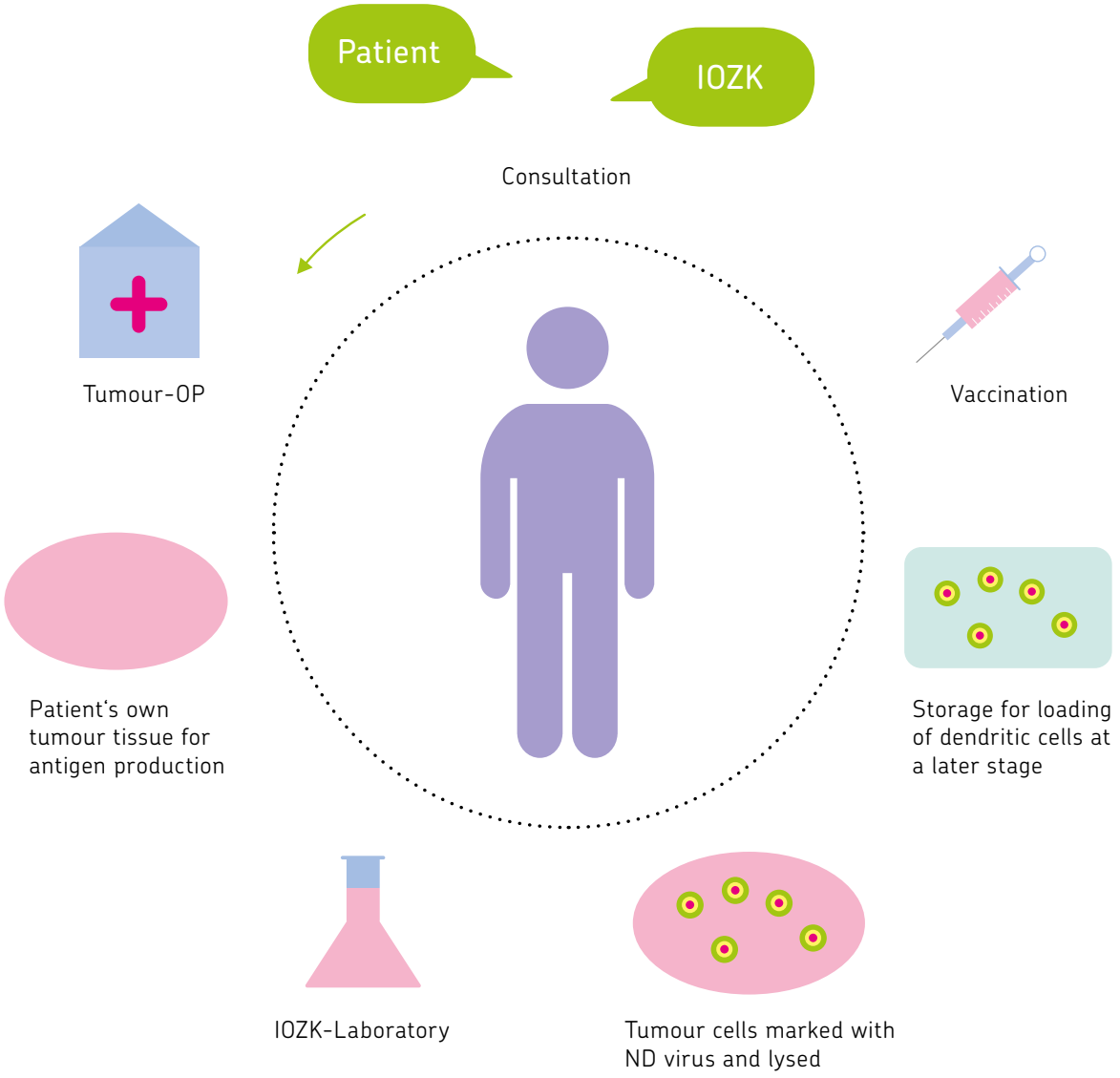
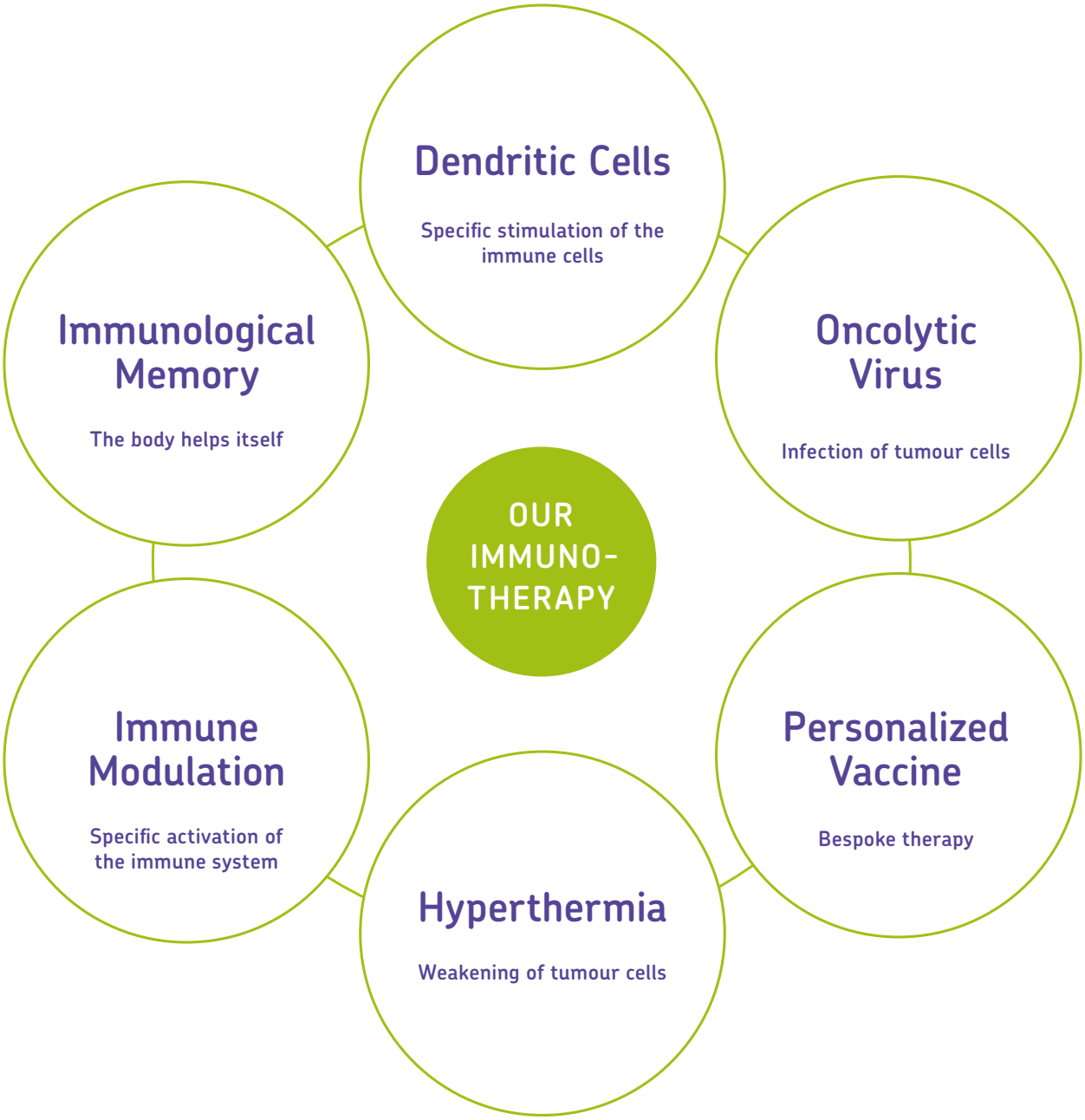
IOZK CONSILIUM

