

# New Perspectives in Cancer Therapy

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**IOZK** | IMMUN-ONKOLOGISCHES  
ZENTRUM KÖLN



"At the IOZK, we strive to extend your life as a cancer patient and to offer you a therapy without side effects."

Dr. Wilfried Stücker  
CEO and founder of the IOZK

# Forging New Paths for the Benefit of the Patient

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Crossing frontiers – between sciences, disciplines, and discourses: That is the challenge for modern oncology. Only then can new, innovative therapies emerge. Immunotherapy is a good example of how interdisciplinary collaboration results in new treatment options.

Tumor immunology has been an area of great worldwideresearch interest over the last few decades. The Nobel Prize in Medicine was awarded for research in the field of immune oncology in 2011 and 2018, highlighting the importance of this discipline. The doctors and scientists at the Immune-Oncological Center in Cologne (IOZK) have been working on the role of the immune system in cancer and chronic infectious diseases since 1985.

Over the years, we have developed the IOZK-Immunotherapy. Our experiences show that we are on the right path: with this treatment we can offer our patients a personalized therapy that offers the opportunity of a gentle treatment as well as the best possible quality of life.

The multi-layered approach of immunotherapy is important to us. Immunotherapy uses and strengthens the patient's own immune system in the fight against cancer and sustainably activates

it against new cancer cell growth. In contrast, surgery, radiation and chemotherapy aim to destroy the tumor through an operation or medication – this is often accompanied by serious side effects for the healthy cells and the immune system.

The successes we have observed with our treatment motivate us to further develop the IOZK-Immunotherapy. We can already offer this form of therapy to our patients – even if it is not yet the standard treatment.

As an individualized treatment, the IOZK-Immunotherapy is especially suited for those patients who want to take an active role in their own recovery. Patients who actively select their treatment method and identify with it, can directly influence the healing process and thus positively influence their recovery.

This vision of a natural and sustainable treatment of cancer is what motivates us every day.





