

Prostate Cancer – Patient Information

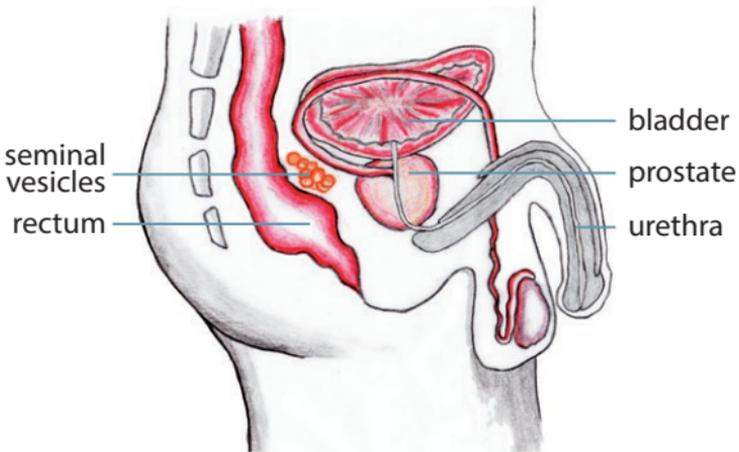


Eckert & Ziegler
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The Prostate & Prostate Cancer

The prostate is a small gland in the male reproductive system, approximately the size and shape of a walnut. It is located directly below the bladder and surrounds the urethra. The prostate produces the seminal fluid, which transports semen during ejaculation.

Sagittal plane of the male pelvis



Cancer is a disease that is characterised by uncontrolled growth and division of cells. In some cases, these cells may accumulate into a mass called a tumour. Tumours can be either benign (non-cancerous) or malignant (cancerous).

During normal aging and in many men around the age of 45, the prostate starts to enlarge. This is generally a non-cancerous condition known as benign prostatic hyperplasia and is rarely life-threatening but can cause problems such as frequent urination or a weak urine stream.

However, in some cases tumours can be malignant, i.e. become invasive and destroy healthy tissues. Late onset symptoms – which do not automatically indicate prostate cancer – are a weak urinary stream, interrupted urination, pain or burning while urinating, blood in the urine or inability to urinate.

Prostate cancer is the second most frequent cancer in men world-wide but can be treated very effectively when detected at an early stage. Prostate cancer often grows at a very slow pace and sometimes causes no symptoms for years.

Early detection of prostate cancer is the key factor in initiating proper treatment that will result in cure of the disease. As long as the cancer is limited to the prostate gland, there is a good chance of eliminating it. Once it passes the border of the gland, it becomes more difficult to treat.

Generally, it is recommended that men of a specified age should receive regular cancer prevention check-ups from a urologist. In the UK and in Spain, it is recommended that men 50 years or older may undergo annual screening should there be no positive history of prostate cancer. In France and Germany, annual check-ups are recommended beginning with the age of 45. For screening recommendations in your specific country, please contact your physician.

Diagnosis of Prostate Cancer

In general, various diagnostic tools are used in combination to achieve high diagnostic reliability.

Prostate Specific Antigen (PSA)

PSA is a protein that is produced by the prostate. Its concentration in human blood is measured by the PSA test. While men normally have a relatively low level of PSA in their blood, an elevated PSA level indicates an abnormal situation in the prostate, but does not automatically mean that prostate cancer is present. It also may be the result of benign enlargement or other conditions. However, if the PSA level is elevated, further clinical evaluation should be performed.

Digital Rectal Examination (DRE)

When performing a DRE a urologist examines the prostate by inserting a lubricated and gloved finger inside the rectum and palpates the prostate through the rectal wall. Due to the close proximity of the rectum to the prostate, abnormalities of the gland can be felt. A DRE is very useful in detecting prostate cancer, but only if the tumour has a palpable size and location. Otherwise false negatives can be recorded. It is therefore recommended to conduct this examination in combination with a PSA test.

Transrectal Ultrasound (TRUS)

The prostate can be visualised on an ultrasound screen using a transrectal ultrasound probe inserted into the rectum. In this way, the physician obtains a precise picture of the gland. The image can then be examined.

