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Production of ^{64}Cu and ^{67}Cu radiopharmaceuticals using zinc target irradiated with accelerator neutrons MASAKO KAWABATA, KAZUYUKI HASHIMOTO, HIDEYA SAEKI, NOZOMI SATO, SHOJI MOTOISHI, YASUKI NAGAI, Japan Atomic Energy Agency — Copper radioisotopes have gained a lot of attention in radiopharmaceuticals owing to their unique decay characteristics. The longest half-life β emitter, ^{67}Cu, is thought to be suitable for targeted radio-immunotherapy. Adequate production of ^{67}Cu to meet the demands of clinical studies has not been fully established. Another attractive copper isotope, ^{64}Cu has possible applications as a diagnostic imaging tracer combined with a therapeutic effect. This work proposes a production method using accelerator neutrons in which two copper radioisotopes can be produced: 1) ^{68}Zn(n,x)^{67}Cu and 2) ^{64}Zn(n,p)^{64}Cu using $\sim$14 MeV neutrons generated by $^{\mathrm{nat}}$C(d,n) reaction, both from natural or enriched zinc oxides. The generated ^{64,67}Cu were separated from the target zinc oxide using a chelating and an anion exchange columns and were labelled with two widely studied chelators where the labelling efficiency was found to be acceptably good. The major advantage of this method is that a significant amount of ^{64,67}Cu with a very few impurity radionuclides are produced which also makes the separation procedure simple. Provided an accelerator supplying an E_d =$\sim$40 MeV, a wide application of ^{64,67}Cu based drugs in nuclear medicine is feasible in the near future. We will present the characteristics of this production method using accelerator neutrons including the chemical separation processes.

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