vučinić, Dr. rer. nat. Beatrice Berneck, Dr. rer. nat. David Reher
Clinic & Polyclinic for Hematology, Cell Therapy, Hemostasis & Infectiology, University Leipzig

Cell Therapy
Oncology

2025

TRACK 1

SUMMARY

Despite high potential for long-term disease control, CAR T cell therapy carries risks of severe side effects. Current treatment options for these side effects are only reactive. A major challenge of CAR T cell treatment is the lack of reliable models to predict treatment outcomes and risks. This project aims to develop two predictive models and identify biomarkers to facilitate risk stratification, paving the way for personalized and targeted treatment options for patients undergoing CAR T cell therapy.

PROJECT GOALS

- Identification of novel biomarkers for early risk stratifications in patients undergoing CAR T cell therapy

LONG-TERM GOALS

- Predictive patient stratification for monitoring after CAR T cell therapy

Immunoassay for the detection of autoimmune encephalitis autoantibodies

PRINCIPAL INVESTIGATOR:
Dr. Christian Blex
Department of Neurology with Experimental Neurology,
Charité – Universitätsmedizin Berlin

Diagnostic

Autoimmunity

2025

TRACK 1

SUMMARY

In patients suffering from autoimmune encephalitis, autoantibodies attack the patient's nervous system and damage nerve cells resulting in functional disorders of the brain. As symptoms are often similar to those of other neurological and mental illnesses, diagnosis is difficult and often made late or not at all. Current tests are complex, results subjective and standardization hardly possible. We will develop a test that overcomes current limitations and is suitable for identifying patients for targeted cell-based therapies.

PROJECT GOALS

- Definition of assay components, completion of assay protocol and submission of patent application

LONG-TERM GOALS

- Extend assay to other autoimmune diseases.

Development of a cardiac gene therapy for the targeted treatment of right heart failure

PRINCIPAL INVESTIGATORS:
Dr. Philipp Schlegel, Eric Meinhardt
University Hospital Heidelberg, Department of Cardiology

Gene Therapy
Cardiology

2025

TRACK 1

SUMMARY

Right heart failure is a serious complication of pulmonary arterial hypertension and long term heart failure, associated with significant morbidity and mortality, with no specific therapies currently available.
In view of the high demand for specific therapies for right heart failure, we aim to harness the unique properties of specific human receptor pathway to develop a novel cardiomyocyte targeted gene therapy to prevent right heart failure.

PROJECT GOALS

- Definition of the optimal gene dose in an animal model
- Initial proof-of-concept study

LONG-TERM GOALS

- First in human clinical trial

On- and off-target genotoxicity of CRISPR-Cas9 in T cells: Bridging research to phase I trials

PRINCIPAL INVESTIGATOR:
Dr. Elvira D'Ippolito
Institute of Medical Microbiology, Immunology and Hygiene,
Technical University of Munich, School of Medicine and Health

Cell Therapy
Immunology

2025

TRACK 1

SUMMARY

Cytomegalovirus (CMV) infections pose a serious risk to patients with weakened immune systems. While antiviral drugs help, they do not fully prevent CMV reactivation, particularly in high-risk patients. This project aims to develop a novel T-cell therapy that can restore functional CMV immunity and thereby prevent CMV reactivation. Gene-edited T-cells will be equipped with a CMV-specific T-cell receptor (TCR), enabling the engineered cells to recognize and kill CMV-infected cells.

PROJECT GOALS

- Characterization of CRISPR-Cas9 genotoxicity in genetically modified TCR-T cells for translation into a Phase I study

LONG-TERM GOALS

- Develop a CMV-specific TCR-engineered T cell product for the prevention of CMV reactivation in high-risk immunocompromised patients

A human iPSC-based cell therapy for Duchenne muscular dystrophy

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Dr. Arne Hofemeier, Prof. Dr. Wolfram Zimmermann, Dr. Malte Tiburcy
Medical Faculty, Institute of Pharmacology and Toxicology
Georg-August-Universität Göttingen

Cell Therapy
Muscle Disease

2025

TRACK 1

SUMMARY

Duchenne muscular dystrophy (DMD) is caused by mutations in the dystrophin protein. Current standard of care cannot prevent the loss of mobility in adolescence and death in early adulthood. Muscle stem cell therapy is a new option to restore impaired muscle regeneration in DMD patients by injecting healthy muscle stem cells. We want to generate a new muscle stem cell population from induced pluripotent stem cells (iPSC) that can colonize and functionally improve 3D patient muscle tissue.

