NEW: WATERJET-SUPPORTED SURGICAL TECHNIQUE FOR TREATING CANCER OF THE BLADDER
Dear Patient,

**YOU** have been diagnosed with a suspected tumor in the bladder. This may sound alarming, but it is not in itself a reason to be overly worried. For at this stage nothing has been confirmed. In vast majority of cases the tumor is discovered in an early stage, which means that the growth is still limited to the inner mucous membrane of the bladder and has not yet penetrated into the muscular layer. For this type of early-stage bladder cancer, which is referred to in medicine as a "non-muscle-invasive tumor", the chances for healing are good. Nevertheless, the tumor tissue must be completely removed surgically. This is normally accomplished by an outpatient intervention under local anesthesia.

**WHAT IS IMPORTANT** is that you make sure that you have treatment and that you are thoroughly informed beforehand about the surgical procedures which are possible. With this brochure, we wish to make a contribution in this regard. Because besides the conventional method, which is transurethral resection of the bladder tumor (TURBT), a new procedure is now available: the so-called waterjet-supported tumor resection. In this procedure, the tumor is lifted by means of a "water cushion" and can then be removed en bloc, i.e. in one piece.

**THIS BROCHURE** provides you with an introductory overview of this procedure. It is only intended as an aid for you though, and cannot replace a clarifying consultation with your doctor.

**WISHING YOU ALL THE BEST FOR YOUR HEALTH,**
ERBE Elektromedizin GmbH
The urinary bladder and different tumor stages

Non-muscle-invasive urinary bladder tumors

**Tis** (carcinoma in situ)
Non-muscle-invasive tumors

**Ta, T1**
Papillary tumors

**T2, T3, T4**
Muscle-invasive tumors

**Tis** Flat-growing form that is limited to the mucous membrane, also referred to as carcinoma in situ (CIS)

**Ta** The tumor is limited to the mucosa (mucous membrane) and protrudes into the bladder in papillary form (like a cauliflower)
Tumors of the urinary bladder – a brief overview

MALE SMOKERS ARE AFFECTED MORE FREQUENTLY
In Germany, it is estimated that around 25,000 people a year newly develop a tumor of the urinary bladder, most of them aged between 50 and 70 years. Men are affected three times as often as women. The most significant risk factor is smoking, because toxic substances from the tobacco smoke are excreted via urine. In most cases, the tumor does not cause any pain. Blood mixed in with the urine is considered to be the most significant symptom of the disease.

THE TUMOR ORIGINATES IN THE MUCOUS MEMBRANE
In 90–95% of all cases, urinary bladder cancer originates in the mucous membrane of the bladder. While in most cases the tumors grow in the form of small protrusions like a cauliflower, some also exhibit flat growth extending over an area. In many cases, several tumors form simultaneously. If they are not removed completely in a timely manner, they can spread. When this happens, the tumor cells penetrate into the muscular layer of the bladder wall. Later on, the bladder cancer can spread to neighboring organs, for instance to the prostate gland or the uterus, and can form metastases in remote organs such as the lungs, liver and bones.

MOST BLADDER TUMORS ARE DISCOVERED AT AN EARLY STAGE
Fortunately, in around three quarters of all cases, the tumor is discovered when it is still in a superficial, non-muscle-invasive stage, which means that the muscular layer of the bladder wall is not yet affected. In such cases, doctors distinguish between the following three tumor stages: Tis, Ta and T1. In these stages, it is usually possible to remove the tumor completely via the urethra. The chances for healing are good in these cases. This brochure does not go in more detail into the advanced, muscle-invasive stages T2, T3 and T4 and their treatment.

T1 The tumor has penetrated deeper into the submucosa (connective tissue) between the mucous membrane and the muscular layer
Non-muscle-invasive bladder tumors – diagnosis and treatment

**CYSTOSCOPY IS INDISPENSABLE**

If bladder cancer is suspected, your urologist will examine the urine and may perform an ultrasound examination. In order to have certainty, you will always need to have a cystoscopy. In this procedure, an instrument (cystoscope or resectoscope) is advanced via the urethra into the bladder under local anesthesia. The inside of the bladder is shown on a monitor transmitted from the optical system of a camera so that any growths can be well discerned. If necessary, a fluorescent dye is first injected to stain the diseased tissue.

