Contribution ID: **116** Type: **not specified**

Quantified cell binding of astatinated immunoconjugates on ovarian cancer cell spheroids by alpha camera imaging

Purpose. Optimization of patient dosing for intraperitoneal α-radioimmunotherapy of microtumours can be performed with the help of a biokinetic model. The goal of this study was to investigate whether simulations of mathematical models can be confirmed by in vitro models. We used the α- camera micro-imaging technology to quantify cell binding of 211At-radiolabelled monoclonal antibodies to small ovarian cancer cell clusters.
Materials and methods. Various sized spheroids (NIH:OVCAR-3) were treated with 211At-MX35 and 211At-Farletuzumab (170kBq/mL) for different time periods. Cell clusters were stained and evaluated as a whole or by serial sectioning using the α-camera device and the γ-counter as reference method. Alpha camera images were frame-parsed to determine the activity uptake and distribution. Cell numbers were estimated by area evaluation of conventional α-camera images in case of whole spheroids or, in case of cross-sections, by manual counting of adjacent haematoxylin and eosin stained cryosections. Kinetic binding curves were derived using the total number of bound antibodies per cell and compared to model simulations.
Results. Quant imaging with the α-camera provides an accurate and precise method for activity quantification. In contrast to 211At-Farletuzumab, binding kinetics of 211At-MX35 were considerably different from the model simulation predictions. Experimental data showed equilibrium binding within 4 hours after treatment followed by a decline in activity due to cell death. The in vitro model did confirm that lower levels of activity uptake per cell were reached for larger spheroids, especially near the core. For this particular cell line, the antibody binding characteristics of MX35 led to higher activity levels.
Conclusion. This study demonstrated that antibody binding characteristics play an important role in intraperitoneal α-radioimmunotherapy. Our observations indicate that radiation effects may occur already shortly after treatment initialization and thus elucidating a parameter that needs to be added in the models used for treatment planning.
Key words: astatine-211, radioimmunotherapy, alpha-particle therapy, quantification, biokinetic model

Email Address

tom.back@radfys.gu.se

Presentation Type

Contributed Oral

Primary author: Dr BACK, Tom (University of Gothenburg)

Co-authors: Dr ANEHEIM, Emma (University of Gothenburg, Sweden); Dr JENSEN, Holger (PET and Cyclotron unit, Copenhagen University Hospital); Ms VERHOEVEN, Marjolein (University of Gothenburg); Dr ALBERTSSON, Per (Sahlgrenska Academy, University of Gothenburg); PALM, Stig (University of Gothenburg); Dr LINDEGREN, Sture (Departemnt of Radiation Physics, Institute of clinical Sciences Sahlgrenska Academy at Gotehnburg University)

Presenters: Ms VERHOEVEN, Marjolein (University of Gothenburg); Dr BACK, Tom (University of Gothenburg)