AbstractID: 10203 Title: Inter-observer variability of mesothelioma area measurements on CT scans

Purpose:

The measurement of mesothelioma is a crucial component of the assessment of disease response to therapy. Current standards for response assessment utilize summed linear measurements acquired on three CT sections. The purpose of this work was to evaluate area measurements as a metric for response assessment, specifically through the study of the inter-observer variability of such measurements.

Method/Materials:

One CT scan from each of 21 mesothelioma patients was collected. Using a computer interface, three radiologists contoured the visible disease on three CT sections containing visible disease. The radiologists were able to inspect the full CT scan, but were only able to contour specified sections. The resulting 189 area measurements (three radiologists, three sections per patient, 21 patients) were compared using a random-effects analysis of variance model to assess relative inter-observer variability. The 63 sums of three section measurements per patient were also analyzed, since these sums of areas are more clinically relevant for response assessment.

Results:

When each radiologist's measurements were compared with the average of the other two radiologists' measurements, moderate correlation was observed (r-values of 0.64 to 0.94). The 95% confidence interval for relative inter-observer variability of section area measurements was [-81.3%, +433.7%], spanning a range of 515.0%. For the summed area measurements (three sections per patient), the 95% confidence interval for relative inter-observer variability was [-68.8%, +220.7%], spanning a range of 289.3%.

Conclusion:

The inter-observer variability in area measurements of mesothelioma tumor spans a range that encompasses the response categories of the original WHO bi-dimensional response criteria, as well as extrapolations of the RECIST response categories to two dimensions. Manual area measurements may not be a robust means of response assessment in mesothelioma patients, thus motivating future research in more precise semi-automated segmentation methods.