External Beam Radiotherapy for Prostate Cancer

Patient Information
Genesis CancerCare treats all patients, referred to its service, irrespective of their financial situation. Across our centres, flexible fee arrangements are provided on an individual patient basis to allow a rapid access to high quality care.

- Our RADIATION ONCOLOGISTS use the most advanced radiotherapy technology and proven medical techniques to care personalised treatment plan for each patient
- MEDICAL PHYSICISTS maintain rigorous quality assurance programs to ensure that the computer systems and x-ray equipment meet the highest standards
- RADIATION THERAPISTS are tertiary trained healthcare professionals responsible for the simulation, calculation and delivery of each patient’s radiation treatment
- RADIATION ONCOLOGY NURSES work with every member of the treatment team to care for patients and their family before, during and after treatment
- PATIENT SERVICES OFFICERS provide coordination of support services and referred medical appointments
- ACCOUNTS ADMINISTRATION STAFF are available to explain how our payment plans work

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A diagnosis of prostate cancer will be confronting for not just our patients, but their family, friends and workmates. We can reassure men that with the use of the most modern radiotherapy techniques available in Australia, Professors Eade and Kneebone combined with Genesis Care at the Mater and Macquarie University Hospitals, are dedicated to not only providing the highest rates of cure for men with prostate cancer, but also to keep the risk of unwanted side effects to an absolute minimum. Professors’ Eade and Kneebone established an image guided IMRT prostate radiotherapy programme in 2007 and have had an overwhelming success in both these objectives.

When we analysed our results in early 2014 of more than 450 patients treated with high dose IMRT radiation, we have had <0.5% of patients die from prostate cancer and only a 3% incidence of late rectal bleeding and a 13% rate where patients reported late urinary difficulties at some stage following treatment. These are five year outcomes (which we have attached as an appendix to this booklet) and we plan to continue to analyse and update these figures over the years to come.

We hope that you find this booklet useful and encourage you to speak to us or one of our team if you have any questions about any of the information enclosed. We would like to thank all those who continue to support our Unit and our endeavours to provide the best possible care to our patients.

A/Professor Thomas Eade and
A/Professor Andrew Kneebone

Intensity Modulated Radiotherapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT)
Both IMRT and VMAT are highly conformal techniques for delivering radiation to the prostate. Both techniques are offered at the Mater Hospital and Macquarie University Hospital. Your doctor may suggest combining hormone therapy with your course of radiotherapy, especially if you have a more advanced prostate cancer. Sometimes this hormone therapy will be continued for a period of time following your radiotherapy treatment. Your doctor will explain the reasons for the addition of this hormone treatment and what it involves.

Information about hormone treatment and the management of any subsequent side effects is also available from Julia Hunter, our Area Radiotherapy Cancer Care Co-ordinator.

Why Radiotherapy and what is involved?
Radiotherapy is designed to destroy cancer cells in the designated treatment area, while at the same time, trying to limit damage to any surrounding normal cells. The whole prostate gland is treated, as well as the areas surrounding the gland. High energy x-ray beams are directed at the prostate from outside the body. These beams damage the cancer cells and stop them from dividing and growing. The cancer cells are not able to recover from this damage and subsequently die. However, the normal healthy cells, which mostly have the ability to repair themselves, are left largely unaffected.

Should you have any questions about the radiotherapy and the treatment field, your doctor will happily explain this information in more detail. IMRT and VMAT are considered the most advanced methods of radiation delivery currently available for prostate cancer. They utilise advanced computer technology to create hundreds of small radiation beams of varying strengths (modulated radiation) coming from different directions or in a continuous arc. This enables the radiation dose to be shaped precisely around the area that needs to be treated, while missing the surrounding normal tissues. IMRT and VMAT dramatically reduce the high dose radiation exposure received by the surrounding tissues.
Radiation therapy planning and treatment

Radiation treatment to the prostate generally involves 38 to 40 treatment visits to the Radiotherapy Unit over a period of approximately eight to nine weeks. In selected cases, a shorter treatment approach (20 treatments) may be offered.

It generally takes between three and five weeks to organise your radiation treatment. IMRT / VMAT are very precise treatments and it is extremely important to be accurate with the delivery of this radiation treatment. All patients are treated with ‘image guided radiotherapy’. This means that the actual prostate position is checked daily prior to each treatment with special X-rays taken while on the treatment couch. Your doctor will offer to arrange fiducial markers (three gold seeds) and hydrogel to be inserted into your prostate (see appendix 1 and 2). If fiducial markers are not possible (e.g. because of blood thinning medication) we can use an alternative method to determine the daily position of the prostate (e.g. cone beam CT technology). The procedure to insert the fiducial markers and hydrogel can be performed by urologists or A/Professor Eade usually at North Shore Private Hospital (NSPH). Julia will discuss the cost of hydrogel when performed by A/Professor Eade. Please let your Radiation
Oncologist know if you do not have private health insurance or would prefer not to have hydrogel and fiducials. After you have seen your doctor (and before the treatment starts) you will need to have a further three appointments:

1. Insertion of the fiducial markers and hydrogel at NSPH (see Appendix 1)
2. MRI scan which is usually done at North Shore Radiology (North Shore Private Hospital, St Leonards)
3. Planning appointment at the hospital that you are being treated (the Mater Hospital or Macquarie University Hospital)

The planning appointment
At the planning appointment you will have a CT scan (simulation) of your pelvis. The CT scan (simulation) is performed in the Radiotherapy Unit within the Radiotherapy department of your treating Hospital. You will also require a MRI pelvis which is usually done at North Shore Radiology, North Shore Private Hospital, St Leonards.

