

“A diagnosis of cancer doesn’t have to be a death sentence now”

Cancer is the world's second most common cause of death. Numerous scientific findings in recent years have changed the way these diseases are viewed. Oncologists are now even talking about unraveling the mystery of cancer. research spoke with Dr. Daniel D. Von Hoff, Professor of Medicine at the Translational Genomics Research Institute (TGen) and Mayo Clinic, Scottsdale, Arizona, and Dr. Karl Ziegelbauer, head of Therapeutic Research Groups in Bayer's Pharmaceuticals Division, about perspectives in cancer therapy.

Do you have a personal connection to cancer?

ZIEGELBAUER: Nowadays almost everybody has had some experience of having cancer diagnosed in their family or circle of friends. I personally have witnessed the initial shock and fear that this diagnosis triggers on several occasions. However, in many cases today this does not necessarily have to be a death sentence. A series of therapeutic options can make it possible today to live with the disease and have a good quality of life. But unfortunately, this is not the case for all forms of cancer. The disease remains one of the greatest challenges in medical research.

VON HOFF: I've treated thousands of patients with cancer over the past 40 years. I remember almost every one of them. Including those who have left us and the long-term survivors. I remember their courage to face life and their fears. I particularly recall one patient who was among the first I treated myself. He had pancreatic cancer and died five days after I met him. That taught me how deadly cancer can be.

What are currently the biggest problems in the treatment of cancer?

VON HOFF: The fact that tumors develop resistance to therapies limits our treatment options. The development of metastases in the brain is another problem. This can happen even years later, after it seemed the disease had been brought under control. Then a patient comes to us with a sudden feeling of faintness, and we find out that tumors have developed in their brain.

How can pharmaceutical companies help to solve these problems?

ZIEGELBAUER: Thanks to modern oncological research methods, we now know a lot more about what causes cancer: why a cell even decides to elude the body's control and proliferate. But at the same time, cancer disorders are just as individual as the patients are. That's why we are working intensively on

developing customized therapies, so that each patient can get the most personally promising treatment right from the beginning and tumors don't even begin to metastasize.

What do you personally regard as the highlights in cancer research?

VON HOFF: Research methods have evolved dramatically. That's why we've gotten to the point at which we are actually talking about curing cancer. Examples here include leukemia, some types of lymphoma, testicular cancer, breast cancer, ovarian cancer and even lung cancer. Many people don't know that a number of malignant tumors can be treated very successfully today.



What new opportunities do we have in cancer treatment?

VON HOFF: In my view, immuno-oncology in particular harbors immense potential. New research results show us that the patient's immune system is intact in many cases. However, the tumor cells have developed ways to hide from immune cells. If we shut off these "don't eat me" signals, we can develop new, highly targeted therapeutic options.

ZIEGELBAUER: We at Bayer also believe that immuno-oncology has a great deal of potential. It is one of the key areas that we are looking into in cancer research. In fact, we have been collaborating for more than five years with the renowned German Cancer Research Center to develop new approaches that in particular reactivate these off-switches for the immune system in cancer cells. The resounding success that has been achieved with the first immuno-oncology drugs, for example in the treatment of malignant melanoma, is hugely motivating for our researchers.

VON HOFF: What a lot of people don't know is that the percentage of people dying of cancer has been declining for years. The chances of surviving a tumor disease are much better than in the past.

What concrete objectives is Bayer targeting in cancer treatment?

ZIEGELBAUER: We want to turn cancer into a chronic disease. This is a difficult endeavor, because many tumors aren't discovered until they've already metastasized. That of course makes treatment much more difficult. In addition to immuno-oncology, we are also working on inhibiting oncogenic signaling pathways by



Expert talk: Dr. Karl Ziegelbauer (photo left), head of Therapeutic Research Groups in Bayer's Pharmaceuticals Division, and Dr. Daniel D. Von Hoff, Professor of Medicine at the Translational Genomics Research Institute (TGen) and Mayo Clinic, Scottsdale, Arizona.

means of small molecules. Another exciting field is antibody-drug conjugates in conjunction with alpha emitters, which we precisely deliver to tumors in order to destroy cancer cells.

What opportunities does increasing digitalization offer?

VON HOFF: Electronic patient files are a real challenge for doctors because they have to spend a lot of time entering the data – time that they then don't have at their disposal for patient conversations, for example. Yet digitalization also opens up new possibilities. For example, if we were able to analyze all of a patient's scans from imaging techniques at the same time, we would know within a few days which therapy is most likely to work best.

ZIEGELBAUER: I also see tremendous potential in molecular biology analysis. Today we can process enormous data sets. This enables us, for example, to study the entire genetic make-up of cancer cells. That in turn makes it possible for us to find out what drives each cancer and to specifically intervene with the best possible therapy following analysis.

Will we soon be able to cure cancer?

ZIEGELBAUER: Unfortunately, it's still difficult to say. The advances of the past 15 years are a promising sign at least. But it is realistic to say that in the future we'll be able to transition further tumor diseases into a chronic course of disease.

VON HOFF: The probability of survival has improved for all types of cancer without exception. With the new research methods and a pharmaceutical industry that is focused on cancer, I believe the future for new therapies is very promising. That said, the future also demands earlier diagnosis. That's because a key factor in the success of treatment is early diagnosis, particularly in patients with an elevated risk of developing the disease.

ZIEGELBAUER: That's a really important point. In addition to a healthy lifestyle, regular medical check-ups can help us make sure that the disease doesn't develop in the first place. But we should not live our lives in constant fear of cancer, but rather with well-informed respect.