

Selective internal radiation therapy (SIRT) – image guided

Information for patients

This leaflet explains selective internal radiation therapy (SIRT). It covers what to expect, including the benefits, the possible risks and the alternatives.

Before SIRT, a clinical staff member will explain the procedure to you in detail. This leaflet is not meant to replace that discussion. If you have any questions or concerns, please do not hesitate to talk to the liver doctors or nurses who are caring for you. It is important that you feel well informed before agreeing to the procedure and signing the consent form.

Confirming your identity

Before you have a treatment or procedure, our staff will ask you your name and date of birth and check your ID band. If you do not have an ID band we will also ask you to confirm your address. If we do not ask these questions, then please ask us to check. Ensuring your safety is our primary concern.

What is SIRT (Selective Internal Radiation Therapy)?

It is a treatment for liver tumours that uses x-ray guidance to help deliver radiation precisely to cancerous cells, minimising damage to healthy tissue.

Millions of tiny radioactive beads (microspheres) containing radioactive substances are injected into your bloodstream. They stick permanently in the small blood vessels in and around your liver tumour. The beads give off radiation, which damages the cancer cells. The radioactivity of each bead only affects nearby tissue, so the cancer cells close to the beads will be most affected. Some healthy cells may also be affected.

Your team will decide how many radioactive beads to inject to minimise damage to healthy cells. The beads lose their radioactivity quickly and are most effective in the first few days. They will remain in you permanently, but this should not cause long-term harm.

There are two stages to the treatment – SIRT 1 and SIRT 2 – and you will need to come to King's twice, usually about two weeks apart. How long you need to stay in hospital varies, depending on the type of tumour you have and how complex the treatment is. Sometimes, you have SIRT 1 and SIRT 2 during the same hospital admission, but not all patients are suitable for this.

Both stages involve having a test called an angiogram. You will have a dye injected (contrast medium) that shows up on x-rays. This enables the doctor to look at blood vessels and see where the radioactive beads will go when they are injected.

- SIRT 1 – planning, where you have an angiogram that shows the blood supply to your liver
- SIRT 2 – treatment, where you have an angiogram that enables your doctor to precisely target the position of the radioactive beads when they inject them into your bloodstream.

You will be given a local anaesthetic during both stages, but you may be given sedatives on either stage to make you comfortable, as long as you are suitable.

Why do I need SIRT?

- If you have liver tumours that cannot be removed with surgery.
- If you have not improved with other treatments, your doctor might suggest SIRT.
- It can be used with other treatments, such as chemotherapy.
- It can be used both for primary liver tumours (that have started in your liver) and secondary liver tumours (that have spread to your liver from another site, such as colorectal cancer).

What are the benefits?

- **Accuracy:** SIRT targets cancer cells directly with a high dose of radiation.
- **Fewer side effects:** You are likely to have fewer side effects with SIRT than with treatments such as chemotherapy.
- **Quick recovery:** You can have the planning procedure (SIRT 1) as a day case and recover at home instead of in hospital. You usually only need an overnight stay after the treatment (SIRT 2).
- Depending on your tumour type, the radioactive beads can be combined with some types of chemotherapy.

What are the risks?

- **Fatigue, nausea and pain:** You might feel tired, nauseous or have abdominal pain for a few days. Sometimes the fatigue can last for a few weeks.
- **Radiation injury:** Because SIRT uses radiation, there is a slight chance it could injure your liver or nearby organs. Your healthcare team will plan the procedure carefully to lower these risks. Please also see page 9, side effects of SIRT.

Are there any alternatives?

- **Chemo-embolisation:** Injecting chemotherapy drugs into your liver.
- **Microwave ablation:** Using heat to destroy the tumours.
- **Chemotherapy:** Drug treatment through a drip into a vein.
- **Liver resection:** Surgery to remove the tumours.
- **Best supportive care:** To ease symptoms if active treatment will not help.

