**Hash/Matt**

**Prostate**

The prostate is a walnut-sized gland below the bladder present in men only. It makes the fluid that carries and nourishes sperm. The prostate sits in front of the rectum ('back passage'), which is why the prostate can be felt by putting a finger into the rectum. Urine flows from the bladder through the prostate to the urethra and then to the outside world. The prostate is like a ring doughnut or polo mint with a hole in the middle.

There are three main problems that affect the prostate, prostate enlargement (benign prostatic hyperplasia, BPH), prostate cancer and prostatitis.

If the channel through the prostate gets small as the prostate enlarges, urinary symptoms can develop such as getting up at night, passing urine frequently, or a poor urinary stream. However, the prostate is not the only cause for urinary symptoms. Investigations and treatments for these problems can be found operations for the benign prostate enlargement including laser prostatectomy.

In general, prostate cancer does not cause urinary symptoms unless it is very advanced. Therefore, the majority of men with urinary symptoms do NOT have prostate cancer/

Prostate cancer is a growing problem in this country as men live longer When it starts there are no symptoms, but it is now the second commonest cause of death from cancer in men after lung cancer (see graphs below). Prostate cancer can be detected early using the PSA and multi-parametric MRI scans. If the MRI is suspicious a subsequent prostate biopsies is needed. PSA testing is controversial and so it is important to understand the advantages, risks and alternatives to PSA testing. Multiple new treatments have arisen for prostate cancer including laparoscopic and robotic prostatectomy and focal therapy using HIFU (high intensity focused ultrasound) and cryotherapy. Active surveillance for is also very safe over many years in the majority of men with low risk prostate cancer.

Urinary symptoms can be due to a variety of different causes. When due to the prostate, these symptoms include getting up a night, passing urine frequently by day, and taking a long time to pass urine when in the toilet.

The prostate is a small gland sitting below the bladder. Urine flows through the prostate which is like a ring doughnut or polo mint with a hole in it. As the hole gets smaller, urinary symptoms can get progressively worse. However, the prostate is not the only cause for urinary symptoms.

See the frequently asked questions (FAQ) regarding the enlarged prostate, operations for the benign prostate enlargement including laser prostatectomy that treats the prostate with almost no bleeding and as a day case so that you can get home the same or next day

*How do I work out how serious my cancer is?*

There are several considerations:

•the underlying risk of the cancer affecting your quality of life

•your general health

The underlying risk of the cancer is determined principally by:

•Gleason Score: this is a measure of how aggressive the cancer is. The two commonest patterns of cancer are each graded from 1 to 5. The two grades are summed and the total is known as the Gleason score. Therefore, this ranges from 2 to 10. In the modern era, prostate cancers are given a score from 6 (the lowest) to 10(the highest). Scores of 2 to 5 are not used anymore.

•Cancer Stage: This refers to how far the cancer has spread and can be determined partially by prostate examination with a finger, and sometimes with transrectal ultrasound at the time of prostate biopsies, a bone scan or magnetic resonance imaging (MRI) scan. If the cancer is confined to the prostate, the stage is 'T1' or 'T2', if it is outside the prostate it is 'T3' or 'T4'. Bone scans indicate whether there is cancer in the bones. Sometimes, the lymph nodes in the pelvis are sampled using keyhole surgery to determine if cancer is present there if imaging tests are uncertain about this.

•PSA: the higher the PSA, the more likely the cancer is outside the prostate; the faster the rate of change, the more likely serious cancer is present

•Other bits of information can be used and relate often to the information gained from the prostate biopsies: the proportion of positive biopsies, the length of cancer in the biopsies or the percentage of the core with cancer.

It is important to know how the cancer was detected i.e. by screening with a PSA test or because of symptoms. Most of our knowledge is based on prostate cancer detected in patients with urinary symptoms. If the cancer was detected early because of PSA testing, the time between diagnosis and the development of symptoms from the cancer is likely to be much longer than if the cancer was detected because of urinary symptoms.

What additional tests or scans are necessary now that I have prostate cancer?

These tests relate mostly to determining if the cancer is confined to the prostate and what chance there is that treatment will fail after a few years. It is possible to combine the information to calculate whether the cancer has spread outside or the chance that the cancer will return after treatment. The information required is:

•PSA

•Gleason Score

•Clinical stage determined by examination of the prostate by a finger

The following web sites contain 'calculators' that can be used to estimate your risk. This information should be interpreted with a doctor who understands prostate cancer, as these calculators were developed ***without*** specialist MRI scans and accurate targeted biopsies, so might be less relevant in the modern era.

• the Sloane Kettering Nomogram ( please enter)

• The Prostate Calculator please enter)

Other investigations, such as magnetic resonance imaging (MRI) can help tell if the cancer is has spread outside the prostate and give information about your anatomy relevant to treatment and side-effects. For this test, you enter a scanning machine, which makes a lot of noise, and produces high quality images of the prostate. It may help determine if the lymph nodes ('lymph glands') contain cancer or not. Sometimes, CT or PET scans are used. These use radioactive tracers such as choline or PSMA and are accurate. Occasionally, laparoscopic lymph node sampling, which is a keyhole procedure for obtaining tissue to examine under the microscope might be needed. This is a highly specific test for the identification of cancer in the lymph nodes.

**What are my choices?**

Depending on your individual situation you might choose

•active monitoring or active surveillance

•radical radiotherapy (external beam or brachytherapy)

•radical prostatectomy (either open, laparoscopic or robotic)

•cryotherapy

•high intensity focused ultrasound (HIFU)

•hormone therapy

The situation is often difficult and experts frequently disagree. A careful decision needs to be made usually in conjunction with consultants in radiotherapy and urology. You will often be given these choices and asked to make a decision based on the pros and cons of each treatment that you hear about.

Part of the problem is that early prostate cancer grows slowly and so treatments are for problems that will often not present for several years. Having said that, the opportunity for curative treatment is available only when cancer is confined to the prostate and has not spread elsewhere.

**What is active monitoring or active surveillance?**

The prostate cancer is monitored to determine whether it is progressing or not. The implication is that if the prostate cancer appears to be growing and is at risk of causing problems, then a treatment option will then be undertaken without losing the window of cure. To do this, the tumour should be of low risk of progression to start with. There are no universally accepted criteria for this and a discussion is necessary with an experienced prostate cancer doctor. In patients less than 70 years of age in good health, few doctors would recommend active monitoring if the cancer has a Gleason score 7 or more, or if there was stage T3a or more or a very high PSA in small or medium sized prostate gland. If these conditions do not apply, then active monitoring may be appropriate.

Active monitoring involves regularly measuring the PSA and seeing how it changes. Some people perform prostate examinations regularly and repeat prostate biopsies every 1-2 years. Recently, with the adoption of specialist MRI scans for diagnosing prostate cancer, repeat MRI scans can be used with biopsy only if the scan shows changes. The idea is to look for evidence that the disease is changing for the worse. Provided it does not, curative treatment is usually not be necessary. This is becoming a more acceptable way to manage people with low risk and some small medium risk prostate cancers. Probably the best strategy is to incorporate all pieces of information regarding the disease and your overall health to make the ultimate decision about what is right for you.

The advantage of this option is that the prostate is preserved and the side-effects of treatment are avoided. The disadvantages are that the opportunity for curative treatment might be missed although this is rare.

Age is not a contraindication to active surveillance or treatment. Older men may benefit from treatment early depending on their fitness levels and any other medical problems they might have.

**What is a radical prostatectomy?**

A radical prostatectomy is the operation to remove the prostate. At the same time the seminal vesicles, which are attached to the prostate, are removed occasionally with the lymph nodes, which are specialised tissue to which the prostate drains. This procedure can be performed by an incision through the lower belly or by key hole techniques ('laparoscopic' or 'robotic'). The advantages are:

•the prostate gland with its cancer and surrounding tissue is removed.