Magazine of the IOZK Foundation Edition 1/2019



The Immune System is the Better Medicine: Forging New Paths in the Treatment of Cancer

MULTIMODAL IOZK THERAPY



Welcome to the Immuno-Oncological Centre Cologne

Immunotherapies are considered a breakthrough in cancer research. The idea to use the body's own immune system to fight cancer is simply brilliant. But the immune system usually only reacts to new, or "dangerous" cells – once a tumour has established itself in the body, it is no longer recognised as foreign. That means that the immune system has to relearn that tumour cells are dangerous. This is why we produce an immune response against the tumour, so that immunotherapies can be effective.

We develop a personalised vaccine against tumour cells. In order to achieve this, we use tumour antigens from the patient. This is important, as each tumour is unique and thus we produce a bespoke vaccine for each individual patient. For our vaccine, we use dendritic cells taken from the patient's blood, which are loaded with tumour components (tumour antigens). To help the immune system recognise the tumour as dangerous, we combine the tumour information with a virus that is not harmful to humans. In order to reduce possible metastases, the ideal time point for our tumour vaccination is directly after complete tumour removal. In cases where the tumour is already at an advanced stage, a cure is still difficult. However, we have observed a clear reduction of the disease progression. Another thing that is remarkable about this therapy: some of the activated immune cells migrate to the bone marrow and build an immunological memory, which prevents the formation of metastases.

As a translational institution, the IOZK sees its role in converting new immuno-oncological research findings into treatments for the well-being of our patients. In order to fulfil this goal, we have set up our own foundation to optimize immunotherapies against cancer. In the magazine of our foundation, CONSILIUM, we would like to inform you about the goals we have reached so far and our future aspirations.

Yours sincerely,

Dr. Wilfried Stücker
CEO IOZK Foundation

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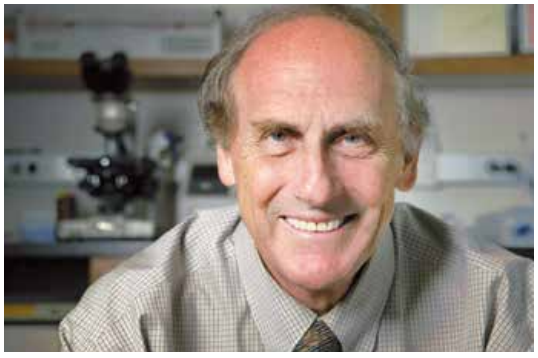
NOBEL PRIZES IN MEDICINE AWARDED FOR IMMUNOLOGY

Milestones in the History of Immunotherapies

In 2011, the Nobel Prize was awarded to the immunologists Bruce Beutler, Jules Hoffmann, and Ralph M. Steinman. The jury stated that our understanding of the immune system was revolutionized through their discoveries and thus opened new possibilities for fighting infectious diseases, autoimmune diseases, and cancer. What also needs to be noted is the research into dendritic cells by the Canadian Steinman, as this plays a prominent role in the immunotherapy at the IOZK.



Ralph M. Steinman (1943–2011).
Photo courtesy of Rockefeller University, New York

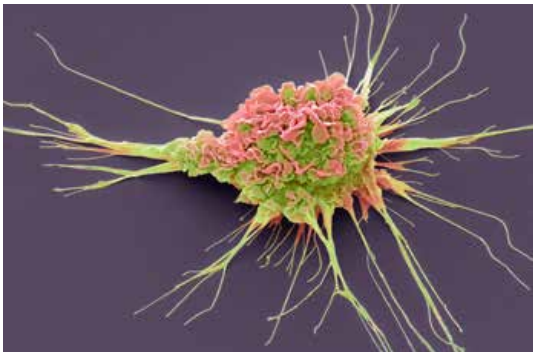
Ralph Steinman knew that he was being considered as a prize winner, but he was never able to receive the honour. He died of cancer three days before the official announcement of the Nobel Prize – the irony of fate. However, the prize was awarded to him posthumously. This is the first time this occurred in the 110 year history of the prize. Steinman had used a personalised immunotherapy to fight pancreatic cancer for 4,5 years – a time period much longer than usually given for this type of cancer. But tragically the researcher missed out on the biggest honour of his life by a few days.