PROJECT GOALS

- Identify the specific subpopulations during muscle stem cell differentiation
- Test these for functional improvement in a patient-specific tissue model
- Demonstrate muscle stem cell engraftment and regeneration

LONG-TERM GOALS

- Production under GMP conditions
- First-in-human trial

Episomal T Cell Receptor engineered Natural Killer Cells for the Treatment of Glioblastoma

PRINCIPAL INVESTIGATORS:
PD Dr. Dr. Lukas Bunse, Dr. Dominik Schmiedel
Neurology Clinic, Medical Faculty Mannheim of Heidelberg University
Fraunhofer Institute for Cell Therapy and Immunology, Leipzig

Cell Therapy
Oncology

2025

TRACK 1

SUMMARY

Glioblastoma is known for its strong immune cell exclusion. However, we found that NK cells can maintain their intratumoral effector function. The project therefore pursues a combined strategy:
First, the focus is on equipping NK cells with T-cell receptors that recognize a characteristic glioblastoma antigen. Thus, this antigen will lead to local NK cell activation. Second, initiated antitumor inflammatory reactions will be maintained via natural innate NK cell receptors and effector functions.

PROJECT GOALS

- Demonstration of efficacy of T cell receptor engineered primary human NK cells in patient-derived glioblastoma mouse models

LONG-TERM GOALS

- Advance pre-GMP and GMP-production procedures
- Gain regulatory authority approval for a first-in-human trial (Phase I)

Generation of alternative HLA-I restricted T cell receptors (TCRs) for Adoptive T cell Therapy of cancer

PRINCIPAL INVESTIGATOR:
Prof. Dr. rer. nat. Gerald Willimsky
Institute of Tumor Immunology, Dept. for Experimental and Translational Tumor Immunology
Charité – Universitätsmedizin Berlin

Cell Therapy
Oncology

2025

TRACK 1

SUMMARY

This project aims to isolate and characterize new alternatives to HLA-I-restricted T cell receptors (TCRs) with high affinity that recognize immunogenic cancer-specific epitopes for TCR gene therapy of cancer.
We take advantage of generating highly avid TCRs from a humanized mouse model harboring the entire human TCRα/β loci that has additionally been modified to express alternative HLA-I molecules.

PROJECT GOALS

- Isolation and characterization of novel high-affinity TCRs targeting cancer-specific epitopes

LONG-TERM GOALS

- Clinical application of TCRs restricted to alternative HLA class I

An integrated Guided Ultrafast Antiviral RNAi inhalation Drug development against Parainfluenza infection

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Prof. Dr. med. Axel Schambach, PhD, Dr. Philippe Vollmer Barbosa, Prof. Dr. Armin Braun, Prof. Adrian Schwarzer, PhD
Hanover Medical School, Fraunhofer Institute for Toxicology and Experimental Medicine

Gene Therapy

Pulmonology

2025

TRACK 2

SUMMARY

In this project, we will conduct essential BfArM-accepted non-clinical studies for approval of clinical testing of the RNA inhalation drug iGUARD-01 directed against parainfluenza. These include formulation and stability studies of the drug candidate in addition to developing a GMP manufacturing strategy. Finally, the commercialization potential of the drug will be analyzed and the obtained results will be comprehensively protected under patent law to enable further financing and clinical development of the drug.

PROJECT GOALS

- Conducting IND-enabling studies based on BfArM Scientific Advice Meeting
- Develop GMP-compliant manufacturing process
- Generate and protect further IP

LONG-TERM GOALS

- FiH Phase I clinical trial for iGUARD-01 safety

Base Editing Advanced Chimeric Antigen Receptor Natural Killer cells to Cure Multiple Myeloma

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. med. Tobias Bexte, Goethe University Frankfurt; German Red Cross Blood Service Baden-Württemberg – Hessen; **Dr. rer. nat. Timo Rückert,**
Dr. Dimitrios L. Wagner, Charité – Universitätsmedizin Berlin

Cell Therapy

Oncology

2025

TRACK 2

SUMMARY

The goal of this project is to develop a novel, improved cell therapy against cancer that enhances the potent anti-tumor effects of natural killer (NK) cells through targeted genetic modifications, in order to achieve lasting treatment success even in difficult cancers such as multiple myeloma. A specific “cancer recognition mechanism” will be integrated into NK cells. At the same time, “brakes” in the immune system that normally prevent cells from effectively attacking cancer will be disabled.

PROJECT GOALS

- New methods of precise genetic modification will be applied, enabling the simultaneous introduction of multiple genetic alteration.

LONG-TERM GOALS

- Prolong NK cell persistence, and, ultimately, enhance their efficacy.

