AbstractID: 12946 Title: Radiation risks in nuclear cardiac imaging

Purpose To investigate how patient age, sex and weight affect risks of radiation induced cancer in cardiac imaging. **Method and Materials** Patients between 40-80 years old and weight > 40 kg undergoing cardiac imaging with ^{99m}Tc sestamibi, ^{99m}Tc tetrofosmin and ^{201}Tl during a 5 year period (2002-2007) were reviewed. Effective doses (E) were obtained assuming a constant 40 mCi administered activity (10 mCi rest/30 mCi stress) for sestamibi/tetrofosmin and 3 mCi for ^{201}Tl. An empirically derived correction factor (i.e., E proportional W^a) was used to calculate an effective dose corrected for patient weight. Patient effective doses were converted into age and sex dependent risks of cancer induction from radiation exposure using BEIR VII data. **Results** A total of 7023 procedures were selected (3801 females/3223 males). Median age for males was 61 years (46-75) and 59 years (46-74) for females (10^{th} to 90^{th} percentile ranges are in brackets). Median weight for males was 88.6 kg (68.6-113.6) and 78.2 kg (59.1-106.8) for females. The overall median cancer induction risk was 0.053% (0.031%-0.085%), 0.044% (0.026%-0.069%) and 0.11% (.066%-0.22%) for sestamibi, tetrofosmin and ^{201}Tl respectively. The median female to male cancer induction risk ratio was 1.25 for ^{99m}Tc and 1.4 for ^{201}Tl. On average for males and females, increasing weight from 10^{th} percentile to 90^{th} percentile reduced the cancer induction risk by factors of 1.6, 1.4 and 2.1 for sestamibi, tetrofosmin and ^{201}Tl respectively, and the risk reduction factors for increasing age from 10^{th} to 90^{th} percentiles 2.2, 2.1 and 2.4 for sestamibi, tetrofosmin and ^{201}Tl respectively. **Conclusion** Patient age was found to be the most significant factor affecting radiation risks, (2.2x) similar to choice of pharmaceutical (2x). ^{201}Tl had a higher risk than ^{99m}Tc (2x). Weight had a slightly smaller influence on risks while sex related variations in risk were lower.