The other half of the 2011 Nobel Prize in Medicine was awarded to the researchers Beutler and Hoffmann, who discovered that a danger signal is required to trigger an immune reaction in the human body so that an immune response can be launched.

At the IOZK we apply this finding when using an oncolytic virus in our vaccine. You can find out more on pages 18/19.

The Discovery of Dendritic Cells

In 1973 Ralph Steinman, in the context of his research at the Rockefeller University in New York, discovered the previously unknown dendritic cells in the blood and described their function in the human body. In cell culture he would prove that they could activate other cells, but he, and the rest of the research world, were oblivious to the importance of this realization for quite some time.



To transmit signals the dendritic cells use their many branched arms. The branched form of the cell reminded Steinman of the branches of trees and gave rise to their name. The Greek word "dendron" means tree, and thus the term dendritic cell was born. Photo: alamy.

Dendritic cells help fight bacteria and viruses in the body. They are "scouts" that recognize certain components, called antigens, take these up, and present them. In this way they teach the T cells of the immune system, the cells that play an important role in the immune response.

On their surface the dendritic cells present the antigen molecules to the T cells. At the same time they emit special signals that send the T cells on a hunt with the right combination of receptors.

Dendritic cells act as transmitters and coordinators in an immune response. They pass on the important information about how enemies can be recognized and what special signals the T cells need to look out for when migrating through the body.

The dendritic cells are responsible for presenting the antigens to the T cells.

This is necessary, as the highly specialized T cells can only identify and fight antigens, if they have previously been exposed to them.

NOBEL PRIZES IN MEDICINE AWARDED FOR IMMUNOLOGY

The First Vaccine was Self-tested

In 2007, the then 64 year old Steinman was diagnosed with pancreatic cancer. The prognosis for this type of cancer is poor: The survival rate is only 25% in the first year and the average life expectancy is around six months. He viewed this challenge like a true scientist and started one last experiment: he designed a therapy that he hoped would extend his life in such a way that a conventional chemotherapy might not be able to.

The dendritic cells he once discovered had the potential to fight this type of aggressive tumour. "He worked with colleagues worldwide to arrive at a plan for treating the cancer, and he designed the therapy in a way that he hoped would allow us to learn something as he was being treated," said Sarah Schlesinger, head of Dr. Steinman's clinical research program.

Each Tumour is Unique

Even tumours that look the same because they arise from the same organ or from the same type of cells can act differently: some shrink, others grow, there isn't a rule.

Today doctors can examine the DNA of each tumour and thus determine its strengths and weaknesses and develop therapies that are best suited for each individual patient.

Tumour Material as Starting Point

Steinman underwent an operation to remove his tumour. Once removed, the tumour was divided, preserved, and sent to labs of Dr. Steinman's collaborators all over the world to be used as the basis for individualized therapy. Using the tumour material as starting point was a new approach. After the operation, he received a traditional chemotherapy followed by a series of eight experimental immunotherapies.

His plan worked. His remaining life was spent relatively healthy, something that he put down to his personalised immunotherapy. He felt well most of the time and continued working to the end and even had enough energy to travel to international conferences. He was analysing data up to a few days before his death.

"We'll never know for sure how much he was helped by the experimental therapies he received," says Dr. Schlesinger, who was closely involved in his care. "Scientifically it's just not possible to draw conclusions from a single patient. But he certainly enjoyed a longer and healthier life than the odds would suggest."

Source of quotations: The Rockefeller University
www.rockefeller.edu/news/1816-nobellaureate-ralph-steinman-dies-at-68/

A Ray of Hope in Cancer Therapy

The potential of vaccines based on dendritic cells is only starting to become visible and clinical trials aimed at better understanding their therapeutic effects have been initiated in recent years.

"Although Ralph did not live long enough to see his discovery win the Nobel, he did live to see vaccines based on his discovery used in real human patients, something that did not occur until after his diagnosis. He was thrilled to finally see the clinical impact of his work," stated Dr. Schlesinger.

Currently (March 2019) many scientists are working on this topic, almost 500 studies are listed on the platform clinicaltrials.gov that use this innovative approach to cancer therapy.

The Nobel Prize would have been a big honour for Steinman after he committed his whole life to this work. The prize not only recognized his work, it also provided a boost concerning the topic of tumour-specific immune response and the treatment options that arise from it.

Today the immune system is better and more effective than any medicine.

THE IOZK IMMUNOTHERAPY

A Patient-Specific Therapy without Serious Side Effects

Yadigar Genc MD, Dr. med. Tobias Sprenger, Stefaan Van Gool MD PhD, Dr. Stücker, Dr. Jennifer Makalowski, Dr. med. Katharina Sprenger, Montassar Cherif MD

"The good thing about immunotherapy is that it is so specific. Only the cell structures that need to be destroyed are targeted."

The more general a treatment is, the more side effects are caused. This is the case with the collateral damage as experienced with chemotherapy. Most general target therapies have the problem that the structures that occur in tumours and are attacked, are also found in normal cells and can result in these also being destroyed. This does not occur with our specific type of treatment.

An Important Goal: Immunological Memory

The immune system can learn to dominate the tumour and slow its growth. This is not possible with other treatments – they are only effective while they are being administered. The difference with the new immunotherapies is that these do generally not destroy the whole tumour, which is why it was initially thought that they are not very useful.

However, what is important is that a balance is created between the immunological competence towards tumour growth and the tumour itself. In addition, an immunotherapy does not exclude the option of combining it with other therapies. For example, when an immunotherapy is combined with chemotherapy, it does not mean that the immunological memory is lost.

Once the body has understood how to deal with the tumour, it will continue to do so independently without continuous new input. In all other therapies the patient remains passive – something is being done to them when the treatment is applied. But the immune system is able to learn how to actively control tumour growth.