N.B. Because the position of the prostate can vary according to the fullness of the bladder and rectum, we require that you have a comfortably ‘full’ bladder and empty rectum before the planning scans and for each of your radiotherapy treatments.

The MRI scans will help us determine the position of the prostate and the surrounding tissues, in order to more accurately direct the radiation beams and thereby reducing side effects.

CT scan
One hour before your CT scan, we would like you to go to the toilet to empty your bladder and bowel. After going to toilet, please drink 500ml of water over a 15 minute period. The 45 minutes between the drink and the scan will allow your bladder to fill up to be comfortably full. If you are feeling that your bladder is uncomfortably full during this process, please speak with one of the nursing or radiotherapy staff.

When your bladder is an appropriate size you will be taken to the CT scanning room by a radiation therapist to begin your CT scan. You will be positioned on the CT bed as you will be for treatment. If your bladder is too small you will be required to drink some more water. If your rectum is full, you may be given an enema to help empty your rectum. You will then be rescanned.

Three permanent skin tattoos are used as reference points to mark the area we plan to treat. They are the size of a small freckle and are given with a small needle into the skin. We will also use some temporary texta ink marks on your skin.

These texta marks can be washed away after the planning appointment. After the CT scan is taken, you will be given a short tour of the unit to show you where to go on your first day of treatment. You should estimate that you will be at the hospital for approximately two hours on this day. Please take this into consideration when parking your car if you are driving.

Your treatment schedule
The Radiation Therapists will provide you with a tentative start date and time at the planning appointment. It is important that you discuss any concerns with your treatment schedule with the Radiation Therapist at this time.

You will be able to drive yourself to the hospital for treatment and continue with your usual daily activities, such as working. If you have difficulties organising transport to the hospital for treatment, please inform radiotherapy staff as
Side effects of radiotherapy

Radiotherapy works by killing cancer cells using high energy x-rays. The normal cells in the area being treated might also be affected and this can cause side effects. Normal tissue cells have a greater ability to recover from the radiation than cancer cells. The gap between each day of treatment allows the normal cells to recover. The following is a list of possible side effects that you may experience.

Early side effects

Though great care is taken to minimise the exposure of the tissues surrounding the prostate, there is no way of avoiding the exposure of small amounts of the bladder and rectum tissue. You may experience some bladder or bowel symptoms (see below for more details) at about two to three weeks after starting treatment. However, be reassured that in the majority of cases, such symptoms will settle within several weeks of ceasing treatment.

The main side effects during treatment may include:

Urinary Problems
Many men find they need to pass urine more frequently, especially at night. There may also be a burning sensation when passing urine. However, this symptom is likely to improve again, after treatment ends. It is rare for radiation to cause incontinence.

Skin
The skin around the anus may become uncomfortable and some men may lose some of their pubic hair in the weeks following treatment. This is temporary and the hair should grow back over several months.

Sexual function
Sexually active men do NOT need to refrain from sexual activity either during or after treatment. Having sexual relations during radiation treatment will NOT harm your partner. Occasionally though, a man may feel a slight ‘burning’ on orgasm during the treatment phase. It is usual following radiotherapy for your ejaculation to dry up.

Tiredness, Fatigue & General Symptoms
Tiredness and fatigue are common side effects of treatment, although most men continue to work and lead a normal life. It is very rare to be sick during this treatment and you will NOT lose your hair.

Bowel irritation
Although relatively uncommon, changes to your bowel habits may occur during
treatment. You may notice that you need to go to the toilet more frequently, pass a lot of wind, or have a feeling of urgency and develop discomfort when passing a motion. Some people may also experience bleeding from the rectum (especially if they have haemorrhoids) or notice a mucus discharge, though this last symptom is rare.

**Long term side effects**

Almost all patients make a good recovery from their radiation treatment and do not experience side effects that are a bother to them in the long term.

Occasionally, however, some patients may experience some side effects that may persist, or even start, many months after the radiation treatment has finished.

Some of these possible longer term/late side effects may include:

**Bowel (or rectal) injury**
The most common symptom of late radiation bowel damage can be rectal bleeding. Though our advanced IMRT/VMAT techniques have significantly reduced such problems, approximately 5% of patients will require further treatment for this condition. Such treatments may include laser therapy or formalin applications to settle the bleeding.