Preclinical development and GMP-compliant manufacturing of Chimeric Autoantibody Receptor T cells for Neurologic Autoimmune Diseases

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. Momsen Reincke, Dr. Niels v. Wardenburg, Prof. Harald Prüß, Prof. Annette Künkele-Langer
Charité Universitätsmedizin

Cell Therapy
Autoimmunity

2025

TRACK 2

SUMMARY

CAAR-T cells are a promising new treatment approach for neurological autoimmune diseases. They are genetically modified to selectively recognize and destroy autoreactive B cells. We will test three different CAAR-T cell products for neurological autoimmune diseases. Based on safety, efficacy, and commercial potential, the most promising treatment will be selected. For this, a manufacturing process will be developed, that meets the high standards required for clinical trials.

PROJECT GOALS

- IND-enabling studies
- GMP-compliant manufacturing process

LONG-TERM GOALS

- Clinical development of a promising CAAR-T cell candidate

Clinical-grade manufacturing of CD40-AIR-Treg cells as cellular therapeutics for Graft-versus-Host Disease

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. Daniel Wolff and Prof. Dr. Markus Feuerer
University Hospital Regensburg and Leibniz Institute for Immunotherapy Regensburg

Cell Therapy
Autoimmunity

2025

TRACK 2

SUMMARY

One risk of allogeneic stem cell transplantation is graft-versus-host disease (GvHD), in which the immune response can cause severe organ damage. So-called regulatory T-cells (Treg) from the donor can prevent this transplantation complication. For this purpose, a biosensor containing the molecule CD40 is genetically introduced into the Treg cells, activating the Treg cells and inhibiting the function of other immune cells. The aim is to further develop this therapy for testing safety and efficacy in clinical trials.

PROJECT GOALS

- Develop a large-scale clinical-grade manufacturing process
- Prepare GMP-compatible manufacturing for CTA

LONG-TERM GOALS

- Develop and clinically approve a safe, effective Treg-based therapy against chronic GvHD after allogeneic stem cell transplantation.

ONCOLYTic virus manufacturing for the preparation of clinical studies

PRINCIPAL INVESTIGATOR:
PD Dr. Jennifer Altomonte
Technical University Munich

Gene Therapy
Oncology

2025

TRACK 2

SUMMARY

Oncolytic virotherapies are gaining recognition for their multimechanistic mode of action in targeting cancer. We have previously developed a chimeric oncolytic virus vector, FUSE102, which additionally encodes a PD-L1-targeting immune checkpoint inhibitor. The project will bridge FUSE102 from the lab towards the clinical setting. Within this project, upstream and downstream manufacturing processes will be further optimized and scaled-up towards a full-scale GMP-compliant production process.

PROJECT GOALS

- Complete technology transfer of manufacturing processes to a CDMO
- Perform process optimization and scale-up towards clinical scale GMP production

LONG-TERM GOALS

- IND-enabling GLP toxicology studies
- GMP manufacturing of FUSE102 drug product
- First-in-human phase I clinical trial

RNA-Therapeutics for Treatment and Mitigation of Liver Fibrosis

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. Amar Deep Sharma, Prof. Dr. Michael Ott
Hannover Medical School

Gene Therapy

Metabolism

2025

TRACK 2

SUMMARY

Liver fibrosis contribute majorly to liver dysfunction and is the strongest predictor of mortality in patients with liver diseases. To date, drugs for inhibiting advanced liver fibrosis are lacking, highlighting the urgent necessity to develop anti-fibrotic drugs. MiRNAs have been shown to regulate acute as well chronic liver diseases. Recently, we identified a miRNA-based novel lead drug candidate with the potential to suppress advanced liver fibrosis. The project aims to restore the lost expression of miRNA using AAV vectors to suppress liver fibrosis.

PROJECT GOALS

- Complete pre-clinical studies

LONG-TERM GOALS

- Development of safe, cost-effective, formulation of highly effective drug for the treatment of liver fibrosis

First-in-class First-in-Human Phase I/IIa study in living-donor kidney transplant patients

PRINCIPAL INVESTIGATORS:
Prof. Dr. Hans-Dieter Volk and Dr. Kerstin Jülke
Charité Universitätsmedizin, Institute for Medical Immunology and CheckImmune GmbH

Cell Therapy
Immunology

2025

TRACK 2

SUMMARY

More than 10% of adults suffer from immune disorders, and millions live with transplants. Current therapies suppress the immune system non-specifically and require lifelong administration with severe side effects. There is therefore a strong need for novel, curative approaches to restore immune balance. We have developed a “first-in-class” Treg product resistant to immunosuppressant drugs. This product will be tested for the first time in kidney transplant patients in combination with immunosuppression.

