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Stereotactic radiotherapy in the treatment of ocular melanoma: A non-invasive eye fixation device

Among the various therapeutic options for the treatment of ocular melanoma, stereotactic radiotherapy provides precise, non-invasive delivery of radiation to the tumor sparing critical structures. With over 25 patients treated so far in this manner, preservation of the eye has been found to be an important aspect with patients. The technique uses the Radionics' XKnife stereotactic treatment planning system with the immobilization provided by the Gill-Thomas-Cosman (GTC) frame.

The accuracy of treatment delivery for ocular targets is critically dependent on eye position reproducibility between CT and the linear accelerator. Hence a non-invasive eye fixation device has been developed that consists of a green light emitting diode (LED) attached to one end of an articulated arm. The other end of the arm is attached to the patient specific dental bite block assembly of the GTC frame. The arm can be adjusted so that the LED is comfortably placed in front of the eye. A miniature camera is fixed to the arm to capture images of the eye.

The patient is asked to fixate the eye on the LED during CT and a reference image of the eye is captured and saved. During treatment with beam on, images of the eye are captured at regular intervals and compared with the reference image. Image subtraction provides data on any eye movements instantaneously allowing the operator to abort the treatment in case of unacceptable deviation of the eye.