Biopsy and Gleason Score

Small samples of prostate tissue are removed in biopsy form with a special needle. The tissue is examined microscopically and the result graded according to the Gleason pattern (ranging from 2 to 10). The score is a measure of the histologic difference between cancer cells and normal cells and describes how aggressive the tumour cells are. Biopsy is the only definitive confirmation of prostate cancer.

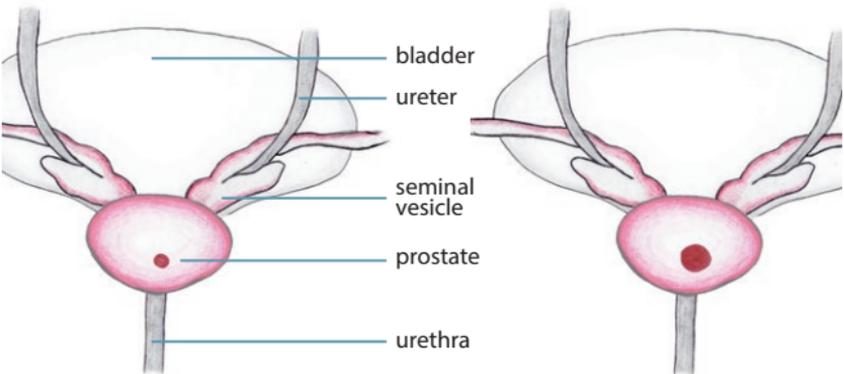
Classification of Prostate Cancer

Based on the results of the examinations, tumours are classified into different stages. Staging is an assessment of the size and location of the cancer. The actual TNM staging (tumour-nodes-metastasis) is as follows:

T1	Tumours are very small and cannot be detected by DRE or TRUS
T2	Tumours are large enough to be detected by DRE
T3/T4	Tumours have already expanded beyond the prostate

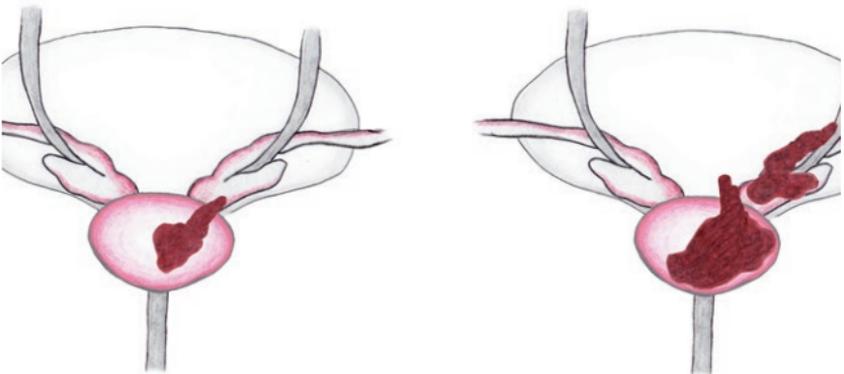
N	N specifies the number of affected lymph nodes (0-3)
M	M specifies the presence of metastases

T1 and T2 tumours are designated as locally confined prostate carcinoma that can be classified as low-, intermediate- or high-risk tumours.



Prostate Cancer T1

Prostate Cancer T2



Prostate Cancer T3

Prostate Cancer T4

Treatment Options for locally confined Prostate Cancer

Modern medicine offers various treatment methods that can be applied as monotherapy or in combination if necessary. The appropriate treatment should be carefully selected, considering the stage of the disease, the patient's condition and the patient's and physician's concerns. Based on your examination results, your physician will discuss with you the appropriate and applicable treatment method.

Active Surveillance

Since prostate cancer often grows at a slow pace, physicians may not necessarily offer immediate treatment, instead the cancer is monitored at regular intervals. This treatment form may be preferable for low risk tumour patients as well as for elderly patients with relatively feeble health, in order to avoid surgical or hormonal treatment. If there are any changes in tumour characteristics, the physician is able to react instantly.

Radical Prostatectomy

The prostate gland, the seminal vesicles and the organ-specific lymph nodes are surgically removed (open, laparoscopic or robotic-assisted). Radical prostatectomy can be performed on low, intermediate and high risk prostate cancer and is an in-patient treatment.

Hormone Treatment

This non-surgical treatment method involves decelerating the growth of the prostate cancer by depriving the body of testosterone (the male sex hormone). It is not a curative procedure and is sometimes combined with percutaneous radiation therapy or brachytherapy.

