Purpose:

Besides flattening-filter-free beams, Varian TrueBeam Linac also has conventional flattened photon beams. In our facility, we have TrueBeam, Trilogy and iX machines from Varian; they all have same energy specifications: 6 and 10 MV photon beams, as well as 6, 9, 12, 16 and 20 MeV electron beams. This study is to compare the photon and electron beams dosimeter parameters among the three machines.

Methods:

Beam data (including PDDs, inline and crossline profiles at various field sizes and various depths) were collected using Sun Nuclear Dosimetry 3D Scanner with nominal 100 cm SSD setup. These data were post processed using Sun Nuclear Dosimetry software, including normalization, interpolation and smoothing. The ion chambers used for scanning are IBA CC13.

Results:

Photon beams: The percentage depth doses with field sizes of 4 cm—4 cm, 6 cm—6 cm, 10 cm—10 cm, 15 cm—15 cm, 20 cm—20 cm, 30 cm—30 cm and 40 cm—40 cm cm of 6 MV and 10 MV photon beams from the three machines are very close. Compared with Varian Golden Beam Data, the maximal variation of PDDs at depths of 5, 10, 15, 20, and 30 cm is 1.0%, with mean value 0.6% and standard deviation 0.28% for 6 MV; for 10 MV beams, they are 2.0% (at depth of 30 cm), 0.9%, and 0.48% respectively. Also, the three machines have very similar beam profiles; the profiles' shoulder, penumbra and umbra match well for both inline and crossline beam profiles at various field sizes and various depths.

Electron beams: As compared the percentage surface doses (0.5 mm from the surface), dmax, R90, R80, R50, and R30 of electron beams with energy of 6, 9, 12, 16, and 20 MeV at 10 cm cone, the electron beams of TrueBeam and iX are almost identical.

Conclusions:

The 6 and 10 MV photon beam data of TrueBeam, Trilogy, and iX have a same variation range when comparing with Varian Golden Beam Data.