



## Image-Guided Radiation Therapy (IGRT) in Gastrointestinal Tumors

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### Abstract

**Introduction and Aim:** Daily setup errors and changes in body habitus during external beam radiotherapy can result in interfraction variation, contributing to uncertainties in treatment delivery. The conventional method of patient positioning using external skin markings is inadequate in reducing these interfraction variations .To evaluate use of on-board imaging with daily kV-kV image matching to reduce interfraction variation in patients with primary gastrointestinal cancer.

**Materials and Methods:** To evaluate interfraction variation, 13 patients underwent radiotherapy for primary non-metastatic gastrointestinal cancer as did 1 patient with renal liposarcoma. After conventional external setup, kV-kV image matching was performed using bony landmarks or radiopaque surgical clips with a Varian on-board imager. The degree of shift between the real-time patient position and the planning position were recorded in three planes, and appropriate corrections were made for treatment .Degree of shift, acute toxicity and local response were assessed.

**Results:** For 276 daily on-board imaging sessions, average shift was  $0.30\pm 0.42$  cm(vertical),  $0.33\pm 0.34$  cm (longitudinal), and  $0.35\pm 0.39$  cm (lateral); average 3-D vector shift was  $0.71\pm 0.52$  cm. Percentage of shift greater than or equal to 0.5 cm was 25%(vertical), 28% (longitudinal), and 30%(lateral); percentage of total vector shift greater than or equal to 0.5 cm was 64%. The pattern of shifts showed a random distribution over time. At median 6-month follow-up, 3(21%) patients had radiographic local disease regression, ten (71%) had local disease stabilization, and 1 (7%) had local progression .



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**Conclusion:** Use of daily on-board imaging kV-kV matching reduced uncertainty in amount of dose delivered, potentially resulting in improvement in local control and reduction in treatment toxicity.

**Keywords:** Gastrointestinal Neoplasms; Image Processing, Computer-Assisted; Radiotherapy, Computer-Assisted, Radiotherapy, Conformal