

Prostate Cancer

Patient Information



With a special focus
on seed implantation
(Prostate Brachytherapy)

Prostate Cancer

Patient Information

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Cancer de la prostate



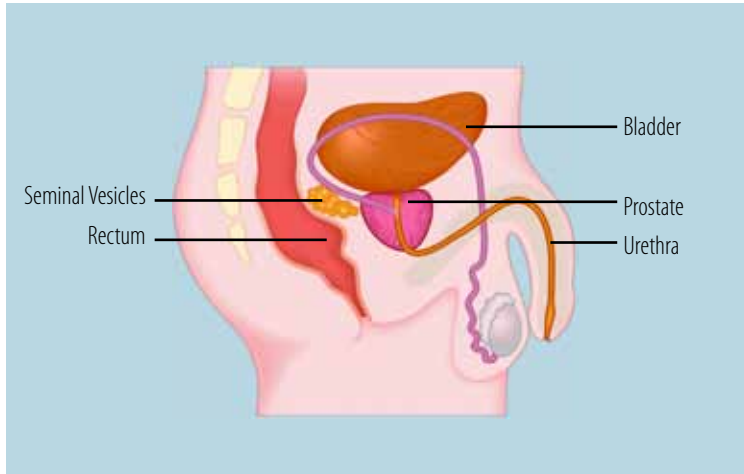
Dear patient,

Prostate cancer is the most common cancer amongst men. There is a high probability of cure if it is detected at an early stage. New developments facilitate its treatment with a small invasion and minimal side effects.

This brochure gives you a brief overview of the disease, the diagnostics and treatment options and puts a specific focus on seed implantation (brachytherapy). This information does not replace the need for consulting the physician. Only the patient and the treating physician can define the best treatment option.

Cancer de la prostate

Section
through the
male
pelvic region



1. The Prostate

The prostate is a small gland of the male reproductive system. It is located directly below the bladder and surrounds the urethra, the tube of urine and semen. The prostate produces the seminal fluid, which transports the sperm during ejaculation. The size and shape of the prostate is similar to a walnut. On both sides it has a group of nerves, the neurovascular bundles. These nerves are important for the erectile process.

In many men at the age of 45 the prostate starts to enlarge. This is generally a non-cancerous condition known as benign prostatic hyperplasia. It does not require treatment unless it applies too much pressure on the urethra causing difficulties to urinate.

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2. Prostate Cancer

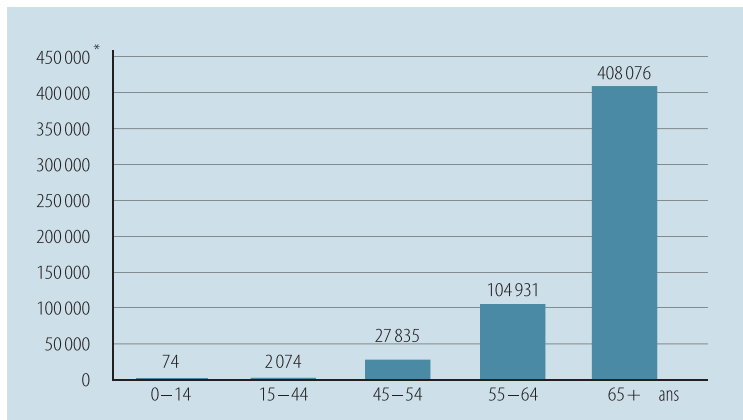
Cancer is a disease that is characterized by uncontrolled growth of abnormal cells. Normally cells reproduce themselves by dividing and replace old or injured cells. But sometimes cells grow abnormally and accumulate into a mass called a tumour. These tumours may be non cancerous (benign) or cancerous (malignant). Benign tumours are seldom life threatening although they may interfere with some bodily functions. Malignant tumours have invasive characteristics, which destroy normal tissues.

Prostate cancer normally grows at a very slow pace and can even grow for years without any symptoms. Nevertheless, a small proportion of the tumour may be highly aggressive, and spread rapidly to other parts of the body.

Age vs. incidences

The exact cause of prostate cancer remains unknown, however a number of factors increase the risk of developing prostate cancer. The most common factors are age, race and family history.

Age vs.
incidences



* Per year, worldwide.
Source:
Globoscan 2000

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Prostate cancer rarely occurs before the age of 45. The risk of prostate cancer increases with age. Men of African origin may be a higher risk group, as well as men with a family history of prostate cancer. Diet may be a factor in the incidence of prostate cancer, as incidence rates are generally greater in countries where meat and animal fat consumption is higher.

2.1 Symptoms

Prostate cancer is a disease that normally shows symptoms only at a late stage. The tumour can be present and growing for years without any symptoms. There are no typical symptoms for prostate cancer but some men may present:

- Frequent urination
- A weak urinary stream
- Interruption while urinating
- Pain or burning while urinating
- Inability to urinate
- Blood in the urine

These symptoms are not specific to prostate cancer and can also be due to a benign growth of the prostate.

