

that, although a large portion of the Complex II is excreted into the bile, another portion is decomposed into  $^{99m}\text{TcO}_2$  and  $^{99m}\text{TcO}_4^-$  through a similar mechanism as observed with the highly hydrolyzed compounds. This phenomenon can show the lower

stability of the Complex II, which can be easily understood from the chemical state.

Thus, the present result suggests that the Complex I is rather a better agent for a cholescintigraphy than the Complex II.

### **The Labeling Reaction of Tc-99m-Bleomycin: a Monomer and a Polymer Complex Formation**

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In the course of studying the labeling reaction of bleomycin (BLM) with  $^{99m}\text{Tc}$ , using  $\text{SnCl}_2$  method, different labeled compounds were detected. Small differences on the labeling condition greatly affected the labeled product.

A tetravalent  $^{99m}\text{TcO}_4^-$  is estimated as coordinated with the ligand in the monomer complex, but a hydrolyzed  $^{99m}\text{Tc}$  is coordinated in the polymer complex. The variable amount of  $^{99m}\text{TcO}_4^-$  or  $^{99m}\text{TcO}_2$  detected in the analysis of the labeling product appeared as to be dependent on the pH of the reaction, the concentrations of BLM and  $\text{SnCl}_2$ , along with its chemical state. After studying the different parameters affecting the labeling product and their biological behavior in mice, a monomer complex was selected, as a possible more reproducible complex to be used in the detection of tumor.

The monomer complex is easily prepared by a

rapid addition of the reducing agent, a  $1 \times 10^{-9}$  M of  $\text{SnCl}_2$  freshly prepared, to a mixture of  $^{99m}\text{TcO}_4^-$  and a  $1 \times 10^{-5}$  M of BLM dissolved in 0.2 M of acetate buffer (pH 6). The addition of this minute amount of the stannous ion was the important step of this preparation. Stannous ion easily undergoes hydrolysis, so when handling such a low concentration of this agent even under  $\text{N}_2$  atmosphere, some change can occur and the reaction can proceed forward to a polymer complex. This polymer complex easily suffers hydrolysis, oxidation or decomposition, and  $^{99m}\text{TcO}_4^-$  or  $^{99m}\text{TcO}_2$  could be detected in vivo or in vitro studies. But, on the other hand, the monomer complex was able to be prepared by avoiding the hydrolysis phenomenon, and once formed, it was a chemically stable complex, even in the in vivo study a great stability was observed.