

**DR SIG wide-beam CT
dosimetry working party**

Aim

- To recommend a method of measuring CT dose on wide-beam scanners that is practical and accurate.

Methodology – AAPM 111

- (Dixon and Boone)
 - Short ionisation chamber
 - E_{tot} instead of DLP
 - D_{eq} instead of CTDI_{vol}
 - $1/3 + 2/3$ becomes $1/2 + 1/2$
 - May require longer phantoms

Methodology – IEC / IAEA

- Can use existing 100 mm chamber
- Can use existing Perspex phantoms
- Likely to be adopted by manufacturers as will become an international standard

- For beam widths 40 mm or less:
 - Measure in air as before
 - Measure in phantom as before

Methodology – IEC / IAEA

- For beam widths greater than 40 mm:

$$CTDI_{100,(N \times T) > 40} = CTDI_{100,ref} \times \left(\frac{CTDI_{free-in-air, N \times T}}{CTDI_{free-in-air, ref}} \right)$$

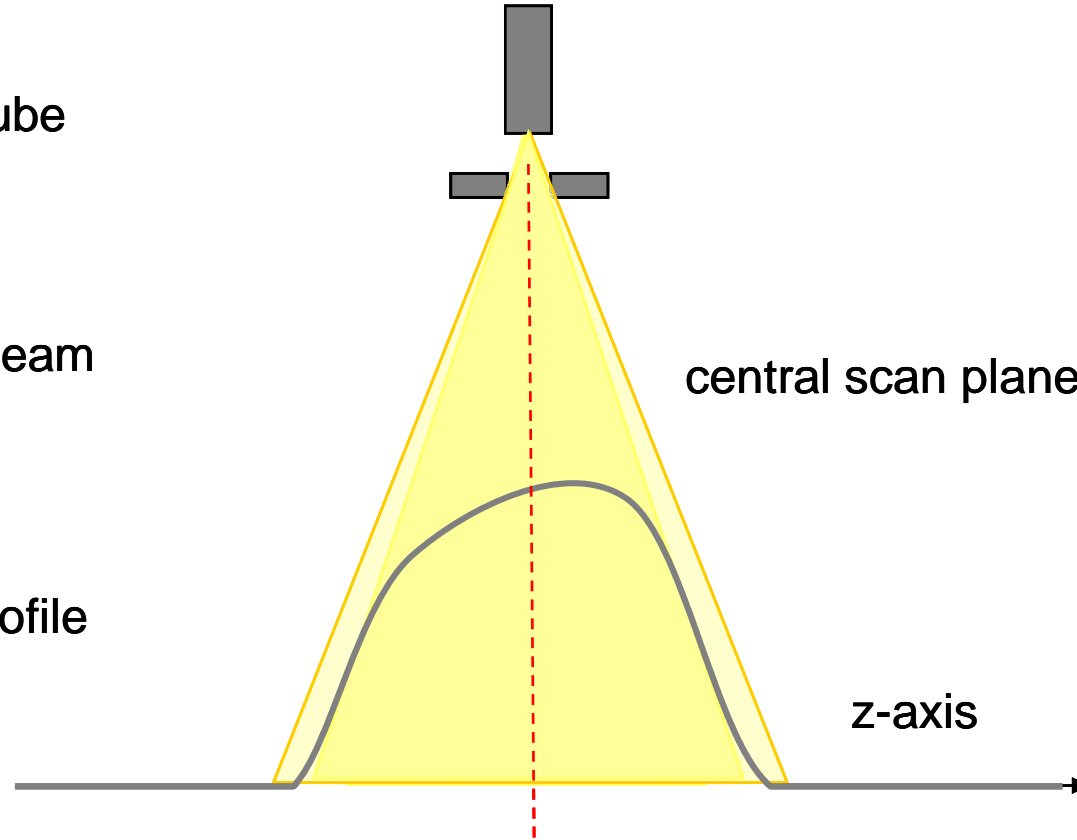
X-ray tube

X-ray beam

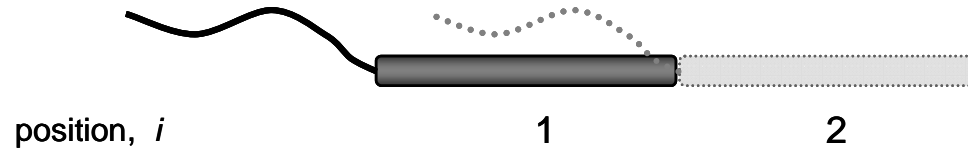
dose profile

central scan plane

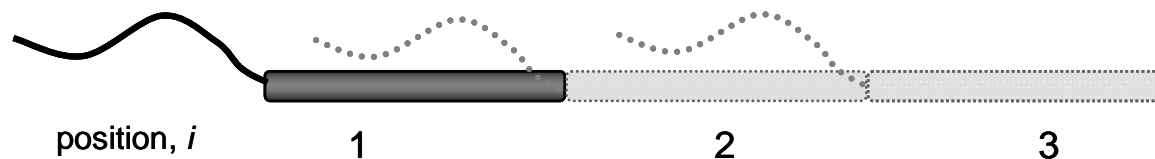
z-axis



a. 100 mm ion chamber: two contiguous positions, integration length 200 mm



b. 100 mm ion chamber: two contiguous positions, integration length 300 mm



IEC test measurements

- Toshiba Aquilion One (160 mm beam)
 - 25.3 mGy using IEC method with two positions
 - 25.9 mGy using IEC method with three positions
- Siemens Definition AS (28.8 mm beam)
 - 22.4 mGy/100 mAs using usual method
 - 22.1 mGy/100 mAs using IEC method