

# Proton Therapy for Patients with Head & Neck Tumors

Talk to your doctor about how Proton Therapy can help.

## Precision Therapy. Fewer side effects.

Proton therapy is an advanced form of radiation cancer treatment that precisely targets tumors. This causes less damage to healthy tissue. Proton therapy patients experience fewer side effects than with standard X-ray radiation. Proton therapy is effective in treating a broad range of tumors including brain, prostate, head and neck, central nervous system, lung, breast, sarcoma, gastrointestinal and many pediatric cancers.

## Head and neck treatment with protons compared to treatment with conventional radiation/X-rays/IMRT

Protons can be controlled with greater precision than X-rays. This means that more energy goes into destroying the tumor and less radiation is delivered to surrounding healthy tissue.<sup>1</sup> For this reason, proton therapy is particularly good for treating tumors near healthy organs, including head and neck tumors.<sup>1-10</sup>

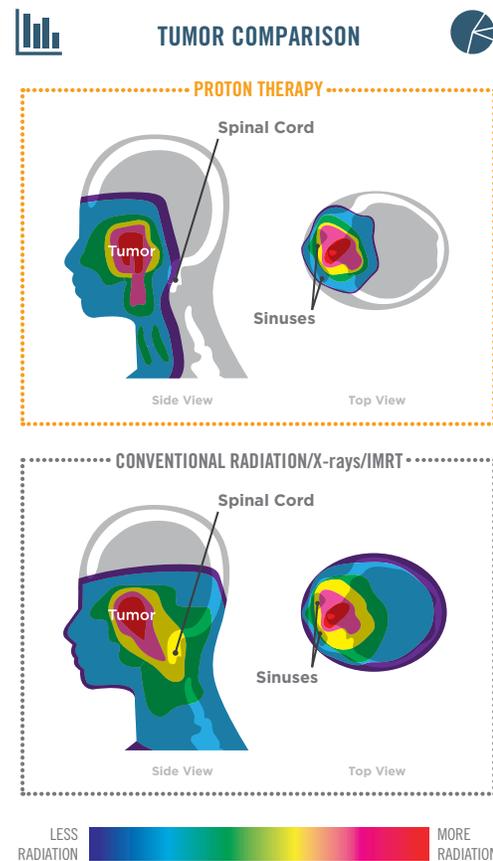
**Proton Therapy delivers significantly less radiation to the spinal cord than X-Rays, reducing the likelihood of side effects.**<sup>8,13</sup>

## Particularly effective in treating head & neck tumors

More than 60,000 Americans are diagnosed annually with head and neck cancer. When treating head and neck tumors it's critical to protect the delicate organs that surround the tumor. Proton therapy can substantially reduce damage to eyes, optic nerves, salivary glands, and other tissue and organs near head and neck tumors.<sup>7-9</sup> Proton therapy also reduces the likelihood of side effects such as blindness, hearing deterioration, and dry mouth.<sup>8</sup> Secondary malignancies are also less likely with proton therapy.<sup>7</sup>

- Head and neck tumors treated with proton therapy<sup>7,8,14</sup>
- Nasopharynx (back of the nose where it meets the throat)
- Nasal (nose) cavity
- Paranasal sinuses (sinuses in the face)
- Oropharynx (area of the throat at the back of the mouth), including the tonsils and base of tongue

In the chart below, the grey/white areas indicate no radiation exposure, while the colored areas indicate radiation exposure.



<sup>1</sup> Fowler JF. What can we expect from dose escalation using proton beams? Clin Oncol. 2003;15(1):S10-S15.

<sup>2</sup> Zhang X, Zhao K, Guerrero TM, et al. Four-dimensional computed tomography-based treatment planning for intensity-modulated radiation therapy and proton therapy for distal esophageal cancer. Int J Radiat Oncol Biol Phys. 2008;72(1):278-287.

<sup>3</sup> Komatsu S, Hori Y, Fukumoto T, Murakami M, Hishikawa Y, Ku Y. Surgical spacer placement and proton radiotherapy for unresectable hepatocellular carcinoma. World J Gastroenterol. 2010;16(14):1800-1803.

<sup>4</sup> Chang JY, Zhang X, Wang X, et al. Significant reduction of normal tissue dose by proton radiotherapy compared with three-dimensional conformal or intensity-modulated radiation therapy in stage I or stage III non-small-cell lung cancer. Int J Radiat Oncol Biol Phys. 2006;65(4):1087-1096.

<sup>5</sup> Zhang X, Li Y, Pan X, et al. Intensity-modulated proton therapy reduces the dose to normal tissue compared with intensity-modulated radiation therapy or passive scattering proton therapy and enables individualized radical radiotherapy for extensive stage IIIB non-small-cell lung cancer: a virtual clinical study. Int J Radiat Oncol Biol Phys. 2009;77(2):357-366.

<sup>6</sup> Komaki R, Seipal S, Wei X, et al. Reduction of bone marrow suppression for patients with stage III NSCLC treated by proton and chemotherapy compared with IMRT and chemotherapy. Particle Therapy Cooperative Group 47. 2008;010:14.

<sup>7</sup> Steneker M, Lomax A, Schneider U. Intensity modulated photon and proton therapy for the treatment of head and neck tumors. Radiother Oncol. 2006;80(2):263-267.

<sup>8</sup> Taheri-Kadkhoda Z, Björk-Eriksson T, Nil S, et al. Intensity-modulated radiotherapy of nasopharyngeal carcinoma: a comparative treatment planning study of photons and protons. Radiat Oncol. 2008;3:4.

<sup>9</sup> Yeung D, Malyapa RS, Mendenhall WM, et al. Dosimetric comparison of IMRT and proton therapy for head and neck tumors. Int J Radiat Oncol Biol Phys. 2006;66(3):S412.

<sup>10</sup> Rutz HP, Weber DC, Sugahara S, et al. Extracranial chordoma: outcome in patients treated with function-preserving surgery followed by spot-scanning photon beam irradiation. Int J Radiat Oncol Biol Phys. 2007;67(2):512-520.

<sup>13</sup> Chao KSC, Deasy JO, Markman J, et al. A prospective study of salivary function sparing in patients with head-and-neck cancers receiving intensity-modulated or three-dimensional radiation therapy: initial results. Int J Radiat Oncol Biol Phys. 2001;49(4):907-916.

<sup>14</sup> Chan AW, Pommier P, Deschler DG, et al. Change in patterns of relapse after combined proton and photon irradiation for locally advanced paranasal sinus cancer. Int J Radiat Oncol Biol Phys. 2004;60(1):320