

## عنوان مقاله:

Suitability Assessment of an Indigenous Heterogeneous Thoracic Phantom for Patient-Specific Quality Assurance in Radiotherapy

## محل انتشار:

مجله فیزیک پزشکی ایران, دوره 19, شماره 2 (سال: 1401)

تعداد صفحات اصل مقاله: 6

## نویسندگان:

Vinod Gangwar - *Department of Physics Bareilly College Bareilly, Uttar Pradesh Medical Physics Division & Radiation Oncology Department, Apollo Medics Hospital, Lucknow*

Avinash Agarwal - *Department of Physics Bareilly College Bareilly, Uttar Pradesh*

Om Prakash Gurjar - *Government Cancer Hospital, Mahatma Gandhi Memorial Medical College, Indore*

Lalit Kumar - *Department of Medical Physics, Rajiv Gandhi Cancer Institute and Research Center, New Delhi*

Vineet Kumar Mishra - *Medical Physics Division & Radiation Oncology Department, Apollo Medics Hospital, Lucknow*

Surendra Mishra - *Department of Radiation Oncology, Dr. Ram Manohar Lohia Institute of Medical sciences, Lucknow, India*

## خلاصه مقاله:

**Introduction:** Patient-specific quality assurance (PSQA) assumes a vital role in precise and accurate radiation delivery to cancer patients. Since the patient body comprises heterogeneous media, the present study aimed to fabricate a heterogeneous thoracic phantom for PSQA. **Material and Methods:** Heterogeneous thoracic (HT) phantom was fabricated using rib cage made up of bone equivalent material, kailwood to mimic lungs and wax to mimic various body parts. Physical density of all these materials used in phantom fabrication was measured and compared with that of the corresponding part of actual human thorax. One beam was planned on the computed tomography (CT) images of phantom and actual patient thorax region. Dose distribution in both the plans was measured and analyzed. **Results:** The estimated densities of heart, lung, ribs, scapula, spine, and chest wall tissues were  $0.804 \pm 0.007$ ,  $0.186 \pm 0.010$ ,  $1.796 \pm 0.061$ ,  $2.017 \pm 0.026$ ,  $2.106 \pm 0.029$  and  $0.739 \pm 0.028$  respectively in case of HT phantom while  $1.038 \pm 0.010$ ,  $0.199 \pm 0.031$ ,  $1.715 \pm 0.040$ ,  $2.006 \pm 0.019$ ,  $1.929 \pm 0.065$  and  $0.816 \pm 0.028$  g/cc, respectively in case of actual human thorax region. The depths of isodose curves in HT phantom were also comparable to the isodose curve's depths in real patient. PSQA results were within  $\pm 3\%$  for flat beam (FB) and flattening filtered free beam (FFF) of 6 megavolts (MV) energy. **Conclusion:** Density and dose distribution pattern in HT phantom were similar to that in actual human thorax region. Thus, fabricated HT phantom can be utilized for radiation dosimetry in thoracic cancer patients. The materials used to develop HT phantom are easily available in market at an affordable price and easy to craft.

## کلمات کلیدی:

Algorithm, Heterogeneous Phantom, Quality Assurance

