AbstractID: 13258 Title: Radiation Dose from Multineedle CT-guided Cryoablation of Abdominal Tumors

Purpose:
To quantify the radiation dose delivered to patients during percutaneous cryoablation of kidney and liver tumors performed under CT guidance.

Method and Materials:
A retrospective review was conducted of consecutive CT guided cryoablations of kidney and liver tumors performed on a 64-detector row scanner. Axial, helical and continuous (CT fluoroscopy) scanning modes were used. A total of 43 cases (28 kidney, 15 liver) were reviewed. Effective dose was calculated from the dose-length product reported by the scanner. Organ dose was estimated using the ImPACT CTDosimetry calculator, which utilizes Monte Carlo modeling of a reference adult patient. CT scans were classified into four identifiable procedure phases (planning, needle placement, treatment and final) and radiation dose per phase was calculated and compared.

Results:
The effective radiation dose was 48.6 +/- 25.4 mSv (mean +/- std dev) and 70.7 +/- 51.2 mSv for kidney and liver tumor ablations, respectively, and 56.4 +/- 37.0 mSv when both groups were combined. The procedure phase with the highest average dose was the treatment monitoring phase (42%), with the remainder delivered during needle placement (27%), planning (21%) and final imaging (10%). The largest doses occurred when avoidance of transpulmonary access required gantry angulation, necessitating axial-mode scanning. Critical organs receiving the highest average radiation doses during liver procedures included stomach (430 mGy), liver (420 mGy) and lung (81 mGy), while for renal tumor ablations it was stomach (230 mGy), liver (170 mGy), and colon (44 mGy).

Conclusion:
The radiation dose delivered during CT-guided cryoablation can be substantial. The largest radiation dose is delivered during the treatment phase, when repeated scanning monitors the placement of treatment needles and the therapeutic effect. Care should be taken to select scan parameters that achieve the lowest dose practical while obtaining adequate image quality.

Conflict of Interest (only if applicable):