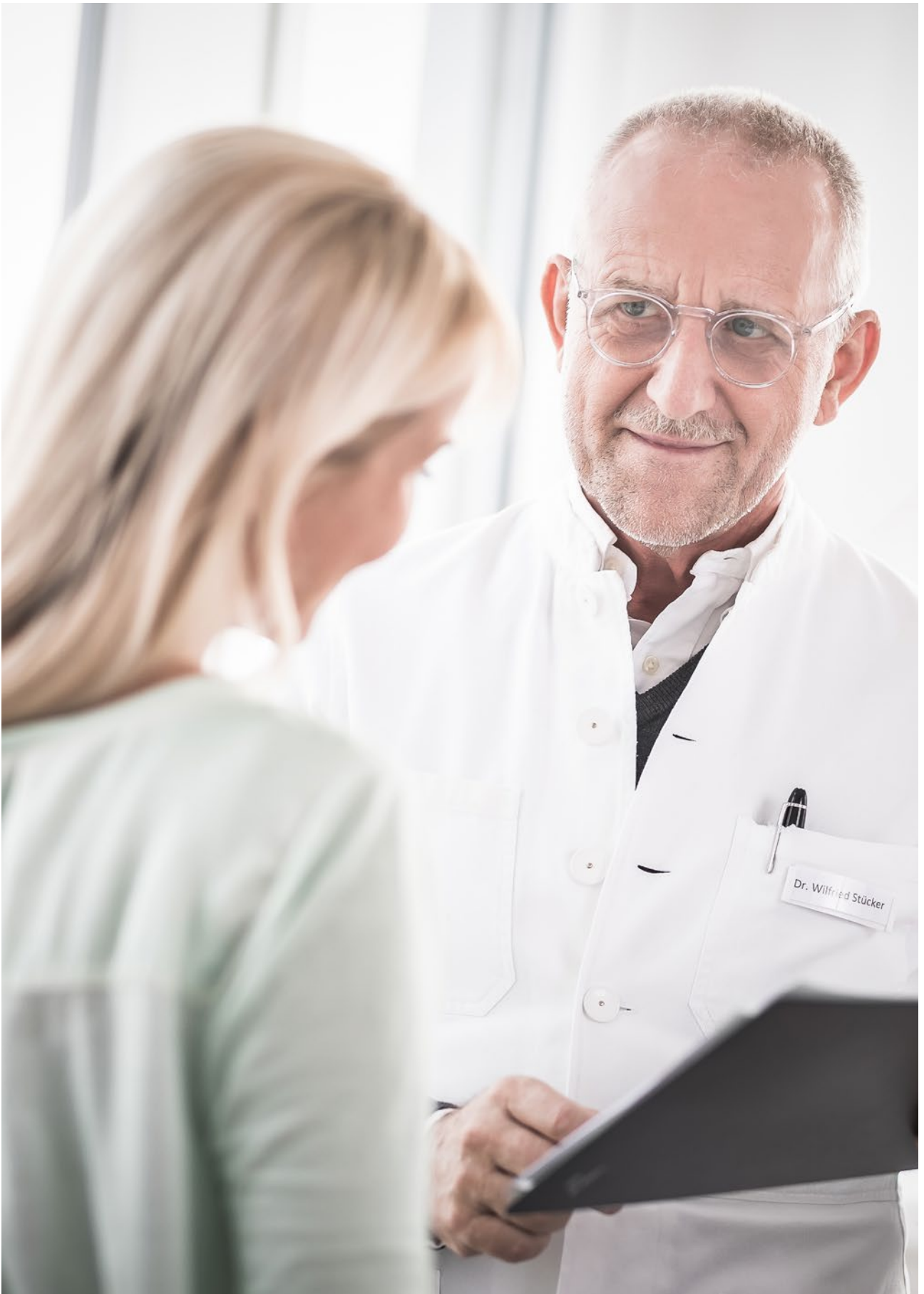
# THE IOZK- IMMUNOTHERAPY

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## Activating the Patient's Immune System

Each case of cancer is unique and requires a complex analysis and a treatment plan tailored to the patient. That is why we plan the IOZK-Immunotherapy for each patient individually and produce a personalized treatment plan. The IOZK-Immunotherapy mobilizes the body's own immune response, thus enabling it to take up the fight against the tumor growth itself.





## Personalized Medicine – the Right Therapy for Each Patient

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Immuno-oncological therapies have revolutionized tumor treatment and have established themselves next to surgery, radiation, and chemotherapy.

At the IOZK, we offer the ideal conditions for an optimal immunotherapy. We combine different aspects that promise the best chance of success: a team of experts consisting of medical doctors and scientists in combination with a treatment developed by us, tailored to, and produced for, each individual patient – the IOZK-Immunotherapy.

Our treatment is based on a personalized vaccine that activates the body's immune system to take up the fight against the tumor. It is based on a comprehensive analysis of the immune system through our laboratory. On the basis of those results, our team of doctors decides on the treatment method and monitoring best suited to the patient.

When deciding on a treatment plan, we take all currently available methods of treating cancer into consideration: from our immunological treatment to the classic chemotherapy. As a result, each patient receives a personalized therapy tailored to their needs.

The IOZK-Immunotherapy consists of different treatment modalities, such as virotherapy, hyperthermia, vaccination, and therapy with checkpoint inhibitors. With this multi-modal form of therapy, all types of solid tumors can be treated, for example, brain tumors, breast, colorectal, lung, skin, or prostate cancer.