Percutaneous Radiation Therapy

In radiation therapy, the cancer cells are exposed to high doses of radiation. Cancer cells are much more susceptible to radiation than healthy tissue. There are two main types of percutaneous radiation therapy available:

1. During External Beam Radiation Therapy (EBRT) a so-called linear accelerator emits a high energy X-ray beam onto the targeted tumorous tissue. External beam radiation is delivered in daily fractions five days a week for approximately six to seven weeks which requires frequent visits to the hospital.

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2. During Proton Beam Therapy accelerated protons enter the body and deposit the prescribed dose inside the tumour. This treatment method requires more than 20 fractions.

Brachytherapy

Brachytherapy applies radioactive sources directly to or into the tumour, allowing a high dose to the tumour while sparing the surrounding healthy tissue. Brachytherapy, which is also called radiation from the inside, can be performed in different ways.

1. During high dose rate (HDR) brachytherapy, which is also known as afterloading, tiny radioactive sources containing iridium-192 or cobalt-60 are temporarily placed into the prostate via transperineally inserted needles. Usually two sessions are required which are then followed by EBRT (3–4 weeks).
2. Performing low dose rate (LDR) brachytherapy, tiny metal pellets containing radioactive iodine-125 or palladium-103 are permanently implanted into the prostate via transperineally inserted needles. LDR brachytherapy is also called Prostate Seed Implantation or Permanent Brachytherapy

Treatment effectiveness and side effects

There is no consensus on what is the best way to treat prostate cancer, as many approaches have comparable outcomes. All treatment options have different hospitalisation and recovery times and come along with side effects, which in quantity and grade depend on the chosen treatment option, the patient's pre-treatment status and his individual reaction on the treatment.

Prostate cancer treatment side effects may comprise: erectile dysfunction, genitourinary bothers like urge, incontinence, urethritis, dysuria or urinary retention, as well as fatigue and gastrointestinal irritations (proctitis, diarrhoea, rectal bleeding).

There is evidence that LDR brachytherapy has a better side effect profile than other treatment options for localised prostate cancer. Anyway, the decision for one of the treatment options is highly individual and should be taken in close cooperation with your physician.

LDR-Brachytherapy – Prostate Seed Implantation

Permanent Brachytherapy – Seed Implantation

Permanent brachytherapy is the most conservative treatment method for early stage prostate cancer. Its international popularity has continuously increased since the early 1990s and it is now generally accepted as a state-of-the art therapy. Prostate seed implantation is an effective and well-tolerated method to cure prostate cancer. Its cure rates are comparable to the ones of EBRT and prostatectomy for early stage prostate cancer

In this treatment, small radioactive iodine-125 sources, so called seeds, are placed inside the prostate. Each seed has a length of 4.5 mm and a diameter of 0.8 mm and emits a specific low dose of radiation to its surrounding tissue inside the prostate. By placing the seeds homogeneously throughout the organ, the prostate is covered with the designated dose required to destroy the cancerous cells. Since irradiation is mainly localised around the radioactive source, neighbouring tissues are spared unnecessary damage.

Patient Selection Criteria

Prostate seed implantation is especially suitable for patients with early stage prostate cancer. The cancerous tissue should be limited to the prostate gland, with the following diagnostic features:

Gleason score < 7

PSA < 10

Staging T2a or lower, N = 0, M = 0

Prostate volume < 50 cm³

Urine flow test: maximum flow rate >15 ml/s

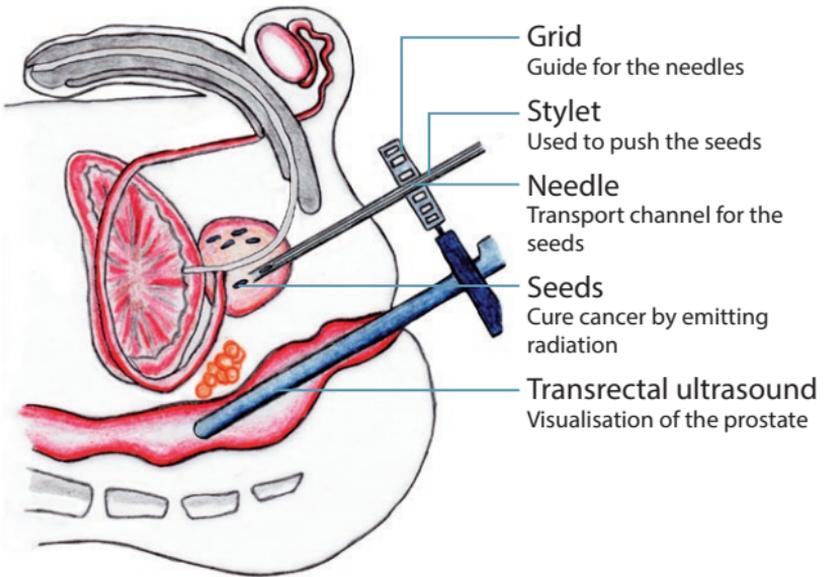
The individual indication may vary from the above values, due to other characteristics of the patient's condition.

