

## K. Heart, Lung and Peripheral Circulation

### Distribution Study of Thallium-204 by Autoradiography

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Myocardial scanning by thallium-201 is now proved to be important clinical tool for diagnosis of myocardial ischemia. Many papers were published in this application as well as basic studies of biological behavior of this radioisotope. However, no report was noted regarding histological or cytological distribution of this watersoluble radionuclide.

In this point, our investigation was undertaken to detect the tissue distribution of thallium by autoradiographic method. Experiments were performed using thallium-204, a  $\beta$ -emitter, instead of thallium-201. Twenty minutes after intravenous injection of the isotope into the mice, the animals were sacrificed, then, histological section were prepared by frozen section to avoid the escape of thallium ion from the tissues during process of routine paraffin preparation. The slides were processed for autoradiography, exposed for 5 days, then developed and stained by H and E.

The greatest homogeneous distribution of thallium-204 grain in autoradiography, among eight organs of mice, was the heart. The grains

were distributed homogeneously throughout the heart muscle. In other five organs, liver, skeletal muscle, intestine, and spleen, grains were noted also homogeneously with lesser grade distribution than that of the heart.

On the other hand, specific focal concentration of isotope was observed in kidney and testis. In the kidney, almost all grains were located in the tubules and no activity was noted in the glomerulus. The grain distribution in the testis was specially characteristic and found in the Leydig cells with marked concentration. It is known that the change in distribution of thallium occurs with time in various organs. And images of myocardium after exercise show increased concentration of thallium when compared to resting-stage images of the same patient. However, importance of our study is to demonstrate the difference of tissue distribution of thallium ion in various organs. Especially the specific thallium concentration into the Leydig cells may suggest the presence of biochemical and/or biofunctional characteristic nature of its functions.

### Evaluation of $^{201}\text{Tl}$ Myocardial Imaging

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When  $^{201}\text{TlCl}$  was injected intravenously, 4.42% of administered dose or 4.04% ad. dose per gm tissue was accumulated in the heart of rats at 30 min. post-injection, which indicated the adequacy of the nuclide to be used for imaging of normal

myocardium.

Scintiphotos in various projections obtained in a healthy volunteer after i.v. injection of 2 mCi of  $^{201}\text{TlCl}$  (Phillip-Dufer-Daiichi) revealed accumulation of radioactivity in the myocardium in doughnut