

## عنوان مقاله:

Optimization of Energy Window and Collimator for Y-90 Bremsstrahlung SPECT imaging: A Monte Carlo Simulation Study

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## نویسندگان:

Hicham Asmi - *Department of Physics, LPHE, Modeling and Simulations, Faculty of Science, Mohammed V University, Rabat, Morocco*

Farida Bentayeb - *Department of Physics, LPHE, Modeling and Simulations, Faculty of Science, Mohammed V University, Rabat, Morocco*

Youssef Bouzekraoui - *Department of Physics, LPHE, Modeling and Simulations, Faculty of Science, Mohammed V University, Rabat, Morocco*

Faustino Bonutti - *Academic Hospital of Udine, Department of Medical Physics, Udine, Italy*

sanae douama - *Department of Physics, LPHE, Modeling and Simulations, Faculty of Science, Mohammed V University, Rabat, Morocco*

## خلاصه مقاله:

**Introduction:** In yttrium-90 imaging, image quality is highly dependent on the selection of energy window and collimator design because the Y-90 bremsstrahlung photons have a continuous and broad energy distribution. The current study aimed to optimize the bremsstrahlung energy window setting and collimator for the improvement of both resolution and sensitivity. **Material and Methods:** In the present study, simulation of medical imaging nuclear detectors (SIMIND) Monte Carlo program was used to simulate Siemens Medical System Symbia. The SIMIND was utilized to generate the Y-90 bremsstrahlung single-photon emission computed tomography (SPECT) projection of the point source. Six energy windows settings and two collimators denoting medium energy and high energy were used in order to assess the effect of the energy window on the resolution. **Results:** The experimental measurements and simulation results showed a similar pattern in the point spread functions with the energy window. The simulation data indicated that the geometric component reached 73% for the energy window within the range of 51-120 keV using the high-energy (HE) collimator. In addition, the obtained results showed that the full width at half maximum (FWHM) and full width at tenth maximum (FWTM) (FWHM=7mm and FWTM=35mm) were higher in this window in comparison to those reported for other windows. **Conclusion:** According to the obtained results of the present study, the optimal energy window for Y-90 bremsstrahlung SPECT imaging was within the range of 51-120 keV. The obtained optimal energy window and optimal HE collimator had the potential to improve the image resolution and sensitivity of Y-90 SPECT images

## کلمات کلیدی:

Y, 90 SPECT imaging Monte Carlo

