A Guide to Proton Therapy for Patients With Head and Neck Cancers

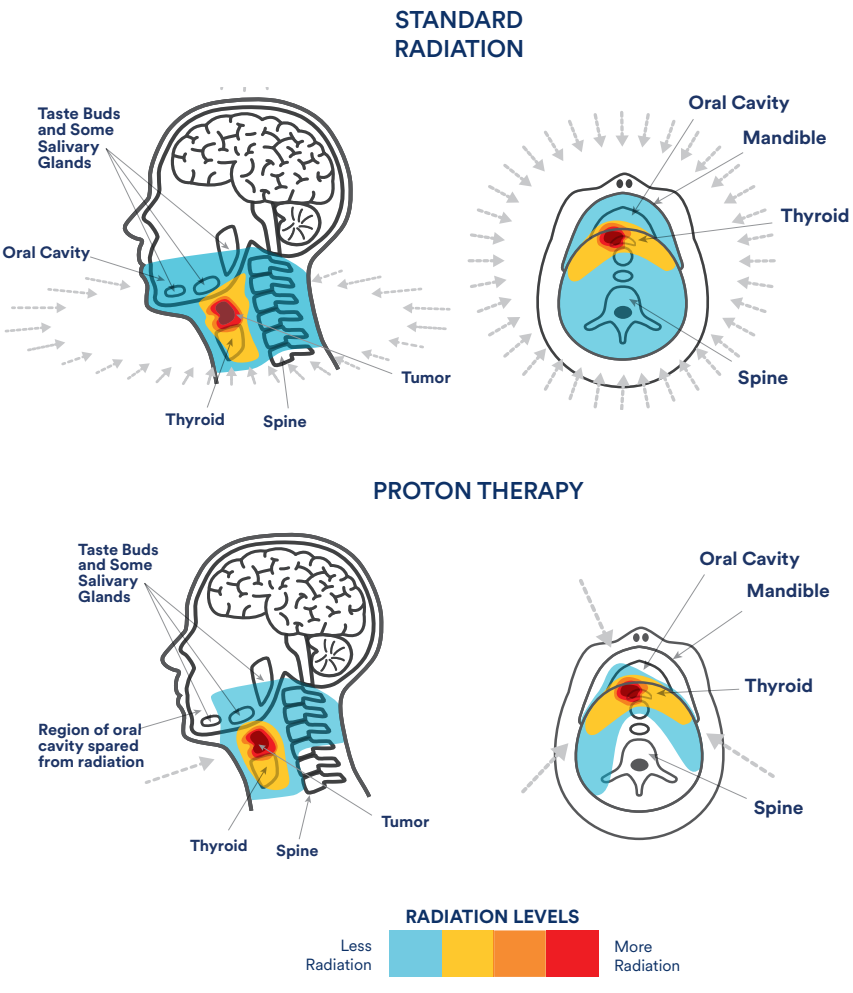
More than 65,000 Americans are diagnosed each year with head and neck cancers. Most patients with head and neck cancer receive radiation therapy. When treating head and neck tumors, it's critical to protect organs surrounding the tumor because excess radiation could damage eyes, optic nerves, salivary glands, taste buds, the brain and other organs, resulting in side effects such as blindness, hearing loss and dry mouth, and secondary tumors in the future

Advantages of Proton Therapy

Proton therapy is a type of external radiation therapy. It can be more precisely controlled than standard therapies that use X-rays, including intensity modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT).

In proton therapy, more control means more energy goes into destroying the tumor. The goal of proton therapy is to minimize radiation to surrounding healthy tissue. This makes it a good treatment option for tumors near healthy organs such as tumors in the head and neck region.

Proton Therapy vs. Standard Therapy with X-rays



The illustration shows the difference between standard X-ray radiation and proton radiation, where fewer healthy tissues are subjected to radiation.

1- to 4-Field Head and Neck Treatment Technique

Our medical physics and dosimetry teams worked with our radiation oncologists to develop a 1- to 4-field treatment technique. The technique uses pencil beam scanning (PBS), which enables us to use multiple dose levels to treat complicated head and neck cancers with bilateral neck involvement.

Tumors appropriate for proton therapy include

Base-of-skull tumors (including, but not limited to, anterior, middle, and posterior cranial fossa, sphenoid and temporal bone-related tumors)

- Sinonasal cancers (paranasal sinuses and nasal cavity)
- Cancers located near the orbits/eyes
- Nasopharynx cancers
- Small/early oropharyngeal cancers (tonsils, tongue base)
- Select salivary gland tumors (parotid, sub-mandibular and minor salivary glands of the upper aero-digestive tract)
- Complex skin cancers involving cranial nerves and/or lymph nodes of the neck
- Select patients who have received previous radiation
- Unknown primary cancers (after a thorough surgical work up)

About Proton Therapy

The Bragg Peak

During proton therapy, a beam of subatomic particles called protons is sped up in an accelerator and then aimed at the tumor. The nature of protons is such that the radiation dose increases suddenly, in what is called a Bragg Peak. Then the radiation falls effectively to zero. This allows radiation oncologists to precisely target tumors, minimize radiation to healthy tissue in front of the tumor, and avoid healthy tissue behind the tumor. Radiation oncologists can spread the Bragg Peak to cover the entire tumor.

The advantages of Pencil Beam Scanning (PBS)

PBS is the latest proton technology that allows for even greater accuracy when treating cancer with proton radiation. PBS uses a narrow proton beam to paint the tumor with radiation. Because the pencil beam can be targeted even more precisely, higher, more effective doses can be used. The pencil beam deposits radiation starting at the deepest layer, and works slice by slice through the tumor.

About our specialists

All our radiation oncologists are faculty at the University of Washington School of Medicine and all are board certified. All our physicians are experts in proton therapy and other forms of radiation. They will provide you with an expert recommendation for you to consider.

References

1. Acta Oncol. 2013 Apr;52(3):492-7. doi: 10.3109/0284186X.2013.767983. Kil WJ1, Nichols RC Jr, Hoppe BS, Morris CG, Marcus RB Jr, Mendenhall W, Mendenhall NP, Li Z, Costa JA, Williams CR, Henderson RH.

2. Int J Radiat Oncol Biol Phys. 2014 Mar 1;88(3):596-602. doi: 10.1016/j.ijrobp.2013.11.007. Mendenhall NP1, Hoppe BS2, Nichols RC2, Mendenhall WM2, Morris CG2, Li Z2, Su Z2, Williams CR3, Costa J3,Henderson RH2.

Find out more.
To learn more about proton therapy for brain cancer or to schedule a consultation, please call us at **888.645.6934** or visit **fredhutch.org/protontherapy**

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