

Healthcare industry BW

Frederik Wenz - radiologist sets milestone with new surgical technique for the treatment of bone metastases

Can painful bone metastases be treated in a targeted and quick way? Can metastases that are potentially present in the liver and kidneys be adequately treated at the same time as bone metastases? These are the questions that Professor Dr. med. Frederik Wenz from the University Medical Center Mannheim asked himself before going on to develop an innovative surgical technique. After a long development period, this technique is now recognized as an effective cancer therapy.

More than ten years ago, Professor Dr. med. Frederik Wenz introduced a novel approach for the intraoperative radiotherapy (IORT) of breast cancer in Germany. The approach involves the use of a miniature X-ray source. Wenz, who has been director of the Department of Radiotherapy and Radiooncology at the University Medical Center in Mannheim since 2000, has received numerous awards, including the Claudia von Schilling Prize in 2010 and the Rhine-Neckar Metropolitan Region's 2011 Innovation Award for his innovative breast-conserving therapy. He was also jointly awarded the German Innovation Prize in the category "SME" alongside the company Carl Zeiss Meditec AG.

The intraoperative procedure, which is used for treating older women with an invasive ductal carcinoma (cancer of the milk ducts) with a well-defined border, involves the use of a miniaturized X-ray source that emits X-ray radiation. Immediately after the tumour has been surgically removed and while the patient is still anaesthetized, a single high X-ray dose is applied directly into the surgical cavity to destroy potentially undetected cancer cells.

In contrast to standard therapy, which involves the daily application of external beam radiotherapy for a six-week period, the targeted one-time intraoperative radiotherapy (IORT) increases the patients' quality of life and reduces treatment costs. The surgeon is able to precisely define the area to be irradiated, leaving surrounding healthy tissue and skin unaffected. "The targeted irradiation of the area allows the application of a radiation dose that is high enough to effectively destroy potentially present tumour cells," says Wenz talking of the achievements made over the last ten years. Wenz decided early on to focus on oncology and radiobiological research and has carved out an outstanding career for himself in the field.

The intraoperative procedure was evaluated in a worldwide multicentre clinical trial on 3,451 patients who were randomly grouped into two groups: one that underwent single-dose targeted intraoperative radiotherapy and one that received the usual course of external radiotherapy. The tumour recurrence rate in patients who underwent intraoperative radiotherapy was similar to



standard therapy involving surgery followed by a six-week radiotherapy. In addition, the innovative method reduces the typical side effects of standard therapy such as the darkening of the skin as well as “spider veins”.

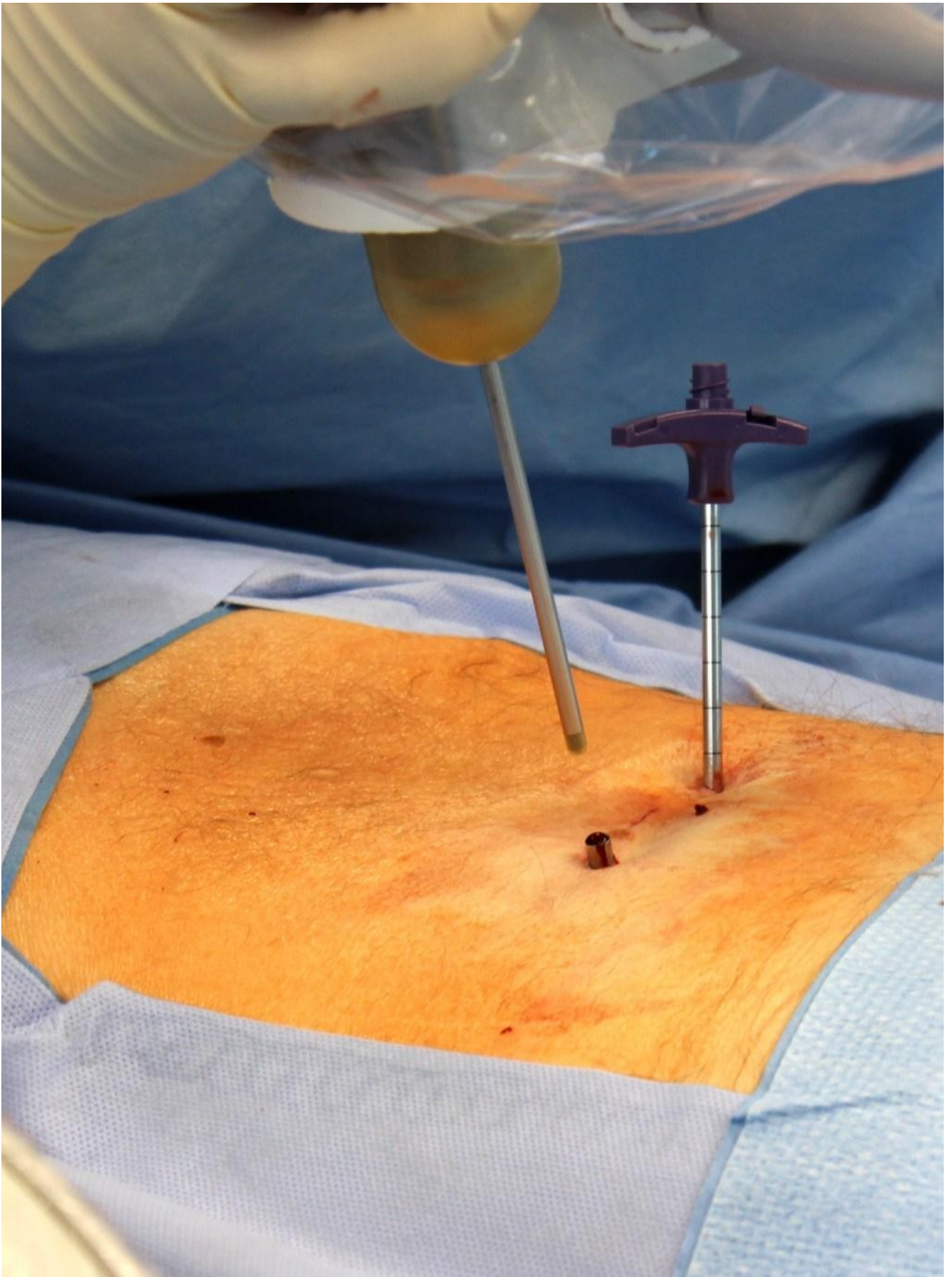
Development of Kypho-IORT for the treatment of bone metastases

