

Individualized cancer therapy soon to be faster and more effective thanks to artificial intelligence

Intelligent and automated production of therapeutics in the future

The treatment of cancer with new, individualized cell therapies is usually very costly and lengthy. Before treatment can take place, patients often have to wait a long time for individualized therapeutics to be produced and they lose valuable time. In the EU project AIDPATH, researchers are now developing a facility for the production of so-called CAR-T cells that is capable of integrating patient-related data and biomarkers into the therapy process via artificial intelligence. The CAR-T cells are produced close to the patient, directly in the hospital. In the future, this will make it possible to provide cancer patients with treatment tailored to their needs and much more quickly.



In the EU »AIDPATH« project, the partners from industry and research will build an automated and intelligent facility over a period of four years that is capable of producing targeted and patient-specific cell therapy directly at the point of treatment. In addition, the project addresses the integration of the facility into the hospital

environment, taking into account logistics processes as well as data management and data security.

© ipopba/stock.adobe.com

The fairly new CAR-T cell therapy is based on genetically modified T cells. These are the body's own white blood cells that make up part of the immune system. The T cells are taken from the patient's blood for treatment and equipped with a so-called chimeric antigen receptor (CAR). This receptor enables the cells to recognize and

destroy tumor cells. CAR-T cell therapy has already been used in Germany for two years and is paving the way for completely new treatment approaches in hematology and oncology. However, much of the time spent on CAR-T cell therapy to date has still been taken up by complex logistics processes from central production facilities and inflexible manufacturing and application schemes. In addition, it has not yet been possible to take into account the individual cell characteristics of the patient, so that the success of the therapy cannot always be guaranteed.

Artificial intelligence for targeted CAR-T cell therapy

For a patient-tailored therapy with CAR-T cells, the partners in the EU »AIDPATH« project are relying on artificial intelligence (AI) that incorporates the patient's individual data and biomarkers into the therapy process. This should produce highly potent and optimally adapted CAR-T cell products that target the altered cells in the patient's blood or the tumor. AI technology is also being used to control upstream and downstream production and logistics processes to improve scheduling and resource planning. A key benefit of automated, decentralized production is the potential to shorten production times and make therapy available to patients sooner. Alongside this, costs and utilization of hospital resources can be reduced. Overall, this results in improved access for patients to this form of therapy.

The prototype for the intelligent and automated production of therapeutics in the future

In the EU »AIDPATH« research project, we are creating a prototype for the intelligent and automated production of therapeutics of the future. The hospital environment is integrated in an intelligent way and aspects of logistics, capacity planning, data management and IT security are also included. CAR T-cell manufacturing will take place in a compact facility that can be operated by medical professionals on-site at the hospital. This enables personalized treatments to be delivered directly at the point of care. In this way, we are enabling a paradigm shift in the care of patients with personalized therapeutics«, says Niels König, head of the department production metrology at the Fraunhofer IPT, who is coordinating the project.

The project is divided into three work areas, in which an intelligent and automated plant for the production of therapeutics will be built over four years. The first work

area consists of the automation of the manufacturing processes and the plant networking, in which the Fraunhofer IPT, the Fraunhofer IZI, as well as AglarisCell, Fujifilm, the University Hospital Würzburg, FORTH and the University College of London, among others, will be involved. The second work area deals with the IoT infrastructure, which will be realized by the Fraunhofer IPT, Red Alert Labs and Ortec. The third work area deals with the development and implementation of AI technology, which will involve Fraunhofer IPT, IRIS, FORTH, SZTAKI, Fundacio Clinic per a la recerca Biomedica, Panaxea and Hitachi.

The EU project »AIDPATH« is funded for four years under the funding code 101016909 from the European Commission's Horizon 2020 funding measure.

Project consortium

- Fraunhofer Institute for Production Technology IPT, Aachen
- Fraunhofer Institute for Cell Therapy and Immunology IZI, Leipzig
- Panaxea BV, Amsterdam
- Foundation for Research and Technology - Hellas, (FORTH), Patras
- IRIS Technology Solutions, Sociedad Limitada, Madrid
- Red Alert Labs, Maisons-Alfort
- Fujifilm Irvine Scientific Inc, Tilburg
- Hitachi Chemical Advanced Therapeutics Solutions, Allendale
- AglarisCell SL, Tres Cantos
- Würzburg University Hospital, Würzburg
- Ortec Optimization Technology B.V., Zoetermeer
- Fundacio Clinic per a la recerca Biomedica, Barcelona
- SZTAKI Számítástechnikai és Automatizálási Kutatóintézet, Budapest
- University College London, London