A New Perspective on the Treatment of Cancer

Our treatment requires a new perspective. Up to now, it was thought that if cancer cannot be detected, then the person is healthy. Many of our patients continue to live without a tumour, but we also have many long-term patients who continue to live comfortably with a certain amount of tumour material in their body. If, for example, the tumour only continues to grow at a very slow rate, then it can therapeutically be reduced time and time again. We see this in our practice every day.

Today it is thought that the balance between the tumour and the immune system is more important and results in an extended overall survival and a higher quality of life. In this context this is termed progression-free or metastases-free survival. An increased overall survival has been proven for personalised immunotherapies.

THE IOZK IMMUNOTHERAPY

Which Types of Cancer can be Treated?

The first experiences with immunotherapies were made with tumours where chemotherapy showed no or only minimal effect: malignant melanoma, renal cell carcinoma, and non-small cell lung cancer.

In our practice we treat many patients with breast, ovarian, and uterine cancer. Our treatment spectrum also includes patients with lung cancer, cancers of the digestive tract such as gastric cancer, colorectal cancers, pancreatic or liver cancer, as well as urological cancers such as prostate tumours or kidney and bladder cancers.

A further focus is on neurooncology, i.e., brain tumours, including cerebral tumours and brain stem tumours.

Melanoma is an important type of tumour currently usually treated with antibody therapies. They are especially suited for a combined treatment with our immunotherapy.

As the principle of our immunotherapy is based on informing the immune system, it is not important which type of tissue or cells the cancer originates from. If tumour antigens are present in the body and the immune system of the patient is active, then our type of treatment can be used to treat all solid types of cancer.

Breast cancer

Colon cancer

Gastric cancer

Pancreatic cancer

Lung cancer

Brain tumours

Uterine cancer

Prostate cancer

Kidney cancer

THE TREATMENT

Prerequisites: Good Physical Condition and a Functioning Immune System

What are the prerequisites for an immunotherapy?

First: The patient has to be in general good physical condition.

Second: The immune system has to be in good functioning order.

Problems may arise if large doses of cortisone have been administered, as this suppresses the immune system. In these cases it is much more difficult to reactivate the immune system. This can also be the case after extensive chemotherapy. It is very important that the immune cells are present and are active.

Of further importance is the aspect of quality of life: the patients themselves have to be active and have the will to live and a vision. We do not want to extend suffering. The general condition of a patient, the status of the immune system, as well as the influence of medication can be measured objectively through our immune-oncological evaluation. The quality of life, however, needs to be assessed in an open discussion with the patient and evaluated on an individual basis.

Even if metastases already exist, our therapy offers the option to activate the immune system in such a way that further tumour growth is prevented or that the tumour recedes. This, however, requires that an immune reaction is raised against the tumour – without this, all novel immunotherapies are ineffective.

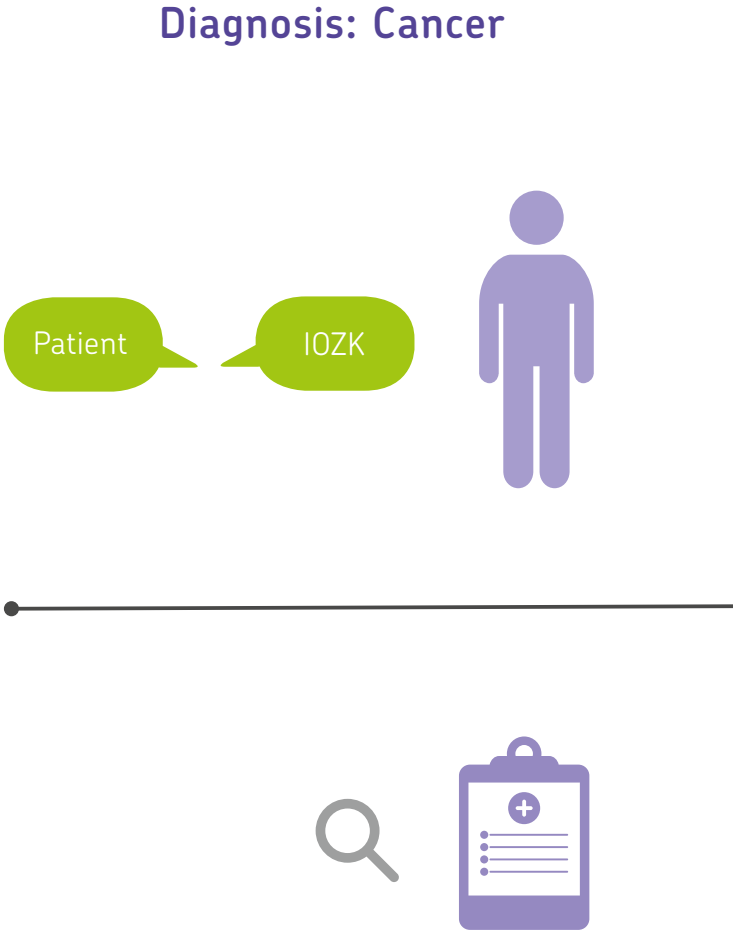
We use the Patient's Own Tumour Material as Basis

The IOZK immunotherapy can be applied at any point after a cancer diagnosis. Current findings show that treatment at an early stage has the best long-term results.

The ideal time for contacting the IOZK is before an operation, as it is beneficial if the patient's own tumour material is available for the preparation of the vaccine. The tumour cells provide the information about the tumour antigens. The tumour material remains property of the patient and can be stored at the IOZK indefinitely.

If no tumour material is available – for example with inoperable tumours – tumour components can be isolated from the blood of the patient.

There are indications that an immunotherapy is more effective the less tumour material remains in the body. However, continuously more successes are being documented in cases where the disease is already more progressed.



THE TREATMENT

The Ideal Course of the IOZK Immunotherapy

Operation

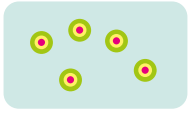
1st Vaccination

8–14 days in Cologne

4 weeks

4 weeks

Hyperthermia



Tumour material from the patient to mark tumour cells with the virus

Preservation and storage of the lysate

Culture of dendritic cells from the patient's blood

Loading with virus-infected tumour antigen

Immuno-oncological diagnostics

2nd Vaccination

8–10 days in Cologne

Check-up

5–7 days in Cologne

Booster

4 weeks

4 weeks

Hyperthermia

Immuno-oncological diagnostics

Has immune memory been developed?

