

## AbstractID: 9149 Title: Statistical Process Control for IMRT Quality Assurance

Part of the QA paradigm is to take an ion chamber measurement in phantom of the IMRT plan to be delivered to the patient. Sometimes the measurement does not agree with the computer prediction of dose within some pre-set limits usually based on clinical experience. We have applied the techniques of Statistical Process Control (SPC) to IMRT QA. SPC is a technique that makes a distinction between controlled and uncontrolled variation. The idea of control limits and the associated control charts, both central to SPC, are used to make this distinction. A stable system (measurement vs computer calculation) should vary only by random errors. Determining control limits is the application of statistics to determine bounds on the distribution of random errors of a stable system. We have applied the techniques of SPC to 684 IMRT cases where an ion chamber measurement was compared to the computer prediction. For all 684 cases, the average difference was 0.1% +/- 1.8% with a maximum difference of 4.6% and a minimum difference of -3.9%. Control limits, determined from the first 20 data points, were found to be +3.5% and -5.7%. Data collected outside these limits should be taken as due to non-random effects on the system. For our data set, 1.2% (8 cases) required further investigation before treatment. In summary, we found that the techniques of SPC provide a qualitative method, consistent with clinical knowledge, to guide the physicist in approving an IMRT plan for patient treatment.