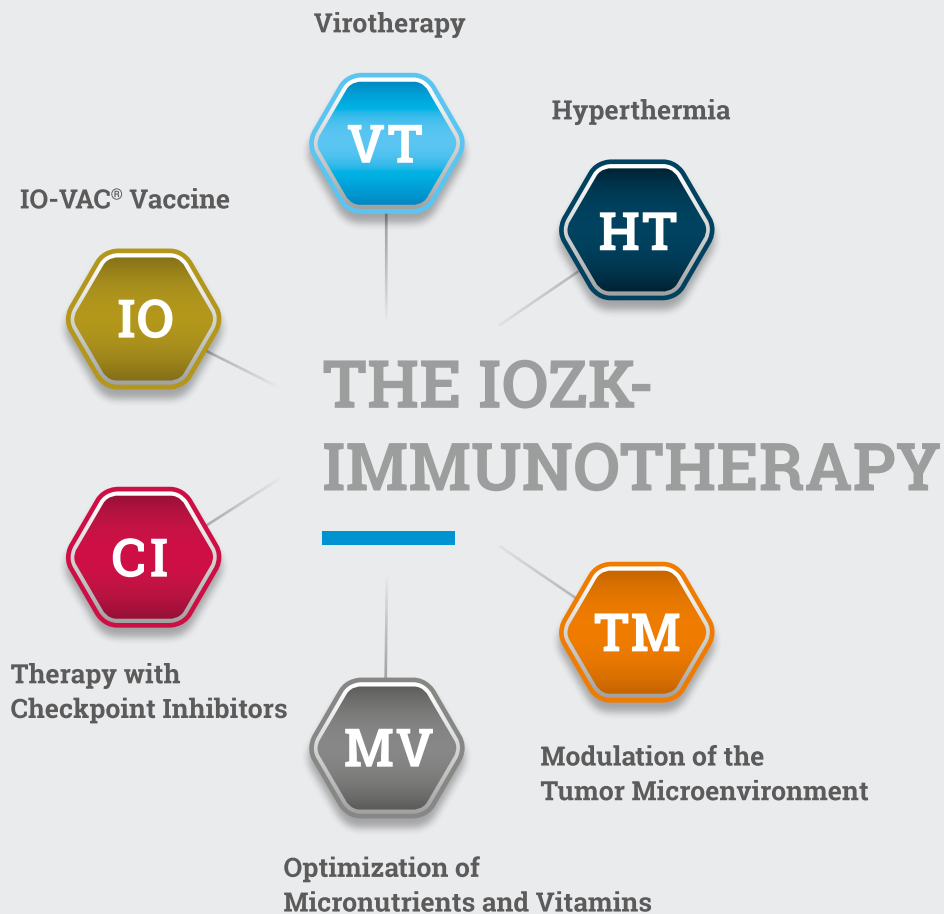
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The IOZK-Immunotherapy for Different Types of Cancer

## A Comprehensive Combination

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The personalized IOZK-Immunotherapy specifically targets the tumor without destroying healthy cells. We achieve this through combining various treatment modalities.







### **IO-VAC® Vaccine**

The basis for, and most important component of, our IOZK-Immunotherapy is the patient-specific vaccine IO-VAC® developed by our laboratory. Explained simply, we combine an oncolytic virus and the patient's tumor material with dendritic cells in our laboratory to produce the personalized vaccine IO-VAC®. This vaccine then activates the patient's immune system to fight the tumor. The IOZK is the only institution in Europe that has received the regulatory approval to produce such a vaccine.



### **Virotherapy**

Virotherapy is an integral component of the IOZK-Immunotherapy. Oncolytic viruses, such as the Newcastle Disease Virus (NDV), are viruses that attack tumor cells and destroy them. When the virus replicates in tumor cells, the immune system is alerted and notices the tumor cells. Through the virus infection, the tumor cells become classified as dangerous and are attacked.



### **Hyperthermia**

**Modulated electrohyperthermia** causes an elevated temperature in, and a stimulation of, tumor cells through electromagnetic waves, without affecting the healthy tissue. Through this, the tumor cells produce certain danger signals on their surface that provoke and intensify an immune reaction.

In **moderate whole body hyperthermia**, a fever-like increase in the core body temperature is generated through infrared light. This passive temperature elevation stimulates the immune cells that are responsible for fighting the tumor.



### **Therapy with Checkpoint Inhibitors**

Checkpoints are the control mechanisms by which the immune system is regulated against over-activation. Tumors “misuse” the immunological controls, also known as checkpoints, to deactivate the immune response targeted against them. This is where checkpoint inhibitors come into play: they inhibit the blocked signaling pathways. In a sense, they release the brakes on the immune cells and thus enable the immune system to fight the tumor again. The PD-1 checkpoint inhibitors, however, are only effective when an immune response against the tumor already exists.



