



# AULA VIRTUAL de RADIOFARMACIA

Plataforma Virtual de Formación Continua en Radiofarmacia

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## Lectura recomendada

### Radiolabelling of peptides for PET, SPECT and therapeutic applications using a fully automated disposable cassette system

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#### Abstract

**Objectives:** Radiolabelled somatostatin analogues have found wide clinical use in nuclear medicine for both diagnostic and therapeutic applications. Here, we describe the development of a fully automated synthesis system allowing radiolabelling of 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA)-derivatized peptides with  $^{68}\text{Ga}/^{111}\text{In}/^{177}\text{Lu}$  and  $^{90}\text{Y}$ , meeting radiation safety and pharmaceutical requirements.

**Materials and methods:** The system consists of a syringe pump, a holder for insertion of a single use multivalve cassette, a heater and a removable radiation shielding.  $^{68}\text{Ga}$  labelling was performed in acetate buffer and  $^{177}\text{Lu}$ ,  $^{90}\text{Y}$  and  $^{111}\text{In}$  labelling in ascorbate buffer, respectively, followed by purification on a C18 cartridge and final sterile filtration. Cross-contamination was prevented by using disposable cassettes and also by ensuring pharmaceutical standards. Radiochemical purity (RCP) was determined by instant thin-layer chromatography on silica gel impregnated glass fibres and reversed-phase high performance liquid chromatography.

**Results:**  $^{68}\text{Ga}$ -DOTA-peptides were prepared with high RCP (>91%) and radiochemical yields (RCY>80% decay corrected) and  $^{68}\text{Ge}$  content was less than 0.0001% in all cases. Synthesis time did not exceed 30 min.  $^{111}\text{In}$ ,  $^{177}\text{Lu}$  and  $^{90}\text{Y}$  labelling of DOTA-peptides resulted again in high yields (approximately 90%) and RCP (approximately 95%) and total synthesis time of less than 45 min. Radiation dose to fingers was considerably reduced when compared with manual labelling procedures.

**Conclusion:** The described system allows fully automated, aseptic preparation of DOTA-peptides radiolabelled with different radionuclides in high radiochemical yields and pharmaceutical quality suitable for clinical application.



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