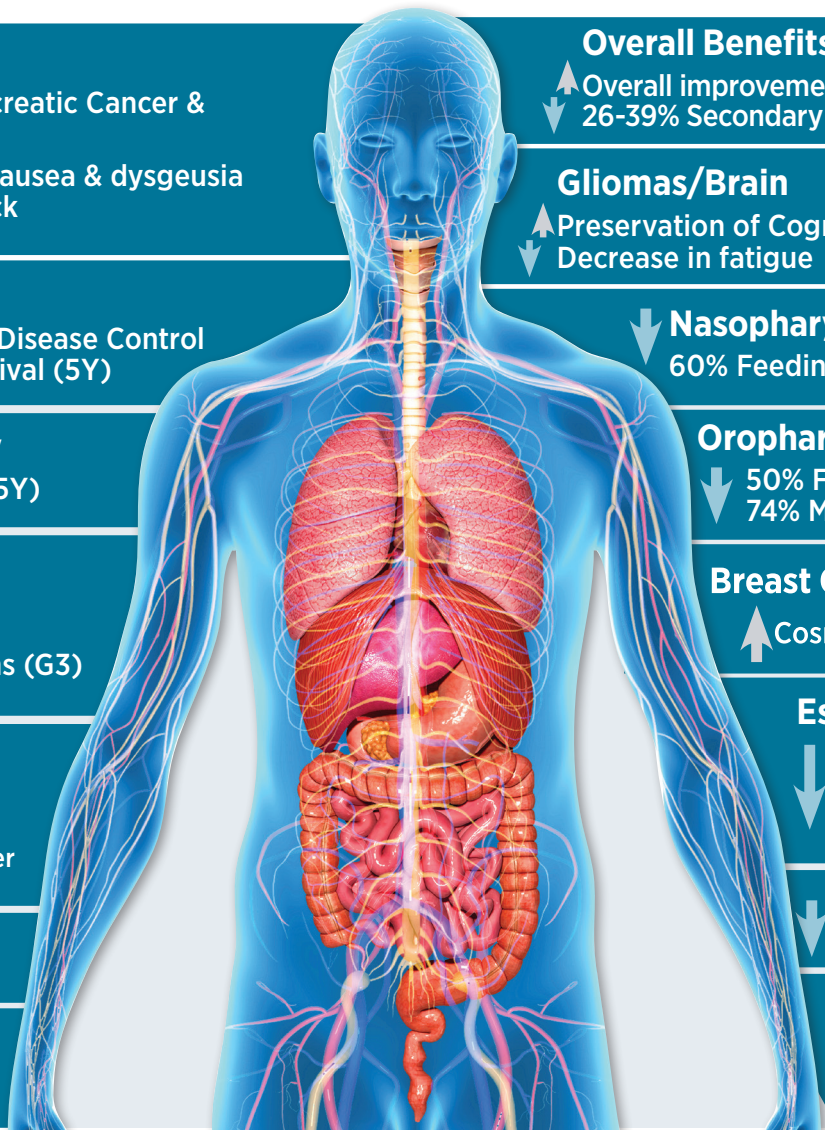


The Clinical Benefits of Proton Therapy

Compared to Conventional Radiation Treatments



Reirradiation

- ↑ Survival for Pancreatic Cancer & Quality of Life
- ↓ 35% mucositis, nausea & dysgeusia for head and neck

Chordomas

- ↑ 49%-56% Cancer Disease Control
- ↑ 153% Overall Survival (5Y)

Sinus/Nasal Cavity

- ↑ 38% Overall Survival (5Y)

Lung Cancer

- ↑ 64% Overall Survival (5Y)
- ↓ 57% Severe Lung Complications (G3)

Hepatocellular Cancer

- ↑ 58% Overall Survival (2Y)
- ↓ Significant decrease in the risk of radiation induced liver disease

Intrahepatic Cholangio CA

- ↑ 54% Overall Survival (4Y)

Sarcoma

- ↓ 49-75% Wound Complications

Overall Benefits

- ↑ Overall improvement in quality of life
- ↓ 26-39% Secondary Cancer Risk

Gliomas/Brain

- ↑ Preservation of Cognitive Function Quality of Life
- ↓ Decrease in fatigue

Nasopharynx Cancer

- ↓ 60% Feeding Tubes

Oropharynx Cancer

- ↓ 50% Feeding Tubes
- ↓ 74% Moderate-Severe Xerostomia

Breast Cancer

- ↑ Cosmesis
- ↓ Toxicities

Esophagus Cancer

- ↓ 41% Lung Complications
- ↓ 20% Hospitalization Rate
- ↓ 36% GI Toxicities

Pediatric Cancer

- ↓ Toxicities, IQ Decline, & Secondary Malignancies

Prostate Cancer

- ↑ 14%-29% Biochemical Survival (5 yrs)
- ↓ 29%-62% Severe Rectal Toxicity (G3)
- ↓ 50% Less Large Bowel Problems

Site Specific Indications

Breast

- Locally advanced (requiring IMN treatment)
- Patients with genetic syndromes (Li-Fraumeni, ATM, BRCA1/2)
- Bilateral radiation (especially with comprehensive treatment)
- Anatomic challenge (pectus excavatum or frozen shoulder)
- Significant cardiopulmonary comorbidity with inability to reduce dose with photon techniques
- Reirradiation

Central nervous system

- Low-grade/IDH mutated high grade gliomas
- Skull base/pituitary axis primary tumors
- Complex Meningiomas
- Hemangiopericytomas
- Medulloblastoma/Ependymoma
- Recurrent high-grade gliomas
- Reirradiation

Gastrointestinal

- Esophagus, especially trimodality patients
- Primary liver cancers (eg HCC, Cholangio CA)
- Locally recurrent, previously irradiated pancreas cancer
- Anal canal cancer – Chemoradiation
- Reirradiation for locally recurrent rectal cancer

Genitourinary

- Low/favorable-intermediate risk prostate cancer (especially younger patients)
- High-risk prostate cancer
- Node-positive prostate cancer
- Adjuvant/Salvage post-prostatectomy radiation
- Seminoma
- Reirradiation (consider hyperthermia)

Gynecologic

- Gross nodal disease
- Medically inoperable sarcoma
- Patients requiring para-aortic treatment
- Reirradiation (consider hyperthermia)

Head and Neck

- Unilateral Head and Neck (Parotid, High Risk Cutaneous, Well Lateralized Tonsil, Etc.)
- Nasopharynx, Paranasal Sinuses, Nasal Cavity, Base of Skull
- Oropharyngeal (Definitive and Post-TORS)
- Benign (Paraganglioma, etc.)
- Reirradiation

Lymphomas

- Young patients, who have received chemotherapy, getting RT to eloquent normal

tissue/at risk for RT induced malignances, with expected long life expectancy

- Reirradiation

Sarcomas

- Extremity/Trunk Sarcoma - Neoadjuvant/Preoperative RT
- Extremity/Trunk Sarcomas - Postoperative RT
- Retroperitoneal Sarcomas
- Spinal Tumors
- Chordoma/Chondrosarcoma of Base of Skull/Spine
- Candidates for Concurrent Hyperthermia/Radiotherapy
- Reirradiation

Thoracic

- Locally-advanced non-small/small cell lung cancer with bulky mediastinal disease
- Patients receiving pre-operative chemoradiation prior to lobectomy/pneumonectomy
- Post-operative non-small cell lung cancer patients requiring RT due to +N2 disease/positive margin
- Mesothelioma
- Ultra-central early-stage NSCLC patients (SBRT/hypofractionated treatment)
- Reirradiation