### **Modulation of the Tumor Microenvironment**

The microenvironment of the tumor refers to the structure of connective tissue into which the tumor is embedded. There exists a direct interaction between this tissue and the tumor cells, and thus it has an influence on tumor cell growth and effectiveness of the immunotherapy. Hence the IOZK-Immunotherapy considers and modulates the tumor microenvironment.



### **Optimization of Micronutrients and Vitamins**

In order to operate optimally, the immune system needs to be supplied with sufficient micronutrients and vitamins. If required, we administer these specifically in order to optimize the immune response.

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IO-VAC® Vaccine



# The Treatment – Optimized for Each Individual Patient

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*The following course of treatment can act as a guideline to the IOZK-Immunotherapy. It contains two vaccination cycles and takes around 5 weeks.*

## 1. First Consultation

During the first consultation at the IOZK, the patient's medical history is taken, as well as examining all existing test results and considering all possible conventional and immunological treatment options. This is followed by taking a blood sample that will be used to assess the immune system and the tumor activity. The test results are available after about two weeks.

## 2. Development of the Treatment Plan

Our team of experts meet to discuss the results and, taking into consideration the patient's history, develops an individualized treatment plan.

## 3. First Cycle of Treatment at the IOZK

*Duration: 8 days*

In a briefing consultation, the treatment plan is discussed with the patient. At the start of the therapy, a blood sample is taken from the patient that will be used to produce the personalized tumor vaccine IO-VAC®. The production process takes 8 days. During this time, the tumor region and the immune system are treated on an outpatient basis with modulated electrohyperthermia, administration of Newcastle Disease Virus (NDV), and, as required, a combination of vitamins and micronutrients.

On the 8th day after taking the blood sample, the first vaccination with IO-VAC® takes place.

## 4. Second Cycle of Treatment at the IOZK

*Duration: 8 days*

Three weeks later, another blood sample is taken for the production of the second IO-VAC® vaccine. Further treatment with hyperthermia and virotherapy is administered.

On the 8th day of the second cycle, the second vaccination with IO-VAC® takes place.

## 5. Analysis of the Immune System and Successful Vaccination

After another three weeks, an analysis of the patient's blood provides information on the state of the immune system as well as the success of the vaccination. Using an ELISpot Test, the T cells are tested for an antitumor reaction against specific antigens. If the immune function and the T cell reactions are good, then further monitoring will be carried out at approximately three-month intervals. Should the immune function be impaired, or if the reaction to the vaccination decreases, further treatment cycles with virotherapy and hyperthermia, or an additional vaccination, can be considered.

## Targeted Against the Tumor – Without Major Side Effects

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The personalized IOZK-Immunotherapy targets the tumor of the patient without destroying the healthy cells. With aid of the vaccine IO-VAC®, the immune system recognizes the tumor cells and starts attacking them. As this method is based on the body's own immune response and only destroys tumor cells, it is free of any serious side effects.

The first treatment usually takes 5 weeks. Generally, the IOZK-Immunotherapy can be started at any time after diagnosis. However, the optimal time point for treatment is as close as possible to the complete removal of the tumor. Contact should be established with the IOZK prior to the operation so that the patient's own tumor material can be used for preparing the immunotherapy.

The IOZK team constantly monitors the patient and their immune system. Depending on the condition of the patient and the course of treatment, further immunological treatments, and possibly additional therapies, are administered.

The cost for the first two treatment cycles, including diagnostics, production of IO-VAC®, and therapy amount to approximately € 55,000. Depending on the terms of your health insurance, some private health insurances or employer's liability insurance associations contribute towards the costs.