PROJECT GOALS

- Conduct first-in-human study to evaluate safety and efficacy
- Gain insights into pharmacokinetics and pharmacodynamics through a scientific biomarker program

LONG-TERM GOALS

- Reduce immunosuppression and its side effects in transplant patients

Clinical Translation of Optogenetic Gene Therapy for Hearing Restoration

PRINCIPAL INVESTIGATOR:
Prof. Dr. med. Tobias Moser
University Medical Center Göttingen

Gene Therapy
Neurology

2025

TRACK 2

SUMMARY

FrontEar aims to translate pioneering research on optogenetic cochlear implant systems (OCIS) into clinical application to restore hearing in people with severe hearing loss or deafness. By combining optogenetic gene therapy with an optical cochlear implant, OCIS promises more natural hearing and improved speech understanding compared to current electrical implants. FrontEar will ensure clinical trial readiness through GMP-compliant manufacturing and completion of preclinical toxicity and efficacy studies.

PROJECT GOALS

- Establishing GMP-compliant manufacturing process
- Evaluate safety through regulatory-compliant preclinical studies

LONG-TERM GOALS

- Advancing optogenetic gene therapy towards pivotal trials, in combination with the oCI

Brain-derived neurotrophic factor restoration via intelligent delivery for gene enhancement

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. med. Athanasia Warnecke and Prof. Dr. rer. nat. Hildegard Büning
Hanover Medical School

Gene Therapy
Neurology

2025

TRACK 2

SUMMARY

We developed a novel AAV capsid variant for efficient transduction of spiral ganglion neurons in the cochlea. We aim to optimize and validate the expression of the factor which is considered crucial for the long-term preservation of spiral ganglion neurons. This project describes the essential next steps for moving the therapeutic approach into a clinical trial phase and optimizing the existing production protocol for transferring the innovative vector to a GMP-compliant manufacturing process.

PROJECT GOALS

- Fine-tuning of continuous and low-level expression
- Validation of approach in large animal model

LONG-TERM GOALS

- Improve neuronal health in the cochlea
- Initiation of clinical trial
- Improve speech perception in CI users

Synergistic Targeting of Acute Myeloid Leukaemia with Azacytidine and gene-edited CD123-CAR NK Cells

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. med. Evelyn Ullrich, Goethe University Frankfurt
Prof. Dr. Toni Cathomen, Dr. Tatjana Cornu,
Prof. Dr. med. Robert Zeiser, University of Freiburg

Cell Therapy
Oncology

2025

TRACK 2

SUMMARY

The AzaCAR4AML consortium is preparing a clinical trial using genetically modified and gene-edited natural killer (NK) cells to treat acute myeloid leukaemia (AML). Hypomethylating drugs such as 5′-azacytidine (AZA) induce the expression of leukaemia-associated antigens on AML blasts, thereby sensitising them to apoptosis. They are developing a combination therapy of pre-treatment with AZA followed by advanced CAR-NK cell therapy.

PROJECT GOALS

- Establish large-scale automatized manufacturing of edited CD123-CAR NK cell therapy
- Evaluate synergy with AZA treatment

LONG-TERM GOALS

- Phase I/II clinical trial for the synergistic treatment of AML

Transforming Solid Cancer Treatment with a dual CAR-T and CAR-Macrophage cell product

PRINCIPAL INVESTIGATORS:
Dr. Michelle Seif & Prof. Nico Lachmann
University Hospital Würzburg, Hannover Medical School

Cell Therapy
Oncology

2025

TRACK 2

SUMMARY

We aim to develop a synergistic CAR-T/ CAR-Macrophage cell therapy for the treatment of solid tumors. CAR-M cells are expected to improve tumor infiltration, function, and persistence of CAR-T cells. A key innovative feature is the use of induced pluripotent stem cells (iPSCs) to produce allogeneic, off-the-shelf CAR-M cells. This approach enables standardized, scalable, and cost-efficient production with high reproducibility and product quality, laying the foundation for a fully allogeneic dual cell therapy platform.

PROJECT GOALS

- Demonstrate the preclinical efficacy and safety of the combined CAR-T/CAR-M approach
- Advance preparations for clinical development

LONG-TERM GOALS

- Pre-clinical data package for dual cell therapy
- CTA for a first-in-human trial (Phase I)

Bridging deep gaps in translation and tissue: a blueprint for TEP development from a corneal sealer

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Dr. Anna Resch, Prof. Dr. Günther Schlunck
University of Freiburg & University of Freiburg Medical Center

Cell Therapy
Ophthalmology

2024

TRACK 2

SUMMARY

Around 1.6 million people worldwide are estimated to be blind due to eye injuries and around 19 million have impaired unilateral vision. Severe corneal injury, one of the main causes, is typically treated with sutures, which can cause scarring, inflammation and corneal opacity. We aim to develop a safe, elastic corneal adhesive containing living keratocytes in a protein-based hydrogel. The adhesive can seal wet wounds; it is elastic and biocompatible. It should be degraded by keratocytes and replaced by natural extracellular material.

