

Method Using Radiochromic Films to Measure the CT Dose of Female Breast During SPECT/CT Imaging

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Purpose

The objective of this work was to test the feasibility of in-vivo dosimetry method to be used for the assessment of entrance surface dose (ESD) on female breast from the computed tomography (CT) part of routine clinical SPECT/CT examinations. The difficulty of the problem resides in the fact that the film dosimeter is irradiated both by the radiopharmaceutical and the x-rays from the CT. the proposed method aims to resolve such difficulty.

Materials &Methods

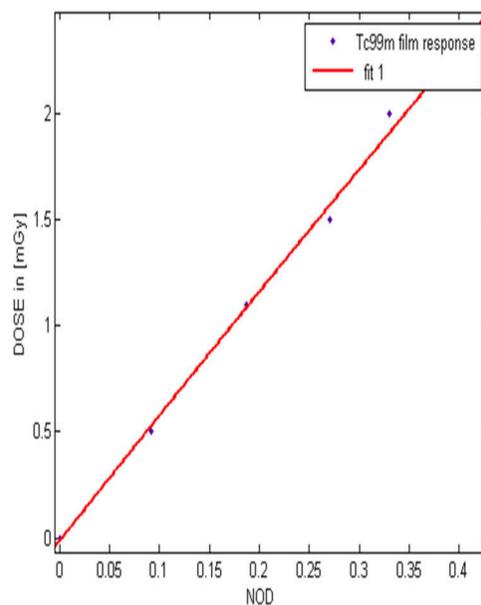
After studying the difference of the films' energy response between the CT polychromic x-ray radiation and Tc-99m mono-energetic radiation, and measuring the effect of exposure due to the SPECT part of the exam on the film response; two pieces of XRQA2 films were placed on the patient surface.

The first film was withdrawn at the end of the SPECT acquisition time and the second film immediately after the CT scanning part of the examination.

The radiation dose from the CT was calculated as the difference between the reflected optical densities from the two films.

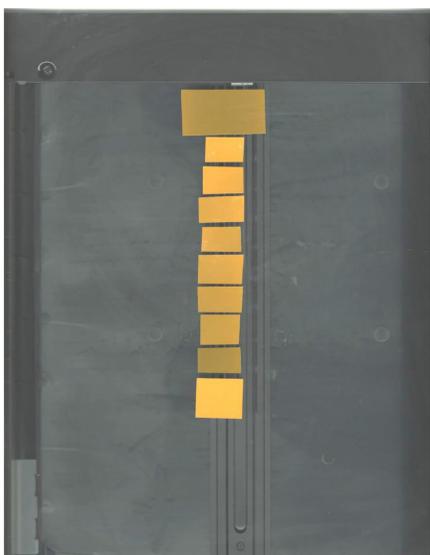
Results

The radiation dose levels on the patients' skin surface due to the injected radiopharmaceutical were low in magnitude compared with the dose values measured from the CT component of the examination. Results were compared with the scanner registered $CTDI_{(vol)}$. The measured doses were compared with the ones published in the scientific literature

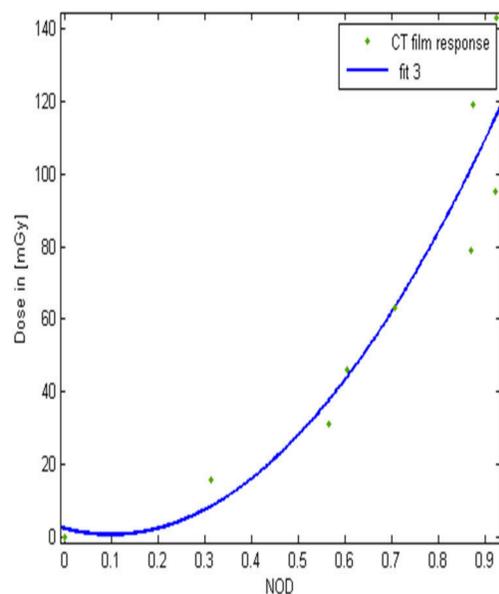


Films response to irradiation using Tc-99m

Materials &Methods



Films irradiated at the surface of a phantom containing Tc-99m



Films response to irradiation using CT scanner

Conclusion

The proposed method allows for real patient ESD measurement of the CT component of the SPECT/CT imaging examinations allowing valuable data that can be applied to estimate the radiation dose and risk of exposure to a range of radiosensitive organs such as the gonads, thyroid and the eyes when applicable. The method did not interfere negatively with the image quality of the radiological examination. The technique can be applied easily in the clinical practice when necessary or as part of the annual quality assurance testing of the SPECT/CT imaging system.

References

Stabin, Michael G.; da Luz, Lydia C.Q.P., Decay Data for Internal and External Dose Assessment, Health Physics Volume 83:471-475, 2002.

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