State of the Art and Technologist Role in Radiopharmaceutical Quality Controls

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The intention of this talk is to propose simple solutions for the increasing demands on the quality control of radiopharmaceuticals.

Quality control of SPECT radiopharmaceuticals, thus mainly of 99mTc labelled radiopharmaceuticals, involves quite simple miniaturized chromatography – thin layer chromatography (TLC) or instant thin layer chromatography (ITLC) – if any quality control at all. The quality control is often performed by the same person who manufactured the SPECT radiopharmaceutical; frequently a technologist that can have any background ranging from physics to pharmacy.

With the emerging number of PET radiopharmaceuticals, especially the 68Ga labelled small molecules, the demands on quality control are tighter; we have the European Pharmacopoeia monographs, the EC GMP demands that there are, at least, two persons involved; one for manufacturing and one for quality control.

For non-68Ga labelled PET radiopharmaceuticals the chemical and radiochemical quality control needs an HPLC, sometimes with a GC to analyse for the residual solvents. For most 68Ga labelled radiopharmaceuticals the preparation is similar to the Tc99m kits "shake 'n bake" approach and the quality control can also often be performed with TLC and ITLC, to separate the free radiometal from the radiopharmaceutical.

One approach to avoid time-consuming and laborious HPLC quality control is to use the "Quality by design" methodology. Briefly, during validation of the labelling process

a "design space" (various labelling conditions with respect to time, temperature, amount of precursor, volume(s), pH, etc) is examined and evaluated. If all preparations within this design space fulfil all the quality control requirements using HPLC, GC, etc, then one can argue that a simpler/simplified quality control may be used for the preparation as long as the manufacturing process is within the determined design space.

Another way to reduce the quality control work load is to have the quality control as hardwired as possible, i.e, to minimise the human factor. This can be accomplished by hardware and software; hardware that gives reproducible results (e.g. autoinjectors/autosamplers) and software that makes the analysis (e.g. chromatographic software, laboratory integrated management system (LIMS)).

After demonstrating competency, an appropriately trained technologist can play an essential role in quality control of radiopharmaceuticals.