Technology Overview

Dr. Matthias Stephan has developed nanoparticles capable of in vitro and in vivo targeting of RNA and/or DNA, with application for gene therapy, adaptive T cell transfer and immunotherapy. Current ex vivo T cell therapy involves physical transfection methods which add specialized protocols and reduce T cell viability, product yield, and quality. Nanoparticles can facilitate robust transgene expression without impairing cell viability or yield. Nanoparticles can be seamlessly integrated into current workflows without complicated protocols or complex ancillary equipment. Nanoparticles can also be utilized for in situ programming of tumor-specific T cells. Lymphocyte transfer therapies are expensive and must be personalized for every patient in specialized facilities. Nanoparticles present an off-the-shelf reagent that can quickly program tumor-recognizing capabilities into T cells without extracting them for laboratory manipulation. Nanoparticle T cell modification can generate tumor regression efficacies that are similar to conventional infusions of transduced T cells.

Applications

- Oncology
- Gene therapy
- Immunotherapy
- In vivo editing of immune cells
- Ex vivo editing of immune cells

Advantages

- Off-the-shelf reagent for adoptive cell therapy
- Cost-effective and no need for specialized equipment, facilities, or procedures

Market Overview

This technology can be developed to treat many types of cancer, with the global oncology market topping $100 billion in 2015. Each year 12.7 million people are diagnosed with a form of cancer and over 7 million people die from the disease.