Perspective
Volume 13:10, 2022

Journal of
Nuclear Medicine & Radiation Therapy

ISSN: 2155-9619

Open Access

Clinical Nuclear Oncology Using KSNM60

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Introduction

A nuclear scanner is a medical imaging device that uses radioactive isotopes to create images of the internal structures of the body. It is also known as a gamma camera or scintillation camera and it is a critical tool for diagnosing and monitoring various medical conditions. Nuclear scanners work by detecting gamma radiation emitted by the isotopes, which are introduced into the body either orally or intravenously. The concept of nuclear scanning has been around for several decades and it has undergone significant advancements in technology and design. The modern nuclear scanner is a highly sophisticated device that can produce high-resolution images of the body with exceptional clarity and detail. The device comprises a large, circular detector that surrounds the body and a computer system that processes the data collected by the detector [1].

Description

The effect of marginally skewing the IXSI modalities (in an off-center calculation) was explored for the decrease of the fluoroscopic and atomic impedance. By quantifying the reconstructed NEMA image quality phantom and determining the spatial resolution and sensitivity of point sources, the 2D and 3D nuclear image quality of IXSI was compared to that of a clinical SPECT/CT scanner. A clinical CBCT scanner's 2D and 3D fluoroscopic images of IXSI were contrasted with those of a Fluorad A+D image quality phantom and a reconstructed liver nodule phantom. Finally, injecting 99mTc and iodinated contrast into an anthropomorphic phantom demonstrated the viability of dynamic simultaneous nuclear and fluoroscopic imaging.

The SPECT/CT facility has a height of 5.3 meters and RC that is 20 cm thick on the ground and ceiling of each floor. These walls are separate in the control rooms (A-D) and the imaging rooms (A1–D1) of this facility and they are 30 cm thick RC and 5 mm thick Pb equivalent. The injection room (I) and the radioimmunoassay laboratory (E) are also separated by 30 cm-thick RC walls and 3 mm-thick Pb equivalent. The new ITC and SPECT/CT facilities are separated by a corridor (R5-8) of 1.5 meters in width. The linear accelerators (Axesse and Elekta Synergy) are operated by the Department of Radiation Oncology (RO), which is located close to the NM and 30 meters away. On the same basement floor as the NM, a self-shielded cyclotron, RDS-111, CTI, operates 35 meters away (B1).

The process of nuclear scanning begins with the administration of a radioactive isotope into the patient's body. The isotope is selected based on the specific condition being diagnosed or monitored. For example, iodine-131 is used to image the thyroid gland, while technetium-99m is used for bone scans. Once the isotope has been administered, the patient is positioned on the scanner bed, which slides into the detector. As the isotope decays, it emits gamma radiation, which is detected by the detector. The detector consists of a scintillation crystal that converts the gamma radiation into visible light, which is then detected by a photomultiplier tube. The photomultiplier tube converts the light into an electrical signal, which is then processed by the computer system. The computer system uses complex algorithms to reconstruct the data collected by the detector into images that can be interpreted by a radiologist or other medical professional.

One of the significant advantages of nuclear scanning is its ability to provide functional information about the body's internal structures. For example, a nuclear scan can show how blood is flowing to various organs and tissues, which can be used to diagnose circulatory disorders. It can also provide information about how different organs are functioning, such as the kidneys or liver. Another advantage of nuclear scanning is its ability to detect abnormalities in the early stages of development. This is particularly important for conditions such as cancer, where early detection can significantly improve the chances of successful treatment. Nuclear scanning can also be used to monitor the progression of certain conditions, such as heart disease or cancer [2-5].

Conclusion

In conclusion, despite its many benefits, nuclear scanning does come with some risks. The most significant risk is exposure to radiation, which can be harmful to the body in large doses. However, the amount of radiation used in nuclear scanning is generally considered to be safe and the benefits of the procedure usually outweigh the risks. One of the most common uses of nuclear scanning is in the diagnosis and monitoring of cancer. Nuclear scans can detect cancerous tumors, as well as monitor how well a patient is responding to treatment.

Acknowledgement

None.

Conflict of Interest

None.

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Received: 28 September, 2022, Manuscript No. jnmrt-23-90704; **Editor Assigned:** 30 September, 2022, PreQC No. P-90704; **Reviewed:** 14 October, 2022, QC No. Q-90704; **Revised:** 20 October, 2022, Manuscript No. R-90704; **Published:** 28 October, 2022, DOI: 10.37421/2155-9619.2022.13.515

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How to cite this article: Moon, Seung. "Clinical Nuclear Oncology Using KSNM60." J Nucl Med Radiat Ther 13 (2022): 515.