•the prostate can be examined completely and a more accurate prediction made of the cancer

•the PSA should fall to almost unrecordable values making it much easier to determine if the disease has unfortunately recurred

•additional treatment such as radiotherapy can be given with fewer side-effects

•a short hospital stay (2 to 7 days) is necessary rather than regular attendance

•urinary symptoms (weak or slow flow etc) due to the prostate are usually eliminated completely

*The disadvantages are*

•it is a major operation

•a blood transfusion may occasionally be necessary

•control of urine is less good in some after surgery and pads may be required. About 5-20 in 100 men have problems with leakage and it is more common in men over 70 years of age

•erections may be weaker or non existent although good sexual activity can be had with Viagra, Cialis or Levitra (jn about 30-60 in every 100)

•additional treatments may be required if the prostate cancer returns or there are positive margins

There is strong evidence that radical prostatectomy reduces the chance of dying from prostate cancer by about 50% compared to watchful waiting and deferred androgen deprivation in men who have medium to high risk prostate cancer. The evidence comes from a randomised study published in one of the world's most prestigious medical journals. However, the results are most applicable to men with cancer detected because of symptoms, with a PSA around 12 ng/ml, prostate cancer that can be felt with a finger when examined, and Gleason score 6 or 7. Nowadays, many men have few urinary symptoms, PSA values around 5 to 8, Gleason score 6 and impalpable cancer ie the cancers are detected earlier in their history. This is not to say that surgery is not effective in some of these men just that to benefit one has to wait longer.

The procedure can be performed through a traditional incision in the lower abdomen or through 5 very small incisions ie laparoscopic or robotic surgery. The advantages of laparoscopic surgery include improved view allowing more precise surgery, shorter hospital stay (2-3 days) and earlier return to leisure activities and work. It is technically difficult to and specialised training is required.

**What is radiotherapy?**

The prostate is treated by radiotherapy given whilst lying in a machine at a special hospital. Usually, one attends every weekday for 6 to 7 weeks for a short time for the treatment. This treatment is sometimes preceded, accompanied and followed by hormonal therapy to block the effects of testosterone, which is the male hormone that drives prostate growth. The advantages are:

•the prostate cancer is treated and is less likely to recur or cause symptoms

•there is a much lesser chance of stress urine incontinence compared to radical prostatectomy or brachytherapy, but other types of urinary symptoms such as frequency or urgency may be worse with some men having urge incontinence needing pads (5-20 in every 100)

•radiotherapy can be given to the side walls of the pelvis which may be important if the cancer has spread.

•HIFU or cryotherapy can be used if radiotherapy fails

•surgery is avoided

*There are disadvantages too:*

•many doctors believe that radiotherapy is probably a less effective treatment than surgery when compared over long periods of follow up but the evidence is not strong

•side-effects include diarrhoea, blood in the stools and back passage discomfort

•erections become weaker over time (50-60 in every 100)

•if treatment fails, cryotherapy, HIFU or surgery is associated with more side-effects such as worse incontinence

**What is brachytherapy?**

Seeds with radiotherapy energy are placed systematically in the whole prostate under a general anaesthetic. Patients stay in hospital usually overnight. This is done either in one or two stages depending on the set up.

The advantages are:

•this can be a day case procedure so patients can often leave the same day

•it is possible to have additional therapy, usually external beam therapy, if there is disease recurrence

•incontinence of urine is less likely

*The disadvantages include*

•urinary symptoms often become significantly worse and sometimes a catheter is required for a period to empty the bladder

•the treatment is probably less effective than surgery regarding cancer cure for medium to high risk cancers

•weakness of erections occurs, although possibly less commonly than after surgery or external beam radiotherapy (30-40 in every 100)

**What is focal therapy?**

The cancer can be killed by freezing (cryotherapy) or heating (High Intensity Focused Ultrasound, HIFU). To give this therapy, a general anaesthetic is necessary and a catheter needs to be placed for several days.

The area of cancer or cancers are treated rather than the whole prostate so that the damage to collateral tissues that serve the penis for erections or control urine flow are avoided. This means side effects are much lower than traditional surgery or radiotherapy. Not all men can have focal therapy and an accurate MRI and biopsy are needed to ensure the tumour can be localised precisely.

Advantages

* Daycase treatment with no cuts
* Early return to normal activities
* Low risk of incontinence (1 in 100)
* Low risk of urinary symptoms
* Low risk of erection problems (5-15 in 100) although half the men lose ability to ejaculate (dry orgasm)
* Back passage problems are rare (1 in 500)

Disadvantages

* About 10-20 in 100 men need to have a second session of focal therapy within 5 years average follow-up
* About 5-10 in every 100 will need surgery or radiotherapy within 5 years average follow-up
* There are no data on long term outcomes at 10 or 15 years average follow-up like there is with surgery or radiotherapy

Only expert centres and surgeons are able to carry out focal therapy but it is offered in the NHS and privately.

**What is hormonal therapy?**

This usually refers to reducing testosterone levels in the body and is usually known as androgen deprivation, androgen suppression or castration. Testosterone with its derivative dihydrotestosterone is the male hormone that drives prostate growth. Rather than reduce the levels of testosterone, its action can be blocked by drugs and this is known as androgen blockade.

This form of therapy is usually used with or without radical radiotherapy, and sometimes after radical surgery but not before. The prostate cancer tends to be more advanced than early.

The side effects of this include hot flushes, tiredness, anaemia, and in the long term osteoporosis.

*How do I decide what to do?*

You have to trade-off the advantages over the disadvantages of each option. It depends on the relative values of each. This is best done by discussing the issues with a doctor and close family. In general, if the thought of having cancer and not doing the most possible to get rid of it dominates your thinking, then you should choose an interventional treatment. There is no caste iron evidence to indicate one treatment is better than another. On the other hand, active monitoring may be the best option if quality of life is more important than preserving a few years of life especially if there is uncertainty over the benefit of treatment and the cancer does not seem obviously to be high risk. A second opinion is often helpful.

Several websites offer details and on-line help in making decisions including:

***The Prostate Cancer Charity***

***Prostate Cancer Frequently Asked Questions***

What is prostate cancer?

The body is made up of many types of cells. Normally, cells grow and divide to produce more cells only when the body needs them. This orderly process helps keep the body healthy. Sometimes cells keep dividing when new cells are not needed. A mass of extra cells forms, and this mass is called a growth, tumour or cancer. Prostate cells in cancer tumours are abnormal and divide without control or order. These cancer cells can invade and destroy the tissue around them. Cancer cells can break away and spread through the blood and lymphatic system. In this way, secondary cancers known as metastases form. The spread of cancer is called metastasis.

What types of prostate cancer are there?

The majority are known as adenocarcinomas of the prostate, but there are other rare form such as mucinous carcinoma.

What increases the risk of prostate cancer?

•Age: the older men get, the more likely a cancer might develop in the prostate.

•Race: Afro-Caribbean men are at higher risk than Caucasians and men from the Far East have a lower risk for cancer.

•Family history: If a father, brother or uncle has prostate cancer, the risk is also increased.

•Obesity: increases the risk of lethal prostate cancer.

•'metabolic syndrome'

•Tall stature: increases the risk of advanced prostate cancer

•Occupation: Farmers, firemen, workers in electrical capacitor plants, pesticide workers and rotating shifts workers

•Diet: see the question below.

It is not certain, but a history of gonorrhoea may also be significant. Benign overgrowth of the prostate (BPH) is not a risk factor for prostate cancer. Smoking may make prostate cancer more serious if a diagnosis is made, but it is not known if it significantly increases the chance of prostate cancer. Men with only daughters as off spring also appear to be at great risk than men with both boys or no children (ref)

Is diet important in prostate cancer?