Not all of these options will be appropriate in your case and SIRT will have been recommended after an in-depth discussion between your doctors and the radiology doctors who are going to treat you. You might also be given a combination of these treatments. For more information, you can have a more detailed discussion with your doctor.

Consent

We must by law obtain your written consent to any operation beforehand. Staff will explain the risks, benefits and alternatives before they ask you to sign the consent form. If you are unsure about any aspect of the procedure or treatment proposed, please do not hesitate to speak with a senior member of staff again. We will inform your GP that you have had this procedure unless you specifically instruct us not to.

Where will I have SIRT 1 and SIRT 2?

You will have them both in the Interventional Radiology Department, 1st Floor, Denmark Wing, King's College Hospital, Denmark Hill.

Will I be admitted to hospital for SIRT?

Important

- **Ideally, you need to live within 30 minutes' travelling time of your nearest hospital and have access to a phone in case you need urgent treatment after you have gone home.**
- **(Day Case Patient) You also need to arrange for a responsible adult to take you home after your SIRT and stay with you for next 24 hours.**

You will have SIRT 1 as a day case patient or a TCI patient, and SIRT 2 as a TCI patient. We explain what this means below. We will let you know which one applies to you.

1. **Day case patient:** You will have SIRT 1 in the morning and, if everything is normal and you are stable, you will be discharged home later in the day. Please arrive at Interventional Radiology at 8am so you can be admitted to the unit.

2. **TCI patient:** You will be admitted to the hospital the day before your procedure and stay overnight before your procedure. The bed manager will call you to let you know when to arrive and which ward to go to.

SIRT 1 – preparation stage

How can I prepare for my procedure?

Pre-assessment appointment

Day case: We will arrange for you to have a pre-assessment appointment and clinic consultation with one of our Interventional Radiologists and Interventional Radiology Nurses, either in person or by phone. They will ask you questions about you, your health and the medications you take. They may also take a blood sample to check that you are in good general health and how well your blood clots. You usually have the blood test in our department at King's College Hospital or have it taken at your GP. After your pre-assessment, we will arrange a date and time for your SIRT 1. We usually let you know the appointment details the same day as your pre-assessment.

TCI: Your Liver Clinical Nurse Specialists and doctors will arrange for a clinic consultation to explain your suitability for SIRT 1. The admissions team will contact you with the procedure date.

Drugs and alcohol: Do not use any recreational drugs or drink alcohol for 24 hours before SIRT 1.

Medications: Please make sure the doctor or nurse knows if you are diabetic and taking oral diabetic tablets such as metformin or using insulin injections. Also tell them if you are taking any of the following blood-thinning medications (anticoagulants): aspirin, clopidogrel, warfarin, apixaban, rivaroxaban, edoxaban, ticagrelor, prasugrel, phenprocoumon, acenocoumarol, dagibatran, argatroban, heparins, fondaparinux, enoxaparin

Usually, you will need to stop taking these medications a few days to a week before the procedure. But do not stop them on your own without talking to your liver doctor or nurse first. They will tell you when to stop and when it is safe to start taking them again.

If in doubt, please bring with you all the medications you are taking, whether they have been prescribed for you or if you have bought them over the counter at your local chemist store.

What happens on the day of SIRT 1?

Eating and drinking: You must **not** eat anything for at least **six hours** before your procedure. You can drink clear fluids (water, black tea and black coffee) up to **two** hours before your procedure

Medications: Keep taking your regular medications, except for any blood-thinning ones. Remember to take your blood pressure medication on the morning of the

procedure (if applicable). If your blood pressure is too high on the day of SIRT 1, you might need to have the procedure on another day.

What to bring with you: Please bring all your medications and something to read

What not to bring with you: Do not bring valuables, jewellery or large sums of money with you. If this unavoidable, please ask a relative or friend to take them home for you. The hospital cannot accept liability for the loss of items that are not handed in for safekeeping.

