Contribution ID: **63** Type: **not specified**

Biodistribution and dosimetry of free 211At and meta-[211At]astatobenzylguanidine (MABG) in normal mice

Alpha particle emitting radionuclides are suitable for targeted radionuclide therapy (TRT), because of their short range in the tissue and high linear energy transfer. 211At is considered to be one of the ideal nuclides for TRT. A new generation of alpha particle compounds for TRT including meta-211At-astato-benzylguanidine (211At-MABG) are expected to have strong therapeutic efficacy with acceptable side effects [1]. 211At-MABG has been proposed for therapy of pheochromocytoma. 211At is a halogen and probably has similar characteristics to radioiodine [1-3]. However, the activity concentration of radioiodine was higher in the thyroid and lower in other organs as compared with free 211At [3]. Therefore, it is important to know the biodistribution and absorbed dose to normal tissues for free 211At and 211At-labelled compounds to predict potential risk organs when these compounds will be used for TRT. The aim of this study is to perform dosimetry of free 211At and 211At-MABG to various organs in normal mice.

Male C57BL/6N mice were injected via tail vein with free 211At (0.13MBq) or 211At-MABG(0.2MBq), and the absolute uptake of these compounds in the organs (%ID/g) were determined at 5 min, and 1, 3, 6, and 24 h after the injection. Number of disintegrations per unit activity administered (μCi-hr/μCi or Bq-hr/Bq) is known as 'Residence time'. It is the integral of a time activity curve for a source region. The absorbed radiation dose for each compound was calculated by OLINDA ver.2.0 by inputting residence time.

Biodistribution study showed that high uptake of free 211At was observed in the lungs, spleen, salivary glands, stomach, and thyroid, while 211At-MABG was observed in the heart and adrenals. The absorbed dose of free 211At was higher in the thyroid and that of 211At-MABG was higher in the adrenals, heart, and liver. The higher mean absorbed dose from 211At-MABG in the specific organs was characteristic to the biochemical property of this compound.

Absorbed dose evaluation of free 211At and 211At-MABG would help to predict potential risk organs and therapeutic strategy when 211At-labelled compounds are used for TRT.

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[3] Spetz J, et al. Biodistribution and Dosimetry of Free 211At, 125I - and 131I - in Rats. Cancer Biother Radiopharm. 2013;28:657–64.

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Presentation Type

Poster

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