UMass Memorial Health Proton Therapy Center – Additional Information

1. The Need for Additional Proton Capacity in Massachusetts

Proton therapy in Massachusetts began nearly 50 years ago with a cyclotron housed at MIT and transitioned to a clinical setting in Boston approximately 30 years ago. According to the Particle Theory Co-Operative Group (PTCOG)[1], an average of 640 patients are treated annually with proton therapy in Boston, based on a 3-year average (2021-2023).

Over the past 15 years, proton therapy has advanced rapidly. The technology has become more compact, precise, and cost-effective, significantly improving access and expanding the range of cancer types treated with protons. This is evidenced by the growing number of proton centers across the United States and worldwide. These advancements now make it economically feasible for UMass Memorial Health (UMMH) to procure locally manufactured equipment from Mevion, a Massachusetts-based company, and to install and operate a proton therapy center in Marlborough. As cancer incidence continues to rise - and as more diagnoses demonstrate positive outcomes with proton therapy - there is an urgent and growing need to expand access to this treatment closer to where patients live. Establishing a proton center in Marlborough will reduce the burden of traveling long distances, improve continuity of care, and ensure that lifesaving treatment is more accessible to patients, throughout Central Massachusetts, the surrounding region and beyond.

As evidenced in statements quoted below in letters of support submitted to the Department of Public Health as part of the Determination of Need public comment process, current proton therapy capacity in Boston to treat patients is not sufficient to meet the need in Massachusetts and the surrounding region.

Baystate Medical Center (Dr. Michael J. Yunes) - Support for Proton Therapy & Central MA Capacity:

"For decades, the only available regional proton center was in Boston, at Mass General Hospital where significant patient backlogs have often prevented new patients from being seen in a timely manner. In addition, the distance to travel has caused a significant barrier to appropriate care for many patients."

"Proton therapy is an essential modality for many adult and pediatric diseases, both in the primary and recurrent setting."

"The excellent leadership of Dr. Fitzgerald… ensures that this endeavor will be a success for the region.

Why Me & Sherry's House (Rebecca Kuczarski) - Support for Proton Therapy & Central MA Center:

"Families in Central Massachusetts often begin their cancer care journey at UMass Memorial Medical Center in Worcester, but when a child requires specialized care, like Proton Therapy, they're sent to Boston for daily treatments. The subsequent travel adds more than just hours on the road. It separates families, stretches thin financial resources, and piles stress onto an already unbearable situation."

"Proton therapy offers a specialized, more precise form of treatment, which is especially important for reducing side effects and improving quality of life in children."

"Having Proton Therapy available in Marlborough would not only bring care closer to home, but it would also expand access to those who need it most."

The UMMH Marlborough Proton Therapy Center will help meet the clear demand for additional capacity, regionally and beyond, while improving equity, access, and outcomes for patients across the Commonwealth.

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[1] Particle Theory Co-Operative Group, 2025, www.ptcog.site.

National Association for Proton Therapy (NAPT – Jennifer Maggiore) - Support for Proton Therapy & Statewide Capacity:

"Currently, less than 9% of patients who would benefit from proton therapy have access to it, often due to geographic and logistical barriers."

"Expanding proton therapy will reduce the financial and emotional burden on patients and their families who would otherwise need to travel long distances for treatment. This step supports Massachusetts' commitment to improving healthcare access and reducing disparities in cancer care…"

"NAPT supports the expansion of proton therapy capacity in Massachusetts to ensure broader patient access to this essential treatment…"

Clark Cancer Center / Cape Cod Healthcare (Maria Giulia Cicchetti, MD) - Support for Proton Therapy & Marlborough Site:

"The most compelling reason for this initiative is the profound impact that care closer to home can have on pediatric patients and their families."

"This technology can offer these patients renewed hope, improved quality of life, and increased chance of a successful outcome."

"The acquisition of a proton machine would not only enhance UMass Memorial's capabilities but also transform the lives of countless patients and their families, allowing them to access vital care in a less disruptive manner."

Dana-Farber Cancer Institute (Dr. Benjamin L. Ebert) - Support for Proton Therapy & Regional Access:

"Proton therapy is an important part of comprehensive cancer care and there is a documented need for the technology in the region."

"We believe the region requires 14 to 19 treatment rooms to serve all patients eligible for proton therapy, yet only four (4) licensed rooms exist… all at Massachusetts General Hospital."

"UMass Memorial Health's proposed proton therapy center would help address this urgent gap, ensuring more patients in Massachusetts and New England can access this vital treatment locally."

"This approval would further the ability of patients to receive treatment in the most optimal center for their specific diagnosis and individual needs and avoid patients having to come into Boston for treatment."

2. Clinical Effectiveness – Proton vs Photon

Growing Support for and Endorsement of Proton Therapy by NCCN and ASTRO

There is growing support for and endorsement of proton therapy by the National Comprehensive Cancer Network (NCCN) and the American Society for Radiation Oncology (ASTRO).

