Purpose: Gamma analysis acceptance criteria for patient-specific IMRT QA are subject to many variables including the measurement device, plan complexity and the threshold value used for the dose distribution. In this work we demonstrate plan-specific gamma analysis using the IBA Matrix Evolution phantom.

Methods: A series of previously treated prostate patient plans were selected to represent moderately complex dose distributions. The plans were delivered to the same phantom plane containing the ionchamber array and again with EDR2 film. Gamma criteria of 3%/3mm were evaluated using thresholds of 10% and a meaningful, plan-specific threshold of 50%. Differences in number of pixels passing were evaluated for both detectors and thresholds using film as the “gold standard”. All plans were delivered in a composite manner using treatment gantry angles. Passing rates for both detectors were compared to determine detector-specific acceptance criteria. The clinical results from the last 329 prostate patients were compared with these criteria.

Results: The passing rates for the 10% threshold between film and the ionchamber array were 99.2% and 92.1%, respectively. Passing rates for the 50% threshold were 99.5% and 96.7%, respectively. These rates represent an approximate 7% and 3% absolute reduction in passing criteria for detector and plan-specific analysis. The average passing rate for the initial 329 clinical prostate cases measured with the array using the 50% threshold was 94.6%.

Conclusions: AAPM TG-119 suggests a passing rate of 88-90% for composite distributions using film. It is important to understand the relationship between film (high resolution) and the detector array and dose threshold used clinically. The 3% drop between film and array in points passing using a plan-specific threshold of 50% for our test cases indicates an acceptable range of 85-87%. Our clinical passing rates ranged between 82.0% to 99.7% with 97.6% of cases meeting the aforementioned range.