What happens before my procedure?

One of our nurses will ask you to change into a gown. They will check your blood pressure, heart rate and temperature, and ask you some questions. They will put a small, thin tube called a cannula into a vein in your hand or arm so we can give you medications such as pain relief if you need them during or after the procedure.

You will be taken by the IR nurses to the room in Interventional Radiology where you will have the procedure.

What happens during the procedure?

An Interventional Radiologist – a specialist doctor trained in image-guided procedures – will carry out your SIRT 1. They will explain the procedure to you, ask for your consent and then start your SIRT 1.

They will ask you to lie flat on your back on an x-ray table and ensure you are in a comfortable position before they start. A nurse will attach you to a monitoring device to check your blood pressure, heart rate and blood oxygen level.

The doctor will clean the skin in your groin or wrist and give you a local anaesthetic to numb the area. Using ultrasound to guide them, they will make a small cut through which they will put a needle into the artery in your groin or wrist. They will then put a thin wire through the needle and into your artery. They check this is in the correct position using the x-ray images.

The needle is then taken out and a plastic tube (sheath) placed over the wire to secure the access site. The doctor will then advance a thin, flexible tube (catheter) into the arteries in your liver.

They will inject a dye (contrast medium) into the catheter. When the dye goes in you may briefly have a warm feeling in your tummy. This is normal. Using the dye and x-ray images, the radiologist will then take pictures so they can map out your liver arteries to ensure that the radioactive beads will be delivered to your liver and not to the surrounding structures such as your lungs or bowels.

They will also inject a test medication into the catheter to simulate the actual treatment. Sometimes they may block other arteries from or near to your liver, to ensure that the radioactive beads only go into your liver and do not enter these arteries.

After the angiogram, you will have a nuclear medicine scan called SPECT-CT to check where the test dose has gone. The doctor can then work out what dose of radiation beads to give you during SIRT 2.

This scan also checks whether the test medication has escaped from your liver to other parts of your body, such as your bowel or lungs. This helps your doctor know if it is safe for you to have the treatment.

Please note: If the nuclear medicine scan shows that a significant number of radioactive beads will go outside of your liver and into your bowels, lungs or stomach, you may have to have SIRT 1 again. Rarely, you may not be able to have SIRT 2.

Will the procedure hurt?

You have this procedure under local anaesthetic. It is generally painless, apart from the brief sting you feel when you have the local anaesthetic injection.

You might find the position the doctor asks you to lie in during SIRT 1 uncomfortable for a short while.

If you have any pain or discomfort, tell our nursing staff and they will give you some painkillers.

How long will it take?

It takes about one hour but it can take longer

What happens after the procedure?

- **Day Case:** You will be taken back to IR Recovery after the scan and monitored closely to ensure there are no complications. If the cut was made in your groin, you must lie flat for a few hours after the procedure to avoid bleeding from the puncture site. The radiologist and nurses will tell you for exactly how long.
- **TCI:** You will return to the ward after the scan and be monitored closely to ensure there are no complications. If you have any pain, tell our nursing staff and they will give you some painkillers.

After SIRT 1 you may:

- feel mild discomfort in your groin or wrist where the catheter was put in for about a week. Please take regular pain medication, if needed
- have some bruising that could last for two weeks
- have some mild oozing from the puncture site
- have a small lump form around the puncture site which lasts up to six weeks.

All of these are normal.

When can I go home?

- **Day Case:** If there are no complications, you can go home later in the afternoon on the day of your procedure.

- **TCI:** If there are no complications, you may be discharged on the day after your procedure.

How do I care for the cut?

You will have a small dressing over the puncture site which you can change if necessary. Keep this dry for two days, then remove the dressing and gently clean the area with soap and water. Dry thoroughly and apply a small plaster. Avoid using lotion or powder. You can shower after two days but do not take a bath or go swimming for one week.

When can I exercise?

