Brachytherapy (HDR & LDR)

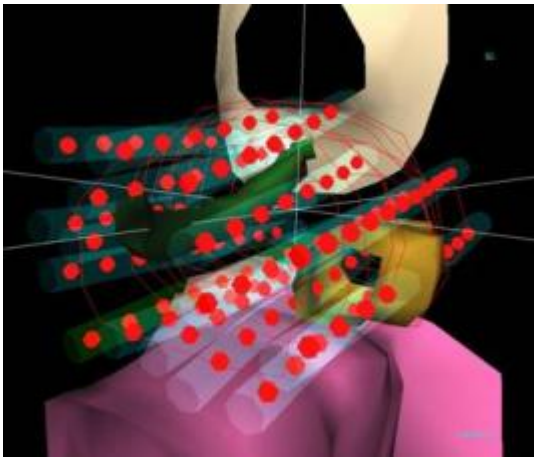
Brachytherapy is a method of delivering radiation to tumors by placing radioactive sources either within or immediately adjacent to tumor tissue. Because the radiation source is very close to the tumor, therapeutic radiation can affect the tumor directly while minimally affecting normal tissue. Brachytherapy can be provided using low dose rate (LDR) or high dose rate (HDR) techniques, depending on the length of time the radioactive sources remain in place.

Brachytherapy can be provided alone or in combination with other therapies such as surgery, external beam radiotherapy (EBRT) [1] and chemotherapy.

A key feature of brachytherapy is that the irradiation affects only a very localized area around the radiation sources. Exposure to radiation of healthy tissues farther away from the sources is therefore reduced. In addition, if the patient moves or if there is any movement of the tumor within the body during treatment, the radiation sources retain their correct position in relation

to the tumor. These characteristics of brachytherapy provide advantages over EBRT

A course of brachytherapy can be completed in less time than other radiotherapy techniques. This can help reduce the opportunities for surviving cancer cells to divide and grow in the intervals



between radiotherapy doses. With brachytherapy, patients typically make fewer visits to the radiotherapy clinic compared with EBRT, and the treatment is often performed on an outpatient basis. This makes treatment accessible and convenient for many patients. Brachytherapy is also associated with a low risk of serious adverse side effects. These features of brachytherapy mean that most patients are able to tolerate the procedure very well.
At UCSF, we use a team approach to care for our brachytherapy patients. The brachytherapy team includes a radiation oncologist, surgeon, physicist, radiation therapist, and nurse, working together to provide the best care possible. We offer brachytherapy for a variety of anatomical sites including central nervous system, head and neck, lung, genitourinary, gynecologic, and other soft tissue tumors. A wide range of specialized applicators and modern treatment planning allow us to provide the most comprehensive brachytherapy program in California, and among the most pioneering programs in the world.

Low Dose Rate (LDR) Brachytherapy

With low dose rate brachytherapy, the radioactive sources are positioned inside or immediately adjacent to the tumor for a minimum of several days but may be left in position permanently. At UCSF, low dose rate brachytherapy is most commonly used to treat prostate cancer and brain tumors.

Permanent prostate seed implants have been performed at UCSF since 1995. Many patients with prostate cancer are candidates for this curative procedure. The urologist and radiation oncologist perform the implant together in the operating room. Most patients go home the

same day.

Central nervous system brachytherapy for brain metastases and other brain tumors has been performed at UCSF for over 25 years. Radioactive seeds are placed in position during the surgery for tumor removal. The neurosurgeon and radiation oncologist work together to position the seeds.

High Dose Rate (HDR) Brachytherapy

During HDR brachytherapy, a single radioactive source is temporarily placed inside the tumor for a few minutes, and then removed. The source travels inside small catheters controlled by a device called a remote afterloader. Since the source position can be precisely adjusted and we can create customized dose distributions to meet each patient's needs, tumors can be treated with very high doses of localized radiation while greatly reducing the doses to surrounding healthy tissues. HDR brachytherapy is most commonly used to treat prostate, cervical, and head and neck cancers; however, the flexibility of our HDR system allows us to use this technology for a wide range of malignancies.

The UCSF HDR brachytherapy team is internationally renowned and its published studies have defined how HDR is optimally performed. Our recent technological advances have led to significant breakthroughs in the delivery of HDR brachytherapy. We routinely use CT and MR image guidance, as well as inverse planning [2], to create the optimal dose distribution, customized for each individual patient. This convergence of innovative HDR brachytherapy technology and clinical expertise is only available at UCSF.

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Brachytherapy Team

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Links

[1] https://radonc.ucsf.edu/external-beam-radiation-therapy-ebrt
[2] https://radonc.ucsf.edu/inverse-planning-simulated-annealing-ipsa
[3] https://radonc.ucsf.edu/i-chow-hsu
[4] https://radonc.ucsf.edu/steve-braunstein
[5] https://radonc.ucsf.edu/adam-cunha
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