



Accurate dose means effective therapy

Molecular radiotherapy can target cancers by going directly to the cancer site. Getting the right amount of a radioactive drug to the cancer is critical, but we are all different and individual responses vary to the same treatment. Accurate radioactivity measurements and sophisticated imaging techniques with the potential to measure the drug's delivery inside the body are needed to ensure effective personalised cancer care.

Europe's National Measurement Institutes working together

The European Metrology Research Programme (EMRP) brings together National Measurement Institutes in 23 countries to address key measurement challenges at a European level. It supports collaborative research to ensure that measurement science meets the future needs of industry and wider society.

Challenge

Molecular radiotherapy (MRT) is often used when other cancer therapies have failed, but it has real potential to be a very effective first line cancer treatment. This therapy directly targets organs with tumours whilst leaving surrounding healthy body tissue unharmed. The treatment uses a range of radioactive drugs to target specific tumours such as radioactive iodine-131 for thyroid cancer or the direct injection of radioactive microspheres into liver tumours. The key for wider use of MRT is accurate measurement of the actual radioactive dose delivered to the tumour.

However, there are no standardised methodologies that accurately relate the radioactivity of the drug administered to the patient to the actual dose delivered. The current approach, called “as high as safely administered” is based on generic responses of patients during clinical trials. It ensures patient safety, but does not necessarily deliver the optimum dose to the individual patient’s cancer so the benefits of the treatment are variable. A new EU Directive coming into force in February 2018 will require dose planning for individual patients to be based on dose taken up by the body at the cancer site.

Solution

The EMRP project *Metrology for molecular radiotherapy* has developed new dose measurement methods for MRT based on accurate monitoring of radioactivity at the tumour site. These use body phantoms (models) and a variety of advanced medical imaging techniques, such as Single-Photon Emission Computed Tomography (SPECT) and Positron Emission Tomography (PET) to measure radioactivity in specific targeted organs.

Together these advances have enabled the formulation of improved protocols to relate measured administered radioactivity to the actual doses delivered to a patient’s tumour and to normal tissues. This helps ensure maximum therapy efficacy, whilst demonstrating high levels of patient safety.

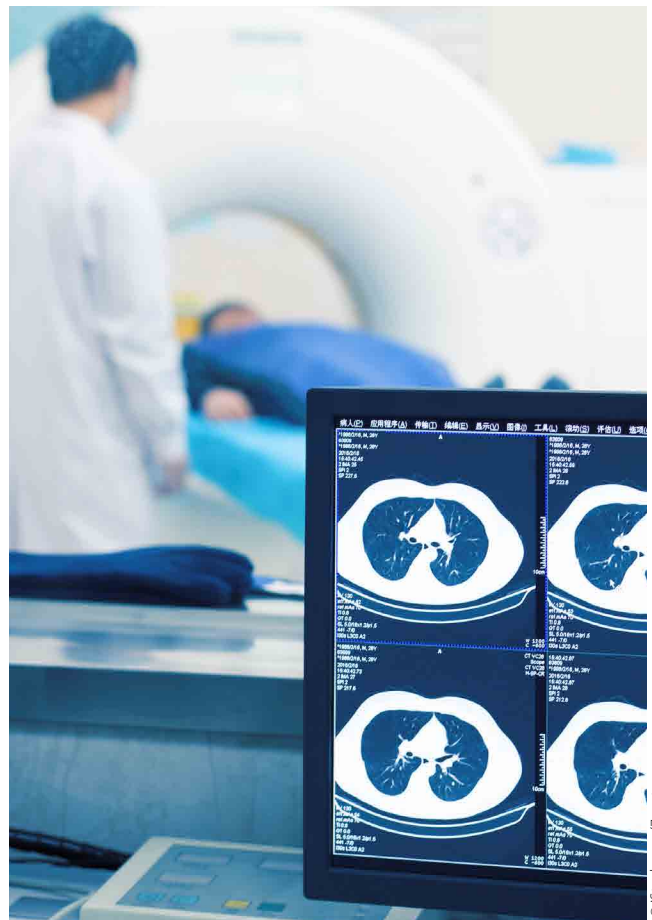
Impact

Nuclear medicine clinicians and researchers require high quality guidance and reference documents to assist them in providing the very best care to patients undergoing radiotherapy. One organisation that provides independent and highly respected publications in this field is the International Atomic Energy Agency (IAEA). Currently the IAEA is drafting a new Health Series publication on Dosimetry for Radiopharmaceutical Therapy. The publication will include methods developed in the project to accurately measure the doses received by individual patients from MRT.

Nuclear medicine clinicians will be able to easily access the project’s methods via this single IAEA publication aimed at improving the delivery of better patient treatments and therapy for cancers. Using these methods clinicians will take a major step towards implementing the new EU directive through the delivery of personalised treatment planning, reduce treatment costs and potentially increase success rates for treating cancer.

Metrology for molecular radiotherapy

The EMRP project *Metrology for molecular radiotherapy* was the first European project to develop standard methods for measuring the absorbed dose received by patients undergoing molecular radiotherapy (MRT). This enables radiation doses to be better tailored to individual patients, increasing the effectiveness of treatment for conditions such as cancer and thyroid disease while minimising side effects. The project results will form a valuable basis for implementing individual dosimetry in MRT clinics across Europe and improving treatment outcomes.



EMRP

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