After the procedure, relax and take it easy for 24 hours. You can go back to most normal everyday activity after 48 hours but avoid strenuous activities such as gardening for at least a week. Drink plenty of fluids, unless otherwise instructed by your doctor.

What should I look out for after the procedure?

Call 999 or go to your nearest Emergency Department (A&E) if you have any of the following:

- significant bleeding from the puncture site. Press firmly over this area to help stop the bleeding
- increased swelling or unusual pain in your groin or abdominal area.

SIRT 2 – treatment stage

Will I be admitted to hospital for SIRT 2?

You will be admitted to the ward a day before the procedure. If you are having SIRT for neuroendocrine tumour(s) you will have an octreotide infusion 12 hours before the procedure, which will continue non-stop during the procedure and for 24 hours afterwards.

What happens on the day of the procedure?

Please see page 4 and 5 for the following instructions, which are the same as for SIRT 1.

- **Eating and drinking**
- **Medications**
- **What to bring with you**
- **What not to bring with you**

What happens before my procedure?

The ward staff will ensure that you are ready for the procedure and escort you to Interventional Radiology.

What happens during the procedure?

Please read pages 5-6, as much of the SIRT 2 procedure is the same.

The Interventional Radiologist will again access an artery, either in your groin or wrist, and place a catheter in the same position(s) in the liver arteries as planned during SIRT 1. Dose(s) of radioactive beads will be injected through this catheter by the Interventional Radiologist and Nuclear Medicine Physician.

How long will it take?

It takes about one hour.

What happens after the procedure?

You will be taken to Interventional Radiology Recovery and then back to the ward to be monitored closely.

You will have a PET-CT scan in the Nuclear Medicine Department to record where the microspheres are and to work out the achieved dose of radiation.

We will give you these medications while in hospital and to take at home:

- painkillers
- anti-sickness tablets
- a drug called a proton pump inhibitor – such as omeprazole – to protect your stomach lining (one-month course).

We may also give you steroids or ursodeoxycholic acid.

When can I go home?

You are usually discharged within 24 – 48 hours of the procedure.

What are the side effects of SIRT 2?

- **Problems at the puncture site.** You may have some slight discomfort and bruising in your groin/wrist where the catheter was put in. Tell your nurse or doctor if you notice any bleeding, redness, swelling, discharge or pain from the puncture site.
- **Feeling sick (nausea) and vomiting.** We give you anti-sickness medication before the procedure to prevent you from feeling sick while you are being treated. You might still feel sick after the treatment but this should only last for a few days.
- **Tummy (abdominal) pain.** Some people have tummy pain during SIRT. Tell your doctor or nurse about any pain during or after treatment and they can give you painkillers to help. Rarely, some beads may escape from your liver and into your stomach or bowel. This can irritate the lining of your stomach or bowel and cause tummy pain or indigestion. We will give you a medication to reduce the amount of acid produce by your stomach.

- **High temperature or infection.** You may have a high temperature for a few days. Low grade fever is a common side effect of SIRT, but a high grade fever can be a sign of infection. Some patients have flu-like symptoms that can last for up to two weeks. This is called post-embolisation syndrome.
- **Tiredness (fatigue).** This can last for a few days up to several weeks after treatment. It is important to get enough rest and eat a balanced diet to help your body recover.
- **Liver dysfunction.** The SIRT will be as targeted as possible. If a larger area of your liver is treated, we will aim to keep the dose to normal background liver below safe levels. This means rates of significant liver dysfunction have fallen with modern SIRT practice. Your doctor will discuss this risk further during the consent process.

Any side effects should ease within two – three weeks of the procedures. If they do not, please contact your Liver CNS or GP immediately for advice.

Do I need to take any radiation precautions?

We will plan your treatment to give you the amount of radiation needed to treat the cancer safely and effectively. We are also careful to protect other people around you from radiation.

