

Healthcare industry BW

How cancer cells can be made discernible for the naked eye

Molecular imaging is one of the biggest hopes in cancer research because it is able to reveal pathological processes on the cellular level long before the first symptoms are apparent. Cancer cells can be identified very early, and can thus be prevented from developing into life-threatening tumours. Five well-known German pharmaceutical and medical device companies have now joined forces and are combining their know-how in the bid to turn molecular imaging methods into reality as soon as possible. Tuttlingen-based KARL STORZ GmbH is a partner in the project.

KARL STORZ is a leading developer and manufacturer of endoscopes and instruments for minimally invasive medicine. Several years ago with the introduction of a fluorescence-based diagnosis system, the company set an important milestone in the early recognition of diverse cancers.



KARL STORZ GmbH company headquarters in Tuttlingen. (Photo: KARL STORZ)

The method exploits the fact that cancer cells have a different metabolism from that of normal cells.

A specific molecular mechanism in the tumour leads to the accumulation of fluorescent substances in the tumour, the defective cells will fluoresce and show up in the image. This molecular imaging method was used successfully for the first time in the diagnosis of urinary bladder cancer. The method will now also be made available for numerous other organ systems.

In order to boost the development of new methods in molecular imaging, the family-owned company joined forces with Bayer Schering Pharma, Boehringer Ingelheim, Siemens Medical Solutions and Carl Zeiss and established the "Molecular Imaging Technology Initiative". The five companies will spend a total of 750 million euros over the next ten years on the development of new methods in molecular imaging, thus setting new standards in the therapy of tumours. The German Federal Ministry of Education and Research (BMBF) is supporting the research of the five partners with funding of 150 million euros.

Closer combination of marker development and imaging

"We are specifically focusing on the development of minimally invasive and optical diagnosis systems that will deliver an excellent image quality," said Dr. Martin Leonhard, Head of Technology Management at KARL STORZ describing the company's objective. "This will enable us to identify the tiniest tissue alterations on the surface of organs that are invisible to the naked eye," said Leonhard highlighting the capacity of the new method to effectively identify early-stage tumours.



KARL STORZ GmbH 's endoscopic autofluorescence system for the early identification of tumours. (Photo: KARL STORZ)

Medical engineers at KARL STORZ also hope that the intensive exchange of information with the pharmaceutical companies involved in the project will give them new ideas for their own developments. The pharmaceutical companies are in charge of producing molecular markers with which the cancer cells can be identified. The developments are still very new, but it is envisaged that

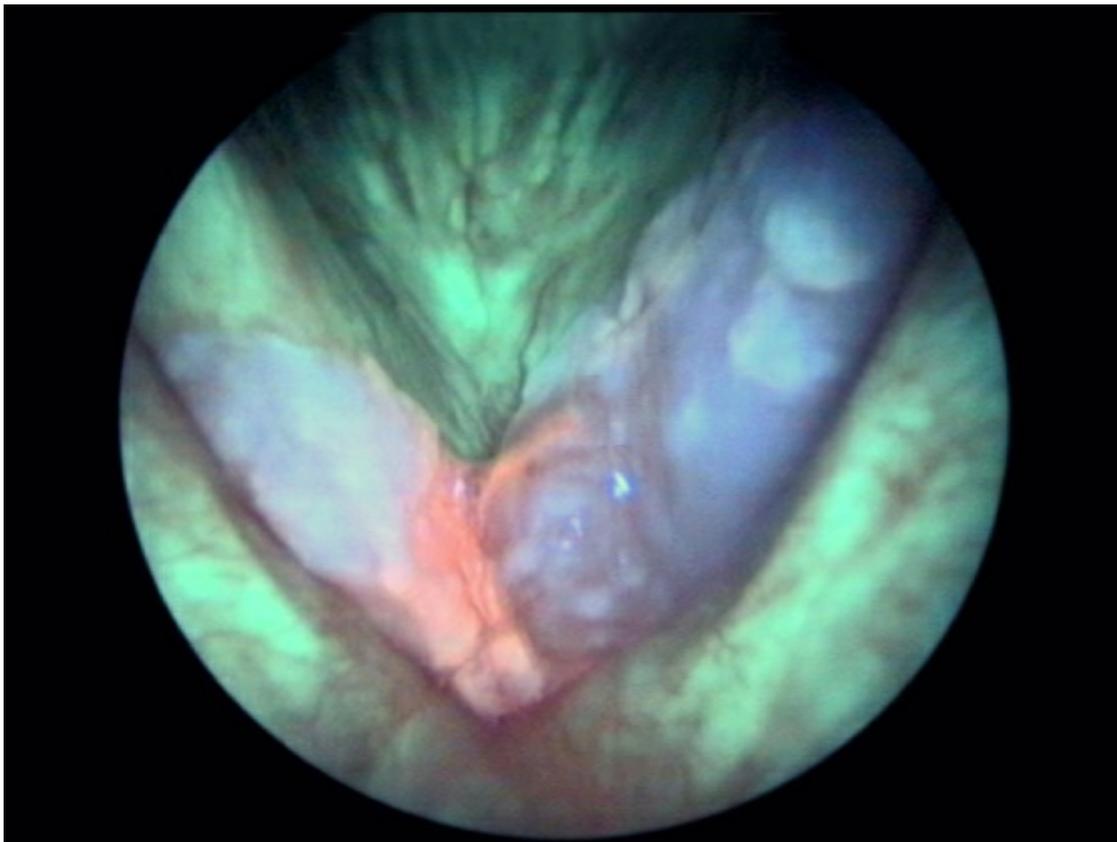
sometime in the future a specific marker will be available for all kinds of tumours.

“We are closely following the progress in this area in order to be able to adapt our products to state-of-the-art findings as soon as possible,” said Leonhard alluding to the fact that the producers of imaging methods have the challenging task of finding suitable methods for visualising the markers accumulating in the cancer cells.

Optical methods have many advantages

Several molecular imaging systems are currently available. According to Leonhard, the optical methods are on a par with nuclear magnetic resonance or PET-CT methods: “The spatial resolution and the sensitivity of fluorescence-based optical methods is currently considerably higher than that of any other imaging method.” Thus, the optical methods are perfect for localising small tumours.

Since early tumours are frequently found on the organ’s surface, endoscopic methods also have the advantage that any tissue alterations discovered can be removed immediately without necessitating further surgical intervention. KARL STORZ does not see its products as being in competition with other imaging methods. “Actually, the different methods complement each other very well,” said Leonhard. Each tumour is different and often requires different examination methods – both in terms of selecting suitable molecular markers as well as in terms of the imaging methods used.



Fluorescence endoscopic representation of laryngeal tissue alterations. The tumour cells are light blue, normal tissue is shown in green. (Photo: University Hospital Gießen/University Hospital Großhadern)

Huge economic potential

The optical systems have another advantage: “The investment required for a high-quality endoscopic system is currently only a fraction of the cost of a magnetic resonance tomograph,” said Leonhard.

This is an important aspect considering that national and regional healthcare systems are hard pressed for money. The "Molecular Imaging Technology Initiative" was not only set up to advance medical progress, but also to "make the healthcare system fit for the challenges of the future" and "increase the quality of care at the same time as reduce healthcare costs".

But above all, the cooperation between the five project partners will open up completely new economic perspectives in international competition. After the USA, Germany is the largest worldwide exporter of medical devices. The collaboration will increase the country's prominence in the development of innovative medical technology. KARL STORZ and the other partners of the "Molecular Imaging Technology Initiative" have set their sights high: they want to be market and technology leader in the field of molecular imaging.

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