PROJECT GOALS

- Build an early basis for a quality-by-design manufacturing strategy
- Study preliminary toxicity in rabbits

LONG-TERM GOALS

- Providing a regulatory strategy as blueprint for similar products

Enhancing Cellular Therapy for B-Cell Neoplasms

PRINCIPAL INVESTIGATOR:
PD Dr. Antonia Busse
Charité University Medicine Berlin

Cell Therapy
Oncology

2024

TRACK 2

SUMMARY

Immunotherapy with CAR-T cells has shown success in the treatment of malignant B-cell tumors, but cure rates are only 40-60%. Major limitations are loss of target expression in tumor cells and the limited lifespan of CAR-T cells. TCR-T cells offer an alternative therapy option, as they recognize peptides from proteins if they are presented by MHC molecules. We have developed a TCR, T3225, which specifically targets the CD22 antigen on B cells and has shown better efficacy than CD22 CAR-T cells.

PROJECT GOALS

- Develop a bispecific T cell product based on T3225

LONG-TERM GOALS

- Commencing a clinical phase I trial

Preparation of a clinical trial of CAR-NK cells in patients with Her2- expressing tumors

PRINCIPAL INVESTIGATOR:
Prof. Dr. Torsten Tonn
Goethe University Frankfurt/M

Cell Therapy
Oncology

2024

TRACK 2

SUMMARY

Her2 is a tumor antigen expressed by approx. one-third of breast, ovarian, colon cancer, osteosarcomas and other tumor indications, which often respond particularly poorly to standard therapies. We plan to treat patients with Her2-expressing tumors using NK cells genetically engineered to carry a CAR that allows the specific targeting and killing of Her2-expressing cells. This CAR-Her2-specific cell line, NK-92/5.28.z, is currently used in clinical trials in patients with recurrent glioblastoma.

PROJECT GOALS

- Validating GMP manufacturing of a CAR-Her2-specific NK cell line
- Preparing a study protocol and investigational medicinal product dossier (IMPD)

LONG-TERM GOALS

- Commencing a clinical phase I trial

All-in-One Genome Editing Therapy for the Treatment of Duchenne Muscular Dystrophy

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Prof. Dr. Wolfram-Hubertus Zimmermann, Prof. Dr. Hildegard Büning,
Prof. Dr. Rabea Hinkel, Prof. Dr. Bernd Wollnik
University Medical Center Göttingen, Hannover Medical School & German Primate Center

Gene Therapy
Muscle Disease & Pediatrics

2024

TRACK 2

SUMMARY

Duchenne Muscular Dystrophy (DMD) is a genetic disease with current treatments providing palliative care only, which do not prevent loss of ambulation or premature death. Genome editing is emerging as a promising option to convert DMD into a milder or even asymptomatic condition. In this collaborative project, we use optimized AAVs for All-in-One delivery of small CRISPR/Cas9 to skeletal and heart muscle. Preliminary results show that this approach can improve contractile function.

PROJECT GOALS

- Complete nonclinical testing of a novel DMD genome editing therapy candidate

LONG-TERM GOALS

- Converting patient-tailored approaches to an off-the-shelf exon-tailored therapy adaptable to most DMD-causing deletions/ mutations

Innovation in AML Treatment

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. Toni Cathomen, Prof. Dr. Evelyn Ullrich
University of Freiburg & Goethe University Frankfurt

Cell Therapy
Oncology

2024

TRACK 2

SUMMARY

The neClectAML consortium is developing a novel immunotherapy for acute myeloid leukemia (AML), an aggressive and challenging form of blood cancer. At the core of the project are genetically engineered natural killer (NK) equipped with a chimeric antigen receptor (CAR) derived from a llama nanobody targeting CLEC12A, a molecule found on AML cells. To further enhance NK cell activity, an NK cell-specific immune checkpoint will be selectively deactivated.

