

Purpose: To measure the dose distribution in buildup region with a 2D ion chamber array. Measurements are compared with calculation from Eclipse and analyzed using Gamma Index method.

Method and Materials:

Dose distributions from 6 MV photon IMRT beams in buildup region are calculated with Eclipse TPS (Varian Medical Systems) in a phantom using sliding window technique for a head and neck case. Those beams are delivered by a Varian Clinac iX linear accelerator with 120-leaf Millennium MLC and are measured with PTW729 ion chamber array (PTW, Inc.). All the measurements are performed at 0.5 cm depth with 96.5 cm SSD. The calculated and measured dose distributions are compared with Gamma index method using Verisoft software (PTW, Inc.). By changing the acceptance criteria in Gamma Index method from 5% dose difference, and 5 mm DTA (distance-to-agreement) to 20%, and 20 mm respectively, the comparison between measured and calculated dose distribution are analyzed.

Results:

Typical preliminary results are listed below:

<u>DTA (mm)</u>	<u>dose difference (%)</u>	<u> Number of compared dose points out of tolerance (total 980 points in this example)</u>
5	5%	131
	10%	116
	15%	91
10	5%	55
	10%	49
	15%	32
15	5%	38
	10%	30
	15%	14
20	20%	0

It can be seen for highly modulated beams, dose difference of 20% and positional difference of 20 mm can result between measurement and calculation.

Conclusion:

The dose distributions in the build up region measured by PTW 2D ion chamber array are compared with those calculated by Eclipse. The comparison is analyzed by Gamma Index method. Detailed measurement validation is underway with different intensity modulation levels and positional accuracy. This type of study can help us to better understand of the accuracy of dose calculations and measurement in buildup region.