Contribution ID: **274** Type: **Poster**

Radioiodination and biodistribution of the monoclonal antibody TU-20 and its scFv fragment

Thursday, 22 April 2010 12:00 (20 minutes)

The ability of the monoclonal antibody TU-20 and its scFv fragment to bind specifically to the C-end of the class III β-tubulin makes these substances useful as potential diagnostics for neurodegenerative diseases – especially peripheral neuropathies.
TU-20 and its scFv were labeled with 125I and 123I by chloramine-T (with average yield 0.75 and 0.50, respectively). Radiochemical purity and stability was revealed by gel filtration (decrease to 80 % and 50 % in two months, respectively). Immunoreactivity of the labeled TU-20 was determined by ELISA - the range of the preserved immunoreactivity varies from 60 % to 95 % in accordance to the used radiolabeling process. RIA and affinity coupling analytic methods were specifically designed with focusing on specifics of the antibody and its fragment. The results of RIA differ in depandance on the type of the reaction vessel (glass or polystyrene) and the affinity coupling results depend on the experimental arrangement - in the batch or at the column. Fragmentation of the labeled antibody and its fragment was estimated by bis-tris gel electrophoresis followed by silver staining and autoradiography (over 95 % of radioactivity bound in the substances). The antibody binding in tissue slices was studied in vitro by immunohistochemistry. The Purkinje cells were observed conjugated with the radiolabeled substances –either TU-20 or its ScFv fragment in the area of the cerebellum.
In vivo biodistribution of 125I-TU-20, 125I-scFv TU-20, 123I-scFv TU-20 and Na125I was proceeded in normal mice (wild type C57B/6/J). Both biomolecules labeled by 123I were also proved in an imaging biodistribution study with use of the SPECT camera. Finally, a transgene population G93A1 Gur was used for comparative study to show the different behaviour of the substances in a normal mouse and in the modified organism with amyotrophic lateral sclerosis (ALS). The most part of differences is observed in the area of the muscles, rostal and caudal spinal cord.
In summary, the monoclonal antibody TU-20 and its scFv were successfully radioiodinated and afterwards analysed by several quality control methods and biodistribution studies which confirmed their preserved or expected immunoanalytical characteristics in normal and genetically modified organism.

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Session Classification: Poster Session - Nuclear Methods in Medicine, Radiopharmaceuticals, Labelled Compounds

Track Classification: Nuclear Methods in Medicine, Radiopharmaceuticals and Radiodiagnostics, Labelled Compounds