**N.B. If you do develop rectal bleeding after radiation treatment, a colonoscopy is recommended to determine the exact cause of the bleeding.**

Sometimes patients with bowel damage may experience greater urgency in having to go to the toilet. Patients may also notice mucous (a slimy substance) coming from the rectum which can stain underpants. On rare occasions, a patient might experience an ‘accident’, if they do not find a toilet quickly enough. The use of Metamucil can often help these symptoms.

**Urinary problems**
For the majority of patients, urinary function returns to normal within 2-3 months.

Occasionally, radiotherapy may also result in blood in the urine. Should this occur, you should advise your doctor, so it can be further investigated.

**Sexual functioning**
Sexual function following prostate radiotherapy is variable. In general, approximately 70% of men will retain their erections. There are medications available by prescription that may help with your sexual function. You can also be referred to a doctor who specialises in erectile dysfunction for further treatment.

Following radiotherapy, you will notice that when you ejaculate very little fluid comes out. This is due to the prostate gland being destroyed.

It is also important to know that there is absolutely NO risk of transferring the prostate cancer from one person to another and that having sexual intercourse does NOT increase the risk of the prostate cancer coming back.

Please feel free to discuss ANY concerns you may have about your sexual functioning with your doctor. Assistance can also be obtained from our Clinical Psychologist, who is available to discuss any relationship or sexuality adjustment issues you may experience.

**Hip injury**
Our advanced radiotherapy techniques dramatically lower the radiation dose to the hips as compared to traditional ones, therefore reducing the risk of damage to the hips.

If you have any concerns or questions about late radiation damage, please discuss this with your doctor.
Looking after yourself during radiotherapy

General health and diet
In general, we encourage people to lead a normal life as possible during their radiotherapy. Many people continue to work as normal during their treatment.

While undergoing radiotherapy, bath or shower as usual using warm water but avoid scrubbing at the skin in the treated area.

It is important to maintain a well-balanced diet during treatment. Please ask one of our staff members if you would like to speak to a dietician appointment for you. On a regular basis you will undertake a special scan, called a ‘cone beam’ CT scan.

This will provide accurate information on the size of your bladder and rectum in order to identify any changes in size. Your doctor and Radiation Therapist will give you feedback on the scan results and may wish to discuss dietary changes if changes in size are a problem. The diagram below is an example of a ‘cone beam’ scan.

Bowel side effects
If you develop diarrhoea, we may adjust the amount of fibre in your diet or recommend the use of medication. If the skin around your anus becomes sore, take care not to wipe too hard with toilet paper. Occasionally your doctor will give you creams or suppositories that can help with this problem.

Bladder filling
You should have your bladder comfortably full for the planning appointment and each day for your radiotherapy treatment.

Your doctor will review this with you during treatment and adjust the amount of water and timing as required. If you are feeling uncomfortable, please speak with one of the treatment team as soon as you arrive.

Bladder side effects
Generally we like people to drink plenty of fluids. You may notice a ‘burning’ sensation when you are passing urine. If you experience this, please talk to your doctor as there may be medications that can help.

Cranberry juice, purchased from the supermarket, can also be used.

Approximately one hour before your appointment:
Empty your bladder and bowels and then drink 500 mls of water in 15 minutes.
Success of the treatment is usually assessed using the PSA blood test. The first hurdle is for the PSA level to come down post treatment and the second is for the PSA level to stay down.

In order to monitor ongoing PSA levels, you will need to see your doctor periodically after completing the full course of treatment.

An appointment will be made for you to come back to the clinic to see the doctor six weeks to three months after the last treatment session. We recommend that you have a check-up at least every six months for first five years following treatment and then once yearly from then on. We can organise phone call follow-ups if you prefer. Please contact Julia Hunter to arrange an appointment.

A blood test (PSA) is generally performed prior to each checkup.

Your follow up may be alternated between the Urologist who referred you and your Radiation Oncologist.
Understanding the costs for radiation treatment
Your first invoice is larger because it includes the costs for simulation and planning that ensures the delivery of high-quality personal treatment. Simulation involves a scan to measure your treatment site. Planning is behind-the-scenes-work your doctor and Radiation Therapist do to design your personal treatment plan. All you need is pay your invoice in full and Medicare reimburses you directly within 24-48 hours.

Understanding radiation treatment billing
- GenesisCare offers affordable, timely, personalised, high quality care
- Radiation treatment is typically an outpatient service, there is a cost associated with your care
- Medicare offers approximately 80-90% of the costs of radiation treatment
- Most Private Health Funds do not cover outpatient services
- Our patient services team are here to help you understand the costs and payment options for your treatment

Our patient services team will discuss Medicare reimbursement, the costs and payment options together with you at your next appointment.

Understanding the Medicare Safety Net
The Medicare Safety Net provides financial assistance for outpatient medical expenses for all Medicare card holders after you have reached the threshold amount.