PROJECT GOALS

- Establish clinical-scale production of these gene-edited CAR NK cells and conduct preclinical testing to ensure their safety and efficacy
- Define preclinical work packages based on scientific advice from PEI

LONG-TERM GOALS

- Prepare for a Phase I/II clinical trial

Clinical-grade manufacturing of NY-ESO-1 TCR-modified stem-like T cells overexpressing the pre-miR-155 SNP, rs377265631

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. Dr. Roland Schelker, Prof. Dr. Wolfgang Herr, Prof. Dr. Luca Gattinoni, Prof. Dr. Simone Thomas, Prof. Dr. Matthias Edinger
University Hospital Regensburg & Leibniz Institute for Immunotherapy

Cell Therapy
Oncology

2024

TRACK 2

SUMMARY

This project focuses on generating stem-like T cells (T_{SCM}) from naive $CD8^+$ T cells of patients and equipping them with a NY-ESO-1 TCR and an immunostimulatory microRNA, the miR-155 SNP rs377265631. These T cells are expected to trigger an enhanced and sustained anti-tumor response in patients with metastatic sarcoma. The project marks an important step towards clinical application and could significantly improve treatment outcomes for patients in the long term.

PROJECT GOALS

- Develop large-scale manufacturing process
- Develop comprehensive quality control tests to ensure that the product meets the required clinical standard

LONG-TERM GOALS

- Prepare for Phase I trial

In Vivo Generation of Chimeric Antigen Receptor T cells with T cell-retargeted Adeno-Associated Virus Vectors

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. rer. nat. Hildegard Büning, Prof. Dr. Michael Hudecek
Hannover Medical School & University Clinic Würzburg

Cell Therapy
Oncology

2024

TRACK 2

SUMMARY

CARtrAAVic aims to revolutionize CAR-T therapy by generating CAR-T cells directly in the patient's body through an cells *in vivo* approach. This eliminates the need for complex *ex vivo* manufacturing and enables a more physiological anti-tumor response with low toxicity. The approach also addresses key clinical challenges, such as cytokine release syndrome, limited response duration, safety concerns related to off-target integrations, while significantly reducing production costs and manufacturing time.

PROJECT GOALS

- Provide preclinical proof-of-concept
- Prepare for clinical development

LONG-TERM GOALS

- CARtrAAVic aims to bring a scalable, chemotherapy-free, next-generation CAR-T therapy platform with broad therapeutic potential, rapid and broad availability and a sustainable cost structure into clinical application

Promoting Healing and Overcoming ELANE Neutropenia with ex vivo CRISPR

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Prof. Dr. Julia Skokowa, Dr. Masoud Nasri, Dr. Cornelia Zeidler, Prof. Dr. Wolfgang Bethge, Prof. Dr. Claudia Lengerke, Prof. Dr. Karl Welte, Prof. Dr. Peter Lang, PD Dr. Dr. Markus Mezger, Prof. Dr. Stefanie Joos, Prof. Dr. Toni Cathomen, Prof. Dr. Doris Steinemann
University Hospital Tübingen, University Hospital Freiburg & Hannover Medical School

Cell Therapy
Immunology
& Pediatrics

2024

TRACK 2

SUMMARY

In the PHOENIX project, we aim to advance the clinical development of the MILESTONE gene therapy approach for congenital neutropenia. This innovative procedure inactivates the disease-causing gene through the editing of its promoter. Here, we will use it to target the non-essential *ELANE* gene, which is mutated in half of patients with congenital neutropenia. In addition to the preclinical work, we are actively engaging patients by structured patient interviews and engaging with patient organizations.

PROJECT GOALS

- Adapt and apply GMP-compliant editing process to large-scale editing of hematopoietic stem cells
- Develop IMPD

LONG-TERM GOALS

- Conduct clinical study (IIT)

Innovative lipid nanoparticles for cell and gene therapy

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Prof. Dr. med. Petra Reinke & Annika Brehmer
BeCAT Charité & Fraunhofer IPK

Cell Therapy

Autoimmunity

2024

TRACK 2

SUMMARY

There is a high clinical need for improved GCT products, as current transfection methods, mainly based on viral vectors, are inefficient and costly. In the “NanoGen” project, non-viral multiplex gene editing of T cells is being developed to treat B-cell-mediated autoimmunity. Fraunhofer IPK’s proprietary Fdmix technology enhances lipid nanoparticle (LNP) delivery, improving particle stability and transfection efficiency, and creating a scalable platform for efficient gene editing in human T cells.

PROJECT GOALS

- Develop a novel process for nucleic acid-based drugs delivery into human T cells
- Provide proof-of-concept for multiplex T-cell therapy for B-cell-mediated autoimmunity

LONG-TERM GOALS

- Advance the approach to clinical trials

Alumni Projects
SPARK-BIH
National GCT

A novel self-inactivating alpharetroviral vector-based gene therapy strategy for IL7RA deficient severe combined immunodeficiency

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. Teng Cheong Ha, Prof. Axel Schambach,
Prof. Michael Morgan, Dr. Melanie Galla & Dr. Michael Rothe
Institute of Experimental Hematology, Hannover Medical School

Gene Therapy
Immunology
& Pediatrics

2024

TRACK 1

SUMMARY

Children suffering from IL7RA-deficient severe combined immunodeficiency (SCID) have almost no functional T-cells to fight infections and, without treatment, often do not survive beyond their first year of life.
The current standard treatment is a bone marrow transplant (BMT), which depends on identifying suitable donors and carries significant risks and long-term health issues. The goal of ARISE is to develop a safe and effective gene therapy for IL7RA-deficient SCID patients.