Early detection is essential

Early detection of prostate cancer is the key factor to initiate a 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 to eliminate it. Once it passes the boarder of the gland it gets very difficult to treat. Therefore, men at the age of 45 should undergo a yearly screening.

2.2 Diagnosis

Various diagnostic tools are used for the detection of prostate cancer. They are generally used in combination to achieve a high diagnostic security and early detection.

In a digital rectal examination (DRE) the physician inserts a gloved finger into the rectum and palpates the prostate. Due to the close proximity of the rectum to the prostate, abnormalities of the gland can be felt. DRE is very useful in detecting prostate cancer but requires a certain size and position of the tumour. Therefore many early stage cancers are missed using this method alone.

The prostate specific antigen (PSA) is a substance that is produced by the prostate. Its concentration can be measured via a simple blood test. A healthy prostate releases very little PSA into the bloodstream. A

high result of PSA indicates an abnormal situation of the prostate, but does not mean automatically that prostate cancer is present. It also may be the result if a benign enlargement of the prostate or other circumstances. If the PSA level is high, additional evaluations should be performed.

Via a transrectal ultrasound probe (TRUS) the prostate can be visualised on an ultrasound screen which allows the physician to analyse the prostate tissue. It is used to further define the condition of the prostate gland. A thin ultrasound probe is inserted into the rectum to a distance that permits visualization of the prostate gland. In this way the physician obtains a precise picture of the gland, which can then be examined.

During a biopsy a small amount of tissue is removed via a special needle and examined. This is the only way to definitively confirm prostate cancer.

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2.3 Classification of the Cancer

There are two types of classification presently used for prostate cancer, *grading* and *staging* of the cancer cells.

Grading indicates how different the cancer cells appear compared to normal cells. It is an indicator of how aggressive the tumour cells are. The grades are usually referred to as "Gleason grade." They range from 2 to 10 with 2 as the least aggressive tumour classification.

Staging is an assessment of the size and location of the cancer. The actual TNM staging (tumour-nodes-metastases) is as follows:

T1	Tumours are very small and cannot be detected by DRE or TRUS
T2	Tumours are large enough to be detected during DRE
T3/T4	Tumours have already expanded beyond the prostate
N :	The N value stands for the amount of affected lymph nodes (0-3)
M :	The M value indicates if distant metastasis of the tumour is present (0-1)

2.4 Treatment Options

Fortunately, various treatment options are available nowadays. The appropriate treatment should be carefully selected considering the stage of the disease, current medical conditions and the patients and physicians concern.

The main treatment options are:

2.4.1 Radical Prostatectomy

Complete surgical removal of the prostate

2.4.2 Radiation Therapy

a. Seed Implantation

Small radioactive sources with a length of 4.5 mm are permanently placed inside the prostate

b. External Beam

Focused radiation is applied from outside the body

c. High Dose Rate (afterloading therapy)

Highly radioactive sources are temporarily inserted into the prostate

2.4.3 Hormone Treatment

Deceleration of the tumour growth

2.4.4 Watchful Waiting

No treatment is applied, but the cancer is closely watched at regular intervals

2.4.1 Radical prostatectomy

Surgery of the prostate in which the gland is completely removed. This is normally performed through an incision in the lower abdomen. By tradition the most common treatment for early stage cancer.

- +** High success rates if the tumour is limited to the prostate gland
- +** Long term data available
- High likelihood of impotence (inability to have an erection or to have an erection strong enough for sexual intercourse)
- High incidence of incontinence (limited bladder control resulting in uncontrolled urination)
- Requires an extensive hospitalisation and often rehabilitation
- Not well tolerated by older men who are not in overall good health
- Surgical risk and surgical related inconveniences
- Only suited for tumours limited to the prostate

24.2 Radiation Therapy

The cancer cells are exposed to high doses of radiation. This therapy takes advantage of the effect that cancer cells are much more susceptible to radiation than normal tissue. The radiation can be delivered externally (external beam radiation) or internally (brachytherapy).

A seed has a length of 4.5 mm and a diameter of 0.8 mm



a. Permanent Brachytherapy - Seed Implantation

With this treatment, small radioactive sources, so called seeds, are placed inside the prostate. Each seed is 4.5 mm in length. The treatment takes advantage of the fact that cancer cells are more susceptible to radiation than normal tissue. Each seed emits a certain radiation

dose to its surrounding tissue. By placing the seeds all over the prostate in well defined distances the organ is covered with exactly the required doses to destroy the cancerous cells. The tissue and organs surrounding the prostate are nearly not affected by the radiation as it is applied directly within the prostate.

