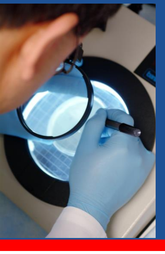

Segmentation for assessment of lumbar muscle mass metrics using quantitative analysis

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Background

Sarcopenia is the decrease of lean body mass usually due to either loss of muscle cells or as a result of cachexia. Most cancer patients experience this life-altering side effects post chemoradiotherapy, some of which includes loss of lean body mass, cancer therapy-induced nutritional compromise, and systemic effect of chemoradiotherapy. Previous experiments in our lab have shown that the onset of sarcopenia during chemoradiotherapy was associated with reduced survival and cancer control in head and neck cancer patients. However, these data were from HPV + patients who received feeding tubes which showed a correlation between toxicity, sarcopenia, and oncologic outcome. The aim of our project is to predict the development of post-therapy sarcopenia and define what effects, if any, systemic agent selection might have upon resultant late toxicity.

Hypothesis

We hypothesize that if we train a deep learning system based on manual segmentation, we will be able to extract quantitative data for the lean body mass and adiposity pre and post radiation treatment.

Methods

The CT scans prior to radiation treatment from 30 patients were pulled from EPIC. Cross-sectional imaging was manually segmented first using Velocity software , and then auto-segmented with an AI model. Both software were used to extract lean body mass (LBM), subcutaneous fat, and intra-abdominal fat body mass alterations from baseline, and stratified using the skeletal muscle index (SMI) in the third lumbar level to assess pre-treatment levels on lean body mass in each patient.

Methods (continued)

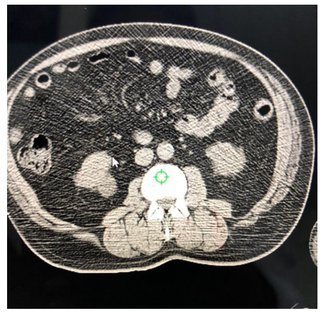

Figure 1A. Unsegmented cross-sectional imaging of L3.

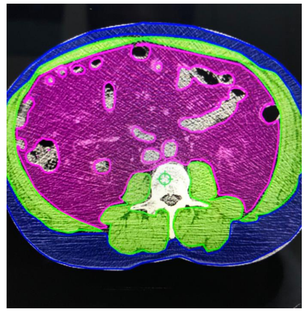

Figure 1B. Manually segmented cross-sectional imaging of L3 .Blue shows subcutaneous fat, green shows lean body mass and pink shows segmented intracutaneous fat body mass.

Results

Manual segmentation was collected on 30 patients and auto-segmentation of LBM, subcutaneous fat, and intracutaneous fat body mass is underway. Statistical analysis will assess the association between delta-LBM, subcutaneous fat, and intracutaneous fat body mass from pre-treatment and MDASI-HN overall score, multi-variable effects of chemotherapy variables, and sarcopenia, and construction of toxicity prediction nomograms.

Discussion

After conducting the segmentation part of the project, we aim to predict post-radiotherapy sarcopenia and define what effects, if any, systemic agent selection might have upon resultant late toxicity. This will improve patient's care because it will allow physicians to be able to change treatments if needed to prevent cancer induced sarcopenia based on the prediction. It would also allow physicians to administer appetite stimulants as a preventive measure.

References

Swartz, Justin E., et al. "Feasibility of Using Head and Neck CT Imaging to ASSESS Skeletal Muscle Mass in Head and Neck Cancer Patients." *Oral Oncology*, vol. 62, 15 Sept. 2016, pp. 28–33., doi:10.1016/j.oraloncology.2016.09.006.

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