It is not absolutely proven, but certain types of diet may increase the risk of prostate cancer including:

•red meat

•saturated fat

•low intake of fruit and vegetables

•omega 6 fatty acids (corn, safflower oils and red meats).

•high calorie diet

•high calcium and milk consumption

The following diet appears to be associated with either a lower incidence of prostate cancer or lower chance that prostate cancer will spread or be more serious:

•selenium - seafood, poultry, brazil nuts and especially broccoli florets

•vitamin E (wheat germ, nuts, soybeans, organ meats and vegetable oils)

•beans -- black, pinto, small red and kidney beans are high in fiber, which helps the body rid itself of excess testosterone. Beans are also rich in inositol pentakisphosphate, a known cancer-fighter

•soy and soya products (e.g. 62.5 mg Soy isoflavone aglycones (ADM Novasoy)

•folate supplementation

•lycopenes - found in concentrated tomato sauces (e.g. pizza), watermelon and pink grapefruit. These work when eaten with broccoli simultaneously

•cruciferous vegetables (cabbage, broccoli, brussel sprouts, cauliflower, bok choy and kale)

•omega 3 fatty acids found in oily fish (e.g. tuna, sardines, salmon), linseed, walnuts or food supplements

•sweet potatoes, carrots and cantaloupe are rich in beta-carotene, which gives them their orange color and helps the immune system keep cancer at bay

•pomegranate juice (8 oz/day)

•zinc

•milk thistle

•turmeric (curcumin): a chemical found in curry especially in combination with watercress, cabbage, winter cress, broccoli, brussels sprouts, kale, cauliflower, kohlrabi and turnips.

•green tea (the evidence for this is less strong than it was a few years ago)

•quercetin: possibly helpful

•A low glycaemic index (GI) diet may also be helpful as this reduces the amount of circulating insulin that . Follow this link for further information.

There was concern that flax seed may be dangerous for prostate cancer, because it is rich in alpha-linolenic acid. However, this is probably a red herring and is probably safe. See the discussion on this link: flax seed and prostate cancer.

Some drugs can also reduce the risk of prostate cancer including 5a-reductase inhibitors (e.g. finasteride, dutasteride). Statins are used to reduce cholesterol and seem to reduce the probability that prostate cancer will spread outside the prostate if develops at all.

For more information go the following link: prostate cancer and diet.

How common is prostate cancer?

For most men, there is a 1 in 6 chance (16%) of being diagnosed with prostate cancer in their lifetime and a 3% chance of dying from it.

The chance of a diagnosis of prostate cancer increases as men get older.

It is possible to estimate the risk of prostate cancer by following this web link:

http://www.hyperion-interactive.com/astrazeneca/risk.htm

or this one:

Harvard Center for Risk Cancer Prevention Prostate Cancer Risk Calculator

or this one:

Prostate Cancer Research Foundation of Canada

Go to PSA to see the chance of prostate cancer alone and high grade prostate cancer by PSA alone.

Is prostate cancer important?

About 10 000 men a year die with prostate cancer in England and Wales. Recently, there have been suggestions that there is considerable over treatment for prostate cancer. That is partly true, but prostate cancer is important and around 10,000 men still die from it. Many men with prostate cancer die from other problems before prostate cancer, but some men's quality of life can be severely affected whilst living with it. In general, men aged 45 have various causes of death and these are shown diagrammatically below. Heart disease, lung cancer, strokes and emphysema kill more people than prostate cancer, but as these diseases become controlled, there is a chance that prostate cancer will become more important.

Prostate diagram

Please insert

The important thing is to try and identify prostate cancer at high risk of progression and causing problems. The factors to consider are: change in PSA over time, change in palpable volume of the tumour, the grade (Gleason Score) of the prostate cancer, and the amount of prostate cancer present in the biopsies (mm in length Ca), versus no cancer in the biopsies (mm in length non-Ca) taken from the prostate.

Does prostate cancer produce symptoms?

When prostate cancer starts, there are usually no symptoms. As prostate cancer advances, symptoms may include:

•blood in the urine

•frequency and nocturia

•weak urine flow that stops and starts

•discomfort whilst passing urine

•inability to urinate ('urinary retention')

•persistent pain in the back, thighs and pelvis

•inability to get an erection (impotence)

However, these symptoms usually occur for other reasons including a urine infection, benign overgrowth of the prostate or other problems, but not prostate cancer. Therefore, you should not immediately worry and think you may have cancer if you have these symptoms. Nevertheless, they must be checked out by a doctor.

Advanced prostate cancer can cause pains in the bones (e.g. back), urinary problems and weight loss. These must be investigated by a doctor in the appropriate setting.

How can prostate cancer be detected early?

Usually, there are no symptoms. The only way to detect cancer early is take samples (biopsies) from the prostate. However, this is not necessary in everyone.

Several factors can be used to help determine the risk of prostate cancer. These include:

•PSA exact level(see PSA FAQ)

•Whether the prostate feels cancerous or not when felt on examination

•Age

•Race

•Prostate size or appearance on ultrasound

•PSA density (PSA/prostate volume)

•Certain variations of PSA (eg Free/Total PSA, complexed PSA)

These bits of information can be used to predict the risk of finding cancer if biopsies are taken. Biomarkers such as 4K, Stockholm3, PCA3 or SelectMDx may in future have a bigger role but the evidence needs to be stronger.

Should I be tested for prostate cancer?

Many doctors believe it is of benefit to detect prostate cancer early providing you are in good health, younger than 70 years with at least 10 years of life ahead of you. Knowing how many years you can live can be difficult to guess obviously. The risk of prostate cancer can be calculated.

If you have prostate or waterworks problems anyway, detecting prostate cancer and treating it may alleviate symptoms. There is good evidence that treating people with prostate cancer detected because they have symptoms live longer and have a lesser chance of the cancer spreading. However, not everyone wishes to go through the process to find prostate cancer.

The advantages of screening for early prostate cancer are

•peace of mind

•finding a problem, taking further tests and treating a potentially serious cancer

•the opportunity for treatment early when it is still possible for the cancer to be completely removed and be cured

•having early treatment at a younger age, when the body is able to tolerate it

•the treatments available have significantly improved and have fewer side-effects than they did many years ago, so there are less side-effects than before

•the ability to enter an active monitoring scheme i.e. close following of the cancer to determine if it has features suggesting it may be dangerous or benign, and so choose an intervention only when absolutely necessary

If you want to catch prostate cancer early, PSA testing should be begin from 50 years of age. In general, if the risk of prostate cancer is thought to be high enough to worry, biopsies may be recommended. The risk can be calculated on line as indicated above. If the prostate feels abnormal when examined by a doctor, most doctors would recommend biopsies, as the chance of significant prostate cancer is high. It is important to realise that there is no absolute PSA value that is globally recognised as being appropriate; It is best to calculate the risk of prostate cancer based on algorithms or nomograms. The implications of the test and biopsies must be understood before undergoing the test.

Why shouldn't I be tested for prostate cancer?

This might sound like a silly question, but it has not yet been proved that detecting men with early prostate cancer and no symptoms through screening improves the quality of the rest of the life. This is so for several reasons:

•using the PSA test to find cancer probably makes the diagnosis occur about 10 years earlier than it would have been made without a PSA test - this can be upsetting and cause anxiety

it is possible that many of the cancers detected so early would not get worse and not kill or interfere in the lives of the affected men

•the treatments available for early prostate cancer treatment can result in serious side effects. The side-effects can include the need to wear pads to stay dry because of incontinence, bowel problems and the permanent loss of erections

•the treatments do not always work i.e. the cancer persists after treatment.

