



## What is Interventional Radiology?

"Interventional Radiology" (IR) is a medical specialty that relies on the use of radiological image guidance (X-ray fluoroscopy, ultrasound, and computed) to precisely target therapy. Most IR treatments are minimally invasive alternatives to open and laparoscopic (keyhole) surgery.

The essential skills of an Interventional Radiologist combine diagnostic image interpretation and the use of small catheter tubes, probes and wires to navigate inside the body under imaging guidance. No other specialist possesses this unique combination of skills.

There is hardly any area of medicine where IR has not had some impact on patient management. The range of conditions that can be treated by IR is continually expanding. Well recognised advantages of these minimally invasive techniques include reduced risk, shorter hospital stay, lower cost, greater comfort, and quicker. Most IR procedures are done on an outpatient basis, avoiding hospitalization altogether. The effectiveness of treatment is often better than with traditional treatments.

### Blood vessel disease (arteries and veins)

**Narrowing of arteries** leads to restricted blood flow (peripheral vascular disease): Interventional radiologists treat this by using balloons to dilate the vessel (balloon angioplasty, PTA) and metal springs called stents to hold the arteries open. Sometimes arteries suddenly become blocked by a clot with loss of blood supply to the limb, which is a medical emergency. To prevent gangrene and amputation, interventional radiologists can remove the blood clots through small catheters without an incision to restore flow.

**Expanded arteries (aneurysms)** are at risk of rupture and bleeding. IR physicians can treat these by inserting a Gore-Tex tube called a stent graft within the aneurysm. At Palo Alto Medical Foundation, we offer our patients the most advanced techniques for repair of aneurysms, including special custom-made graft with special holes and branching limbs to

maintain normal blood flow to the organs.

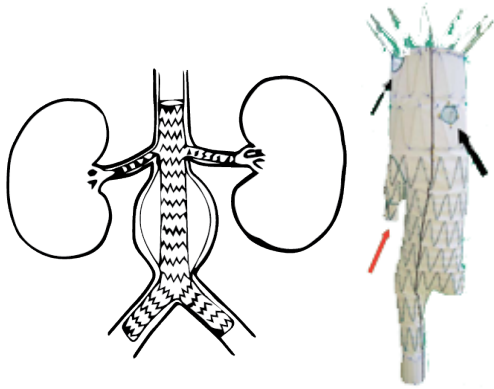


Fig1. Fenestrated endograft: it has special holes within the graft to maintain the blood flow to kidneys and intestine.

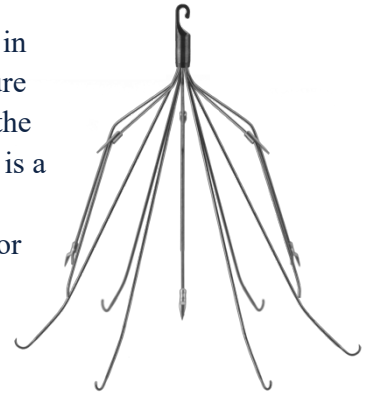
**Bleeding:** bleeding can occur almost anywhere in the human body after a traumatic event. However, bleeding from arteries can also start spontaneously in the stomach, intestine, kidneys, liver or uterus. Fortunately, Interventional Radiologists can navigate a catheter to almost anywhere in the body and find the exact artery that is bleeding. Once the location is identified, the bleeding can be stopped by using a special plug, IR physicians can also prevent or stop bleeding during surgery such as during caesarean section in patients with a high risk of bleeding from an abnormal placenta.



fig2: Duodenal ulcer with active bleeding (arrow) and resolution of the bleeding with embolization.

### Blood clots in the lung (pulmonary embolism):

Interventional Radiologists can place a filter in the inferior vena cava to capture blood clots before they reach the lung, preventing. When there is a massive PE, IR may use a catheter to aspirated the clots or to break them up to restore blood flow.



### Deep Venous Thrombosis (DVT):

blood clots that occur in the veins can cause significant swelling of the legs or arms. The clot can be aspirated through a catheter or treated with clot busters (thrombolysis) through a small catheter passed into the vein. Some patients develop blood clots as a result of a narrowing in a vein that may require balloon dilatation or placement of a stent



### Dilated veins (varicose veins):

these most commonly occur in the legs but can occur in the pelvis or scrotum, causing pain. These can be treated by blocking the vein by using glue and embolization techniques.



## Interventional Oncology

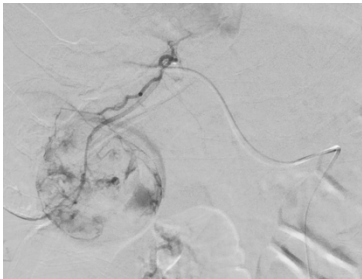
Interventional Oncology is a subspecialty where IR techniques are used to diagnose and treat tumors in patients with cancer.