If metastases occur, then the memory cells activate the immune system

If necessary, booster vaccine administered after one week

COMBINATION THERAPY AT THE IOZK

Hyperthermia as a Component of our Multimodal Therapy

Hyperthermia is an additional immune modulating treatment. It is used to place tumour tissue or tumour cells into a state of stress so that the immune system can recognize them more easily.

It has been found that the immune system reacts noticeably when the body temperature is raised (e.g., from 38,5 to 39,5 °C). The immune cells become more agile, their activity becomes more alert and motivated to step up the fight against the tumour cells.

Thus hyperthermia can be used as a component in the tumour vaccination cycle. Usually patients receive treatment with modulated radio waves on five consecutive days. On day 5, a blood sample is taken from which tumour antigens are extracted and fed to dendritic cells in the laboratory.

Depending on the condition of the immune system of the patient, moderate whole-body hyperthermia is indicated on the day of vaccination, in addition to the regional modulated electro-hyperthermia, to increase the activation of the immune system.

Through continuous immune monitoring, we observe how the immune system responds. We look at the reaction of the tumour: Is it stable, does it continue to grow, or is it decreasing? The evaluation is discussed with the patient and a decision is made on how to proceed with the treatment. Depending on the individual situation, a maintenance therapy approach may be taken. It is our goal to "push" the immune system, to support it in its activity so that it can fight the cancer itself. The combination of vaccine and hyperthermia is a worthwhile complement.

IOZK – IN PERSON

Stefaan van Gool, Expert for Brain Tumours in Children and Adults

Glioblastoma is a rare condition, a malignant tumour with a devastating prognosis. Up to now, standard therapies have not been able to provide many answers as to how these patients can be helped. That is why they search for innovative therapies.

I have been working in this field for nearly twenty years. I received my training in paediatric oncology with the classical treatments of radio- or chemotherapy or their combination. In parallel, I discovered the world of immunology and worked in basic research. To me, the logical step was to combine these two worlds, even if they are very far apart. I proceeded to study neuro-oncology, as it seemed obvious to start the research there, where the biggest problems are faced. I feel at home at the IOZK where I can combine my knowledge and put it to meaningful use for the patient.

Dr. Wilfried Stücker, Expert in Immunology and CEO of the IOZK

In principle, a tumour is always a unique occurrence and not comparable to any other situation in the body. That is why no general prediction can be made how long a person will continue to live with the disease.

We need to make an individual decision based on the test results of the patient, as each person is unique. Every tumour, even if it carries the same name, is unique. These specifications can only be met with an individualized, bespoke therapy.

At the IOZK we do not work with a treatment protocol. We use a therapy plan that is tailored to the individual's needs. We are the ones who always need to adapt to the patient, not the patient to our treatment regime.

NEWCASTLE DISEASE VIRUS

Outsmarting the Immune System

Viruses spread fear. This is something that we put to use in our therapy at the IOZK. Newcastle Disease Virus (NDV) serves the purpose of producing new danger signals in the body. The oncolytic virus infects the tumour cells and thus triggers the fight against the cancer.

As tumour cells are the body's own cells, the immune system does not fight them. That is why we use a trick: We mark the tumour tissue as "dangerous". The immune system only acts against foreign, unknown cells or cell structures and those that pose a threat. Infecting the cancer cells with the virus helps the immune system to differentiate between healthy cells and cancer cells. Thus the immunological tolerance towards the tumour cells is broken and they are attacked.

As NDV replicates in tumour cells exclusively, healthy cells are not affected. The virus is only harmful to poultry and causes no harm to humans, nor does it cause any adverse effects to their health. The IOZK complies with all the regulations concerning the use of this virus. The patient's tumour material is infected with the virus, lysed, and used to load the dendritic cells.

In accordance with the German Medicine Act for New Therapies, the IOZK uses the first NDV worldwide to be produced under strict GMP conditions for their vaccine.

Using the combination of our dendritic cell vaccine and the tumour antigens, which are infected with NDV, all aspects of the Nobel Prize for Medicine 2011 are being implemented: i.e., the discovery and application of dendritic cells and the use of immunological danger signals. As such, the necessary prerequisites to trigger an immune response against the tumour cells are met.

NOBEL PRIZE FOR MEDICINE 2018 – CHECKPOINT INHIBITOR THERAPIES

A Further Important Milestone in Modern Cancer Therapy

The awarding of the 2018 Nobel Prize in Medicine to the immune researchers James P. Allison and Tasuku Honjo is a further milestone in modern cancer therapy, placing the body's potential to heal itself in focus. The prize was awarded to one component of immunotherapy, i.e., the findings about the protection of specific immune cells that attack tumour cells. At the IOZK we have been using the medication that has been developed out of this basic research – the checkpoint inhibitor antibodies – for over two years.

Tasuku Honjo, Kyoto University and James P. Allison, University of California, Berkeley. Photo: Wikipedia.

The medication improves the effectiveness of our therapy at the IOZK, while we create the prerequisites for the effective application of this innovative medication. However, this new form of treatment has only helped a small number of patients. It is only effective in those patients which have already developed an immune response against the tumour.

In certain cases we can use checkpoint inhibitor antibodies so that the tumour-specific activated immune system can effectively destroy the tumour cells.

Allison and Honjo studied immune cells looking for proteins used by the tumours. In the 1990s Allison discovered the protein CTLA-4 on the surface of T cells while, in parallel, Honjo discovered PD-1. These discoveries gave rise to new weapons against cancer.

