P-169 - Influence of radiolysis on astatine-211 chemistry

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team has set up a radiosynthesis of ^{64}Cu-radiolabeled compound whose process and operators were qualified at the aseptic level by the realization of media fill test and bioburden. The outsourced sterility analyses have also been qualified. The entire production is based on a robust chain between independent departments: Quality Assurance (QA), Radiopharmacy (production), Quality Control (QC), ^{64}Cu raw material production and also support departments (radiosafety department, facility management). Therefore, the QA system has enabled the implementation of an efficient electronic document management system and has ensured the follow-up of operators' training and equipment qualifications. QC has played a major role in the management of the raw material circuit, filling items and finished product controls. The release by the radiopharmacist is thus allowed to be in optimal conditions before administration to a patient.

All the steps described above will be detailed in order to propose a global review of all the elements that have to be implemented to provide a radiopharmaceutical in Phase I clinical trial according to GMP industrial standards.

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P-169
Influence of radiolysis on astatine-211 chemistry

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Objective: Astatine-211 is one of the good candidate among radioisotopes that can be used for targeted alpha therapy. Its half-life (7.2 h) makes it possible to label it with different kinds of molecules with different size. ^{211}At alpha emitting cause auto radiolysis which influence its chemical stability and oxidation state. That is why radiolabeling of this radioisotope is complicated. This study aims to address the impact of radiolysis on astatine chemistry.

Methods: For this purpose; first, the pH of chloroform medium was measured during the ^{211}At extraction and second, the medium was irradiated by γ-ray. At the end of irradiation for second time, the pH was determined by measuring HCl chemical yield obtained during the radiolysis (G_{HCl}). In this study, we investigated the amounts of produced HCl under γ radiations in presence and absence of oxygen at low doses of irradiation. The latter one allowing to be close to the dose rate corresponding to the real conditions of exposure of chloroform when performing ^{211}At- radiopharmaceuticals for pre-clinical development.

Results: Figure 1 is shown the obtained data in this study. The G_{HCl} is 1.46 folds higher in aerated medium. According to our results at low doses (< 500 Gy) a small difference is observed for the radiolytic yield of acids with and without air. This difference is grown when the dose is increased which means that oxygen can react with $CHCl_3$ in presence of ionizing radiation to form HCl [1].

Conclusion: The amount of HCl follows a linear behavior. In the low dose range (< 3kGy), the trichlorohydroperoxymethane (Cl_3COOH) production by chloroform reaction with O_2, must be taken into account for the mechanisms of HCl production. In fact, with the G-value determined in this work we have calculated the theoretical pH value in the Chloroform/Astatine solution (pH = 2.3) close

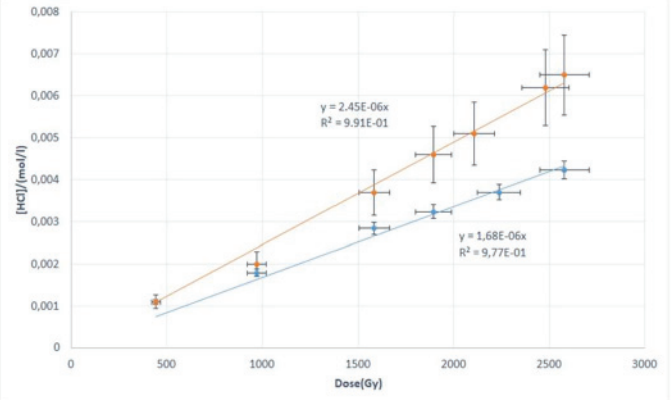

Figure 1. Experimental G-yield values of HCl, produced during irradiation of $CHCl_3$ in aerated (red spots) and oxygen free (blue ones) atmospheres by 137Cs-source irradiator Eγ = 0.667 MeV, Dose Rate = 7-9 Gy/min, Total Dose = 2580 Gy.

to the one measured in the real Astatine complexation/extraction process (pH= 1.5). Moreover, synthesis ^{211}At radiopharmaceuticals such as SAB (N-succinimidyl 3-[^{211}At]-astatobenzoate) is suffered from chemical decomposition [2] and formation of HCl by radiolysis may explain this problem. Our results may also explain why different species of ^{211}At exist in chloroform at the same time [3]. We recommend a washing of astatine solution with water before use for radiochemistry.

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P-170
A study to obtain a highly reproducible radiochemical yield (RCY) in the PSMA-11 radiolabeling

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Objectives: A highly reproducible radiochemical yield (RCY) is an important parameter for the planning and optimization of clinical routine activity.

It is known that in the case of radiometallation of PSMA-11, the presence of metal ion contaminants in the peptide precursor causes a decrease of the [^{68}Ga]Ga-PSMA-11 radiochemical yield because the Fe (III) competes with gallium-68 during the complexation reaction with the chelator.

In this study, we present the data obtained in our institute preparing the solution of PSMA-11 synthesis precursor following various methods in order to obtain a high and over-time reproducible % RCY.

Methods: According to European Pharmacopoeia (Ph. Eur.) Monograph "Gallium (^{68}Ga) PSMA-11 injection", which prescribes to use of a maximum of 30 μg of PSMA-11 for [^{68}Ga]Ga-PSMA-11