Purpose/Objective(s): Adjuvant radiation therapy (RT) for gastric cancer is challenging in part due to adjacent dose limiting organs at risk. The purpose of this abstract is to measure amplitude of breathing motion and inter-fraction shifts relative to the vertebral bodies for the liver and kidney, two dose-limiting organs, during the course of adjuvant gastric cancer RT.

Materials/Methods: 207 CBCTs from 11 patients with gastric cancer treated post-operatively with 45 Gy in 25 fractions and concurrent chemotherapy were evaluated on an institutional research ethics board approved study. Prior to each fraction, a full rotation, 120 kV CBCT scan was obtained in the treatment position, followed by vertebral body alignment. Offline, CBCT scans were sorted into 10 bins, based on phase of respiration, creating a respiratory correlated CBCT (rcCBCT). Amplitude of breathing motion during each rcCBCT and shifts in liver and kidney position after vertebral body alignment were measured using manual rigid registration of the exhale and inhale liver and exhale kidneys from each rcCBCT to the planning CT.

Results: In the medial-lateral (ML), cranial-caudal (CC), and anterior-posterior (AP) directions, the mean amplitude of motion was 2.3, 9.7 and 5.1 [mm] respectively for the liver and 2.1, 7.2, and 1.8 [mm] respectively for the left kidney. Following vertebral body alignment, systematic () inter-fraction shifts in ML, CC and AP directions were 1.1, 8.1 and 3.4 [mm] respectively for the exhale liver, and 3.6, 9.5 and 3.2 [mm] for the exhale left kidney. Random (σ) ML, CC and AP offsets were 1.9, 4.7 and 3.1 [mm] respectively for liver and 3.1, 4.8, 3.2 [mm] for kidney.

Conclusions: Large systematic offsets in liver and kidney position relative to vertebral bodies may have a clinically relevant impact on delivered RT doses and subsequent understanding of liver and kidney RT tolerances. Quantification of motion and shifts of other regions within the adjuvant gastric CTV is ongoing, and soft-tissue IGRT strategies are being investigated.

Author Disclosure: A. Al-Omair, None.