2015 Safety Net thresholds

<table>
<thead>
<tr>
<th>Safety Net</th>
<th>Threshold amount</th>
<th>Who is it for</th>
<th>Benefit detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended Safety Net Concessional and FTB (A)</td>
<td>$638</td>
<td>Concessional cardholders and families eligible for FTB (A)</td>
<td>80% out-of-pocket costs for outpatient services</td>
</tr>
<tr>
<td>Extended Safety Net General</td>
<td>$2000</td>
<td>Non-concession Medicare cardholders</td>
<td>80% out-of-pocket costs for outpatient services</td>
</tr>
</tbody>
</table>

Cost

Week 1 | Week 2 | Week 3 | Week 4 | Week 5
Costs are lower in following weeks during treatment as we follow a plan developed in week 1.
A/Professor Thomas Eade returned to RNSH in January 2007, after time spent working as the Thomas Baker Fellow at the Fox Chase Cancer Center in Philadelphia, USA. Fox Chase, which specialises in the treatment of prostate cancer, is one of the leading Radiation Oncology Centres in the USA. While in America, A/Professor Eade trained in the latest radiation therapy techniques, including IMRT, intraoperative real-time seed brachytherapy and high dose rate brachytherapy.

A/Professor Eade is now recognised across the country for his expertise in the IMRT/VMAT and IGRT techniques for the treatment of prostate cancer. A/Professor Eade has pioneered some of the most advanced prostate cancer ‘external beam’ treatments in Australia. In 2008, A/Professor Eade also established a permanent seed brachytherapy programme and high dose rate brachytherapy programme.

A/Professor Eade is also one of a few specialists in Australia able to offer intraoperative real-time seed brachytherapy treatment for prostate cancer. A/Professor Eade has been a guest speaker at state, national and international meetings on advanced radiation techniques.

In addition to his strong patient care and outcome focus, A/Professor Eade is also a committed researcher. A/Professor Eade is the Director of Research in the Northern Sydney Cancer Centre and also developed the prospective database for prostate cancer radiotherapy, which is in use across the North Shore and Central Coast campus. A key area of interest for A/Professor Eade is in researching and evaluating the delivery of new technology in radiotherapy. He is the Principle Investigator for the first Australian study of Stereotactic Radiotherapy (five treatments) for prostate cancer, which is currently recruiting (HEAT study).

A/Professor Eade has authored articles on dose escalation and IMRT for prostate cancer publications in major international oncology journals.
A/Professor Andrew Kneebone has nearly 20 years experience as a prostate cancer specialist and is committed to a caring, and honest relationship with his patients. For more than 10 years he has been an integral member of the national Radiation Oncology Genitourinary executive and has been an author on multiple guidelines for definitive and post prostatectomy radiotherapy.

A/Professor Kneebone frequently sees patients from across Sydney for second opinions. He regularly publishes Australian results on prostate cancer radiotherapy and continues to collect prospective outcome and toxicity data on all prostate cancer patients, so as to ensure he can provide his patients with the best level of care.

Due to his high profile, A/Professor Kneebone is on numerous state and national committees related to the treatment of prostate cancer. In addition to being the Convener for seven past national conferences on urological cancer, A/Professor Kneebone was for six years the Secretary of the NSW Genitourinary Oncology Group.

A/Professor Kneebone remains a committed teacher to medical students and junior doctors. He is attached to and lectures at the University of Sydney and is the Director of Registrar Training at Royal North Shore Hospital. A/Professor Kneebone’s has a strong interest in research and has been a Chief Investigator in trials attracting more than $4 million in competitive grants. He was the Principal Investigator, in 2 randomised Australian trials, which were looking at methods to reduce bowel damage arising from prostate radiotherapy and ways to better keep patients still during radiotherapy treatment.

A/Professor Kneebone is currently the Australian Chair for a multi centre randomised trial which is trying to ascertain the optimal timing for post prostatectomy radiotherapy.

This is called the RAVES trial and with a secured $2.1 million to fund ongoing investigation. Further, A/Professor Kneebone has also been listed as an author on more than 70 peer reviewed publications and has been invited speaker at more than 80 conferences or meetings.

Julia Hunter
Area Radiotherapy Cancer Care Co-ordinator
Email: julia.hunter@health.nsw.gov.au

Julia is one of our specialist cancer nurses. Her role is to provide co-ordinated and supportive care to radiation oncology cancer patients. Julia is the key point of contact for the patient and their family. Julia’s aim is to help make the patient’s journey through the treatment process as smooth as possible.

Radiation Oncology Nurses

The team of nurses within Radiation Oncology deliver expert nursing advice and care for you and your family. They can provide you with information about your radiotherapy including bladder and bowel education as well as providing emotional support for you and your family.

Prostate Cancer Planning Team: Radiation Therapists

This specialised team of Radiation Therapists (RTs) are responsible for co-ordinating all aspects of your care. From the planning scan and all the preparation in between, our RTs will be happy to discuss any aspects of the preparation for your treatment, should you have questions or concerns about.
If you feel you require further information about your cancer or the treatment, please don’t hesitate to contact your doctor or our Area Radiotherapy Cancer Care Co-ordinator.

