

AbstractID: 8574 Title: A continuous patient movement monitoring device for radiotherapy treatment

Purpose: To fabricate and test an in-house device for monitoring patient's movement during external beam radiotherapy.

Method and Materials: The patient movement monitoring device (PMMD) consists of a transmitter and a sensor. The transmitter is 2.5 cm diameter and 1.5 cm high. The weight is 15 grams. The transmitter is placed on the patient's skin. The infrared light emitted by the transmitter is detected with the sensor. The size of the sensitive area of the sensor can be varied to change the tolerance level. The sensor is attached to the bottom of L-shaped movable rod. The output from the sensor is processed by an electronic circuit, which generates warning signals. The L-shaped rod can be attached to the gantry head. The distance between the transmitter and sensor is adjustable. Any patient movement detected by the PMMD during treatment delivery was warned by means of audible alarm or breaking circuit, which in turn would put the machine in stand by mode.

Results: We did a phantom study to measure the sensitivity and tolerance limit of the device in all directions. The tolerance limit of the device to stop the beam was 0.5 cm when the sensitive area of the sensor was 1 cm². PMMD was used for monitoring the movement of 207 patients with various cancers. The movements of 65 patients were detected by PMMD and the machine went into standby mode.

Conclusion: PMMD was successfully fabricated and patient movements were quantitatively analyzed using this device. The PMMD is an electronic compact device, which is light weight, low cost and easy to handle. The results with 207 patients demonstrated that the device was able to detect patient movements with sensitivity of about 0.5 cm. This device can be used to monitor and control the patient's movements during the EBRT.