### The IOZK-Immunotherapy for Different Types of Cancer

The multimodal therapy approach at the IOZK can be used to treat solid tumors, such as:

Anal Cancer  
Bile Duct Carcinoma  
Bone Cancer  
Bowel Cancer  
Brain Cancer  
Breast Cancer  
Cancers of the Head and Neck  
Cervical Cancer  
Colorectal Cancer  
Esophageal Cancer  
Gastric Cancer  
Hepatic Cancer  
Lung Cancer  
Malignant Melanoma  
Ovarian Cancer  
Pancreatic Cancer  
Prostate Cancer  
Renal Cancer  
Sarcoma  
Testicular Cancer  
Thyroid Cancer  
Uterine Cancer

# Multidisciplinary Expertise for Every Patient

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## The Team of Experts

The CEO, **Dr. Wilfried Stücker**, initiated the IOZK in 1985. In collaboration with various doctors and scientists, he developed the IOZK-Immunotherapy and established the treatment Center and laboratories.



**Stefaan Van Gool, MD, PhD**, is a specialist in pediatric hemato-oncology with a focus on brain tumors. He is the Head of Translational Oncology at the IOZK. He spent many years at the University Clinic in Leuven and at the Department of Microbiology and Immunology, where he conducted research on the use of vaccines against cancer and published many studies. He leads the team of doctors at the IOZK and is responsible for planning and implementing the IOZK-Immunotherapy.

