Abstract

Objectives: This senior thesis was aimed at determining a method of albumin labelling with a particular radionuclide – technetium ^{99m}Tc. Our task was to review the various possible methods needed for working out a procedure for albumin labelling with the mentioned radioisotope and also to test the behavior of labelled albumin *in vitro* in experiments with newly-isolated rat kidney cells. The next objectives of this work were to analyze the performed experiments, compare the results with other known procedures of albumin labelling with technetium ^{99m}Tc and cast the results in the form of a scientific statement.

Methods: A low pH and high concentration of albumin were useful for the albumin labelling experiments. A solution of $SnCl_2.2H_2O$ was used for the reduction of pertechnetate. Purification of labelled albumin was performed by gel chromatography with a Sephadex G-50. The locations of albumin peaks in the chromatographic fractions were determined by the bicinchonic method. The location of pertechnetate was found by investigating the chromatographic spectrum of pertechnetate. Investigation of the elution spectrum was used to check for proper labelling. The radiochemical purity of labelled albumin was verified by paper chromatography and subsequent detection. Newly-labelled albumin was used in the cell experiments. Accumulation of albumin was observed in cells after incubation both at 2°C and 37°C.

Results: Very pure labelled albumin was repeatedly prepared, with very good radiochemical stability. It was observed that the quality of preparation depends highly on the pH of the reaction mixture, the concentration of albumin and on the way the $SnCl_2.2H_2O$ solution is prepared. The accumulation of albumin by kidney cells was decreased to 15-20 % after incubation at 2°C. A linear dependence of accumulation in time was observed during incubation at 37°C.

Conclusions: With the labelling method established here, the reproducible preparation of high quality albumin labelled with ^{99m}Tc is quite easy. It is necessary, though, to establish and maintain proper conditions during labeling. The final preparation is sufficiently stable for use in biological experiments. The accumulation of ^{99m}Tc-albumin is time- and temperature-dependent and increases slowly in time. It is evident thata large component of the transport is active because the uptake of albumin was decreased to 15-20 % at

low incubation temperatures. It appears, though, that a small component of the transport is due to passive processes.