However, what is also known is that there is no cure for prostate cancer unless it is diagnosed when it is confined to the prostate (i.e. early prostate cancer, localised prostate cancer). Furthermore, it is very difficult to predict with certainty which men with prostate cancer will go on and have problems from those that will not. In addition, it younger men are better able to tolerate the main treatments available for prostate cancer than older men. Thus, early detection is the only way currently available to give an opportunity for cure.

Dr Thomas Stuttaford in the Times wrote an interesting article on PSA testing that can be read in the Times Online.

How can I be tested for prostate cancer?

Ask your general practitioner and have a discussion with him or her about it. Alternatively see Contact Us.

What do I do next if I have a diagnosis of prostate cancer?

Do not worry unduly. No two men are alike with prostate cancer and many things need to be considered when deciding what to do to. These include:

•Your age

•general health including the qualify of your sex life

•whether you have urinary or bowel symptoms already

•the grade (severity) of the cancer, which is usually given as the Gleason score.

•PSA level

•whether the cancer is located only within the prostate or has spread outside either beyond the prostate borders, to the lymph glands or elsewhere such as the bones

•your inclination for treatments including radiotherapy or surgery

•to what extent treatment affect the natural history of disease

These issues can be discussed with your doctor.

*Prostate Specific Antigen (PSA)*

What is PSA?

PSA stands for Prostate Specific Antigen. This is something produced by cells in the prostate and its level can be measured in the blood when it is taken from a vein for analysis. PSA is used best in combination with other factors, when estimating the risk of prostate cancer being found on prostate biopsies or the severity of prostate cancer.

What is important to know about PSA?

The absolute level and rate of change of PSA are important. A raised PSA may be either transient i.e. temporary or sustained and persistent. PSA varies by as much as 33% between tests, although not usually as much. For example, if the PSA is 3 ng/ml on 1 occasion, it may go down to 2 ng/ml or even up to 4 ng/ml on another occasion without being significant. This may be just normal variation in PSA measurements.

Therefore, several readings over time (e.g. 1 per month or every 3 months) may be needed to determine if a raised PSA is genuine or due to a temporary aberration. After several readings have been made, it is possible to calculate the PSA velocity, rate of change or doubling time, which may give additional information as to the chance or severity of prostate cancer. Some experts believe that any one PSA level above 3 should be investigated further because the variation in PSA is not reliable and no one threshold of normal completely rules out cancer of the prostate.

It is important to remember that PSA is just one factor to be considered when considering the risk or severity of prostate cancer.

What does the level of PSA indicate?

This means how low or high it is. PSA is made by cells within the prostate and so PSA levels are higher in men who have big prostates and lower in men with small prostates.

PSA levels can be consistently high for the following reasons:

•benign (non-cancerous) enlargement of the prostate

•prostate cancer

•chronic inflammation (chronic prostatitis)

Transient reasons for elevations in PSA occur:

•when the prostate is disturbed by a medical procedure (e.g. cystoscopy, prostate biopsy or prostate surgery)

•urine or prostate infection

•acute inflammation (acute prostatitis)

•the sudden inability to pass urine ('acute urinary retention')

•ejaculation in the previous 24 to 48 hours sometimes

PSA levels may also fall because of drugs:

•drugs finasteride (Proscar, Propecia), dutasteride (Avodart)

•hormone or steroid medications

•antibiotics (especially when there is prostatitis present)

Sometimes, the PSA changes because of laboratory reasons e.g. different test components or kits that are used in different hospitals.

Should I be worried about my PSA?

It is of value to determine the PSA level and rate of change if knowledge of its level helps you make decision that might have an impact on your quality of life. Thus, it depends on your age, whether you have urinary (water works) symptoms that are causing bother, and whether you have any other significant health problems affecting your life. It is best to have a discussion with a doctor who understands all the nuances before having the test done.

In what situations is it helpful to know the PSA?

There are three main situations when it can be helpful:

•Prostate cancer: If you are less than 70 years old, in good general health, PSA can be used to find men who might have prostate cancer. If the level is between 2.5 and 10 ng/ml, then there is a 25% to 40% chance that prostate cancer might be present if samples (prostate biopsies) are taken from the prostate. If the PSA is more than 10 ng/ml, the chance is more than 40%. However, it is important to understand that the PSA can rise for other reasons as indicated in the previous question.

•Urinary symptoms due to non-cancerous (benign) prostate enlargement (BPH): If you have this problem, a higher PSA may mean that the prostate is enlarged and that there is a slightly greater risk that you might stop passing urine altogether ('urinary retention') and need a catheter or TURP (an operation to remove blockage from the prostate) to improve your urinary symptoms. It is important to exclude the possibility of prostate cancer and this may mean that prostate biopsies need be taken. Treatment with drugs is less likely to be successful for long in reducing symptoms from the prostate if it is large compared to when the it is small.

•Bony aches in men that are new, persistent and painful: Rarely, such pain can be due to spread of prostate cancer to the bones. As many people have back ache anyway, usually the cause will not be cancer. However, one should think carefully about back pain that has recently started, persistent and disturbs sleep.

There is a booklet (Adobe PDF) that can be downloaded from Cancer Backup by following this link:

What level of PSA is dangerous?

This is very controversial for reasons given above and below.

The National Institute of Excellence (NICE) has recommended the referral of every patient with a hard and irregular prostate be referred to a urologist. NICE has recommended that referral should also be made to a urologist if t the PSA is above the average for the age of the patient even with a normal feeling prostate: i.e.

However, not all experts agree with this. The problem is that the average PSA for each age group includes men with prostate cancer that has not yet been detected. In addition, the higher the PSA, the less chance of cure because cancer spreads out from the prostate cancer. Many experts recommend testing for prostate cancer if the PSA level is more than 2 ng/ml or 2.5 ng/ml for men 45-49 years old and more than 3 for men aged 50-69 years. However, there is a lack of consensus on this.

In a recent study (Thompson et al, 2004, New Engl J of Med) of more 18,000 men performed to evaluate how to reduce the risk of prostate cancer, the proportion of patients with cancer by PSA is shown in the table below:

PSA (ng/ml) range

Insert age specific PSA tables

It is possible to estimate the risk of 'high-grade' cancer and any grade of prostate cancer providing you know the following:

•PSA level in the blood

•whether the prostate feels normal or abnormal on examination

•whether there is prostate cancer in the family

•if you have had negative prostate biopsies in the past

•Race

Then go to 'Predicting Likelihood Of Cancer If A Prostate Biopsy Is Performed'. Also the prostate risk indicator offers more estimates of risk that are more accurate than PSA alone.

See this picture for a graph of the chances using age, PSA level and what the prostate feels like:

*Inset table and graph*

The rate of change of PSA may also important and may indicate that high grade (i.e. important cancer) or risky cancer is present.

What rate of change of PSA is dangerous?

If the PSA is rising rather than staying at the same level, it can mean prostate cancer is present even at low absolute levels. If the PSA was measured every year and changed as follows from 1.00, 1.25, 1.56, 1.95 ng/ml, then the PSA is doubling every 3 years or so. This can indicate a prostate cancer is present and growing slowly.

Similarly, if the PSA rises more than 2 ng/ml in 1 year, then it is more likely that serious prostate cancer is present.

Thus, even at low absolute levels of PSA, cancer may be present and this can be detected by serial monitoring of PSA. If prostate cancer is present, the rate of change of PSA or PSA doubling time is also associated with the degree of spread of prostate cancer.

Thus, a baseline PSA when young can be helpful for the future (see ref).