Websites and Organisations that may be helpful:

- Prostate Radiotherapy
  - www.prostateradiotherapy.com.au
- NSW Cancer Council
  - www.cancercouncil.com.au
- Cancer Institute, NSW
  - www.cancerinstitute.org.au
- Prostate Cancer Foundation of Australia
  - www.prostate.org.au
- Andrology Australia
  - www.andrologyaustralia.org
- Continence Foundation of Australia
  - www.continence.org.au
- Impotence Australia
  - www.impotenceaustralia.com.au

Appendix 1
Hydrogel Information
Radiotherapy treatment will treat your prostate cancer but it can also affect other healthy tissues situated nearby, specifically your rectum.

The rectum is the last 7 to 10 centimetres of the bowel and stores solid waste until it leaves the body through the anus (see diagram 1.0 opposite). As the rectum is located close to the prostate gland it can also receive radiation when the prostate is been treated. In some patients this can cause it harm, in particular a condition called proctitis. Proctitis is an inflammation of the rectum that causes discomfort and or pain, bleeding and occasionally a discharge of mucus.

Other side effects can include an urgency to go to the toilet, more frequent bowel movements and/or diarrhoea. Hydrogel is a temporary gel that is injected into the space between your prostate and rectum before the start of your treatment.

The aim is to reduce the dose of radiation received by the rectum by increasing the distance between the prostate gland and the rectum so that any potential side effects will be reduced.

**Diagram 1.0 Anatomy of the Rectum and Prostate, Image © 2008 WebMD, LLC**

<table>
<thead>
<tr>
<th>Day of Hydrogel Insertion</th>
<th>NORTH SHORE PRIVATE HOSPITAL</th>
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<tbody>
<tr>
<td><strong>Insertion of Gold Fiducial Seeds</strong></td>
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<tr>
<td>Gold fiducial seeds will be inserted into the prostate via an injection through the skin whilst you are asleep, under general anaesthetic. This is part of standard treatment if you have radiotherapy to the prostate.</td>
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<tr>
<td><strong>Insertion of Hydrogel</strong></td>
<td></td>
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<tr>
<td>Whilst under general anaesthetic, and after the gold seeds have been inserted into the prostate, the temporary gel will be injected in to the space between your prostate and rectum (see diagram 2.0 on the next page). This will be done under ultrasound guidance to ensure the gel is delivered into the right place. The gel is water based and will dissolve in approximately 4 to 5 months. The gel will increase the distance between the rectum and prostate which it is expected will reduce the radiation dose to the rectum, and potentially reduce side effects from the treatment.</td>
<td></td>
</tr>
<tr>
<td><strong>You will not be required to stay in hospital overnight, but you will need to ensure you have transport to get home as you will not be able to drive.</strong></td>
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<table>
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<tr>
<th>1 Week after the Insertion of the Hydrogel</th>
<th>MRI</th>
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<tbody>
<tr>
<td><strong>A Magnetic Resonance Imaging (MRI) scan of the pelvis will be done one week after the hydrogel insertion to assist with the planning of your treatment. It is usually done in the North Shore Radiology, North Shore Private Hospital. The hydrogel is easily seen on an MRI scan but not on a CT scan.</strong></td>
<td><strong>MRI</strong></td>
</tr>
</tbody>
</table>

| CT scan | A pelvic CT scan will be done in the radiotherapy department of your treating hospital. The scan will be used to plan the delivery of your radiotherapy treatment now the gel is in place. | **CT scan** |
Insertion of hydrogel into the prostate

You are not under any obligation to have the hydrogel insertion in order to have radiotherapy at the Mater Hospital or Macquarie University Hospital. If you decide not have hydrogel, you will still receive the standard treatment available for your prostate cancer.

Costs of Hydrogel Insertion
There are costs involved with the hydrogel procedure.

- The cost is covered by your private health insurance
- The procedure is done at North Shore Private Hospital as a day procedure
  You may have to pay an excess for the hospital stay
  Please check with your health fund regarding your excess fees
- You will get a bill for the Anaesthetist. There may be a gap. A/Professor Eade can let you know which Anaesthetist he will be using to enable you to get a quote from them prior to the procedure

MRI scans of patient with and without hydrogel

Normally the prostate (pink circle) rests right against the rectum (blue circle). The red circle is the area that is receiving the full dose of radiation.

This means that in the majority of cases, the front wall of the rectum receives the full dose of radiation.

This is the same patient after some hydrogel (white area) has been inserted between the prostate and the rectum.

This means that the front wall of the rectum no longer receives the full dose of radiation.
All medical procedures involve some risk of injury.

