



CORRECTION PROTOCOL FOR GAFCHROMIC EBT2 DOSIMETRY FILM

1. Scan all films in **rgb** mode on a color scanner. It is assumed that there will be one, or more, calibration films plus at least one “measurement film”, i.e. a film on which you would like to make dose measurement.
2. Split out the red and blue color channels for all images
3. Convert the red and blue images from raw scanner values to “density” values to create images in density space - $I_{\text{red, density}}$ and $I_{\text{blue, density}}$

$$\text{Density value} = -\log_{10}(\text{scanner value}/65535)$$

4. Calculate images $I_{\text{red:blue, density}}$ that are the ratio of red density : blue density

$$I_{\text{red:blue, density}} = I_{\text{red, density}} / I_{\text{blue, density}}$$

5. Measure the images $I_{\text{red, density}}$ and $I_{\text{red:blue, density}}$ of the calibration films to get responses in the red color channel and the ratio of the red:blue channels
6. Plot the red channel density vs. the ratio of the ratio of red:blue channel density and fit to a function (a 2nd or 3rd order polynomial works well)

$$\text{Red channel density} = f(\text{red:blue channel density})$$

7. For each image in red:blue channel density space (calibration film and measurement film images) use the function in Step 6 to convert the red:blue channel density image, $I_{\text{red:blue, density}}$, into a corrected red channel density image, $I_{\text{red, density, corrected}}$
8. Re-measure the Corrected Red Image(s) for the calibration films (or recalculate the values), plot the corrected red density values vs. dose and fit to a function:

$$\text{Dose value} = f(\text{Value}_{\text{red, density, corrected}})$$

Note: You will probably find that the fit function is very similar before and after correction. In our experience it may be practical to not correct the calibration images and just use the calibration data before correction. However, the measurement images should all be corrected.

9. Use the function in Step 8 to convert the corrected red channel images, $I_{\text{red, density, corrected}}$, of the measurement films, from density values to dose values.
10. FilmQA™ software can be used to analyze the measurement images against treatment plans



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