

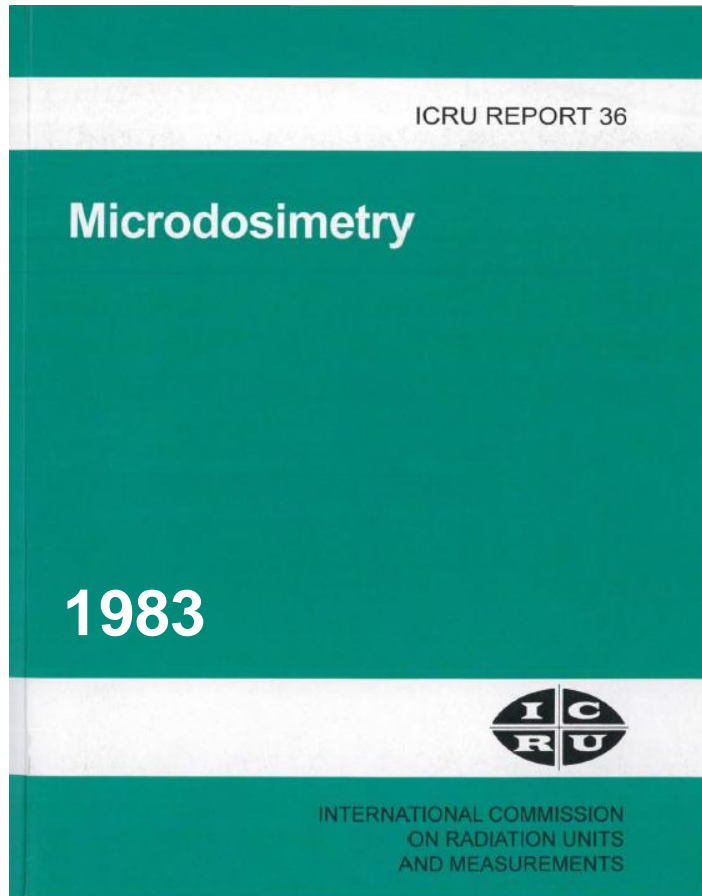
Microdosimetry

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Not really new at all!



The term microdosimetry originated when Rossi and coworkers (1955a, 1959, 1960, 1968b, 1972) developed a conceptual framework and the corresponding experimental methods for the systematic analysis of the microscopic distribution of energy deposition in irradiated matter.

A 1955 concept isn't very futuristic!

Why are we talking about it today?

Microdosimetry – a parallel universe?

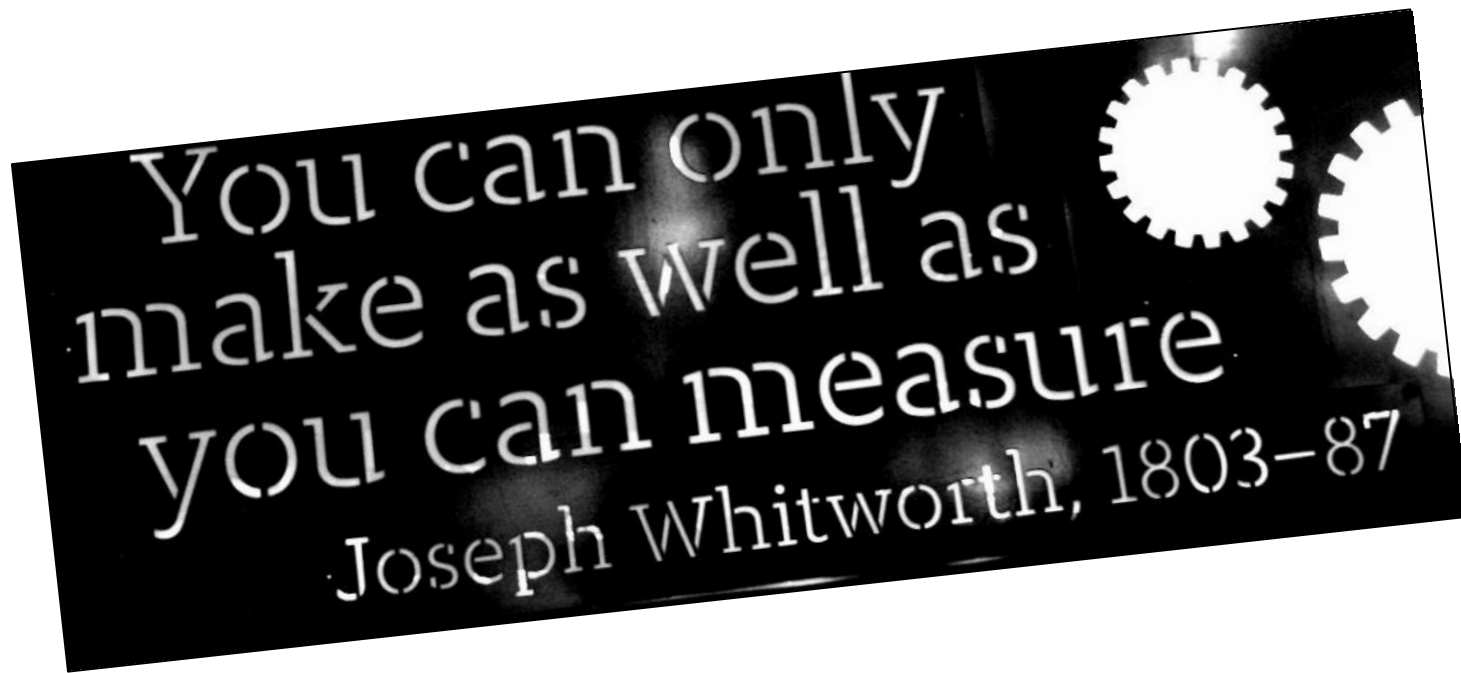
- Developed before there were absorbed dose standards, when dosimetry was based on air kerma
- A quick review of the literature brings up issues of neutron spectra and radiation protection – not really medical
- Little take-up by the radiation therapy community
- Certainly not a feature of CAMPEP programs

Microdosimetry – why now?

- ✓ Therapeutic radiation fields are getting ever smaller
- ✓ Increased use of proton and heavy-ion beams means that track structure is important
- ✓ Radiobiology is coming into treatment planning – tissue sensitivity is required
- ✓ In molecular radiotherapy (targeted nuclear medicine) the cell is the focus, not the tumour

Our standard macroscopic quantities and concepts may not be sufficient for tomorrow's state-of-the-art treatments

What do we need to do?



What was stated in the first industrial revolution applies to radiation therapy

For the newest treatments (“makes”) we need new measures

And where we can't measure we need new calculations

Microdosimetry – the challenges

What we need

- 1) Accurate calculations
- 2) Accurate measurements



What is going to cause problems

ASSUMPTIONS

EXTRAPOLATIONS

IGNORANCE

This is the lesson from almost every recent development in medical physics

Microdosimetry – a reality check

- It took 10 years to work out a protocol for measuring dose down to field sizes of 5 mm diameter (IAEA TRS-483)
- And still there are gaps in what we know
- This will not be easy, nor will it be quick!
- But it will make a difference