**OBJECTIVES**

Current Gafchromic EBT, EBT2 and EBT3 (GC-EBT-x) dosimetry protocol improvements focus on evaluation algorithms and streamlining dosimetry work-flow. At the same time the scanning part of the dosimetry process mostly remains unchanged. Focus of this work is to investigate possibilities for improvements in the scanning part of GC-EBT-x Dosimetry. We investigate undefined readout temperature and scan-timing as source of systematic uncertainty. Wet-scanning is a long known method in professional photography to avoid newton rings or similar scanner bed artefacts when scanning films. Further goal of our investigation is to evaluate, whether wet-scanning can reduce uncertainty in GC-EBT-x Dosimetry.

**METHODS**

For film scanning an Epson V700pro flat bed scanner in transparency mode is used. The scanner bed temperature is monitored with a Voltcraft K202 data logger thermometer with two temperature probes situated on the head side and on the foot side of the scanner bed. Systematic control of absolute temperature and temperature balance between head and foot side of the scanner was achieved with defining rigidly timed surface-temperature based warmup- and scanning procedures. For the wet scan procedure commercial wet scan fluid was used.

**RESULTS**

For EBT film already observed systematic and reversible temperature dependent readout change [2] can be reproduced for EBT2 and EBT3 film. Systematic readout change of 0.3% for 10 scans on flat bed scanner occurs, when unirradiated film is evaluated. Timing of warmup and evaluation scans is observed to influence temperature distribution of the scannerbed. Fig.1 illustrates a scanner readout value change sole in the upper part of the scan area with an amount of 1% different readout for 10 min of waiting without moving the scanner lamp. When choosing a reference temperature for dosimetry and using an always moving lamp as part of the scanning protocol uncertainties can be minimised. Scan reproducibility of temperature controlled inter-day scan sessions we observe to be 0.7%. With the use of scan fluid the reproducibility of inter-day scan sessions can be reduced to 0.31%.

**CONCLUSIONS**

Reproducibility of temperature controlled flat bed scanning compares well to previously published results [2] for single ROI based evaluation. Our evaluation of the total scanner bed area reveals systematic temperature related readout variations, when scanner bed temperature balance is not maintained. A substantial improvement in reproducibility when using wet scan fluid for scanning can be demonstrated. No final protocol for handling of a dosimetry procedure involving wet scanning is defined. To evaluate, whether total uncertainty can be reduced, the possibility of additional uncertainties with respect to wet-scanning has to be addressed in further research.

**References**