COMPLETION   REPORT

Influent Factors on the Effectiveness of Sumitomo Cyclotron and Synthesizer Applications for PET/CT Scans in Thailand and Japan

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This study aims to investigate the influence factors that effect on efficiency of PET/CT and Cyclotron applications in Japan and find the potential PET tracers to produce in Thailand. An interview with a set of questions and the closed observation on PET radiopharmaceutical manufacturing were performed at two Japanese institutes and one Japanese hospital during June 2014. (Japan National Cancer Center Hospital, National Center of Neurology and Psychiatry and Tokyo Metropolitan Institute of Gerontology) and manufacturing feasibility of Sumitomo cyclotron and synthesizer model CFN MPS-100 were studied. The findings of more effective of PET tracers' production in Japan than Thailand are observed in this study. From the study, varieties of PET tracers produced by synthesizer model CFN MPS-100 are used in oncology, neurology, cardiology, and psychiatry in a rate of 5 times/week, 2 times/weeks, 2 times/weeks, and 1 time/week, respectively. More than 1,200 times of cyclotron-produced PET radiopharmaceuticals are to serve 4,800 Japanese patients per year. From the effective radiopharmaceuticals production, the qualified PET tracers certified by Japanese law or the local committee are generally applied for clinical diagnosis with satisfied clinical outcome. Regarding the potentialities in radiopharmaceuticals production, the increasing of the research in the neurology and gerontology tracers for supporting the aging society in Japan is observed.

The main influence factors on the effectiveness radiopharmaceutical production in Japan come from the core knowledge and the personnel experience which greatly affect the efficiency of the radiopharmaceutical production compared to the production by the same synthesizer and cyclotron facilities in Thailand. To catch up using the same strategy, the PET/CT and cyclotron centers in Thailand should provide adequate practical training to staffs and encourage them in learning and developing a good radiopharmaceutical. From the data analysis of the production techniques and manufacturing observation, we designed to produce two potential radiopharmaceuticals; ^{11}C-Methionine, one of the most common and reliable radiotracer in Japan, and ^{11}C-Raclopride in PET/CTand Cyclotron Center Chiang Mai University. Five syntheses of ^{11}C-Methionine were performed starting from 34.16 ± 7.83 GBq ^{11}C-CO2 (end of bombardment, EOB). At the end of synthesis (EOS), 5.61 ± 1.76 GBq of pure L-[methyl-11C]-methionine was obtained, representing a radiochemical yield (non-corrected for decay) of 16.38%. When we compared the production of ^{11}C -Methionine from Japanese system with our system in the same protocol, the Japanese system has a significant quality over our production system, because of the modification technique with the good experience of them. For ^{11}C-Raclopride, the production is in process

The influence factors on effectiveness of cyclotron and synthesizer applications can be developed by the co-operation with the excellent institute which has the cored knowledge, experiences, and potentialities in radiopharmaceuticals production. The more efficiency the system, the more beneficial outcome the patients. The research will also support high cost technological investment in Thailand, especially in nuclear medicine.

Publication of the Results of Research Project:

Verbal Presentation   (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)
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