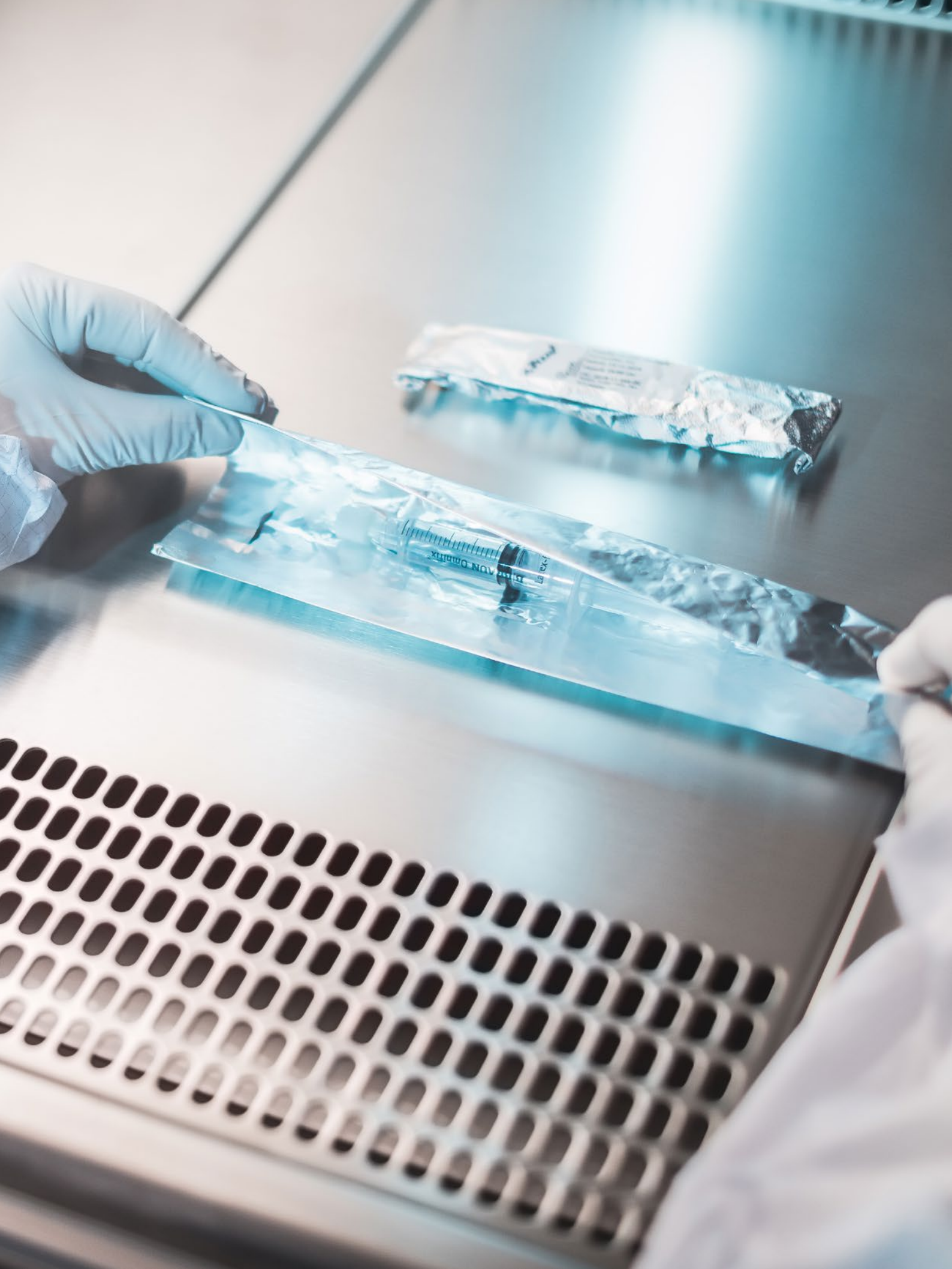


The scientific side of the IOZK is headed by **Prof. Dr. rer. nat. Volker Schirmacher**. He spent over 30 years conducting research at the Deutsche Krebsforschungszentrum (German Cancer Research Center) in Heidelberg, where he led the Department of Cellular Immunology. He is an internationally recognized pioneer of immunotherapy for cancer, specializing in oncolytic viruses. Together with the scientists and doctors at the IOZK, he works on systematically integrating new scientific findings to further develop the IOZK-Immunotherapy.

### > READ MORE

Further information is available on our website:  
[www.iozk.de/en/the-iozk/team](http://www.iozk.de/en/the-iozk/team)







## THE VACCINE IO-VAC®

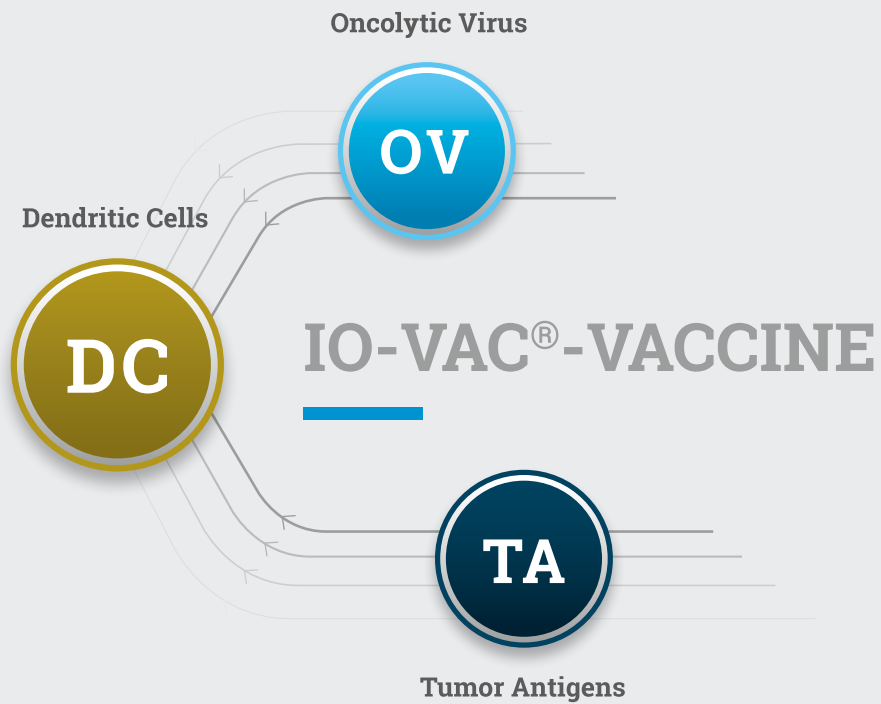
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### Unmasking Cancer Cells and Fighting them Effectively

Through repeated vaccinations with IO-VAC®, the immune system of the patient is activated and enabled to detect and uncover the camouflage mechanisms of the tumor cells and to take action against these. Here dendritic cells, acting as messengers, and a virus that is not harmful to humans, play the key roles.