1. Insertion of Hydrogel
There have been three previous studies, with a total of 27 patients, using a similar gel treatment. No adverse events were observed in this small population. However, in spite of all reasonable precautions, you might develop medical complications from the insertion of the gel but these would be considered as rare. The possible risks associated with the insertion of the hydrogel are:

- Infection (you will be provided with antibiotics to help prevent this)
- Allergic reactions such as itching
- Injection site reactions including bleeding and pain
- Difficulty passing urine
- Pressure in your bowel or a sensation of your bowel feeling full
- Systemic embolisation if the gel or air is injected into a blood vessel
- Needle penetration of the rectal wall or urethra during injection and injection of the hydrogel into the rectum, prostate or bladder

2. Insertion of Gold Fiducial Seeds
The possible risks associated with the insertion of the Gold Fiducial Seeds are:

- Infection (you will be provided with antibiotics to help prevent this)
- Bleeding from the injection site
- Bleeding from the prostate which would show up in the urine and/or faeces lasting 2-3 days in duration
- Urinary retention (unable to go to the toilet and pass water, for more than 8 hours)

If you have questions regarding the hydrogel procedure, costs or the radiotherapy treatment, please do not hesitate to contact A/Professor Thomas Eade or A/Professor Andrew Kneebone. Alternately, you can contact Julia Hunter, Area Radiotherapy Cancer Care Co-ordinator.
Implantation of Gold Seeds into the prostate

Introduction and background
The aim of your prostate cancer treatment is to deliver radiation therapy as precisely as possible to the prostate and spare the surrounding structures such as the bladder and rectum. However, even when lying still, the prostate continually moves due to the bladder and rectum constantly changing size and position. This means that the radiotherapy ‘margins’ around the prostate need to be generous and even then, we are not always certain that all of the prostate cancer is being treated every day. To overcome this problem, we have to establish a system of placing gold seeds (fiducial markers) into the prostate and monitoring the position of the prostate every day during treatment.

Gold markers are small gold beads measuring 3 x 1.5mm in size that when inserted into the prostate can be seen on special X-rays taken by your radiotherapy machine just prior to your treatment being given. We can then make movements to ensure that your prostate is in exactly the right position during your treatment. These corrections are only possible because the change in the position of the gold markers indicates movement of the prostate. Reports have shown that radiation therapy treatments using gold markers have been much more precise than the traditional approach of relying on the position of bony structures.

The implantation of the gold markers into the prostate can be an uncomfortable procedure and is be very similar to your biopsy experience though only 3 needles will be inserted. As with the prostate biopsy, this procedure has shown to be safe and reliable. The gold markers are placed in the prostate, under general anaesthesia, by A/Professor Thomas Eade under ultrasound guidance. Patients are required to take antibiotics on the day of the procedure to reduce the risk of potential infection. The fiducial markers stay in the prostate permanently but cannot be felt and are not known to cause any long term complications.

Potential Risks
Gold seed marker implantation is an invasive technique with a less than 5% risk of infection. However in some cases the infection can spread to the blood (septicaemia) which can be very serious. To minimise the risk of infection, you will take some antibiotics on the morning of the procedure.

Minimal bruising that lasts for one to two days that might be experienced by gold seed implantation can be treated with paracetamol. You may notice some blood in your ejaculate or urine which in rare cases can require treatment (this is why blood thinning medication such as aspirin needs to be stopped).

How is the procedure performed?
The procedure is done with a general anaesthetic (you are asleep during the procedure) at North Shore Private Hospital. A probe with an ultrasound device about the size of a finger is inserted through the anus to visualise the prostate. Using a probe, a very fine needle, with a gold seed marker at its tip, can be directed into the prostate. When the needle is in the correct position the gold seed marker is implanted from the needle tip. Three gold seed markers will be inserted into your prostate.

What must you do before the procedure?
If you are currently taking blood-thinning agents e.g. Warfarin, clopidogrel or Aspirin please inform your Radiation Oncologist. If your medications are unable to be safely stopped, your doctor will discuss cancelling the fiducial marker procedure and using Conebeam CT for your radiation treatment. If it is safe to do so your specialist may ask you to stop the medications prior to your procedure. These need to be ceased for 10 days prior to the fiducial markers insertion. Please also avoid anti-inflammatory medications for 10 day prior to procedure.

You do not need to fast as you would for an operation. On the morning of the procedure, however you should not eat any solid foods. Fluids such as jellies and soups are fine. On arrival to the Radiation Oncology department, you will be asked to take an oral antibiotic. You may also be given an intravenous antibiotic (via a needle in your arm). A nurse will then give you a fleet enema to empty your bowels.


Side Effects
One of the advantages of performing the procedure under ultrasound guidance is to decrease the risk of damage to adjacent organs, however side effects and complications may still occur from this procedure.
For a day or so following the procedure you may notice MINOR pelvic discomfort or pain. MINOR blood staining of your urine/bowel motions may last for up to a week or so.
For a month or so following the procedure, you may notice blood staining of your ejaculate.

Possible Complications
If any of the following main complications develop:
- Severe infection (symptoms include feeling generally unwell, raised temperature, shivers etc most commonly manifested in the first 24-72 hours)
- Urinary retention (inability to pass urine for 8 hours)
- Profuse bleeding from the rectum or penis
contact your Radiation Oncologist IMMEDIATELY and proceed to the Emergency Department, Royal North Shore Hospital or your local hospital without delay, as you may need urgent admission to hospital for intravenous antibiotics or other treatment.
Infection develops in approximately 1 in 100 procedures and urinary retention/profuse bleeding occur in less than 1 in 1000. Spread of infection to the spine and death from infection is rare.

