

Poster Session : P23

Initial dose audit results obtained from a high resolution DBT System in a Symptomatic Setting

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Cork University Hospital has just commissioned the first of three new high resolution digital breast tomosynthesis (DBT) systems for use in its Breast Imaging Unit (BIU). The Hologic 3Dimensions DBT incorporates new detector technology which enables rapid acquisition of higher-resolution 3D images. Results presented by the national breast screening programme indicate that the average breast dose from 3D exposures can exceed 2D exposures by up to 30%. A dose audit of the new DBT unit was performed to assess the impact of 3D imaging on the breast dose of the symptomatic population attending CUH. The dose audit used the exposure data from at least 50 examinations and dose calculations were performed using NCCPM breast dose survey software. Breast dose was calculated in terms of the mean glandular dose (MGD) for each 3D image in accordance with Dance et al. Dose audit results from the new DBT system were found to be similar to values obtained by the national screening programme. DBT breast dose performance was evaluated by comparing the average MGD of a standard-sized breast with the national DRL for 3D breast imaging established by the screening programme. Dose performance of the new DBT system was thus found to be acceptable, providing justification for clinical use.

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Poster Session : P24

Objective evaluation of imaging performance using a commercially available spherical lesion anechoic phantom

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The nature of ultrasound imaging makes it challenging to perform quantitative quality control tests representative of clinical performance. IPeM Report No. 102 outlines several different tests which monitor aspects of the systems performance likely to affect the clinical efficiency following deterioration and change. Such tests include measurement of axial and lateral resolution, slice thickness, contrast resolution and low contrast penetration using ultrasound phantoms. Such phantoms consist of cylindrical objects and wire filaments embedded within homogeneous tissue-mimicking material. The ability of an ultrasound system to resolve the contrast difference between the cylindrical targets and background is regarded as an indicator of imaging performance; however, cylindrical targets are not necessarily representative of the clinical situation where ellipsoidal or spherical lesions may be considered more appropriate. To date, spherical lesion target phantoms have been produced in specialist research laboratories and are, thus, not widely available. Accordingly, this study sought to examine a relatively new commercially available anechoic spherical lesion phantom to determine its efficacy for objective evaluation of performance change. Several modern medical ultrasound systems were tested using the Gammex RMI 408 Spherical Lesion target phantom, containing 2mm and 4mm diameter anechoic spherical targets located within one plane throughout the phantom depth. A Matlab® program was used for automatic objective image quality analysis. Preliminary results will

be presented on the automated objective evaluation, metric repeatability and reproducibility. Simulated probe faults will be used to establish test efficacy and the results will be compared to traditional QA testing.

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Poster Session : P25

Estimating I-131 Thyroid Uptake from Tc-99m scintigraphy: Implication for calculated I-131 Therapy Activities in Benign Thyroid Disease

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For benign thyroid disease, pre-therapeutic radioiodine (¹³¹I) dosimetry is recommended given that higher quality of care can be achieved by personalised radioiodine patient treatment (Salvatori and Luster 2010). Pre-therapeutic dosimetry evaluates the ¹³¹I kinetics of the thyroid, and calculates ¹³¹I uptake (¹³¹IU) function, which is used to calculate the radioiodine-therapy administered activity. Thyroid technetium-99m (^{99m}Tc) scintigraphy also forms part of patient diagnosis and ^{99m}Tc uptake (^{99m}TcU) can be estimated from this scan. Studies have demonstrated the use of ^{99m}TcU to estimate the ¹³¹IU and, hence, eliminate the need for ¹³¹IU assessment (Smith et al. 1990; Gorur et al. 2009; Szumowski et al. 2016); however, the question remains as to whether ^{99m}TcU may accurately reflect ¹³¹IU or whether results in an uncertain prescribed ¹³¹I therapy activity. Accordingly, ¹³¹IU with ^{99m}TcU datasets were compared for a patient cohort examined between 2012 and 2018. The factors affecting ^{99m}TcU accuracy, including demographic data and laboratory thyroid function test, were analysed. The study sample comprised 133 patients (100 women and 33 men) diagnosed with Graves' disease (55%), multi-nodular goitre (21%) and toxic nodules (25%). Results showed the correlation between ^{99m}TcU and ¹³¹IU is significantly more pronounced in men than women ($R^2 = 0.90$ vs. $R^2 = 0.27$, respectively). The study could not estimate ¹³¹IU based on ^{99m}TcU. It was shown that other investigated parameters affected the correlation between the two. It demonstrates how the use of ^{99m}TcU alone, in place of ¹³¹IU, would lead to significant over and underestimation of ¹³¹I therapy activities.

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Poster Session : P26

GFR measurement for the living donor programme – An in-house software solution

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The National Renal Transplant centre performs over 50 Living Donor transplants per year. This process involved the donation of a kidney from a family member or friend. In order to assess an individual's suitability for a kidney donation they must undergo a series of