Rapid increases in PSA over a short time period (weeks) can be due to infection in the urine or prostate ('prostatitis'). This is as frequent a cause for a rapid rise in PSA over a short period as prostate cancer. If there is any suggestion of infection, this should be treated first with antibiotics and then the PSA measured again.

Therefore, it is important to remember that the PSA can also change for the reasons as indicated in the question above.

What is my chance of having a high PSA?

If a 100 men aged over 50 years have a PSA test, then about 85 will have a level less than 4 ng/ml and are less likely to have prostate cancer. Fifteen men will have a PSA greater than 4 ng/ml, and about 3 of these 15 men will have prostate cancer. These numbers are slightly higher in Afro-Caribbean men and lower in men from the far east.

What does finasteride or dutasteride do to my PSA?

You should multiply your PSA value by 2 or 2.3 if you are taking a drug like finasteride (Proscar) or dutasteride (Avodart) and use this adjusted value to make decisions such as whether to have prostate biopsies or not. These drugs lower PSA and an adjustment must be made for correct interpretation.

When on these medications, most of the change in PSA is due to prostate cancer, if present, and so changes in PSA are more important.

Are there any improvements on PSA alone?

There has been much hope in the use of Free PSA also known as free/total PSA. It identifies more closely those people who might have high grade prostate cancer. It may be helpful in deciding who should or should not have a repeat biopsy of the prostate if the first biopsy was negative and there is still worry that prostate cancer might be present. It has little use if the prostate is vey large or there is prostatitis (infection/inflammation). High levels (i.e. more than 25%) are good.

Using PSA as one variable in a nomogram can enhance its accuracy in predicting prostate cancer. A link to a predictive model is given above, but there are also publications of predictive methods that can be used. Some of these have been authored by M Kattan and M Garzotto. These include the use of prostate volume and PSA density. These significantly improve the accuracy with which a diagnosis of prostate cancer can be made; however, a transrectal ultrasound is necessary to calculate the prostate volume.

How can I get a PSA test done?

You can have this test performed through your general practitioner or urologist. Before the test is done, you should understand carefully the implications and limitations of the test result. A careful discussion and counselling is necessary, which should be with a knowledgeable individual.

What should I do next if my PSA is high or is rising quickly?

Don't get alarmed. There are many reasons for a high PSA other than prostate cancer as indicated above. It is important to have a discussion with your doctor or urologist quickly to make a plan. This may mean either another blood test possibly after antibiotics, biopsies of the prostate, drug treatment or no action at all.

Reasons for prebiopsy multiparametric MRI

What if an MRI is performed before prostate biopsy? There are several advantages to such an approach.

Firstly, some men may be so reassured by a negative MRI that they decide not to have a biopsy at all. We know that a very high quality MRI is, if negative, more reassuring about the absence of tumour than a negative biopsy, and some men decide to go no further, and to have their PSA checked regularly, and perhaps another MRI at an interval. If they decide on biopsy, and that is negative too, they are very unlikely indeed to have a cancer that will harm them.

Secondly, we can detect most significant tumours on MRI, so that the biopsies can be targeted to the suspicious area. This stops us missing tumours that lie in difficult to reach places (around 10% of significant cancers are completely missed by standard biopsy because of where they lie, but picked up by MRI) and it also helps us to be sure that the sample is representative: sometimes random biopsies just shave the edge of a large tumour, leading us to underestimate how much there is.

This leads on to the third advantage of MRI before biopsy. If a small amount of tumour is detected, MRI can check that this is not the edge of a large amount, or that there is a larger tumour in the front of the prostate. Active surveillance is unsuccessful in some men precisely because of such undetected tumours, most of which can be seen with MRI.

Finally, the finding of a significant cancer usually means that staging is required to detect spread outside the prostate. Radiologists who have looked at MRI images both before and after biopsy have no doubt that they are degraded for several months by the effects of bleeding from the biopsy: the best quality staging scan is undoubtedly one done before any of this has occurred - before the biopsy.

In all three cases then: whether no disease is found, a small amount, or a significant amount, MRI is likely to be useful. This is why most of the urologists and radiologists at Nuada would see it as the optimal first step in a man presenting with a raised PSA.

Summary

A prostate biopsy is a procedure to remove small samples of prostate tissue to be examined under a microscope. See an illustration of the prostate gland.

*Prostate Biopsy Diagram*

*insert*

For a prostate biopsy, an ultrasound probe is inserted through the rectum ('transrectal ultrasound') and needles passed through the rectum ('transrectal biopsy') or perineum (transperineal biopsy). The biopsy samples are examined under a microscope for cancer cells.

A biopsy may be done when there is a suspicion that prostate cancer is present e,g. after a blood test shows a high level of prostate-specific antigen (PSA) or after a rectal examination reveals an abnormal prostate or a lump.

Why have a prostate biopsy?

Biopsies are taken to find the cause for:

•a high PSA

•because the prostate feels abnormal

•abnormal findings on transrectal ultrasound or MRI

Once biopsies are taken, it may be be possible to determine the severity of cancer, if it is found. This enables a decision on how to treat prostate cancer if it is present.

How do I prepare for prostate biopsies?

It is important to let the nurses and doctors know of the following:

•allergies to latex, drugs or medicines

•current medications or drugs (antibiotics, blood thinning agents or anticoagulants, e.g. warfarin, aspirin, clopidogrel or herbal remedies)

•Have had bleeding problems (e.g. after dental treatment).

Please also do the following:

•Stop clopidogrel (Plavix) at least 5 and preferably 10 days before the procedure

other blood thinning medication such as warfarin, or newer agents that anticoaglate should be stopped following advice from your doctors.

You will need to sign a consent form that says you understand the advantages, risks and alternatives of a prostate biopsy and agree to have the test done.

Let us know about any concerns you have regarding the need for the test, its risks, or how it will be done.

How are prostate biopsies performed?

One hour before the procedure is planned, you will take an antibiotic (ciprofloxacin 750 mg) by mouth with water if the biopsy is transrectal. You will be asked to take off all of your clothes and put on a hospital gown. Usually, the procedure takes place in the outpatient department or a procedure room. Just before the prostate biopsy samples are collected, a very small needle will be placed in an arm vein and an antibiotic (gentamicin) given. These antibiotics are to prevent infection.

You will be asked to lie on your left side for transrectal biopsy. For transperineal biopsy you will be on your back with the legs held in supports. Your prostate may be re-examined with a finger in a glove. Then, an ultrasound probe is passed up the anus. This can sometimes be uncomfortable as the anus is sometimes stretched by the probe. The prostate is examined by ultrasound and local anaesthetic is injected around the prostate to allow the biopsies to be taken comfortably. Transrectal ultrasound (TRUS) is used to guide the needle to the correct biopsy location. Biopsies are taken with a spring-loaded needle. The needle enters the prostate gland and removes a tissue sample quickly, but is quite loud and makes a snapping sound as a biopsy is taken.

Prostate Biopsy

How does it feel to have biopsies taken from the prostate?

You may feel a slight sting when you receive an injection of local anaesthetic, which rapidly fades. You may feel a dull pressure as the ultrasound probe is placed in the rectum and when the biopsy needle is inserted. As local anaesthetic is use, it is usually painless. Rarely, you also may feel a brief, sharp pain as the biopsy needle is inserted into the prostate gland. Usually several biopsy samples are collected over 5 to 10 minutes. Finally, an antibiotic suppository (metronidazole, Flagyl) in placed in the rectum.

Following the test, you will be asked to avoid strenuous activities for about 24-48 hours. You may experience some mild discomfort in the biopsy area for 1 to 2 days after the test and may notice some blood in your urine. Also, you may have some discoloration of your semen for up to one or two months after the biopsy. You may experience a small amount of bleeding from your rectum for 2 to 3 days after the test.