- Between 2018–2019, NCCN guidelines described proton therapy as appropriate only when photon therapy failed to meet tissue constraints.
- From 2020–2021, they recognized growing dosimetric and toxicity-reduction benefits, especially in pediatrics and adolescent and young adult (AYA) populations.

- By 2022–2024, the guidelines expanded further to include new sites: mediastinal lymphoma, uveal melanoma, squamous cell skin cancer, vaginal cancer (re-irradiation), neuroblastoma, and thymic malignancies. Robust planning tools such as plan robustness evaluation were also mentioned.

- In 2025, NCCN consolidated these advances with further endorsement of proton therapy for retroperitoneal sarcomas (with motion management and 4D-CT), Central Nervous System (CNS) tumors with re-irradiation protocols and leptomeningeal metastases, skin cancers (e.g., Merkel cell, basal cell), and T-cell lymphomas with expanded OAR definitions and precision planning.

Similarly, ASTRO's 2023 Model Policy classified proton therapy as medically necessary for Group 1 indications (e.g., pediatric tumors, ocular/base of skull tumors, esophageal and hepatocellular cancers, and re-irradiation) and emphasized robust individualized planning using DVH analysis and genetic risk profiles.

Clinical Scenarios Where Proton Therapy is needed

Major clinical contexts in which photon therapy is inadequate and proton therapy becomes a need:

- Pediatric Malignancies: proton therapy reduces risks of neurocognitive impairment, endocrine dysfunction, hearing loss, growth abnormalities, and secondary malignancies. For medulloblastoma, it preserves IQ and reduces cochlear and pituitary exposure.

- Head & Neck Cancers: proton therapy lowers mucositis, feeding tube use, osteoradionecrosis, and narcotic use while maintaining outcomes.

- Thoracic Cancers: proton therapy reduces heart/lung dose, grade ≥3 toxicities, lymphopenia, and improves post-op outcomes in lung and esophageal cancer.

- Re-irradiation: proton therapy permits curative doses in previously irradiated fields with lower complication risk. ASTRO recognizes re-irradiation as a Group 1 indication.

- Base of Skull Tumors: proton therapy is standard for chordomas/chondrosarcomas. It enables high-dose conformity while sparing critical structures like the brainstem and optic nerves.

Disease-Specific Dosimetric and Toxicity Data in Support of Clinical Necessity

Comparative effectiveness of proton therapy across multiple cancers:

- Brain Tumors: proton therapy reduces radiation-induced IQ loss, especially in processing speed and working memory, with better sparing of cochlea and endocrine structures.

- Head and Neck: Recent Level 1 evidence further strengthens the case: a multi-institutional Phase III trial Intensity Modulated Proton Therapy (IMPT) vs. Intensity-Modulated Radiation Therapy (IMRT) for oropharyngeal cancer demonstrated a significant overall survival benefit (90.9% vs. 81.0%) and reduced gastrostomy tube dependence, confirming IMPT as a new standard of care in this setting.[2].

- Lung and Esophageal Cancer: Phase II trials and meta-analyses confirm lower toxicity burden, shorter hospital stays and reduced 90-day mortality and lymphopenia.

[2] Frank, Steven J., et al. "Intensity-Modulated Proton Therapy vs. IMRT for Oropharyngeal Cancer: Final Results of a Multi-Institutional Phase III Randomized Trial." *Plenary Session, 63rd Annual PTCOG Meeting*, Buenos Aires, Argentina, June 2025.

- Secondary Cancer Risk: National Cancer Database study links proton therapy to lower second malignancy rates across nine tumor types.

Conclusion

For an increasing number of cancers, proton therapy is not simply a technological upgrade - it is a clinical imperative. Where photon therapy compromises outcomes or increases risk, proton therapy delivers better disease control with fewer side effects, especially in children, re-irradiation, complex anatomical sites, and thoracic malignancies. Proton therapy lowers overall cost via fewer hospitalizations, reduced complication rates, and improved work productivity. The MD Anderson pilot showed no increase in total cost of care with expanded proton access.[3]

3. Payor Reimbursement – Proton vs Photon

Below is a table that provides a side-by-side rate comparison of photon and proton radiation therapies as well as the weighted average of these rates based on the anticipated payor mix that has been assumed in the financial model. These rates reflect estimated reimbursement for patients receiving on average 24 proton treatments throughout the course of their care, which is consistent with UMMMC's LINAC average treatment visits per patient.

The rate differential between the two types of radiation therapy services (proton vs photon) takes into consideration the differences of both required capital spend and increased operational cost of running the two different units. As noted in the Lancet Oncology "Global democratization of proton radiotherapy, "a single-room treatment unit costs from US$30 to $50M, whereas conventional x-ray systems cost up to about $6 million."[4] Until recently these single gantry proton units weren't available making the cost of purchasing this advanced form or cancer treatment out of reach for most health systems throughout the country. Even with today's proton unit being more affordable it still represents an investment that is 5 to 8 times higher than traditional photon units.

From an operational perspective this advanced technology also requires a higher level of staffing to support not only the day-to-day patient needs, but also routine quality and service requirements during off hours. Additionally, there is a higher maintenance cost to keep the proton unit running properly compared to a traditional photon unit (~$2.0M to $2.6M for proton vs $250K to $300K for photon units).

