Purpose:A new method to evaluate radiochromic film dosimetry data scanned in multiple color channels is presented. The multi-channel method allows for the separation and removal of the non-dose-dependent portions of a film image and performs superior to the traditional single channel method.

Methods:Exposed radiochromic films were scanned in RGB format on a flatbed color scanner and measured to build calibration. Images were converted to dose maps using both single color channel and multi-channel method. The multi-channel method allows for the separation of the scanned signal into one dose-dependent part and another dose-independent part and enables the correction of a variety of disturbances including non-uniformities of the film as well as scanner related artifacts. The fundamental mathematics of the two methods is described and the dose maps calculated with both methods are compared and analyzed.

Results:The multi-channel dosimetry method was shown to remove effectively non-dose dependent abnormalities from radiochromic dosimetry film images and improve the integrity of the dose information and also reduces random noise in the dose images and mitigates scannerrelated artifacts such as lateral position dependence. In providing an ability to calculate dose maps from data in all the color channels the multi-channel method provides the ability to examine the agreement between the color channels. The method permit compensation for nonuniformities in the film, increases the signal to noise level, mitigates scanners effect of the calculated dose map and extends the evaluable dose range to 10 cGy - 100.

Conclusions:Multi-channel dosimetry is shown to have significant advantages over single channel method in ensuring the best data integrity and dosimetric accuracy.

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