For 1 week after treatment:

- Avoid sharing a bed with anyone.
- Do not travel on public transport – including air travel – lasting more than two hours.
- Avoid crowded public places such as cinemas or theatres.
- Avoid prolonged periods of close contact with adults (less than 1 metre).
- Avoid all close contact with children or pregnant women.

Pregnancy and breastfeeding

You must not:

- have this treatment if you are pregnant
- become pregnant within two months of having SIRT
- breastfeed for the first two weeks after treatment
- give your child expressed breast milk by bottle.

We will give you specific information about the radiation safety precautions you need to take after your procedure.

Will I have a follow-up appointment?

Before you are discharged home after SIRT 2, an outpatient appointment will be arranged for you at King's for about eight weeks after your treatment. Please contact your Liver CNS if you have any concerns before that appointment.

How and when will I get the results of the treatment?

You will have a CT and/or PET-CT scan in 12 weeks to assess the effectiveness of the treatment. You usually have the scans at King's College Hospital, but if it is difficult for you to travel to us, we can arrange for you to have them locally in some cases.

What should I do if I cannot come for my procedure?

Please let us know as soon as possible by contacting the Interventional Radiology Department, so we can arrange another date and time. This also enables us to offer your appointment time to someone else.

King's College Hospital, Denmark Hill, Tel: **020 3299 3490**, **020 3299 6730** or **020 3299 3280**

Who can I contact with queries or concerns?

If you have any questions about your procedure, please contact:

- **Interventional Radiology Nurses**, tel: **020 3299 3490** or **020 3299 2060**, 9am – 5pm, Monday to Friday
- **Hepatobiliary (HPB) CNS**, tel: **020 3299 1420**, email kch-tr.kch.hpbcns@nhs.net, 9am – 5pm, Monday to Friday
- **Hepatocellular carcinoma (HCC) CNS**, tel: **020 3299 5189**, email: kch-tr.HCC-CNS@nhs.net, 9am – 5pm, Monday to Friday
- **Neuroendocrine tumours (NET) CNS**, tel: **020 3299 3854**, email: kch-tr.NETCNS@nhs.net, 8am – 5pm, Monday to Friday

More information and support

- King's College Hospital: www.kch.nhs.uk
- NHS: www.nhs.uk, tel: **111**
- British Society of Interventional Radiology: www.bsir.org (click on Patients, click on patient information leaflets, select leaflet)
- The British Liver Trust, www.britishlivertrust.org.uk
- SIRTEX, the manufacturers of Sirspheres www.Sirtex.com
- BTG – The manufacturers of Theraspheres <https://btgplc.com/en-US/TheraSphere/Patients-and-Carers>
- Yttrium 90 Microspheres Education & Support (YES)
- Macmillan Information & Support Centre, Cicely Saunders Institute, King's College Hospital, open at 9am – 4pm, Monday to Friday. tel: 020 3299 5228 (have checked against info on King's website)
- Macmillan cancer support, www.macmillan.org.uk

MyChart

Our MyChart app and website lets you securely access parts of your health record with us, giving you more control over your care. Visit www.kch.nhs.uk/mychart to find out more.

Care provided by students

We provide clinical training where our students get practical experience by treating patients. Please tell your doctor or nurse if you do not want students to be involved in your care. Your treatment will not be affected by your decision.

PALS

The Patient Advice and Liaison Service (PALS) offers support, information and assistance to patients, relatives and visitors. They can also provide help and advice if you have a concern or complaint that staff have not been able to resolve for you. They can also pass on praise or thanks to our teams. The PALS office is located on the ground floor of the Hambleden Wing, near the main entrance on Bessemer Road - staff will be happy to direct you.

PALS at King's College Hospital, Denmark Hill, London SE5 9RS

Tel: **020 3299 4618**

Email: **kings.pals@nhs.net**

If you would like the information in this leaflet in a different language or format, please contact our Interpreting and Accessible Communication Support on 020 3299 4618 or email kings.access@nhs.net

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