Tumor targeted treatments are intended to shrink or destroy tumors at their primary site or metastasis. Targeted treatment is rapidly advancing leading to longer patient survival while preserving the quality of life.

**Biopsies:** the first step in management of any patient with cancer is to obtain an adequate diagnosis with a tissue biopsy. Today, is not enough to know the type of cancer (lung, colon...), but we need to know complete genetic components of the tumor, so the best treatments can be used.



**Tumor Embolization:** a small catheter is inserted through the blood vessels using real time x-ray guidance. The catheter can travel all the way to a specific tumor. With the catheter in the correct position, chemotherapy or radio-active beads can be injected directly into the tumor, killing the cancer cells, minimizing side effects to the rest of the body.

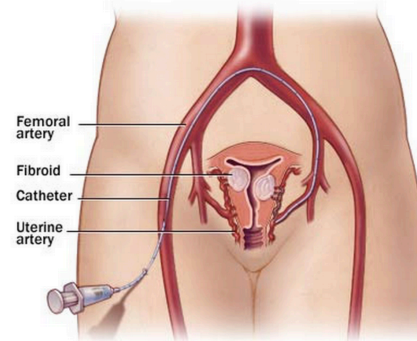


**Tumor ablation (liver, kidney bone, lung):** IR uses direct probe delivered cancer killing therapies involving heat (radiofrequency, laser, microwave, ultrasound) or freezing (cryotherapy). The treatment is performed and monitored using imaging (ultrasound and computed).

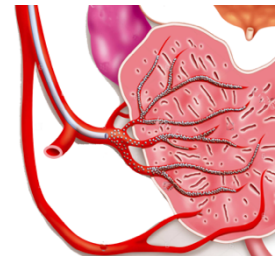
## Fibroids and Prostate therapies

**Uterine fibroids:** heavy menstrual bleeding and pain can be caused by benign tumors of

the uterus called fibroids. These tumors can be treated by blocking blood vessels (uterine fibroid embolization, UFE) that leads to shrinkage of the fibroid and improvement of the symptoms



**Prostate Embolization:** 50% of men over the age of 60 will have symptoms of benign prostatic hyperplasia (BPH) including frequent urination and urinary retention. Patient who are not surgical candidates or do not want surgery can undergo embolization. This is a minimally invasive procedure in which we block the blood flow to the prostate causing it to shrink, with minimal recovery time.



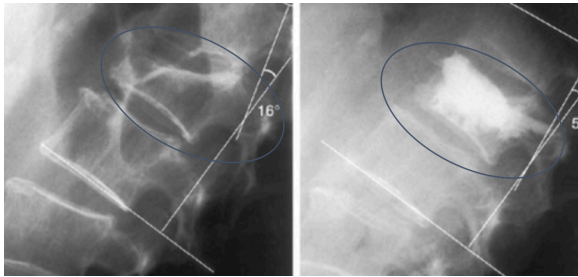
## Feeding Tubes

**Gastrostomy tubes:** patients who have swallowing problems may need a feeding tube inserted for nutrition. Interventional Radiologists can easily place these tubes using imaging guidance without the need for general anesthesia.

**Gastro-jejunostomy tubes:** these are longer tubes that are advanced into the small bowel under x-ray navigation and can provide nutrition in patient with stomach or pancreas problems.

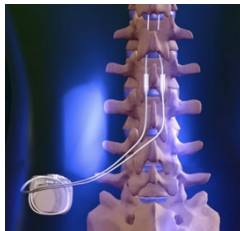
## Spine interventions and pain management

**Kyphoplasty:** patients with compression fractures of the spine can take months to recover. Interventional Radiologists can inject cement directly into the fracture, expediting healing and reducing pain.



**Nerve blocks:** guided by x-rays or a CT scan, medications can be injected directly into painful nerves, reducing the need for narcotics or even surgery.

**Spinal Stimulators:** they create tiny electrical stimuli to the nerves to reduce or eliminate chronic pain, avoiding the use of heavy narcotic medications.



**Pain pumps:** these are implantable reservoirs that accurately inject very small doses of narcotics directly into the nerves.



## Other Problems

**Kidney stones:** are and cause pain, infection and blockage of the kidney. IR techniques include placing a tube in the kidney (nephrostomy) to allow the urine to drain. Stones using a variety of instruments.

**Gallstones and Jaundice:** gallstones are one of the most common upper abdominal disorders. Most gallstones are treated with laparoscopic surgery. When stones or tumor stop bile from draining normally, which causes jaundice. In some situations an Interventional Radiologist will treat this by placing catheters through the liver to either remove the stones or place stents to open tumor blockages to allow proper drainage of the bile.