## Components and Functioning of the Personalized Vaccine

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The tumor vaccine IO-VAC® activates the immune system of the patient so that it can fight the cancer cells itself. To achieve this, the vaccine employs the patient's own dendritic cells and tumor material, as well as an oncolytic virus.



## Dendritic Cells Activate an Immune Reaction Against the Tumor



Once a tumor has established itself, it develops biological camouflage mechanisms to prevent it from being attacked by the immune system. Through repeated vaccination with the IO-VAC®-vaccine, the immune system is enabled to unmask these camouflage mechanisms and to recognize the tumor cells as dangerous and take up the fight against them effectively. Similarly to regular vaccines, the immune system can build up an immunological memory against the tumor antigens, so that long-term effectiveness is given.



## Using Viruses Against Cancer

Certain oncolytic viruses can only multiply in tumor cells, destroying them in the process, while healthy cells can defend themselves against the virus. The Newcastle Disease Virus (NDV) is such a virus. It is totally harmless for humans: it exclusively multiplies in human tumor cells while not damaging healthy cells. Infected tumor cells send out danger signals, which alarm and activate the immune system. Thus NDV increases the effectiveness of IO-VAC®.

## Production of the Vaccine

The first step is taking a blood sample from the patient. Monocytes, a type of white blood cell, are isolated and grown into dendritic cells in the IOZK Laboratory. They are matured in the laboratory and loaded with information about tumor components and viral danger signals. After the vaccination, the dendritic cells present these tumor-specific molecules to the immune system of the patient and thus activate the T cells. The role of the T cells is to destroy sick cells. Due to the information the T cells receives, the T cells can now recognize and attack tumor cells throughout the body.









# THE TREATMENT CENTER

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## Modern Cancer Therapy in the Heart of Cologne

The IOZK is a treatment Center with its own laboratory in the city center of Cologne, Germany. Our extensive treatment Center consists of examination and consultation rooms, conference rooms, offices, and modern laboratories of the highest standard.



## THE TREATMENT CENTER

# Treatment Facility

Each year around 60 dedicated, specialized staff members attend to approximately 350 new patients from Europe, Asia, Africa, America, and the Middle East. Our team of medical doctors have extensive experience in immunological cancer therapy and our leading scientists have spent decades researching this topic and publishing their findings.

Our facilities adhere to the highest quality standards – we have five devices for localized hyperthermia, one device for transurethral hyperthermia, and two units for whole-body hyperthermia.



## The IOZK Laboratories

Qualified staff members and a specialized clean room laboratory where interference through foreign particles is excluded are two basic requirements for specialized research into and production of individualized immunotherapy. While we produce the patient-specific vaccine IO-VAC® in our **GMP Production Laboratory**, research and special immunological analyses take place in the **Diagnostics Laboratory**.

### > READ MORE

You can find further information about the laboratories on our website:  
[www.iozk.de/en/the-iozk/laboratories](http://www.iozk.de/en/the-iozk/laboratories)

## WEBSITE

You will find further information and explanations on our website. We also provide a selection of scientific publications related to the IOZK-Immunotherapy.

**[WWW.IOZK.DE/EN](http://WWW.IOZK.DE/EN)**

## IOZK CONTACTS

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## BARRIER-FREE

The IOZK is barrier-free.

## ARRIVAL AND OVERNIGHT ACCOMMODATIONS

You can easily reach the IOZK by car and public transport.

You can find a detailed description of how to get there and where to stay under:

[www.iozk.de/en/directions-and-accommodation](http://www.iozk.de/en/directions-and-accommodation)

## IMPRINT

Publisher and responsible for the content:

IOZK GmbH & Co.KG, Hohenstaufenring 30–32, 50674 Cologne;

Editor: Dr. Wilfried Stücker, Tobias Sprenger

Translation: Gundula von Fintel

Concept and Design: Bernd Balling, Lars Friedrich

Editorial editing: Dr. phil. Birgit Gottschalk

Photography: Roland Baege







**IOZK** | NEW PERSPECTIVES  
IN CANCER THERAPY

IMMUN-ONKOLOGISCHES ZENTRUM KÖLN

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