

AbstractID: 7255 Title: A comparison of EBT radiochromic and EDR2 radiographic films for Tomotherapy treatments dose verification

Purpose

To determine which film between EDR2 radiographic (Kodak, Rochester, NY) and EBT radiochromic (ISP, Wayne, NJ) is more accurate for dose verification in HI-ART Tomotherapy System (Tomotherapy Incorporated, Madison, WI) treatments.

Materials and methods

We performed six Tomotherapy treatments (1 prostate, 2 head and neck, 1 lung, 1 brain, 1 spine cancer) on a “cheese” phantom loaded with EDR2 films, and repeated the procedure using EBT films. EDR2 films were scanned with a Vidar (Vidar Systems Corporation, Herndon, VA) scanner and elaborated with the Tomotherapy Film Analyzer software. EBT films were read with an Epson 1680 Scanner using only the central 10x15cm² scanner region. Net optical density was calculated and converted to dose with a home-made MATLAB routine.

We compared measured 2-dimensional dose distributions with dose calculated by the treatment planning software using the gamma function, with a tolerance of 3mm and 3% of the maximum calculated dose. We compared absolute dose readings in points inside regions in the phantom corresponding to patients’ OARs and PTV. We repeated the gamma test after normalizing measured dose distributions to dose at the same point.

Results

Radiochromic films show, in 5 over 6 treatments, better results of the gamma test for absolute dose. After normalization, EBT films still give better results in 4 patients over 6. Absolute dose readings in regions corresponding to OARs and PTV do not show a significant difference in films’ behaviour.

Conclusions

2-dimensional dose distributions measured with EBT radiochromic films have a better agreement to calculated dose. We advise to perform treatment plan verifications in Helical Tomotherapy treatments using EBT films, especially when interested in verification of absolute dose.