DOSIMETRIC INVESTIGATION OF THE EFFECTS OF DOSE CALCULATION ALGORITHMS AND DIFFERENT GRID SIZE VALUES ON THE TREATMENT PLAN IN RADIOTHERAPY FOR PATIENTS WİTH LEFT BREAST CANCER

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- ✓ Breast cancer
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- ✓ algorithm
- ✓ Grid size

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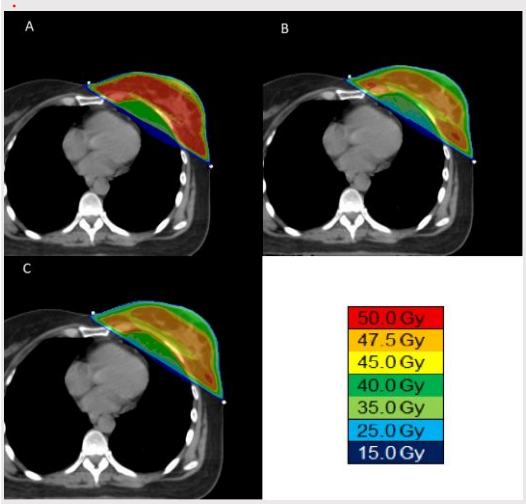

THESIS ABSTRACT

This study comparatively evaluates the effects of different dose calculation algorithms and grid size values on treatment planning accuracy in radiotherapy for locally advanced left-sided breast cancer. In the planning process, a total of 15 different treatment plans were generated for each patient using Field-in-Field (FIF) and Volumetric Modulated Arc Therapy (VMAT) techniques with various algorithm and grid size combinations.
The treatment plan created using the Monte Carlo algorithm with a 1.5 mm grid size was accepted as the reference plan, and all other plans were dosimetrically compared with this reference. According to the Monte Carlo algorithm, the lowest calculation accuracy was observed with the Pencil Beam algorithm. Although the Collapsed Cone algorithm produced results closer to the reference algorithm compared to Pencil Beam, noticeable differences in dose calculations were still observed. It was also found that increasing the grid size led to significant differences in dose calculations within the treatment plans. Despite providing shorter calculation times, a 5 mm grid size resulted in considerable deviations in dose distribution compared to the 1.5 mm grid size. Although a 3 mm grid size yielded results closer to those obtained with 1.5 mm, notable differences in dose calculations were still observed.

APPLICATION AREAS OF THE THESIS RESULTS

The results obtained from this study may contribute to the selection of algorithms and grid size values in clinical treatment planning processes, as well as to the existing literature by enabling a comparative evaluation of dose calculation accuracy associated with these parameters in FIF and VMAT techniques.

ACADEMIC ACTIVITIES

1. Guzsoy, K., Kahraman, A., Gözcü Tunç, S., Cayırlı, O., Abbak, Ö., & Kahraman Çetintaş, S. (2025). The impact of different grid size values and dose calculation algorithms on plan accuracy in VMAT (Volumetric Modulated Arc Therapy) for breast cancer radiotherapy. *Uludağ Üniversitesi Tıp Fakültesi Dergisi, 51*(3), 1–5. doi:10.32708/uutfd.1762554.