After the procedure
1. Drink plenty of fluids
2. You will probably notice some blood in your urine, your bowel motion or in your semen. Do not be alarmed, this should settle down within a few days.
3. Problems are uncommon but you must go to the Emergency Department at your nearest hospital if you experience any of the following :
   a. Excessive bleeding
   b. Increased difficulty passing urine
   c. Fever above 37.5°C, rigors, shivers or shakes
4. If you have any concerns or questions, contact our Radiation Oncologist

Appendix 3
Bladder and Rectal Preparation for Prostate Radiotherapy
Your doctor has suggested a course of radiotherapy for the treatment of your prostate cancer. You will need to have a comfortably full bladder and empty rectum at your planning appointment and each day during treatment.

This information sheet will explain the process you will need to go through to do this and help keep your bladder and bowel a consistent size during treatment.

Why is this preparation important?
The rectum lies behind the prostate. Changes in the shape and size of the rectum alter the position of the prostate. If there are significant changes during radiotherapy treatment, the prostate can potentially receive a reduced amount of radiation than intended. We, therefore, would like to have your rectum approximately the same size at the planning appointment and each day during treatment.

The bladder lies in front and above the prostate and below the small bowel. When the bladder gets bigger it pushes the small bowel up and away from the prostate. By having a comfortably full bladder, your small bowel will receive less radiation and reduced side effects.

How should you prepare for your planning appointment?
Prior to radiotherapy, you will be required to attend an MRI which is usually done at North Shore Radiology, North Shore Private Hospital and a planning appointment involving a CT scan in the radiotherapy department of your treating hospital.

Bladder and rectal preparation
One hour before both scans, please go to the toilet and empty your bowels and bladder. You should then drink 500mls of water within 15 minutes and not empty your bladder until after your scans. If you are feeling that your bladder is uncomfortably full during this process, please speak with one of the nursing or radiotherapy staff.

Planning CT scan
During the CT scan, you will be positioned on the CT bed as you will be for treatment. If your rectum is full, the staff may give you an enema to help empty your bowels. You will then be rescanned.

After the CT scan is taken you will be given a short tour to show you where to go on your first day of treatment and given a tentative start date and time. The staff will call you once the start date is confirmed. You should estimate that you will be in the unit for approximately two hours. Please take this into consideration when parking your car if you are driving.
**How should you prepare for your treatment?**
Your treatment will begin 2-3 weeks after your planning appointment. Each day you are having treatment, you will need to have your rectum and bladder the same size as they were at your planning appointment.

One hour before your treatment appointment time, you will need to empty your rectum and bladder. You then should drink 500ml of water over 15 minutes. This will help you get your bladder to the same size it was at the planning appointment.

Please feel free to arrive at the department earlier than your treatment appointment and go through this preparation here.

**How do you know if your preparation is working?**
For the first three treatments and then once a week during your treatment you will have a CT scan in the treatment room just prior to beginning your treatment. This gives us information on the treatment area and shows us the rectum and bladder. From this the radiotherapy staff and you doctor will feedback information regarding your rectum and bladder. They will advise you if you need to drink more or less water and if any adjustments to your diet or medications are needed.

**Tips to help you with the preparation**
- Keep hydrated during the day so the water you drink before your appointment will go to your bladder. Try to drink at least 1 litre of water throughout the day.
- Minimise drinking caffeine drinks such as coffee, tea or caffeinated soft drinks. These make you feel like your bladder is too full when it isn’t.
- If you are having difficulties emptying your rectum and feel you are constipated, please speak with the radiation therapy staff and they can advise you on what can be done to help you.

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**Appendix 4**
Dose Escalated IMRT/VMAT – Reduced side effects from treatment with excellent results at 5 years
Dose Escalated IMRT/VMAT – Reduced side effects from treatment with excellent results at 5 years

The following graphs show the quality of life outcomes of 415 patients, using a validated international scoring system – EPIC. All patients were treated with advanced radiotherapy for prostate cancer by Professors Eade and Kneebone, using daily image guidance (IGRT) and either IMRT or VMAT. Average dose to the prostate was 82Gy.

The graphs show the pre-treatment scores (ie prior to radiation) and the post treatment scores to five years. With modern advanced radiotherapy the side effects are now much reduced. As the graphs show, on average there is very little impact on patient quality of life in bowel or bladder function following radiotherapy.
Dose Escalated IMRT/VMAT – Reduced side effects from treatment with excellent results at 5 years
Appendix 5

Urology related publications by A/Professor Andrew Kneebone and A/Professor Thomas Eade

THE FIRST CLINICAL TREATMENT WITH KILOVOLTAGE INTRAFRACTION MONITORING (KIM): A REAL-TIME IMAGE GUIDANCE METHOD.
MED PHYS. 2015 JAN;42(1):354. DOI: 10.1118/1.4904023. PMID: 25563275 [PUBMED - IN PROCESS]

Su MZ, Kneebone AB, Woo HH.
ADJUVANT VERSUS SALVAGE RADIOTHERAPY FOLLOWING RADICAL PROSTATECTOMY: DO THE AUA/ASTRO GUIDELINES HAVE ALL THE ANSWERS?

