

**Purpose:** Respiratory gating and high-quality image guidance allow for use of smaller PTV margin, while non-gated RT, such as TomoTherapy, must account for respiratory motion by increasing PTV margin. It is not clear whether this increased margin can be compensated by the fact that Tomotherapy usually offers improved normal tissues sparing. The purpose of this study is to compare the dosimetric differences between these two RT methods for pancreas irradiation.

**Methods:** 4DCT datasets of 6 patients with pancreas irradiated previously were analyzed. The PTV for Tomotherapy was the ITV of all respiration phases plus 10 mm margin, while the PTV for the gated IG-IMRT was the ITV for the 2 gating phases plus a 5 mm margin. This smaller margin is because a high quality CT, such as in-room CT, is used for daily repositioning. Plans were generated for two PTVs with a prescription dose of 50.4Gy using the Tomotherapy and Prowess treatment planning systems.

**Results:** The gated IG-IMRT reduced the duodenum V45Gy by 15.8% ( $p < 0.05$ ) and the mean dose by 7.4 Gy ( $p < 0.05$ ) compared to the Tomotherapy. However, since the Tomotherapy generally has a more homogeneous dose distribution and since the duodenum often overlaps the PTV, the duodenum V52Gy for the gated IG-IMRT plans was  $0.9 \pm 0.7$  cc ( $p < 0.05$ ) while the Tomotherapy plans all had maximum doses below 52Gy. The mean dose to the liver was found to be 3.2 Gy less for the gated IG-IMRT plan ( $p < 0.05$ ). The right kidney V45Gy for the gated IG-IMRT plan was found to irradiate 9.2% less kidney volume ( $p < 0.05$ ) compared to the Tomotherapy plan.

**Conclusions:** For pancreas irradiation with significant respiration motion, the combined effect of respiration gating and daily high-quality CT guidance for IMRT leads to reduced doses to duodenum, liver, and right kidney as compared to Tomotherapy.