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PRODUCTION OF RADIOPHARMACEUTICALS SUITABLE AIDING RADIOTHERAPY PLANNING

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Positron emission tomography (PET) could significantly improve the radiation therapy planning by increasing the targeting accuracy and therapeutic efficacy of the delivered radiation. Since this method gives information of the biochemistry of tissues, it should be a necessary supplement to the anatomical imaging methods such as CT or MRI. The main advantage is its ability in image metabolism, apoptosis, proliferation, cellular transporters, cell receptors, oxygen availability, gene expression and cell kinetics, non-invasively in living subjects at multiple time points. Besides the 2-[fluorine-18] fluoro-2-deoxy-D-glucose (FDG), the most often applied radiopharmaceutical, there are several other well established but much less used tracers. The use of other tracers is often hindered by price and the lack of availability of these tracers. The second most frequently used tracer family is the fluorine-18 or carbon-11 labelled amino acids like [11C] methionine, [^{18}F] Fluoro (methyl or ethyl) tyrosine or even [^{18}F] FDOPA (fluorodopa). The carbon-11 and fluorine-18 labelled choline analogues could be useful in prostate tumour metastases or in some cases in gliomas. Since hypoxic tumour cells are relatively resistant to radiation and would be more likely to be controlled if a higher radiation dose could be accurately targeted at regions of imaged hypoxia with [^{18}F] FMISO (fluoromisonidazole) or [^{18}F] FAZA (Fluoroazomycin arabinoside). The ideal radionuclide for PET imaging is fluorine-18 due to its ideal nuclear properties. Application of other nuclides is always call for compromise in image quality. The acceptance of the radiopharmaceuticals by the end users, i.e., clinicians and the patients is important, however, the approval by the national regulatory agency and above all reimbursement for the particular clinical indication are critical factors that determine the success of a scientifically useful molecular imaging agent. Recently in Hungary there are four tracers that are available for human applications. Their use for radiation therapy planning so far was not commenced.

Biography

Pal Mikecz has received his University Doctoral Degree in 1988 based on the work of Production Methods of Medically Important Radioisotopes which was conducted in Joint Nuclear Research Institute in Dubna. Since then, he had participated in establishment and running a few PET radiochemistry laboratories in Hungary, Scotland, Poland and Germany. He has recently retired from the University of Debrecen. He is Senior Advisor for the Radiochemistry Laboratory of the newest Hungarian PET centre at the Kaposi Mór Teaching Hospital in Kaposvár. He had participated in several IAEA mission as an Expert in the field of PET Radiochemistry. He has published more than 50 papers in reputed journals with 500+ citations and has been serving as Reviewer of many articles.

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