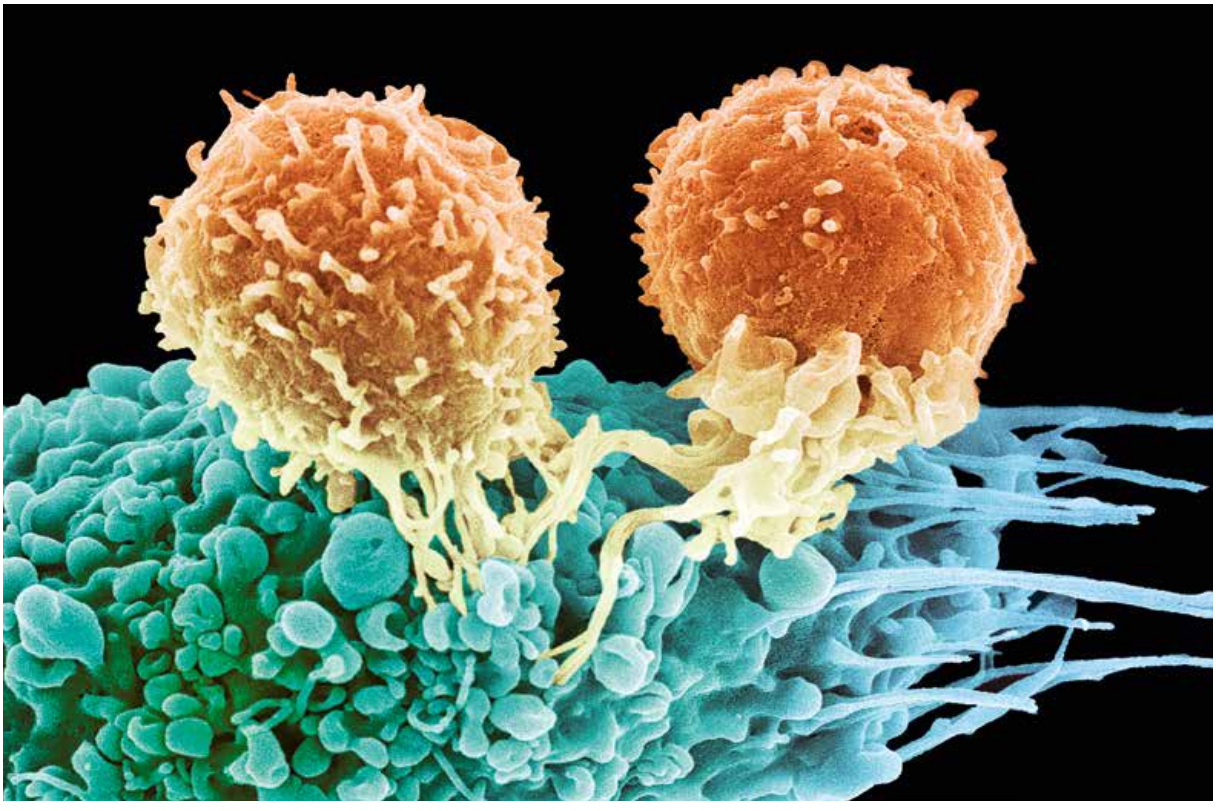
In 2011, anti-CTLA-4 was approved as the first checkpoint inhibitor antibody in the USA for use against metastatic melanoma. These days, derivatives of PD-1 or PD-L1 checkpoint blockers are used, also at the IOZK, as the side effects of these medications are easier to manage.

As a child, Allison first lost his mother and then his brother to cancer. This was his reason for his research in microbiology.

In the 1980s his research focussed on how certain white blood cells, the T cells, were directed in the immune system. He found that these cells can be blocked through molecular brakes. This process prevents the immune system from becoming active. During the course of this research, he discovered the control points (so called checkpoints) that regulated the brakes.

Immunologist Honjo had a similar idea. He discovered a further checkpoint and he was able to isolate it, enabling the immune system of his patients to fight the cancer cells. The clinical trials in Japan were successful.

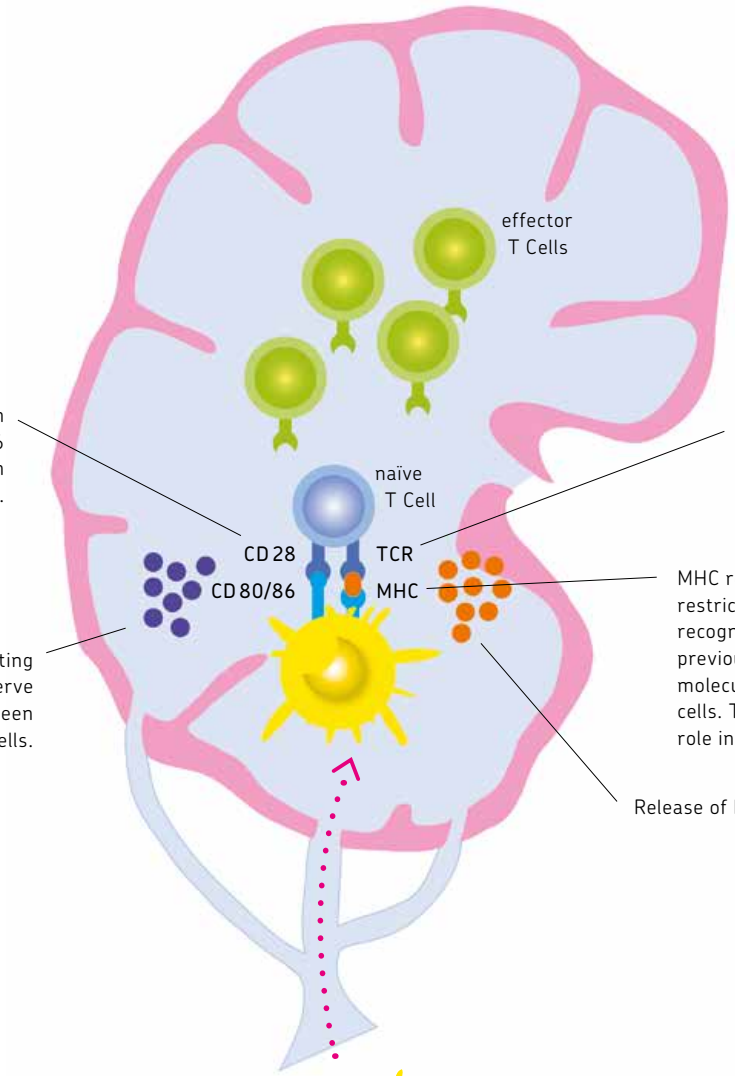
Immunotherapy to treat cancer has since become a ray of hope in medicine. Nevertheless, Tasuku Honjo believes that it should be combined with conventional treatments, such as radio- and chemotherapy, even if the immune system is the key to fighting oncological diseases.



