The Peacock[1] planning system uses inverse planning and computer optimization to create dynamically modulated treatment fields. The beam algorithm uses measured a pencil-beam model and measured beam data to calculate dose. Within the beam model algorithm, a user-determined constant, the Peacock Calibration Factor, is used for monitor unit determination for patient treatments. In reality this factor is a variable and verification of delivered doses is prudent. To facilitate this validation, a program called Phantom Plan was developed that calculates the dose distribution to any phantom using the beam weights generated in the inverse planning process. However, part of calculation of the dose distribution in Phantom Plan is a calculation of new Tissue-Maximum Ratios for the phantom and this may introduce calculated differences between patient and phantom geometry.

To test this hypothesis, a 290° arc using an unmodulated 2x2 cm^2 was created and plans generated by Peacock and Phantom Plan were tested against manual calculations and measurements at different points in a phantom. The results show that shifting targets near the surface of a patient to a centrally located depth in a phantom can introduce 2-3% additional error that is not associated with the patient's treatment and should be considered in the design of QA tools and test procedures.

Using this information to make a selection in the value of the Peacock Calibration Factor does enable one to create a system that allows patient doses to be within 5% of that calculated by the Peacock planning system. The data from over 100 patients will be presented

[1] NOMOS Corporation, Sewickley, PA.