AbstractID: 10258 Title: Radiation risks to patients with suspected PE undergoing chest CT and V/Q scans

Purpose. To compare the risks of radiation induced cancer to patients with a suspected pulmonary embolism (PE) undergoing chest CT scans with those of ventilation/perfusion (V/Q) nuclear medicine scans.

Method. We determined absorbed doses to eight radiosensitive organs in adult male and female patients with ages that ranged from 20 to 80. Organ doses for a chest CT scan were determined for a Sensation 64 scanner operated at 120 kV (DLP 190 mGy-cm) using the ImPACT spreadsheet. Corresponding doses were obtained for ventilation study (110 MBq 99mTc labeled DTPA aerosol) and a perfusion study (370 MBq 99mTc labeled MAA) using ICRP organ dose per unit administered conversion coefficients. Organ doses were converted into lifetime attributable risk factors provided by BEIR VII.

Results. In 40 year old patients, cancer incidence rates in CT were 26 and 53 per 100,000 for males and females respectively. Corresponding cancer incidence rates in ventilation studies were 7 per 100,000 (males) and 9 per 100,000 (females), and in perfusion studies were 33 per 100,000 (males) and 68 per 100,000 (females). When averaged over all ages and sexes, the average cancer mortality rate was 67%. Reducing the patient age to 20 years increased the patient risk by an average of 51%, whereas increasing patient age to 80 reduced the cancer risk by an average 69%. For CT and perfusion studies, the highest risks were for the lung whereas for ventilation studies, the highest risk from irradiation of the bladder.

Conclusion. Cancer radiation risks depend much more on patient demographics than on the choice of imaging modality (i.e., CT vs V/Q).