



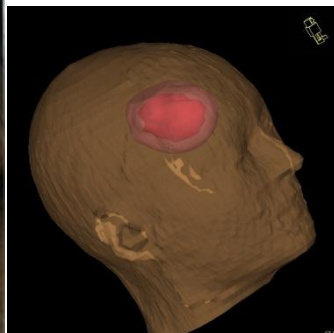
TC for ionising radiation; Dosimetry, Radionuclides and Neutrons

TC-IR

Climate



Radiotherapy



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Novel dosimetry concept for ionising radiation interaction with matter

Medical applications – radiotherapy

- different biological effectiveness of radiation qualities on cancerous and healthy tissue
- different irradiation conditions for external photon beam therapy and radionuclide therapy using alpha emitters
- different patient radio-sensitivity

The ESTRO 2020 vision of individualised radio-therapeutic treatment using a multi-disciplinary approach

- A dosimetric concept that facilitates the combination of different treatment modalities
- Providing metrology support based on the virtual human approach
- Development of a unified dosimetric concept for radiation quality
- Developing a measurement protocol for biological effects
- Measuring individual radio-sensitivity, enabling treatment plans based on patient-specific rather than population-averaged dose-effect curves





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System of physical operational quantities in dosimetry (Unit: sievert) is based on phenomenological weighting factors that are almost exclusively based on epidemiological evidence

Metrological challenges:

- Prevention and reduction of significant security threats
- Extension of the range of applicability of biological dosimetry toward lower doses by enhancing the through-put and reliability of biological assays through better control of experimental conditions by application of metrology
- Establishing a traceability chain of biological dosimetry to physical standards of ionising radiation or, alternatively, develop biological standard systems

New materials of geometrical dimensions of particle track diameters.

A measurand quantifying damage due to radiation interaction:

- in nano-tech components
- electronics and bio-systems
- in space application
- at fusion reactor experiments
- in accelerator-based treatment units in clinics



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Medical applications of ionising radiation

- combination of different treatment modalities
- optimisation of image-guided techniques in radiotherapy
- development of radio-sensitizers and patient-specific treatment planning based on quantitative measures of individual radiation sensitivity

New or redefined operational quantities in dosimetry

- Improved standards for occupational radiation protection
- Better data base for decision maker and regulatory bodies
- Reduction of radiation risk to occupationally exposed personnel and the general public

Facilitation the development of radiation-resistant

- nano-electronics and other nano-structured devices
- reliable biological-cell based production techniques

Realisation of the components of the virtual human that are related to ionising radiation