Forde E, Bromley R, Kneebone A, Eade T.
"A CLASS SOLUTION FOR VOLUMETRIC-MODULATED ARC THERAPY PLANNING IN POSTPROSTATECTOMY RADIOTHERAPY."

Bell LJ, Cox J, Eade T, Rinks M, Kneebone A.
"THE IMPORTANCE OF PROSTATE BED TILT DURING POSTPROSTATECTOMY INTENSITY-MODULATED RADIOTHERAPY."

Stanley K, Eade T, Kneebone A, Booth JT.
INVESTIGATION OF AN ADAPTIVE TREATMENT REGIME FOR PROSTATE RADIATION THERAPY.

"CLINICIAN-LED IMPROVEMENT IN CANCER CARE (CLICC) – TESTING A MULTIFACETED IMPLEMENTATION STRATEGY TO INCREASE EVIDENCE-BASED PROSTATE CANCER CARE: PHASED RANDOMISED CONTROLLED TRIAL – STUDY PROTOCOL."
IMPLEMENT SCI. 2014 MAY 29:9:64.

"A PHASE III TRIAL TO INVESTIGATE THE TIMING OF RADIOTHERAPY FOR PROSTATE CANCER WITH HIGH-RISK FEATURES: BACKGROUND AND RATIONALE OF THE RADIOTHERAPY – ADJUVANT VERSUS EARLY SALVAGE (RAVES) TRIAL."
BJU INT. 2014 MAR;113 SUPPL 2:7-12.


Hovey E., Marx G., Kneebone A., Patel M., Shapiro J. “AN AUSTRALIAN CLINICAL PERSPECTIVE: MANAGEMENT OF HORMONE REFRACTORY (ANDROGEN INDEPENDENT) PROSTATE CANCER.” ASIA PACIFIC JOURNAL OF ONCOLOGY AND HAEMATOLOGY 2009; 1 (1) MARCH


Contributing author (steering committee member)

“LOCALISED PROSTATE CANCER - A GUIDE FOR MEN AND THEIR FAMILIES” AUSTRALIAN PROSTATE CANCER COLLABORATION ISBN 0 9579938-1-1 DECEMBER 2001 AND JULY 2006 EDITION


Urology related publications by A/Professor Andrew Kneebone and A/Professor Thomas Eade

Jacob S, Berry M, Kneebone A, Delaney G, Fowler A, Behan S, Barton M.  
“COMPUTERISED SCREENING FOR ANXIETY, DEPRESSION AND RADIATION TOXICITY IN CANCER PATIENTS.”  

Kneebone A., Turner S., Berry M., Cakir, B. Gebski, V.  
“PROSPECTIVE REVIEW OF OUTCOME FOLLOWING RADICAL IRRADIATION FOR CLINICALLY LOCALISED PROSTATE CANCER”  
AUSTRALASIAN RADIOLOGY 2003 DEC;47(4):422-7

Kneebone A., Hogendorn N.; Tramontana D.; Gapes L.; Turner S.; Gebski V.  
“RANDOMISED TRIAL OF COMPLETE IMMOBILIZATION FOR PELVIC IRRADIATION”  

Kneebone, A; Mameghan, H; Berry, M; Kearsley, J; Turner, S; Bolin, T; Fisher R; Graham P; Delaney, G.  
“A PHASE III RANDOMISED TRIAL TO ASSESS THE EFFECT OF ORAL SULCRAFATE ON THE ACUTE PROCTITIS ASSOCIATED WITH PROSTATE RADIOTHERAPY”  
INTERNATIONAL JOURNAL RADIATION ONCOLOGY BIOLOGY PHYSICS. 2001 NOV 1;51(3):628-35
Locations

MATER HOSPITAL
Department of Radiation Oncology
Lower Ground Floor
40 Rocklands Road, North Sydney, NSW 2060
Tel: (02) 9458 8050 | Fax: (02) 9929 2687

Transport
Public transport is available close by.
Bus stops are easily located on the corner of Rocklands Road and Pacific Highway.
North Sydney and St Leonards train stations are a 5-15 minute walk away.

Parking
Free parking available. Entry is located off 25 Rocklands Road. Free patient drop off is available for 15 minutes at a time on neighbouring streets.

MACQUARIE HOSPITAL
Hospital Building
Suite 1, Level B23 Technology Place
Macquarie University, NSW 2109
Tel: (02) 9812 3220 | Fax: (02) 9812 3389

Transport
Macquarie University train station is located two streets away on the corner of Herring Road and Waterloo Road.

Parking
Parking is accessible on site in the marked bays at the front of the Clinic Building.
Alternative parking in the secure basement car park located off Research Park Drive.