However, notify us or a doctor immediately if:

•You have persistent bleeding that fills the toilet bowl

•You feel faint.

•Your pain increases.

•You have a fever higher than 100.4 °F (38 °C).

•You are unable to urinate within 8 hours.

If you have a general anaesthetic, you will return to your room a few hours after the procedure. You will need someone to drive you home when you are released.

You may need to take antibiotics for a few days after the procedure decided by your surgeon.

What are the risks of having a prostate biopsy?

The following problems can occur after prostate biopsies:

•Infection: this can occur in the blood, prostate or urine. Antibiotics taken before and after reduce this risk to a minimum. The risk of infection is lower with transperineal biopsy.

•Blood in the urine: usually there is no blood, but sometimes there is blood and this can form clots from time to time. If the clots become large, it can sometimes be difficult to pass urine and this may require a return to your doctor

•Bleeding from the rectum. You may experience a small amount of bleeding from your rectum for 2 to 3 days after the test. Contact your doctor if the bleeding persists beyond this time.

•The biopsy samples may not contain cancer even though cancer is present in the prostate.

•Further biopsies may be necessary at a later date.

•Swelling of the prostate after biopsies can make it more difficult to pass urine afterwards, and rarely a catheter may be necessary to empty the bladder.

What do the results show?

Usually, the results are available within 4 days. The following may be found:

•normal prostatic tissue: no infection and no cancer

•prostate cancer

•prostatic intraepithelial neoplasia (PIN): this may or may not go on to prostate cancer and needs further observation

•Inflammation: this indicates that there is a greater chance of developing urinary problems in the future but not necessarily cancer

•ASAP cells that are commonly found if cancer is present, but not true cancerous cells

•Other abnormalities: rarely other findings are made

If cancer cells are present, analysing them can determine how fast the cancer is likely to spread. This analysis is called a Gleason score, which we will discuss with you. Further tests (such as prostate-specific antigen, bone scan, lymph node biopsy, or MRI scan) may be done to evaluate whether the cancer has spread beyond the prostate gland.

What Affects the Test Results?

Test results may be inconclusive if the prostate biopsy sample does not contain enough tissue to make a definite diagnosis.

Because a needle biopsy collects tissue from such a small area, there is a chance that a cancerous growth may be missed.

What to think about?

Normal prostate biopsy results do not rule out cancer.

If the biopsy results indicate cancer, other tests may be needed to determine the extent of the cancer. These tests may include a blood test (prostate-specific antigen), bone scan, lymph node biopsy, or MRI scan.

Not all cases of prostate cancer are treated. There are many factors to consider when deciding on a treatment plan.

A prostate gland biopsy does not cause problems with erections and will not make a man infertile.

What are the alternatives to a prostate biopsy?

Multiparametric MRI is the most promising alternative to prostate biopsies, as these can indicate with reasonable certainty whether high grade disease is present. This needs to be performed in places experienced in prostate MRI.

Sometime, it is appropriate not to have a prostate biopsy and just repeat the blood test in case it was an error or just a transient rather than sustained rise in PSA.

Before cancer treatment is planned or given, it is usually essential to have proof of cancer. Usually, this can only be obtained by taking a biopsy. In some situations, it can be possible to make a diagnosis based on other features. These include:

•a very high PSA level (having ruled out an infection in the urine or prostate) or PCA3 score

•what the prostate feels like when examined with a finger, or how it looks when an MRI or transrectal ultrasound is performed

•the presence or absence of abnormalities in the bones when a bone scan or x-ray is performed

Usually, at least two of the three features should be present before a diagnosis of prostate may be made without biopsies from the prostate.

These are special biopsies that map the WHOLE prostate such that EVERY part of the prostate is a biopsies. This overcomes the major disadvantage of typical transrectal prostate biopsies that do not sample the prostate as thoroughly that result in cancers being missed inappropriately.

For more information, please download the patient information sheet on prostate mapping biopsies and read below.

Please insert

Why should I have this procedure?

There are a number of reasons why prostate mapping biopsies may be suitable for you:

Precision diagnosis:

•If you have a raised PSA and need to have a prostate biopsy, but do not wish to undergo the procedure under local anaesthetic.

•If you have a raised PSA or other risk factors for developing prostate cancer, but your prostate biopsy or biopsies have not detected any cancer so far.

Precision risk stratification:

•If you have had a prostate biopsy which has already shown low risk prostate cancer which may be suitable for active surveillance and wish to have greater certainty about whether this is the correct option for you. In other words, you wish to make sure that the prostate biopsy has not missed areas of higher Gleason grade tumors or missed other areas of prostate cancer which would mean that active surveillance is not a good option for you.

•If you have had a prostate biopsy which has already shown moderate risk prostate cancer of Gleason 3+4=7 or 4+3=7 and/or high volume of prostate cancer in the gland. You are not keen on having radical treatments. You wish to find out if the prostate biopsy may have over-called the prostate cancer as a higher risk than it actually is and you may actually be suitable for active surveillance.

•If you have had a prostate biopsy which has already shown moderate or high risk prostate cancer of Gleason 3+4=7, 4+3=7 or 4+4=8 and/or high volume of prostate cancer in the gland. There is a possibility that the prostate biopsy has over-called the Gleason score of the prostate cancer and the amount of prostate cancer present in the prostate. You wish to avoid treatments such as radical radiotherapy and radical surgery and wish to be considered for newer treatments such high intensity focused ultrasound treatment (HIFU) or cryosurgery.

•If you have had a prostate biopsy which has already shown moderate or high risk prostate cancer of Gleason 3+4=7, 4+3=7 or 4+4=8 and/or high volume of prostate cancer in the gland. There is a possibility that the prostate biopsy has over-called the Gleason score of the prostate cancer and the amount of prostate cancer present in the prostate. You wish to avoid treatments such as radical radiotherapy and radical surgery and wish to be considered for clinical trials that are looking at destroying only the areas of prostate cancer (focal therapy) rather than the whole prostate. Such treatments may lead to less side-effects, although these are trials so the outcome is not certain.

(See treatment section).

What happens on the day of the procedure?

The procedure is carried out under general anaesthetic. You will be admitted to hospital for 1 or 2 days depending on when during the day the procedure is scheduled. You will be asked to not eat anything for at least 6 hours before the procedure and not drink anything for at least 4 hours before the procedure. You will be given a phosphate enema 1 or 2 hours before hand to clear the back passage of faeces, so that the prostate can be scanned by the ultrasound clearly. You will be assessed by a Consultant Anaesthetist who will discuss the anaesthesia. A plastic tube called a catheter is inserted through the penis into the bladder so that the water passage can be seen properly throughout the procedure and avoided. After the biopsies have been taken, the catheter is removed.

The procedure lasts for 30 to 45 minutes and involves taking 30-50 biopsies through the skin that lies in front of your back passage rather than through the back passage. Antibiotics are given before the start of the procedure through a vein and antibiotic tablets and pain killers will be given for 7 days after the procedure. A thick padding will be placed over the area of skin that the needle has gone through to prevent a lot of bruising. This padding should be left for at least 6 hours.

How are prostate mapping biopsies carried out?

Am ultrasound probe is inserted into the back passage and the prostate is scanned. Using a grid with holes placed every 5mm, a biopsy needle is inserted through each hole and the prostate is sampled every 5mm. Each biopsy we take is placed in a separate pot for a Consultant Histopathologist to examine each one separately under the microscope. A report is given telling us whether each biopsy has cancer in it or not. Other information is also given such as whether the tissue looked inflamed or whether there are other features such as precancerous areas in the prostate.

What are the potential side effects of prostate mapping biopsies?

