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Trend of Electron Modality Usage over the Last Five Years In a Large Academic Clinic

Sung-Woo Lee, PhD[1]; Weiguang Yao, PhD[2]; Steven Bartolac, PhD[1]
[1]University of Maryland School of Medicine, [2]Georgetown University Hospital

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Abstract

Electron beam therapy is traditionally preferred for treating shallow tumors such as skin lesions or postoperative keloids. These treatments are often delivered using a single beam with visual setup and without kV or MV image guidance. Despite the simplicity of preparation and delivery, the clinical use of electron therapy has steadily declined. In particular, utilization of higher-energy electrons (16 and 20 MeV) has decreased sharply.

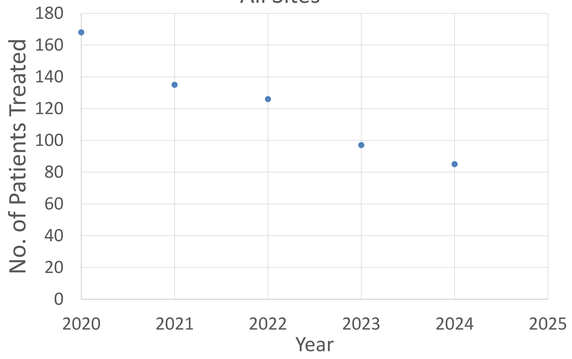
Introduction

The aim of this study is to evaluate a five-year trend in electron beam usage across a large academic radiation oncology network and to assess the clinical relevance of maintaining higher-energy electron options. Clinical utility limited due to gradual falloff at depth.
Query results show only 1 patient treated with 20 MeV across five sites within last 5 years. This beam historically less stable compared to other energies. Suggests that decommissioning the 20 MeV beam would have little if any clinical impact and would reduce the burden of maintaining the beam across all centers

Methods and Materials

University of Maryland Medical Center composed of 6 photon clinic sites. All of them use the Varian ARIA as the EMR system. The specific data used in this study has been extracted using an in-house script. Although minor site-to-site differences in electron usage were observed depending on planners and physician's choices, the overall trend consistently showed a decline across the network. Electron therapy utilization declined from 168 patients in 2020 to 85 patients in 2024 (see Fig.1). Over the five-year period, a total of 5,103 electron treatment fractions were delivered across

Fig. 1. Total Patients Treated with Electrons - All Sites



Results

By energy level, the number of patients treated was 250, 199, 135, 26, and 1 for 6, 9, 12, 16, and 20 MeV, respectively (see Fig. 2). In clinical practical use, 6–12 MeV electrons accounted for the vast majority of treatments, while 16 and 20 MeV were rarely used (see Fig. 3). Notably, only a single patient received 20 MeV treatment during the entire study period. These findings will help guide decisions regarding the maintenance and allocation of electron modalities on a daily, monthly, and annual basis to ensure that resources align with actual clinical demand. In addition, this study evaluates electron beam energy utilization over time within a modern academic radiation oncology network.

Fig.2 Number of Patients Treated- All Sites

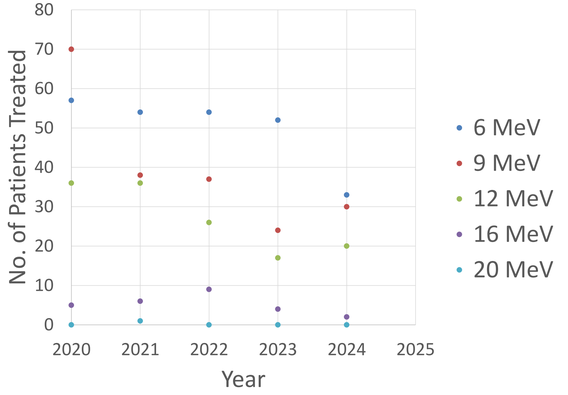
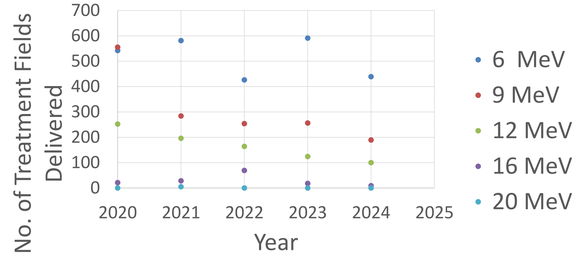


Fig. 3. Electron Fields Delivered - All Sites



Discussion

The results demonstrate a paradigm shift in the treatment approach for shallow targets, with a decline in the use of higher-energy electron beams. Current utilization trends suggest that the 20 MeV beam has become obsolete, and that the clinical utility of the 16 MeV beam is in rapid decline, ultimately approaching a point at which continued maintenance is also no longer justifiable.

Conclusions

Electron therapy usage has steadily declined over the past five years at our institution, largely due to the adoption of VMAT and 3DCRT techniques for cases historically treated with electrons. The extremely limited use of 20 MeV—only one patient over five years—reflects its reduced clinical utility, likely due to limited depth-dose characteristics and historically lower beam stability. These findings support the decision to decommission the 20 MeV beam, which is expected to have minimal clinical impact while reducing maintenance burden across all centers. The beam was formally decommissioned in Fall 2025.

Contact

Sung-Woo Lee, PhD
University of Maryland School of Medicine
Email: sungwoolee@umm.edu
Website: https://www.medschool.umaryland.edu/profiles/lee-sung-woo/
Phone: 410-801-5408

References

1. Shin-Hyung Park and Jae-Chul Kim, "Comparison of Electron and X-Ray Beams for Tumor Bed Boost Irradiation in Breast-conserving Treatment," Journal of Breast Cancer September 16(3): 300-307.
2. Renard S, Parent L, de Marzi L, Tsoutsou P, Kirova Y. "Electron radiation therapy: Back to the future?" Cancer Radiotherapy 2024 Nov;28(6-7):553-559. doi: 10.1016/j.canrad.2024.07.013. Epub 2024 Oct 10