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Why should we take care about occupational dosimetric impact when routine use of gallium-68 in nuclear medicine? A preliminary study.

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Introduction: Medical research in PET/CT diagnosis involving new gallium-68 radiolabelled pharmaceuticals is steadily rising in the last years thanks to the combined improvement of both radionuclide production and radiolabelling. Publications demonstrate benefits for the patient but few studies evaluate the occupational dosimetric impact when use the gallium-68 in routine, in terms of effective and equivalent dose. **Subjects & Methods:** In this study, extremities, crystallin and whole body exposure are evaluated for three technologists when use of the gallium-68 radiolabelling with DOTATOC peptide (10 runs) requiring handmade steps and PSMA-11 peptide (5 runs) that is an automated process. Electronic dosimeter ED3 (APVL) is used to access to instantaneous dose-rate that can be afterward related to steps of handling. OSL pellets (LANDAUER) are used to measure the cumulative dose. Dosimeters are placed on fingers, protection eyeglass and chest. During the production runs, we separate radiolabelling phase from injection handmade phase to the patient (150 MBq/patient). The annual equivalent and effective doses are extrapolated on a mean of 2.5 patients per day during 52 weeks of 5 days with 68Ga-PSMA-11 or 68Ga-DOTATOC lonely. **Results:** The measurements show high exposures heterogeneity, confirmed with ED3 measurements that present high punctual peaks during the production runs. For 68Ga-PSMA-11, the median equivalent dose to extremities, per production run and per syringe, is 228 µSv [208; 493] and, at the injection time, the median equivalent dose to extremities per syringe is 212 µSv [188; 278]. For 68Ga-DOTATOC, the median equivalent dose to extremities, per production run and per syringe, is 315 µSv [28; 875] and, at the injection time, the median equivalent dose to extremities per syringe is 493 µSv [111; 1225]. The extrapolated annual equivalent dose to extremities lead to 288 mSv [257; 501] and 525 mSv [90; 1365], respectively for 68Ga-PSMA-11 and 68Ga-DOTATOC. The extrapolated annual equivalent dose to crystallin lead to 6,5 mSv [4,9; 11,7] and 1,3 mSv [background; 113,1], respectively for 68Ga-PSMA-11 and 68Ga-DOTATOC. The extrapolated annual effective dose lead to 1,3 mSv [background; 16,9] and 1,3 mSv [background; 53,3], respectively for 68Ga-PSMA-11 and 68Ga-DOTATOC. **Conclusion:** This study highlights that the use in routine of radiolabelled gallium-68 could lead to significant equivalent doses for technologist, especially since the protocol is not automated. This advocates strongly for a specific attention when routine use of a new radiopharmaceuticals, particularly on radiation optimisation of radiolabelling protocol and injection phase, also on high practical training of technologist.