# AbstractID: 1258 Title: A Fast Dose Calculation Method Including Scatter For IMRT Optimization

Most IMRT optimization algorithms are iterative in nature in which many dose calculations are necessary for convergence. Therefore the planning time can be significantly reduced when a faster dose calculation algorithm is used. Fast algorithms are inherently less accurate than slower ones. Techniques have been developed to combine several dose calculation algorithms in sequence in the optimization process to reduce the planning time and to provide adequate accuracies. A fast dose calculation method for IMRT optimization was previously proposed using table-lookup (TLP). The kernel is constructed at the beginning of the optimization from an accurate superposition/convolution (SC) dose calculation algorithm and subsequent dose calculations are performed rapidly by looking up this kernel in memory. In this study, we propose an improved table lookup method that can incorporate the scatter contributions (TLPS). To build the kernel for the primary and scatter, doses are calculated using SC method with complementary checkbox like intensities. The performance of this algorithm is compared with the methods of SC only and TLP without scatter on clinical cases of prostate cancer and lung cancer. The TLPS is found to be more accurate than the TLP method and faster than SC only method. While the initial construction of the TLPS kernel takes longer than the TLP kernel, there is no observable penalty in the speed of the subsequent iterations. The separation of the kernel construction and table lookup is especially useful for those optimizations that take IMRT as an inner loop, such as the beam angle optimization.