Interstitial re-irradiation (IRI) provides a curative option for some patients that is sometimes, unfortunately, not presented to the patient. This might be because older techniques that utilize RT after previous radiation encompassed large volumes of tissue. With external RT techniques, late complications were often the result. In contrast, interstitial re-irradiation to localized areas in selected patients can often be completed very safely and with excellent outcomes, including cure.

Most IRI implants are done by permanently inserting small radioactive seeds into the tumor, typically with only local anesthesia and on an outpatient basis. The seeds give up their radiation over a few weeks. The radiation dose is essentially localized to the area of the tumor, with rapidly decreasing doses to nearby tissues. These implants are quite safe, even in patients who are poor candidates for surgery due to other illnesses, advanced age or previous treatment. For most patients, the objective of treatment is cure without significant morbidity, even when there are no other options. Figure 1 highlights some of the advantages and disadvantages of IRI.

### Advantages
- Little perioperative morbidity or mortality.
- Little or no hospitalization for permanent implants.
- Relatively inexpensive.
- Preserves structure and function in most patients.
- Applicable to patients who are medically infirm or aged.

### Disadvantages
- Extent of disease difficult to assess in some cases.
- Risk of late radiation injury.
- Applicable especially to small volume recurrences if excessive complication rate is to be avoided.

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**The problem:** Patients with gynecological malignancies who have already received radiation therapy (RT) and have recurrent or new malignancies within the previously treated area present a significant challenge for providers. Options for treatment have historically been limited. Salvage surgery may be offered to patients with relatively small, centrally recurrent lesions if their age and general condition are suitable. However, surgery following previous RT carries significant morbidity in almost all patients due to substantial loss of tissue structure and function, and operative mortality may be significant as well.
Typical Patient Criteria for Referral for Interstitial Re-Irradiation (IRI)

Although patients can self-refer, our preference is that referrals originate in the office of the treating gynecologic or radiation oncologist. Due to the nature of the procedure, medical co-morbidities are rarely a contraindication to IRI. The ideal patient will have a centrally recurrent tumor (or new primary) in the vagina, accessible for visualization and implantation, of appropriate size (a suggested size limit is 4 cm in maximum dimension, although there are exceptions based on several factors), and the patient will not have evidence of metastatic disease. A disease-free interval of at least 18 months also supports superior outcomes. All histologies (squamous, adenocarcinoma and even sarcoma) have been treated and are potential candidates.

Typical Access/Process

• Patients are usually referred by a physician to Dr. Marc Randall in the Department of Radiation Medicine. Patients can usually be seen within one week of referral. The first visit will also include an appointment with a UK gynecologic oncology physician, since a team approach is considered optimal. Based on the physical examination and review of all aspects of the case, including previous treatment, a recommendation will be made. It is possible additional studies might be needed. If the patient is accepted for treatment, detailed tumor measurements will be made. Based on evaluation and tumor measurements, calculations are performed to determine the appropriate radioactivity, the ideal seed distribution, etc.

• The second appointment is set 10-14 days after the first visit to allow for the radioactive material to arrive and be tested. The vast majority of IRI procedures are conducted on an outpatient basis. If the patient is coming from some distance away, she can typically arrive in the morning, have the procedure and then depart (even by airplane) to arrive home in the evening.

• The third visit, if warranted, occurs approximately one month after treatment, at which time Dr. Randall will perform an examination and answer questions.

• After that, care is typically returned to the referring doctor, who will monitor the patient’s progress on a regular basis. Dr. Randall and the gynecologic oncology team will continue to be available for consultation or re-evaluation.
Case Study I:

Vaginal Vault Malignancy

A 37-year-old female patient presented with complaints of vaginal discharge for the previous eight weeks. After examination by a gynecologic oncologist in a large midwestern city, a diagnosis of a clinical Stage III squamous carcinoma of the cervix was made. The patient underwent several rounds of chemotherapy and radiation therapy. Treatments were completed and the patient was determined to have reached a state of remission.

Approximately one year later, the patient returned for follow-up care wherein a 3 cm recurrent malignancy was detected at the apex of the vaginal vault. Intracavitary radiation was completed without significant change in the lesion. Further treatment options along with risks and benefits of each were discussed with the patient, including a pelvic exenteration or IRI. The patient was informed that IRI would require out-of-state travel. Due to fear of complications related to pelvic exenteration, which included ostomy placement as well as significant disfigurement of the pelvis and genital areas, the patient declined surgical intervention and the decision was made to refer the patient to Dr. Marcus Randall for interstitial re-irradiation (IRI).

The referring physician contacted Dr. Randall by phone to discuss referral and patient history. The patient was seen one week later.

An initial evaluation for seed placement was completed and the patient was determined to be a candidate for IRI. Placement was scheduled for the following week so that dosing could be determined and the seeds obtained. The in-office procedure was completed in less than an hour with local anesthesia. An oral antianxiety medication was provided to the patient prior to placement. The patient stated a pain scale of 0/10 during and following placement and she returned home the next day. Final care for her diagnosis included four rounds of chemotherapy given by the referring physician. Subsequent rounds were discontinued due to patient intolerance.

The patient has been cancer-free for six years and reports no further complications. Her physician reports she is receiving follow-up care and monitoring every six months and remains in remission. Dr. Randall remains available for consultation with the referring physician as needed.

About Dr. Randall

With more than 25 years of experience, Dr. Randall is adept at selecting patients for and performing interstitial re-irradiation procedures. He has refined his techniques, including the adoption of a new isotope, Cesium-131, which has some advantages over older isotopes. Dr. Randall performed the world’s first Cs-131 implant for a gynecologic malignancy in 2011.

He received his medical degree from the University of North Carolina at Chapel Hill and did his residency at the University of Virginia in Charlottesville. He chaired the Department of Radiation Medicine at Indiana University School of Medicine and is currently chairman of radiation medicine at the University of Kentucky College of Medicine in Lexington.

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Marcus E. Randall, MD, FACR, Markey Cancer Foundation Chair in Radiation Medicine.
Case Study II:

Multiple Vaginal Recurrences

A 64-year-old female from southern Kentucky was referred to UK HealthCare in 1995 for treatment of clinical stage IB cervical cancer. She underwent a radical hysterectomy and lymph node dissection. Although all lymph nodes were negative, the tumor extended into the right parametrium and exhibited extensive lymphvascular space invasion, warranting postoperative pelvic RT.

After surgery and RT, the patient was NED until 2002 when she was noted to have vaginal intraepithelial neoplasia (VAIN). Over the next five years, the patient underwent multiple laser surgeries and partial vaginectomies, the last one performed in June 2008. In September 2008, a biopsy revealed recurrent, invasive carcinoma, and she was referred to Dr. Randall for consideration of interstitial re-irradiation. After evaluation and discussion with the patient, she underwent interstitial implantation with radioactive gold-198 for a lesion measuring approximately 5 x 2.5 cm. Her Pap smear reverted to normal and the patient reported no pain and no side effects or complications. However, 22 months later she developed a new lesion just anterior to the previously implanted area measuring approximately 2.5 x 1.5 cm. Biopsy confirmed invasive squamous carcinoma.

After extensive discussion and informed consent, the patient requested a second gold seed implantation procedure and this was completed in November 2010. Again, the lesion disappeared, the Pap smear reverted to normal and more than one year later she remains without evidence of disease. She has had no adverse effects from the implant.