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Cyclotron produced gallium-68 chloride [68Ga]GaCl3 as an alternative to 68Ge/68Ga generators

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Jakub Boratyński 1,2, Michał Jagodziński 1,2 and Zbigniew Rogulski 2

1 Centrum Produkcji Radiofarmaceutyków VOXEL S.A, ul. Wrocławska 1-3, 30-006 Kraków,
2 Wydział Chemii, Centrum Nauk Biologiczno-Chemicznych, Uniwersytet Warszawski, ul. Żwirki i Wigury 101, 02-089 Warszawa

E-mail: j.boratynski@voxel.pl

The 68Ga isotope is usually eluted from the 68Ge/68Ga generator and is therefore readily available in PET (Nuclear Medicine) laboratories which do not have a cyclotron in place. The characteristics of the 68Ga isotope that this possesses make it a desirable radionuclide for PET diagnostics and the first widely available PET radioactive metal ion for routine use worldwide. With the help of a chelator, it can be easily attached to a biologically active molecules, which makes it suitable for conjugation with various biomolecules using bifunctional chelators and various macromolecules. Additionally, the selection of the chelator enables one compound to be radiolabelled with different radiometals. Thanks to this, it is possible to widely use (PET, SPECT, MRI, multimodal PET/SPECT/CT and therapy) of the compound only through the exchange of the radiometal with minimal changes in biological behavior. This facilitates patient-centered care, from diagnosis to molecular imaging to treatment, e.g. possible combination with 177Lu or 90Y isotopes as a theranostic pair. Due to serious disadvantages of 68Ge/68Ga generators, such as a very high purchase cost, short expiry date of the generator, low activity of the obtained isotope, low availability on the market and the need to keep a break between successive elutions, the number of PET studies with the use of 68Ga based radiopharmaceuticals do not meet the market demand [1], hence recently attempts have been made to obtain this valuable isotope using medical cyclotrons by irradiating of liquid (solution of 68Zn salts) [2] or solid target made of metallic 68Zn [3][4].
The paper presents the method of obtaining [68Ga]GaCl3 via a solid target technology in a medical cyclotron at the VOXEL Radiopharmaceuticals Production Center in Kraków, in quality compliant with the requirements of the European Pharmacopoeia and Good Manufacturing Practice (GMP). This method leads to obtain much greater activities, allowing for the subsequent distribution of the 68Ga isotope. The above method may be an attractive alternative to 68Ge/68Ga generators and in the future, by increasing the availability of the 68Ga isotope, may contribute to changing the cancer diagnosis strategy.

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Primary authors: BORATYŃSKI, Jakub (Univeristy of Warsaw); JAGODZIŃSKI, Michał (University of Warsaw); Dr ROGULSKI, Zbigniew (University of Warsaw)

Presenters: BORATYŃSKI, Jakub (Univeristy of Warsaw); JAGODZIŃSKI, Michał (University of Warsaw)

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