Advantages of Permanent Brachytherapy

Compared to other treatment methods, prostate seed implantation may offer the following advantages:

- Quicker physical recovery after the medical intervention, including mobility the day after implantation and fast return to daily activities
- Shorter hospital stay (often performed as outpatient treatment)
- Minimal treatment time (only one session) – duration of seed implantation: 50 – 70 minutes
- Better preservation of urinary continence, erectile and rectal function in comparison to other treatment options, resulting in enhanced quality of life

Sagittal view of the male pelvis Implantation of seeds with LDR brachytherapy



Prostate Seed Implantation Procedure

The procedure is as follows:

- The patient is anaesthetised and an ultrasound probe is inserted into the rectum.
- A treatment planning system calculates the number of seeds as well as their exact location based on the ultrasound prostate image. It guarantees an optimal dose distribution, with minimal exposure of surrounding tissue and organs at risk to radiation.
- The physician inserts the implantation needles into the prostate and implants the seeds. The optimal placement is continuously monitored by ultrasound and fluoroscopy. The complete procedure takes approximately 50 – 70 minutes.
- After the treatment is completed, the patient may leave the clinic on the same day and resume his normal activities a few days later.
- As Iodine-125 has a short half-life, the seeds emit radiation only for a certain period of time. Since the rate of emitted energy is low, there is limited risk of irradiation outside of the body.

Safety Measures after Prostate Seed Implants

Patients do not need to worry about the radiation from the implanted seeds. By the time it reaches the outside of the body, the amount of radiation is so small that there is no danger to surrounding people.

Nevertheless, up to 8 weeks after the implantation, extended close physical contact with the patient should be avoided. Pregnant women and children under 18 years should prevent direct physical contact with the patient during this period, however a short hug or a salutation is harmless. During two months following the implantation, it is recommended to use a condom for intercourse.

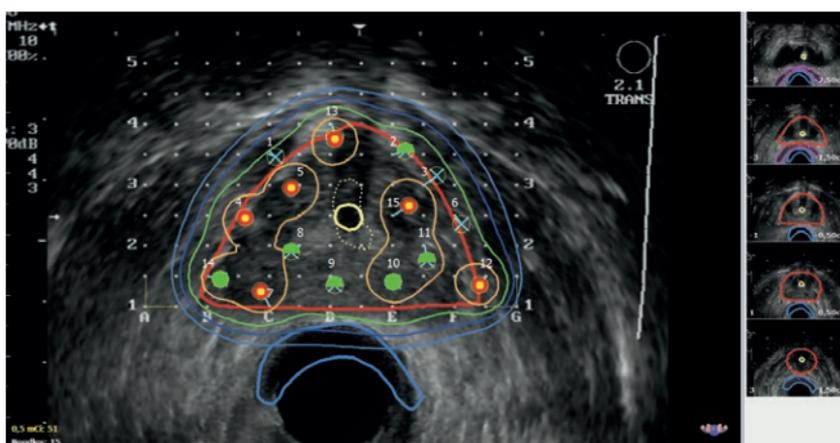
After one year, almost 100% of the radiation has been delivered. Two years after implantation, no special safety measures need to be taken anymore, i.e. in case a removal of the prostate should be required. For any question or concern, please contact your physician.



An Iodine-125 seed has a length of 4.5 mm and a diameter of 0.8 mm



Fluoroscopic image after successful seed implantation



A treatment planning system calculates the number of seeds as well as their exact location based on the ultrasound prostate image

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