PROJECT GOALS

- Develop a safe and effective gene therapy to repair the defective IL7RA gene in SCID patients

LONG TERM GOALS:

- Fulfil regulatory requirements
- Perform phase I/II clinical trials with further funding
- License to Biotech/Pharma or clinical co-development
- Deliver a safer alternative therapy for patients

Gene therapy targeting neuroinflammation in Alzheimer's Disease

PRINCIPAL INVESTIGATOR and PROJECT PARTNERS:
Dr. rer. hum. biol. Dr. med. Sergio Castro-Gomez, Ida Kulinska, Prof. Dr. Florian I. Schmidt
Center for Neurology / Institute of Physiology II, University Hospital Bonn

Gene Therapy
Neurology

2024

TRACK 1

SUMMARY

Alzheimer's Disease (AD) is a devastating and incurable disorder. Currently, research is shifting from addressing classical neuropathological hallmarks to neuroinflammation. The common adaptor inflammasome protein ASC (Apoptosis-associated speck-like protein containing a CARD) has been implicated as a target in AD. Our project aims to develop AAV-based gene therapy targeting ASC to modulate neuroinflammation and protein aggregation in AD, with the goal of creating a breakthrough treatment.

PROJECT GOALS

- Optimize AAV vectors for efficient and brain tissue-specific transduction.
- Develop an AAV-based gene therapy targeting the ASC inflammasome protein to specifically to modulate neuroinflammation in early AD.
- Validate ASC *in vivo* as a viable therapeutic target in AD therapy

LONG-TERM GOALS

- Develop a systemic gene therapy for Alzheimer´s disease

Safety of genome editing as therapy for autosomal dominant osteopetrosis

PRINCIPAL INVESTIGATOR:
Prof. Dr. rer. nat. Uwe Kornak
Institute of Human Genetics
Georg-August-University Göttingen

Gene Therapy

Muscle Disease

2024

TRACK 1

SUMMARY

Autosomal dominant osteopetrosis (ADO), a hereditary skeletal disorders caused by mutated CLCN7 gene impairing osteoclast function, leads to fractures and bone pain, with no effective or safe causative therapy currently available. We aim to develop a genome editing therapy for ADO and have already demonstrated proof-of-concept for restoring osteoclast function *in vitro*. In this project, the safety of this therapeutic approach will be investigated, by carefully assessing off-target effects.

PROJECT GOALS

- Optimisation of DISCOVER-seq for use in cells of the hematopoietic lineage
- Apply optimized DISCOVER-seq to identify localization and frequencies of off-target editing sites in the genome
- Independent validation of identified off-target candidates

LONG-TERM GOALS

- Clinical application of ADO gene therapy

Reference Material for Mesenchymal Stromal Cell Critical Quality Attribute Assays

PRINCIPAL INVESTIGATOR:
Prof. (apl.) Dr. rer. nat. Karen Bieback
Cell and Immune Therapy, Institute of Transfusion Medicine and Immunology, FlowCore Mannheim, Medical Faculty Mannheim, Heidelberg University

Cell Therapy

Quality Control

2024

TRACK 1

SUMMARY

Strict quality standards apply to medicinal products like mesenchymal stromal cells (MSCs) to ensure safety. However, reference materials for testing the identity, purity and efficacy of MSCs are not available on large scale yet. This project aims to develop, produce, and test large-scale reference materials to verify the identity, purity, and efficacy of MSCs for use in cell therapies. These standards will support consistent quality and help overcome regulatory barriers to MSC-based therapies.

PROJECT GOALS

- Generate reference material for use in critical quality assays of MSCs

LONG-TERM GOALS

- Support development and commercialization of MSC therapies

SIMPLE-seq – Advancing Safety in Genome Editing

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Dr. Carla Fuster García, Prof. Dr. Toni Cathomen
Institute for Transfusion Medicine & Gene Therapy
Medical Center – University of Freiburg

Cell Therapy

Quality Control

2024

TRACK 1

SUMMARY

The SIMPLE-seq project aims to develop an innovative, user-friendly in vitro method for evaluating the off-target activity of base editors (BEs). While CRISPR-Cas9 induces double-strand breaks, BEs create single-strand breaks. SIMPLE-seq converts these into detectable signals, enabling accurate, high-throughput mapping of unintended DNA alterations. The aim is to comprehensively assess the safety and specificity of BEs, making their clinical applications safer and more predictable.

