ABSTRACT

Radioimmunotherapy combines biological treatment with the use of highly effective radioactive radiation, which allows for more effective and gentle cancer therapy. This bachelor thesis focuses on the use of the therapeutic radioisotope 161Tb, which is characterized by the emission of low-energy electrons and gamma rays that allow monitoring of therapy and targeting of cancer cells, metastases and whole tumors. This theranostic approach offers increased treatment efficacy, especially in the early stages of the disease. This thesis focuses on a model study of rituximab monoclonal antibody conjugates that have been fluorescently labelled using a fluorescein tag. Covalent binding between the immunotherapeutic conjugate and the fluorescent label was accomplished using free amino groups of lysines and bioorthogonal chemistry. A biologically active antibody conjugate with a fluorescent label was developed that allowed direct monitoring of the conjugate binding to CD20-expressing cells using confocal microscopy. Subsequently, a radioactive conjugate of rituximab, modified with the p-SCN-Bn-CHX-A"-DTPA chelator and radiolabeled with the ^{161}Tb radioisotope, was tested. The biological activity of the radioimmunoconjugate was determined by in vitro experiments. Biodistribution of the radioimmunoconjugate was monitored after intravenous administration, and in vivo tests showed retention of the substance in the body of the experimental laboratory animal. Furthermore, gold nanoparticles were modified with isotype IgG antibodies with fluorescent labels that can be used for imaging plant tissues by fluorescence and transmission electron microscopy.