Two T lymphocyte cells attached to a cancer cell. Scanning electron micrograph. Photo: Steve Gschmeissner/Science Photo Library

THERAPY WITH PD-1 / PD-L1 CHECKPOINT INHIBITORS

Looking at the Micro-Environment



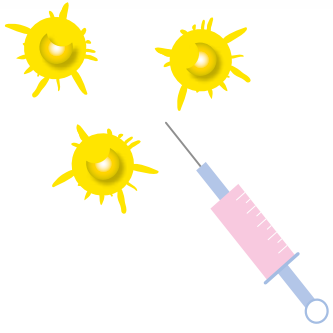
Costimulation through CD 28 and CD 80/86 expressed on T cells, i.e., DCs.

The T cell receptor (TCR) recognizes antigens and initiates contact to T cells.

MHC restriction refers to the restriction of the T cells to only recognize antigens that have previously been bound to MHC molecules on antigen-presenting cells. This plays an important role in an immune response.

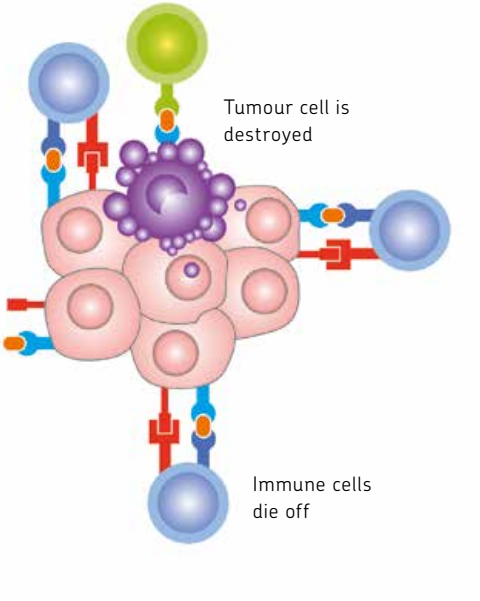
Release of inflammation-promoting cytokines. These proteins serve as signal transmitters between the cells.

Release of DC-processed messengers.

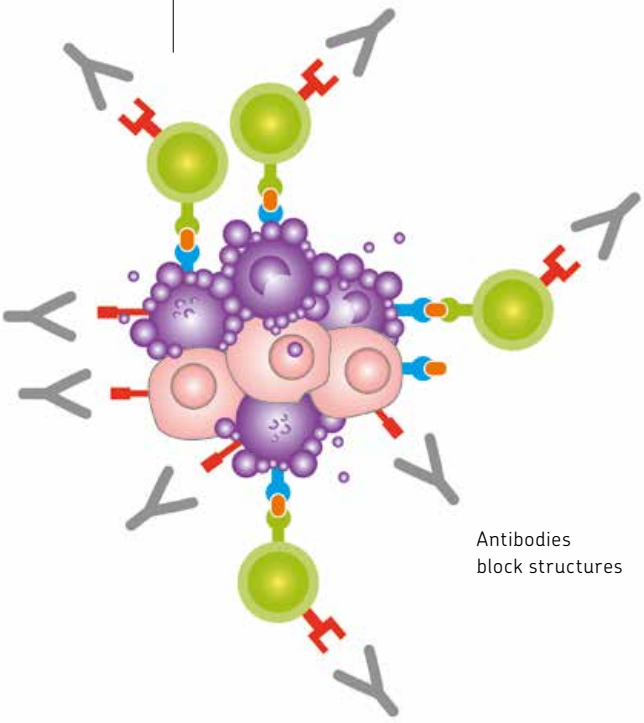


Monocytes or naturally occurring dendritic cells are isolated from the patient's blood, loaded with tumour antigens and then matured. After vaccination, the active DCs migrate to the lymphatic system, where they interact with naive T cells and ultimately trigger the transformation into cytotoxic effector T cells.

Activated immune cells
in tumour tissue



Blockade of PD-1 or PD-L1
structure of the antibody



The effector T cells migrate into the tumour. In response the tumour cells develop a mechanism to protect themselves from the killer cells: They activate a molecular structure on the immune cells called PD-1. This induces programmed cell death (apoptosis) in the immune cells. The checkpoint inhibitor antibodies occupy the PD-1 structure of the immune cells or the PD-L1 of the tumour cells and apoptosis can no longer be induced. That is one of the great applications of the Nobel Prize for Medicine 2018.

Checkpoint inhibitors are antibodies that are supposed to prevent a manipulation of the immune system by the tumour cells. Antibodies such as OPDIVO® (Nivolumab) und Keytruda® (Pembrolizumab) were approved in 2015. However, the antibody therapy is only effective when an immune response against the tumour exists.

The treatment with vaccinations is thus a worthwhile support, and vice versa.

