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Radioisotope Productions for Medical Use with Accelerator Neutrons FUTOSHI MINATO, YASUKI NAGAI, NOBUYUKI IWAMOTO, OSAMU IWAMOTO, JAEA — Various kinds of radioactive isotopes (RIs) are widely used in nuclear medicine for diagnostics and therapy. Since the RIs are not usually present in the nature, they must be produced by nuclear reactors and accelerators. For instance, ^{99m}Tc, which is the most common RI used in diagnosis, is mainly produced by fission of highly enriched ^{235}U (HEU) in nuclear reactors. However, use of the HEU is unfavorable in terms of nuclear security. Therefore, many methods without ^{235}U have been studied in order to produce RIs for medical use; for example, thermal neutron capture, gamma disintegration, and proton induced reactions. We also have proposed an alternative method using accelerator neutrons besides the above methods. Technique producing high intense accelerator neutron beam as much as 10^{15} n/s is being developed and RI productions with the accelerator neutron have been done recently. The major advantages of the use of accelerator neutron are followings. 1) A wide variety of carrier-added and carrier-free radioisotopes can be produced using the neutrons, because a charge exchange reaction of a sample nucleus has a sizable cross section of 50 to 500 mb. 2) High transparency of neutron allows us to use a large amount of sample to co-produce other RIs by putting other samples behind the main sample in the beam direction. In this talk, we will show the features of RI productions with accelerator neutron which we have ever investigated and found, along with numerical results of RI yields calculated with Japanese Evaluated Nuclear Data Library (JENDL-4.0).

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