**THE TUMOR IS REMOVED VIA THE URETHRA**

If the tumor is limited to the mucous membrane and the inner connective tissue layer, it can normally be removed via the urethra and can then be assessed under a microscope. The aim of the intervention is to completely remove the bladder tumor without releasing any cancer cells, because these could resettle and lead to renewed growth of the tumor (recurrence). In the conventional method, the so-called transurethral resection of the bladder tumor (TURBT), the diseased tissue is "planed away" layer by layer by means of a wire snare through which electrical current flows.

**WHERE WOOD IS CUT, SPLINTERS MUST FALL**

However, only small tumors not larger than the diameter of the snare (approx. 5–7 mm) can be removed in one piece with the "hot wire". Larger growths must therefore be removed one small piece at a time. The tissue fragments can only be assessed with difficulty under the microscope. It cannot always be determined by examining these tissue fragments, whether all tumor cells have been removed and eliminated. Furthermore, individual cancer cells can get into the surrounding tissue during the removal procedure and can start growing again there.
**Transurethral resection**
Conventional layer-by-layer removal of the tumor

- Bladder
- Prostate gland
- Pubic bone
- Resection snare
- Mucosa (mucous membrane)
- Submucosa (connective tissue)
- Muscularis (muscular layer)
Improved tumor removal by means of HybridKnife®: lifting the mucous membrane of the urinary bladder with the tumor.
New: Sparing tumor removal using HybridKnife®

IN ONE PIECE - UNCUT
A procedure is now available, in which bladder tumors can be removed as a whole, or en bloc, as doctors say. This so-called "waterjet-supported resection" is performed with the aid of a special probe, the HybridKnife®. This high-tech probe fulfills two functions: it is able to lift the tumor by means of a high-pressure waterjet, and then to sever it in one piece from the healthy tissue by means of a high-frequency electrode.

THE HIGH-PRESSURE WATERJET LIFTS THE TUMOR
A waterjet as thin as a hair hits the mucous membrane of the urinary bladder with a pressure of around 25 bar and lifts the mucous membrane along with the tumor. The tumor is now seated in an elevated position on a liquid cushion. This facilitates removal of the tumor in one piece by means of the high-frequency electrode. At the same time, the cushion protects the bladder wall from injury. This procedure has already been applied with good success for years in other interventions, for instance when operating on gastric or intestinal tumors.

BENEFITS AT A GLANCE
- Precise and complete removal of the bladder tumor
- Even larger-sized tumors can demonstrably be removed as a whole
- Spreading of tumor cells is kept to a minimum
- Tissue-sparing, tried and tested procedure
- High diagnostic certainty thanks to better material for assessment
- Potentially fewer follow-up operations
HybridKnife® – a high-tech development from Germany

**PRECISION INSTRUMENTS FOR HOSPITALS AND MEDICAL SPECIALISTS**

Scientists, physicians and ERBE Elektromedizin’s engineers have developed HybridKnife® for the treatment of early-stage tumors. The program of the Tuebingen-based company features innovative systems for high-frequency surgery, waterjet surgery and cryosurgery. For over 160 years, surgeons, OR teams and patients have relied on the quality of ERBE’s medical technology.

**REMOVING THE TUMOR EFFECTIVELY AND LASTINGLY WITH HYBRIDKNIFE®**

HybridKnife® combines two technologies: high-frequency surgery and waterjet surgery. The effectiveness and safety of waterjet-supported tumor resection with HybridKnife® was confirmed in several trials. Since 2007, the procedure has been applied with good success in other fields, e.g. in gastric and intestinal surgery. The procedure is being tested for further applications in trials conducted at various university hospitals.

**FOR WHOM IS THE WATERJET METHOD SUITABLE?**

The procedure can be applied in all patients with suspected non-muscle-invasive bladder cancer. This means, that a precondition is that the urinary bladder tumor has not yet penetrated into the muscular layer of the bladder wall. A cystoscopy can clarify whether or not you qualify for waterjet-supported tumor resection with HybridKnife®.

**WHERE CAN I INQUIRE?**

Ask your urologist about the possibility of waterjet-supported treatment with HybridKnife®.

You can find further information as well as a video on the manufacturer’s website at [WWW.ERBE-MED.COM](http://WWW.ERBE-MED.COM) or on YouTube. The surgical procedure is shown clearly there.