PROJECT GOALS

- Validate SIMPLE-seq in benchmark studies using established BEs

LONG-TERM GOALS

- Position SIMPLE-seq as a reliable, cost-effective, and scalable method with broad applications in both research and industry
- Establish SIMPLE-seq as the new gold standard for safety assessment of BEs

Gene-edited CD38/CD45-CAR-NK cells for leukemia treatment and non-toxic conditioning

PRINCIPAL INVESTIGATOR:
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Research Dept. Cell & Gene Therapy, Dept. of Stem Cell Transplantation
University Medical Center Hamburg-Eppendorf

Cell Therapy
Oncology

2024

TRACK 1

SUMMARY

CAR-based immunotherapies have revolutionized the treatment of some blood cancers but have not been successful in treating acute myeloid leukemia (AML) so far due to the lack of suitable target antigens and the rapid progression of the disease. To address this, we are developing off-the-shelf CAR-NK cells that target both CD45 and CD38, antigens commonly found on AML cells. We previously demonstrated that CD38 and CD45 double-knock-out prevents fratricide and results in highly effective elimination of cancer cells.

PROJECT GOALS

- Develop a method for the efficient production of CAR-NK cells with double-knock-out of CD38 and CD45 and dual CARS targeting CD38 and CD45

LONG-TERM GOALS

- Further develop the technology for future clinical use

Development of a nanobased mRNA therapy for heart diseases

PRINCIPAL INVESTIGATOR and PROJECT PARTNER:
Univ.-Prof. Dr. med. Georg Daniel Dürr, Dr. Tim Stüdemann
Department of Cardiovascular Surgery
University Medical Center Mainz (Johannes Gutenberg-University Mainz)

Gene Therapy

Cardiology

2024

TRACK 1

SUMMARY

Engineered mRNA, a novel and highly adaptable class of therapeutics, offer a new solution for treating cardiac diseases. In this project, we aim to evaluate nanoparticles that may target human cardiomyocytes derived from explanted myocardium ex vivo. These nanoparticles will be used to deliver mRNAs encoding factors demonstrated to elicit cardiomyocyte proliferation and cardiac regeneration in transgenic mice.

PROJECT GOALS

- Evaluate nanoparticles for targeted mRNA delivery to cardiomyocytes

LONG-TERM GOALS

- Facilitate treatment of cardiac diseases and improve patient outcomes

RNA-Based Delivery of Prime Editors targeting MYO5B Deficiency

PRINCIPAL INVESTIGATOR:
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Dept. of Gastroenterology, Hepatology, Infectious Diseases and Endocrinology: RG
Translational Hepatology and Stem Cell Biology, Hannover Medical School

Gene Therapy
Metabolism & Pediatrics

2024

TRACK 1

SUMMARY

Proper hepatocyte polarization is essential for functional hepatobiliary transport, relying on motor protein such as Myosin-5b (MYO5B). Myosin-5b and Rab11a are crucial for the bile canaliculus formation, and defects in either can alter the polarization, leading to major pathological consequences.
Thus, RAPIDMYO aims to define a robust Prime Editing approach targeting MYO5B-mediated progressive familial intrahepatic cholestasis (PFIC) as unmet clinical need.

PROJECT GOALS

- Develop defined mRNA/ pegRNA combination for Prime Editing

LONG-TERM GOALS

- Efficient and safe restoration of liver function

Testimonials

"I wish I had something similar to SPARK-BIH when I started developing ATMPs. I thoroughly enjoy helping scientists in their quest to develop new products and, in the long run, contribute to this Program in giving answers to patients in need."

Ander Izeta, Former President
of the Spanish Society for Gene
and Cell Therapy (SETGyC)

As a scientific/CMC advisor to the SPARK-BIH program, I have witnessed firsthand the transformative impact of the program to bring innovative ideas discussion in open and interdisciplinary collaborative environment. I have seen phenomenal engagement from the world class experts and innovators for fostering new discoveries in Cell and Gene Therapy domain. The program effectively bridges the gap between academic research and clinical application, empowering researchers to navigate the complexities of translational medicine for patient focused solutions. By fostering innovation and providing strategic guidance, SPARK-BIH plays a pivotal role in advancing early-stage biomedical discoveries toward tangible patient solutions.

Dharmesh Patel, Ph.D., MBA
Strategic Scientific Advisor, Pennsylvania, USA