Contribution ID: **42** Type: **not specified**

# Production of 211At at the Copenhagen University Hospital, Denmark.

Production of At-211 at the Copenhagen University Hospital, Denmark.

Holger J. Jensen, PET and Cyclotron Unit, Copenhagen University Hospital, DK-2100, Copenhagen, Denmark.

**Objective**
There is a great interest in At-211 for alpha radio immunotherapy. However the production of At-211 is difficult and it can only be produced in few accelerator facilities worldwide. In Copenhagen we have produced At-211 for more than 18 years at our Scanditronix MC32 cyclotron. The special features of this cyclotron will be discussed together with a presentation of results, data and experience from our more than 500 productions.

**Method**
The general accelerator production route of At-211 is via the 209Bi(α,2n)211At reaction using beam energies of 28-29 MeV, but only very few cyclotrons worldwide are capable of making α- beams with the necessary energies. Most cyclotrons today are build for acceleration of only negative ions and in many cases only H-. The Scanditronix MC32 cyclotron at the Copenhagen University Hospital, Copenhagen, Denmark, is a negative-ion cyclotron for dual beam irradiation at two beam lines with variable proton and deuteron energies of 16-32 and 8-16 MeV respectively. A special feature of this cyclotron enables all magnetic elements of the cyclotron to be reversed. Combined with the design of our RF system, this allows in addition the acceleration of positive ions and α-particles for internal target bombardment.

Targets are prepared on 30×28×5 mm aluminium backings, at the Department of Physics, Chalmers University of Technology, Gothenburg, Sweden, using highly enriched (99.999%) Bi-209 layers of 24±2 mg/cm2. To stabilize the Bi-209 layer and to prevent diffusion of produced 211At out of the target surface during irradiation, an additional layer of 0,5±0,3 mg/cm2 pure aluminium are added on top of the Bi-209 layer. Irradiations are done at an internal water-cooled probe using beam energies of 28-29 MeV. Shortly after irradiation the target are transported to our only collaborator - the Department of Radiation Physics, Göteborg University, Sweden - by car within 4 hours for the final refinement of At-211. Upon arrival to Göteborg the At-211 are isolated using a dry distillation procedure previously described by Lindegren et al. (Appl. Radiat. Isot. 2001, 55(2), 157-160).

**Results**
With irradiation times of 3,8±0,2 hours and beam currents of 16,4±1,1 μA, we have produced activities of 1,23±0,19 GBq EOB in average over the last 10 years. This corresponds to a saturation yield of 246±31 MBq/μA, which corresponds very well with the expected yield of 240 MeV/μA given by Lambrecht et al (Appl. Radiat. Isot. 1985, 36, 443-450).

**Conclusion**
We have established a stable and reliable production of At-211, with activities relevant for both research and therapy. With only one production every second week we clearly have the capacity for more costumers.

## Email Address

Holger.Jan.Jensen@regionh.dk

## Presentation Type

Contributed Oral

**Primary author:** Dr JENSEN, Holger J. (Copenhagen University Hospital)

**Presenter:** Dr JENSEN, Holger J. (Copenhagen University Hospital)