AbstractID: 8782 Title: Practical guidelines for radiation treatment planning and dose constraints for gastro-intestinal cancers

Purpose: With the advent of conformal radiation therapy (3D-CRT) and intensity-modulated radiation therapy (IMRT), dose constraints to organs at risk (OARs) based on 2D planning toxicity data have become obsolete. The purpose of this report is to provide practical guidelines to the treatment planner for gastro-intestinal cancers, based on the standards of practice at our institution and our experience from a large patient population.

Methods and materials: We describe our standard clinical practice for constraints on OAR from inhomogeneous irradiation data (in equivalent 2-Gy/fractions) for gastro-intestinal treatment planning, delineation of OARs and margins added to the target volumes. We use the same constraints for 3D-CRT and IMRT.

Results: For upper abdominal sites, we use the following dose-volume histogram (DVH) constraints: esophagus (V50Gy < 50%, maximum dose < 70Gy), stomach (maximum 54Gy), heart (V40Gy < 40%, V60Gy < 25-30%), lungs (V20Gy < 35%), kidneys (V20Gy < 33% each), and spinal cord (maximum 45Gy). For the whole normal-functioning liver, we limit V20Gy < 66%, V30Gy < 50% and NTCP < 10%. For lower abdomen sites, we keep the DVH of the small bowel limited to V20Gy < 50%, V45Gy < 10% and maximum 50Gy; bladder, V45Gy < 20%; genitalia, V20Gy < 67% and V30Gy < 20%. A predetermined Internal Target Volume (ITV) margin of 1cm radially and 2cm superior-inferiorly is added for neoadjuvant gastric radiation treatment. The ITVs for the esophagus and liver are determined using 4D-CT. A 10-mm planning target volume margin is used when imaging is performed weekly, and 5 mm when imaging daily.

Conclusion: Guidelines on constraints and margins for 3D-CRT planning provide practical tools to the planner. Uniformity of the planning process might lead to more accurate indications about treatment risks, with planning efficiency and treatment safety being the ultimate goals.