Commissioning procedures for Monte Carlo dose calculation algorithms

The era of routine clinical Monte Carlo treatment planning is nearly upon us. As with all dose calculation algorithms, there is a need for quality assurance and commissioning tests. We have implemented a Monte Carlo-based dose calculation algorithm, *MCV*, which is interconnected to our treatment planning system. Before using the code for clinical use, a series of tests for commissioning was performed to validate system performance. The commissioning aim was to create the minimum set of tests which covered every aspect of commissioning of the dose calculation algorithm. Our criteria for acceptable accuracy in patient dose computation is ±2% or ±2 mm (ICRU 1987). Each test has a clear purpose, scope, specification, method and results. The required tests are: Density and Material Test, Field Geometry Test, Phantom Geometry Test, Open and Wedge Field Output Test, Open and Wedge Field Dose Distribution Test, Non-unit Density Test and a Block Field Test. This test set has been applied to dose calculations for a Varian Clinac 2100C 6 MV photon beam. Future work will involve applying this method to all of our photon beams, and our electron beams. We will use these tests as a generic test set for other dose calculation algorithms, such as our pencil beam code, and Peregrine.