Malignant tumours are cancerous and often metastasize. The lungs and liver, but also the bones, are the most common locations among the sites for metastatic deposits. Up to 75 percent of all breast cancer patients develop vertebral metastases, which can dissolve bones and cause painful vertebral collapses. The aim of surgery in conventional therapy is to reconstruct and stabilize the spinal column. This usually involves the injection of a special type of bone cement into the fracture site to ensure that the bone does not collapse again (kyphoplasty). The affected vertebrae are then percutaneously irradiated for a period of between two and four weeks. Wenz was able to set another development milestone in the treatment of breast-cancer-related bone metastases: “Our goal is to find a therapy that quickly relieves the pain and at the same time leads to the immediate destruction of abnormal cells without further loss of time.”

In addition to painful bone metastases, progressive visceral metastases in the lungs and liver are usually simultaneously present. However, simultaneous treatment is usually not possible. This leads to a common therapeutic dilemma as to whether to apply a four-week course of radiotherapy to destroy the bone metastases or full-dose chemotherapy to prevent the formation of metastatic deposits in the lungs and the liver. “Whatever treatment we choose, the result is always the same - one of the two types of metastases is not treated efficiently,” says Wenz alluding to the reasons behind his novel Kypho-IORT approach.

Wenz and trauma surgeon colleagues have been using the novel Kypho-IORT approach developed by Wenz since 2009. It is a minimally invasive method that delivers a high dose of intraoperative radiotherapy during kyphoplasty, providing immediate stability, pain relief and sterilization of the metastases at the time of the original operation. Patients no longer have to undergo a four-week radiotherapy course which is usually the case following kyphoplasty. Moreover, chemotherapy can be applied to destroy lung or liver metastases that may be present without the usual delay of several weeks.

More than 90 patients have undergone Kypho-IORT treatment



The radiation source of the miniature X-ray generator - protected by the applicator - is guided through a metallic sleeve inserted into the vertebrae.

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Sleeves and applicator as well as proper positioning and application are tested on a model.
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Kypho-IORT has already been used to successfully treat more than 90 patients at the Mannheim University Medical Centre; no complications have occurred. During the follow-up period – which admittedly is relatively short – only one patient has developed recurrences. “Patients who have single, painful vertebral metastases that are big enough to potentially touch the spinal cord stand to benefit from the novel approach. This includes around 30 percent of all patients with vertebral metastases,” says Wenz.

The innovative Kypho-IORT procedure is now scientifically recognized. Since 2011, Wenz has been training staff at other centres in the application of this method, sometimes directly on patients within the first clinical application cycle. A multicentre phase III trial is currently awaiting approval from the Federal Office for Radiation Protection (BfS). The trial aims to directly compare the efficiency and outcome of Kypho-IORT and conventional external radiotherapy. “Although we have no results as yet, we are very confident as far as the reduction of local recurrence rates and the improvement of pain relief is concerned. From our point of view, Kypho-IORT is an excellent method for improving the quality of life of the patients concerned,” says Wenz, who is clearly optimistic about the new approach.

Further information:

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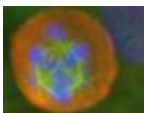
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