Transperineal biopsies carry no extra risk than a normal prostate biopsy carried out through the rectum. Complications of both include:

•bruising of skin in all men and occasionally bruising that spreads to the scrotum

•prostatitis (inflammation or infection of the prostate) in some men

•temporary discomfort or pain in the back passage area (most men)

•bloody urine for the first few hours to a maximum of 2 days in most men

•bloody semen in most men lasting for up to 3 months in a few men

•retention of urine requiring a temporary catheter (2-10 in 100)

•infection (requiring admission and intravenous antibiotics, 0-1 in 100)

•a few men have experienced temporary poorer erections

What happens after the procedure?

One of the doctors will call you on the day following your discharge from hospital to see how you are doing. The prostate mapping biopsies results will be available in about 2-4 days. You will be able to check your results on a secure online server, so that you can view your results immediately and print out a copy of the multisequence-MRI and the prostate mapping biopsies. These reports will indicate where the cancer is, how much cancer and how aggressive it is by denoting the Gleason score of each focus and also tell you how many biopsies were positive in each location.

Prostate Cancer Information

How do I work out how serious my cancer is?

There are several considerations:

•the underlying risk of the cancer affecting your quality of life

•your general health

The underlying risk of the cancer is determined principally by:

•Gleason Score: this is a measure of how aggressive the cancer is. The two commonest patterns of cancer are each graded from 1 to 5. The two grades are summed and the total is known as the Gleason score. Therefore, this ranges from 2 to 10. Most cancers have a Gleason Score of 6: the most serious is 10 and the best is 2.

•Cancer Stage: This refers to how far the cancer has spread and can be determined partially by prostate examination with a finger, and sometimes with transrectal ultrasound at the time of prostate biopsies, a bone scan or magnetic resonance imaging (MRI) scan. If the cancer is confined to the prostate, the stage is 'T1' or 'T2', if it is outside the prostate it is 'T3' or 'T4'. Bone scans indicate whether there is cancer in the bones. Sometimes, the lymph nodes in the pelvis are sampled laparoscopically to determine if cancer is present there.

•PSA: the higher the PSA, the more likely the cancer is outside the prostate; the faster the rate of change, the more likely serious cancer is present

Other bits of information can be used and relate often to the information gained from the prostate biopsies: the proportion of positive biopsies, the length of cancer in the biopsies or the percentage of the core with cancer.

It is important to know how the cancer was detected i.e. by screening with a PSA test or because of symptoms. Most of our knowledge is based on prostate cancer detected in patients with urinary symptoms. If the cancer was detected early because of PSA testing, the time between diagnosis and the development of symptoms from the cancer is likely to be longer than if the cancer was detected because of urinary symptoms or another medical reason.

What additional tests or scans are necessary now I have prostate cancer?

These tests relate mostly to determining if the cancer is confined to the prostate and what chance there is that treatment will fail after a few years. It is possible to combine the information to calculate whether the cancer has spread outside or the chance that the cancer will return after treatment. The information required is

•PSA

•Gleason Score

•Clinical stage determined by examination of the prostate by a finger

•the proportion of positive biopsies, the total length of biopsy cores with prostate cancer and without cancer in the biopsies

The following web sites contain 'calculators' enabling you estimate your risk. This information should be interpreted with a doctor who understands prostate cancer.

•the Sloane Kettering Nomogram

•The European Association of Urology Nomogram

Other investigations, such as magnetic resonance imaging (MRI) can help tell if the cancer is has spread outside the prostate and give information about your anatomy relevant to treatment and side-effects. For this test, you enter a scanning machine, which makes a lot of noise, and produces high quality images of the prostate. It may help determe if the lymph nodes ('lymph glands') contain cancer or not. Sometimes, lymphotropic superparagmagnetic particles are used (this is still under trial). The best way to tell is by laparoscopic lymph node sampling, which is a keyhole procedure for obtaining tissue to examine under the microscope. This is a highly specific test for the identification of cancer in the lymph nodes.

What are my choices?

Depending on your individual situation you might choose

•active monitoring

•radical radiotherapy (external beam or brachytherapy)

•radical prostatectomy (either open, laparoscopic or robotic)

•cryotherapy

•high intensity focused ultrasound (HIFU)

•hormone therapy

The situation is often difficult and experts frequently disagree. A careful decision needs to be made usually in conjunction with consultants in radiotherapy and urology.

Part of the problem is that early prostate cancer grows slowly and so treatments are for problems that will often not present for several years. Having said that, the opportunity for curative treatment is available only when cancer is confined to the prostate and has not spread elsewhere.

What is active monitoring?

The prostate cancer is monitored to determine whether it is progressing or not. The implication is that if the prostate appears to be growing and is at risk of causing problems, then a treatment option will be undertaken. To do this, the tumour should be of loss risk of progression anyway. There are no universally accepted criteria for this and a discussion is necessary with an experienced prostate cancer doctor. In patients less than 70 years of age in good health, few doctors would recommend active monitoring especially if the cancer was detected because of urinary symptoms, the Gleason score was 7 or more, or if the PSA was 15 ng/ml or more, or if both sides of the prostate contained cancer (stage T2b or higher). If these conditions do not apply, then active monitoring may be appropriate.

Active monitoring involves regularly measuring the PSA and seeing how it changes. Some people perform prostate examinations regularly and repeat prostate biopsies annually. The idea is to look for evidence that the disease is advancing. Provided it does not advance too far, curative treatment might still be possible or not be necessary! This is becoming a more acceptable way to manage people with prostate cancer. Probably the best strategy is to incorporate all pieces of information regarding the disease and your overall health.

It is possible to calculate the rate at which PSA changes. The faster the PSA increases, the more likely it will be a problem. More than 2 ng/ml in the year per year is thought to be serious. The slower the PSA doubles, the less likely the tumour will affect the individual with it. Conversely, the faster the PSA doubles, the more likely the prostate cancer will cause problems. Men with low grade cancer rarely develop problems until the PSA is greater than 50 ng/ml. If the cancer is high grade, a long or slow PSA doubling time is unreliable although a short doubling time indicates treatment is probably necessary.

The advantage of this option is that the prostate is preserved and the side-effects of treatment are avoided. The disadvantages are that the opportunity for curative treatment might be missed and that our ability to make an accurate estimate of whether a cancer is 'safe' or not is not reliable enough on an individual person basis.

What is a radical prostatectomy?

A radical prostatectomy is the operation to remove the prostate. At the same time the seminal vesicles, which are attached to the prostate, are removed occasionally with the lymph nodes, which are specialised tissue to which the prostate drains. This procedure can be performed by an incision through the lower belly or by key hole techniques ('laparoscopic' or 'endoscopic' or 'robotic'). The advantages are

•the prostate gland with its cancer and surrounding tissue is removed offering what many doctors believe to be the best chance of preserving length of life. This is believed to be most accurate when the cancer is detected because of 'prostate' (urinary) symptoms, the cancer can be felt with a finger, or the cancer is Gleason score 7 or more.

•the prostate can be examined completely and a more accurate prediction made of the likely outcome

•the PSA should fall to almost unrecordable values making it much easier to determine if the disease has unfortunately recurred

•additional treatment such as radiotherapy can be given with fewer side-effects

•a short hospital stay (3 to 7 days) is necessary rather than regular attendance

•urinary symptoms (weak or slow flow etc) due to the prostate are usually eliminated completely

The disadvantages are

•it is a major operation

•a blood transfusion may occasionally be necessary

•control of urine is less good in some after surgery and pads may be required. About 1 in 20 men have problems with leakage and it is more common in men over 70 years of age

•erections may be weaker or non existent although good sexual activity can be had with Viagra, Cialis or Levitra

•additional treatments may be required if the prostate cancer returns

There is strong evidence that radical prostatectomy reduces the chance of dying from prostate cancer by about 50% compared to watchful waiting and deferred androgen deprivation. The evidence comes from a randomised study published in one of the world's most prestigious medical journals. However, the results are most applicable to men with cancer detected because of symptoms, with a PSA around 12 ng/ml, prostate cancer that can be felt with a finger when examined, and Gleason score 6 or 7. Nowadays, many men have few urinary symptoms, PSA values around 5 to 8, Gleason score 6 and impalpable cancer ie the cancers are detected earlier in their history. This is not to say that surgery is not effective just that to benefit one has to wait longer.

