

$^{99m}\text{TcO}_4^-$  is reduced to  $\text{TcO}^{3+}$ , the labeling reaction proceeds through a competitive reaction between the formation of the complex and hydrolysis of the reduced  $^{99m}\text{Tc}$  species, depending upon the ligand coordinating atoms or the bonding strength with technetium.

An O-O coordinating ligand, such as DOPA,

ascorbic acid, where the hydrolysis easily took its course, the use of Resin- $\text{Sn}^{2+}$  appeared as an effective tool to be applicable. So even with this very weak chelate, a monomer complex was able to be labeled. In animals studies, this complex showed higher stability than the polymer complex.

### **In Vitro Studies on Tc (IV) and Its Human Serum Albumin Binding**

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The hydrolysis and the human serum albumin (HSA) binding of tetravalent  $\text{TcCl}_6^{2-}$  were investigated in vitro by the use of  $^{99}\text{Tc}$ . UV absorption spectra showed that  $\text{TcCl}_6^{2-}$  was stable for 20 min or so at pH 3 and decomposed immediately at pH 7. But the valency of Tc was assumed to be kept IV. When Tc (IV) was reacted with HSA, Tc was considered to bind to HSA in a monomeric Tc (IV) state such as  $\text{TcCl}_6^{2-}$  at both pH regions. The number of binding sites was 2 and the association constants were approximately  $1.6 \times 10^4 \text{ M}^{-1}$  and  $2.5 \times 10^4 \text{ M}^{-1}$  at pH 3 and 7, respectively. The values of association constants

showed that these bindings were attributed to coordinating bonds. The fact that the association constants of the monomer Tc(IV)-HSA interaction were not much higher than these of other metals and organic compounds suggested that the monomer Tc(IV)-HSA complex was not always stable in vivo. While, it was observed that the polymer Tc(IV) appeared if more than  $1 \times 10^{-5} \text{ M}$  of Tc(IV) concentration was used at pH 7. At pH 7  $\text{TcCl}_6^{2-}$  was hydrolyzed to the various species of Tc (IV), which had various reactivities to HSA. It was assumed that some of the hydrolyzed Tc(IV) species had high affinity for biopolymers such as HSA.

### **Simple Method for Preparing $^{99m}\text{Tc}$ -sulfur Colloid with Metallic Sn.**

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Various kinds of  $^{99m}\text{Tc}$ -colloid have been used for imaging the liver so far, and  $^{99m}\text{Tc}$ -Sn-phytate is widely used due to the simplicity of preparation at the present time. However, this is not satisfactory, since kidneys are always visualized as well. Therefore we investigated a new simple method of preparation of liver imaging agent considering the method with sulfur colloid, which has been known to visualize the liver but kidneys.

#### **Procedures**

Five ml of  $^{99m}\text{TcO}_4$  solution and 1  $\mu\text{l}$  of 1 N HCl are added. The solution is eluted through the column containing Sn and Ag metal plates, mixed with 25  $\mu\text{l}$  of sulfur solution consist of  $\text{Na}_2\text{S}$  and sulfur 5 mg/ml each, stirred, and pH is adjusted below 3. The efficiency of labelling was between 96% and 97%. A beautiful image of liver and spleen, but kidneys was obtained using the agent prepared as mentioned above.