**Title**

**Quantification in SPECT/CT: Calibration, methodology during Q.Metrix software implementation.**

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**Introduction: Although widely emphasized, quantification in single photon emission computed tomography (SPECT) is still questionable. Coupling this modality to X ray CT (SPECT/CT) increases its capabilities in terms of quantitative information. Q.Metrix software (General Electric) is a good example. The purpose of this work is to propose a methodology to minimize bias when Tc-99m quantification is needed.**

**Material and Method: As Tc-99m is largely used in nuclear medicine, the images obtained are significantly different in terms of shape and uptake (e.g. diffuse pulmonary versus bone scintigraphy). To take into account these characteristics, a well adapted coefficient has to be determined. We implemented two phantoms. The first, Torso phantom from Data Spectrum with pulmonary and hepatic inserts, is well adapted to simulated the initial workup before selective internal radiation therapy (SIRT) with Y-90 microsphere. The second, NEMA IEC Body Phantom including 6 hollow sphere (0.5 to 26.5 mL), allows the simulation of clearly delineated uptake as encountered in bone imaging. Acquisitions was performed on a Discovery NM/CT 670 (General Electric) gamma camera. All acquisition and reconstruction conditions were identical to those used in clinical practice (15 s and 6 ° by projection, 128x128 matrix, OSEM 10 subsets / 2 iterations, 3D post filtering Butterworth 10 / 0.50). Finally, the coefficients of sensitivity were determined by 3D segmentation of SPECT or CT images after scaling (256x256).**

**Results: Large area uptake, Torso phantom – Sensitivity coefficient (72.4 cps/s/MBq) was determined from the activity contained in the liver insert. Applying this factor to right and left pulmonary inserts the differences between measured and contained activities is respectively equal to -4.4 and -4.3%. These results were obtained for a liver to lung ratio in radioactive concentration of 3.3. Once referred to the individual organ’s volumes this value matches to a 15% pulmonary shunt. Small area uptake, NEMA IEC phantom – When the largest sphere is considered and for an arbitrary concentration ratio of 20, the coefficient of sensitivity is equal to 50 cps/s/MBq if a threshold of 40% is applied. Appling this coefficient to all spheres the differences are between -0.3 and -27%, the smallest volume resulting in the largest difference.**

**Conclusion:** The results obtained in this study are consistent regarding the properties of the images obtained in SPECT/CT. In this context Q.Metrix maintains a good potential as long as the coefficient of sensitivity is determined considering clinical situations.