The procedure can be performed through a traditional incision in the lower abdomen or through 5 very small incisions ie endoscopic or laparoscopic surgery. The advantages of laparoscopic surgery include improved view allowing more precise surgery, shorter hospital stay (2-3 days) and earlier return to leisure activities and work. It is technically difficult to and specialised training is required.

What is radiotherapy?

The prostate is treated by radiotherapy given whilst lying in a machine at a special hospital. Usually, one attends on week days for 6 to 7 weeks for a short time for the treatment. This treatment is sometimes accompanied or preceded by hormonal therapy to block the effects of testosterone, which is the male hormone that drives prostate growth. The advantages are

•the prostate cancer is treated and is less likely to recur or cause symptoms

•there is a much lesser chance of incontinence compared to radical prostatectomy or brachytherapy, but frequency or urgency may be worse

•radiotherapy can be given to the side walls of the pelvis which may be important if the cancer has spread.

•HIFU or cryotherapy can be used if radiotherapy fails

•surgery is avoided

There are disadvantages too:

•many doctors believe that radiotherapy is probably a less effective treatment than surgery when compared over long periods of follow up

•side-effects include diarrhoea, and blood in the stools

•erections become weaker over time

•it is more difficult to use the PSA to determine if the treatment has been successful or not

•if treatment fails, cryotherapy or surgery is associated with more side-effects such as worse incontinence

What is brachytherapy?

Seeds with radiotherapy energy are placed systematically in the prostate under a general anaesthetic. Patients stay in hospital usually overnight. This is done either in one or two stages depending on the set up.

The advantages are

•this can be a day case procedure so patients can often leave the same day

•it is possible to have additional therapy, usually external beam therapy, if there is disease recurrence

•incontinence of urine is less likely

The disadvantages include

•urinary symptoms often become significantly worse after surgery and sometimes a catheter is required for a period to empty the bladder

•the treatment is probably less effective than surgery regarding cancer cure

•weakness of erections occurs, although possibly less commonly than after surgery or external beam radiotherapy

What is cryotherapy?

The prostate and its cancer can be killed by freezing the cells. To give this therapy, a general anaesthetic is necessary and a catheter needs to be placed for several days.

The main advantage is that it can be given after radiotherapy if it is not effective. It can also be repeated. However, it almost always causes erectile dysfunction. Expertise with its use is limited in the UK.

What is hormonal therapy?

This usually refers to reducing testosterone levels in the body and is usually known as androgen deprivation, androgen suppression or castration. Testosterone with its derivative dihydrotestosterone is the male hormone that drives prostate growth. Rather than reduce the levels of testosterone, its action can be blocked by drugs and this is known as androgen blockade.

This form of therapy is usually used with or without radical radiotherapy, and sometimes after radical surgery but not before. The prostate cancer tends to be more advanced than early.

The side effects of this include hot flushes, tiredness, anaemia, and in the long term osteoporosis.

How do I decide what to do?

You have to trade-off the advantages over the disadvantages of each option. It depends on the relative values of each. This is best done by discussing the issues with a doctor and close family. In general, if the thought of having cancer and not doing the most possible to get rid of it dominates your thinking, then you should choose an interventional treatment. There is no caste iron evidence to indicate one treatment is better than another, but many doctors believe that radical prostatectomy offers the best chance of prolonging life. It becomes more important to maximally remove the cancer if it is high risk or there are many years of life possibly ahead. On the other hand, active monitoring may be the best option if quality of life is more important than preserving a few years of life especially if there is uncertainty over the benefit of treatment and the cancer does not seem obviously to be high risk. A second opinion is often helpful.

Several websites offer details and on-line help in making decisions including:

• American Cancer Society

• National Cancer Institute

• Michigan Cancer Consortium

• The Prostate Cancer Charity

About prostate cancer

PSA

PCA3 Score

Prebiopsy MRI

Prostate biopsies

Template Biopsies

Prostate Cancer Risk

Treatment Options

Robotic Prostate Surgery

Patient Experiences

Robotic Prostatectomy (dVP)

Prostate Cancer Links

Robotics News

Robotic prostate surgery

Robotic prostate surgery - why choose this option? Robotic prostatectomy is also known as da Vinci prostatectomy and has become the most popular way of performing a radical prostatectomy as a treatment for prostate cancer in the USA. People don’t like traditional open surgery for reasons that are obvious. However wouldn’t it be great to achieve the benefits of surgery without the side-effects? To get rid of the cancer, but maintain near-normal erections and be dry?

No-one can guarantee the above, but if you believe that removing the prostate with its cancer and keeping other options open is the best strategy then, total or radical prostatectomy is the procedure of choice. After surgery, the PSA should fall to almost unrecordable levels and no additional treatment should be necessary in most men, depending on the risk before treatment and the success with which the surgery is performed.

Laparoscopic prostatectomy

In the 1990’s, some highly-skilled surgeons performed laparoscopic (key-hole) surgery to remove the prostate. This was highly popular because there was less pain, reduced need for blood transfusion, better cosmetic appearance, fewer infections and faster return to normal activities than after conventional surgery. Although it had tremendous advantages, it was technically difficult to perform and the instruments did not match the natural movements of the human hand.

da Vinci Surgical System

At the turn of the century, a company (Intuitive Surgical) in the US created the da Vinci Surgical System which allowed surgeons to perform keyhole surgery in a way that mimicked or even improved on the movements of the human hand. This system preserved the keyhole nature of the surgery, and improved other aspects allowing the surgery to be performed with greater precision. The goal was to improve cancer cure as well as maintain all the other benefits of keyhole surgery.

More recently, the da Vinci Surgical System has been upgraded to the da Vinci S Surgical System. This has high definition vision in 3D and other functional improvements.

## What is HIFU?

High Intensity Focused Ultrasound (HIFU) is the name for a technique to treat prostate cancer. Like a magnifying glass focuses light rays to a focal point, HIFU concentrates sound waves on a precisely targeted, tiny area of diseased tissue. HIFU heats the tissue to about 100°C degrees and destroys it.

The advantage of visually directed HIFU over conventional HIFU is that the surgeon uses real-time feedback to adjust the amount of energy needed to ensure eradication of the diseased tissue whilst protecting healthy tissues. The active involvement of the surgeon in the planning and treatment achieves a higher rate of success.

HIFU is a relatively new treatment that has become popular as it is minimally invasive with few side effects.

## What is Robotic Surgery?

Robotic Surgery offers minimally invasive robot assisted laparoscopic. The main benefits to the patient may include, reduced pain and trauma to the body, less anesthesia, less blood loss and need for transfusions, less post-operative pain and discomfort, less risk of infection, shorter hospital stay, less scarring and improved comesis, faster recovery and return to normal daily activities.

The use of Robotics also offers benefits to the surgeon in enhanced 3-D visualization, improved dexterity, greater surgical precision, improved access and an Increased range of motion

Robotic Surgery’s computer-enhanced technology integrated with the surgeon’s expertise, enables surgeons to perform extremely delicate and precise minimally invasive surgery. Reducing trauma to the patient by allowing surgery to be performed through small ports or "keyholes" rather than large incisions, resulting in shorter recovery times, fewer complications and a reduced hospital stay.