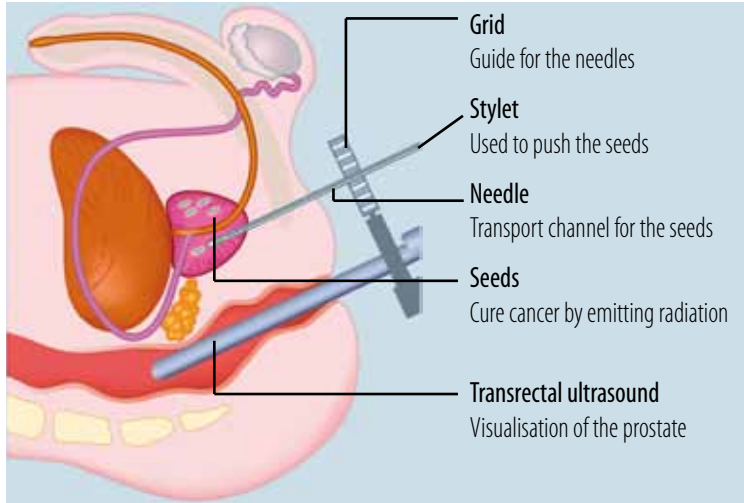
The procedure is as follows:

- The patient is anaesthetised and an ultrasound probe is inserted in the rectum.
- The placement and number of seeds is based on the ultrasound prostate image.
- The physician places the implantation needles and implants the seeds. With the ultrasound he constantly verifies the placement.

The complete procedure takes about an hour. It is generally well tolerated, because it does not require open surgery. The treatment can be performed ambulant or requires just a short stay at the hospital. The patient may resume his normal activities within days.

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Section through the male pelvic region. Implantation of seeds using brachytherapy



What is the clinical outcome?

Long term data (up to 15 years) show that the treatment of early prostate cancer with seed implantation has comparable success rates as radical prostatectomy but better results than external beam therapy. The side effects associated with brachytherapy are relatively low. The incidence of urinary incontinence is below 5%. The incidence of impotence

is only 20–30%. However, directly following treatment some acute but temporary side effects such as difficulty with urination or pain while urinating may appear.

Which patients can benefit from this therapy?

Seed implantation may be applied in patients with early stage prostate cancer. The cancerous tissue must be limited to the prostate gland. The diagnostic values should be in the following range^{i, ii}.

Gleason score	< 7
PSA	< 10
Staging	T2a or lower, N = 0, M = 0
Prostate volume	< 50 ccm
Urine flow test	maximum flow rate >15 ml/s prostate causes minimal disruption to urinary discharge

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

Benefits of seed implantation

There are various substantial advantages for the patient:

- + Low incidence of impotence
- + Low incidence of incontinence
- + Success rate comparable to radical prostatectomy
- + Low surgical risk
- + One day procedure
- + Can be performed ambulant
- + Also suited for elderly patients with limited overall health

ⁱ Recommendation from
EAU, ESTRO, EORTC,
published in 2000

ⁱⁱ Recommendation from DGU,
DEGRO, BVDS, BDU,
published in 2001

b. External Beam Radiation

This treatment option is delivered using a so-called linear accelerator that emits a high energy X-ray beam. The beam is targeted using various configurations at the prostate cancer. The treatment is delivered once a day (5 days/week) for approximately six to seven weeks. This treatment at daily intervals, also known as fractionation, allows to minimize the damage to the normal tissue that the beam has passed through.

- ⊕ Well tolerated in older men, as it does not require hospitalisation
- ⊖ Requires daily visits to the clinic over a long period of time
- ⊖ Significant risk of impotence

- ⊖ High likelihood of acute (short term) side effects and complications due to radiation passing through normal healthy tissue. They may include: fatigue, frequent and painful urination, upset stomach and diarrhoea, rectal irritation or bleeding

c. High Dose Rate (afterloading therapy)

Under general or spinal anaesthetic, needles are inserted through the skin in the prostate. A radioactive iridium or cobalt source is deposited temporarily into the needles. Due to the high dose rate this treatment has to be split into various sessions. This modality is mainly used as a boost treatment after external beam radiation or radical prostatectomy.

- ⊕ Hospitalization not required
- ⊕ Only about three treatment sessions needed
- ⊖ No long term data
- ⊖ Anesthesia risk on every session



2.4.3 Hormone Treatment

Decelerates the growth of the prostate cancer by depriving the body of testosterone (the male sex hormone).

- ⊕ Non-surgical treatment
- ⊕ Can be used for tumours that have already spread
- ⊖ Side effects, which include hot flushes, loss of sex drive, risk of cardiovascular problems
- ⊖ Limited long-term efficiency due to possible habituation of the body
- ⊖ Does not cure the prostate

2.4.4 Watchful Waiting

No treatment applied but the cancer is observed closely. Requires an ongoing monitoring program. In case of a slow growing tumour it may be preferable for elderly patients with in generally a relatively poor health not to undergo treatment at all. In this case the development of the tumour has to be closely monitored to be able to react to any changes in tumour characteristics.

- ⊕ No side effects and inconvenience by the treatment
- ⊖ Does not cure the prostate

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The information given in this booklet is intended only to complement the information given by the physician. It does not replace the need for consulting the physician. Only the patient and the treating physician can determine the best treatment option.

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