THE LABORATORY

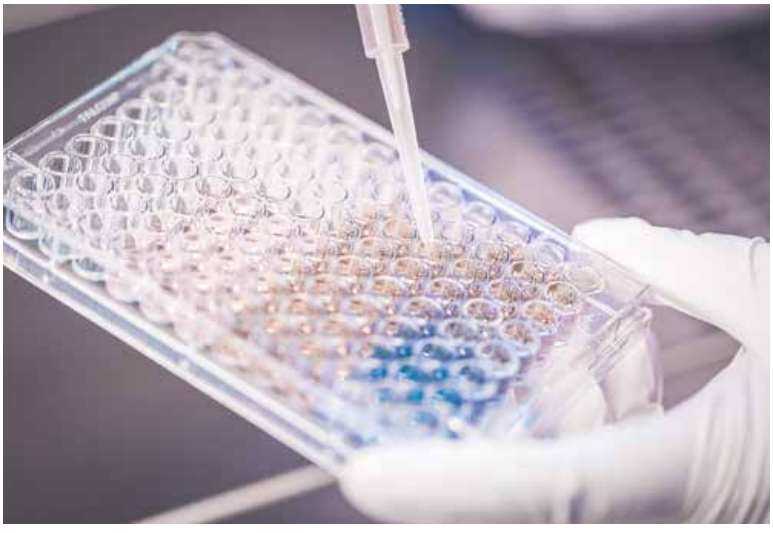
The Highest Standards in Cleanliness and Quality

To produce the vaccine, highly-qualified employees and a clean room, equipped with the latest technology to exclude foreign particles, are a prerequisite. Here human cells can grow in specific nutrient media at body temperature.

In our IOZK laboratory a specialised team works in accordance with the Medicines Act and European GMP-Guidelines (Good Manufacturing Practice).

Cleanliness is examined according to these guidelines, i.e., the laboratories have to be completely free of germs so as to eliminate the contamination of cell cultures. This is achieved through an over-pressure system with material and personnel air locks. A constant flow of air to the outside prevents that contaminating particles enter the clean rooms through the air.

In combination with the high-quality equipment, this complex setup adheres to the highest hygiene requirements.



IOZK – IN PERSON

Prof. Dr. Volker Schirrmacher, Head of Research

I have been involved in the development of tumour immunology for over 50 years. The important discoveries are primarily based on research results in the areas of cellular immunology, molecular biology, virology, and cancer research. Nobel Prizes were awarded for important discoveries, such as dendritic cells, toll-like receptors, or the checkpoint inhibitors.

In future, tumour immunology will gain ever more importance in clinical oncology. Oncolytic viruses will become even more effective through the introduction of therapeutic genes. Immunological adapter proteins will assist in guiding the immune system towards tumours and metastases. Immunological memory cells will be of increasing importance in T cell therapy. Immune diagnostics will continuously improve the efficiency of personalized and individualized medicine, something the patients at the IOZK already benefit from.

Almost No Side Effects

Contrary to other cancer medications approved in the last ten years, the treatment at the IOZK distinguishes itself through the negligible side effects. The main reason for this is that most components for the treatment come from the patients themselves. This includes the dendritic cells, which are cultivated from the patient's blood cells.

This also includes the tumour antigens. Tumour antigens are individual disease-specific changes of the tumour cells, which are recognized by certain cells of the immune system, the T cells. The dendritic cells are loaded with such tumour antigens and take over an important role for the T cells in transmitting information.

The healthy cells of the body are not threatened by this specific therapy. That is the reason why there are no serious side effects.

Oncolytic Viruses

A further feature of the immunotherapy at the IOZK is the inclusion of so-called oncolytic viruses. These viruses are promising biological agents. They destroy tumour cells, but do not affect the healthy cells of the body.

The virus used at the IOZK is an avian virus (NDV). It has been applied in cancer patients for over 60 years and stands out due to the high level of safety in its application. It can thus be classified as harmless. After being in contact with NDV, the healthy cells of the body produce a signaling protein called interferon. Interferon protects the organism against viral infection while also activating the immune system.

The IOZK is the first institution world-wide that has been able to produce NDV in accordance with the highest purity and quality criteria in medicine (GMP standard).

THE IOZK FOUNDATION FOR IMMUNO-ONCOLOGICAL RESEARCH

Research Projects 2019-2020

Research means finding answers to questions. Many questions arise during the daily work in our practice. Our goal is to look for the answers and thus to further develop and improve the IOZK Immunotherapy.

The purpose of the non-profit IOZK Foundation is to support the scientific principles of immuno-oncological research and its translation into treatment practice.

The funds support research into therapy options and the timely implementation of results in order to benefit patient treatment, in accordance with the relevant regulatory conditions.

The IOZK Foundation carries out these research projects at the IOZK and employs its own staff, including doctoral students.

Antigen production and antigen presentation of immunocompetent dendrictic cells for tumour vaccination

In this project, a collaboration with the Institute for Clinical Immunology at Leipzig University, the aim is to modify tumour antigens to improve antigen presentation to enhance the possible success of a cancer therapy. Tumour-associated tolerance mechanisms can currently be effectively reduced through checkpoint inhibitors. However, how the suitable tumour antigens should be produced is widely discussed in the research community and scientific literature presents many different options. This project will compare different methods of antigen production and test their possible application for the treatment of humans.

Extending ELISPOT diagnostics

At the IOZK, we assess the success of the dendritic cell vaccine with a modified ELISPOT (Enzyme Linked lmmuno Spot Assay). Diagnostics with the ELISPOT remain the standard method of testing for specific T cells, however, many alternatives or improvements with increased sensitivity are discussed in scientific literature. We want to find out, if extending the currently used ELISPOT can lead to a more conclusive result. In collaboration with Immatics GmbH in Tübingen, we want to test their assay with the ELISPOT from our laboratory. Comparison with further commercially available kits is possible.

Immunotherapy based on encapsulating oncolytic viruses in nanoparticles

This EU-funded PhD project will investigate the effect of our specific tumour vaccine in Glioblastoma multiforme. This is a Marie-Skłodowska-Curie Action with which the Europeran Union wants to support the careers of international and interdisciplinary scientists. These measures are part of Horizon 2020, the European framework programme for research and innovation. The action is named after the Nobel Prize winner Marie Curie. The programme was developed by the European Commission to make a career in the sciences and Europe as a research base more attractive and to improve the pool of European scientists.

Participating in scientific discussions

The scientific exchange that takes place at conferences is an important aspect for developing basic research in tumour immunotherapy. For this reason, the researchers of the IOZK Foundation will actively participate at conferences such as the CIMT in Mainz and the CICON in Paris.

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