Medicare and Medicaid payors (which represent 67% of the planned UMMH proton payor mix) do not allow providers to negotiate prices as they are set by the federal and state governments. The commercial payor rates below have been consolidated to ensure that negotiated rates are not publicly disclosed. While the commercial rates listed below for proton therapy represent higher reimbursement compared to photon therapy, UMMH expects that its proton therapy rates are lower than MGH's proton rates based on the most recent publicly available CHIA outpatient relative pricing data (2022) as presented in Exhibit E page 2 of the DoN application. Additionally, it worth noting that the reimbursement rates provided below likely show a greater cost differential than actually exists because the photon reimbursement rates do not take into account the additional costs that result from increased complications and readmissions after photon treatment nor do they consider the additional personal costs that patients and families incur because of these complications and readmissions.

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[3] Ning, Matthew S., et al. "Three-Year Results of a Prospective Statewide Insurance Coverage Pilot for Proton Therapy: Stakeholder Collaboration Improves Patient Access to Care." *JCO Oncology Practice*, vol. 16, no. 9, Sept. 2020, pp. e966–e976, https://doi.org/10.1200/jop.19.00437. Accessed 27 Feb. 2022.

[4] The Lancet Oncology; Volume 24, Issue 6, June 2023, pages e245-e254; Global Democratisation of Proton Radiotherapy; authored by Susa Yan PHD, Prof Twalib A Ngoma MD, Prof Wildfred Ngwa PhD, Prof Thomas R Bortfeld PhD https://www.sciencedirect.com/science/article/abs/pii/S1470204523001845

		Reimbursement Rates			Weighted Avg by Payor Group		
Payor Group	Payor Mix	Proton Therapy	Photon Therapy	Variance	Proton Therapy	Photon Therapy	Variance
Medicare	55%	40,449	18,687	21,762	22,223	10,267	11,956
Medicaid	12%	38,520	12,368	26,152	4,784	1,536	3,248
Commercial	33%	91,136	43,841	47,295	26,846	13,170	13,676
Combined Avg		56,702	24,965	31,737	53,854	24,973	28,881

4. Access to a Proton Facility in Rhode Island is Not a Substitute for the Proton Therapy Center in Marlborough

While the new Rhode Island Proton Center will improve access for patients in Rhode Island (and other out of state proton centers will improve access for patients in the state where the proton center is located), the Rhode Island facility is not a substitute for the Proton Therapy Center in Marlborough for several reasons.

First, the Rhode Island facility's projected capacity is limited to treating approximately 26 patients per day by 2029 - less than a tenth of the estimated annual need for proton therapy in Massachusetts, which exceeds 3,877 patients. Second, based on UMMH's cancer incidence model applied to Rhode Island's population and assuming a total annual capacity at the Rhode Island facility of 300 patients, the Rhode Island patient need for proton therapy would require two proton units. Accordingly, the new Rhode Island facility will not meet the need of patients in Central Massachusetts for proton therapy. Third, as more fully described below, out-of-state care poses significant access barriers for many Massachusetts residents, including travel burden, network restrictions, and insurance coverage limitations - especially for patients with MassHealth, HMO plans which limit coverage to a limited network of providers, and those requiring prior authorization to use out-of-network providers.

The payer mix is different in Rhode Island where national insurers have more market share than in Massachusetts and Rhode Island hospitals and physicians may not be contracted with Massachusetts health plans, including for example Harvard Pilgrim (Point32), Fallon, and Health New England. These network issues can lead to access challenges for patients and the potential for higher patient copays for out-of-network providers for those patients who do have out-of-network benefits. MassHealth members are particularly affected, as many providers do not accept out-of-state Medicaid plans. Finally, expecting Massachusetts patients to seek care in Rhode Island will lead to fragmented care, reduced continuity, and logistical and financial burdens that disproportionately affect underserved populations.

Access Barriers Associated with Prior Authorization

Further, treatment delays may occur due to the administrative burden of securing prior authorizations, negotiating individual patient agreements, and navigating appeals processes for out-of-network care. These delays can adversely impact clinical outcomes and survival rates. Directing patients away from in-state providers fragments care, disrupts continuity, and may lead to increased healthcare utilization and costs over time.

UMMH's Responses to DoN Program's Requests for Clarification

Regarding Question 1: The chart says "new starts" is that how many you expect? Or is UMMH saying that is one Unit's capacity? We need to know what the capacity of the unit is. My calculations based on 30 mins/treatment came up to about 290 patients per year. Is that consistent with yours?

Response: “new starts” removed, and unit capacity noted in Question 1 Response submitted concurrently with this response.

Regarding Question 4: It says currently 640 patients on average receive Proton Therapy in Boston. Do you mean 640 of UMMHC’s oncology patients, or 640 from Worcester County?

Response: We do not have information about the county from which the proton therapy patients reside. 640 is the annual average of patients treated in Boston according to data reported to PTCOG from 2021-2023.