thereafter. The percentage of injected radioactivity excreted in the 24-hour urine averaged 5.2 per cent.

2) Abnormal plasma disappearance of radioactive vitamin B$_{12}$ was noted in CML, PA, blind loop syndrome before treatment and myelitis. Although the plasma clearance curve was normal in liver cirrhosis, its urinary excretion of radioactivity was markedly increased, suggesting the reduced hepatic uptake. The remaining patients studied showed normal plasma disappearance and urinary excretion of radioactive vitamin B$_{12}$.

3) In CML, the clearance of the plasma radioactivity was markedly delayed and urinary excretion was reduced as well. This may be explained by the increased binding capacity of the plasma proteins for vitamin B$_{12}$, since almost 100% of the radioactivity remaining in the plasma sample was found to be non-dialyzable at any given time subsequent to injection.

4) In PA in relapse, the plasma disappearance was observed in between the normal and CML. The curve which remained above the normal range even after the treatment with vitamin B$_{12}$, fell within the normal range when 30 units of hog intrinsic factor had been administered orally prior to the intravenous disappearance test. This fact implies the possibility of the intrinsic factor to pass through the intestinal mucosa into the blood stream and have some function to transfer circulating vitamin B$_{12}$ from plasma to tissues.

V. Malignant Tumor

Neutron Activation Analysis of Cancer-I

T. HIGASHI
Kanagawa Dental College, Department of Radiology

T. HISADA
Kanagawa Dental College, Department of Pathology

K. TOMURA
The Institute for Atomic Energy, Rikkyo University, Tokyo

A study was undertaken on the inorganic elements of the cancer tissues, especially the phosphorus compound, by the neutron activation method using an atomic reactor.

The cancer specimens used in the present study were obtained from the patients with the gastric, thyroid or breast cancer. The samples enclosed in the capsule were irradiated by $3 \times 10^{11}$ neutron flux in the reactor of Rikkyo University for 2 to 4 hours. As to the irradiated specimens, the gamma-rays was examined with a 400-channel pulse height analyzer. The typical spectra of each sample, in 24 hours after irradiation, were found to be that of $^{24}$Na. Besides the spectrum of $^{24}$Na, however, peaks which suggested the gamma-ray spectra of $^{64}$Cu and $^{56}$Mn were found particularly in the thyroid gland.

It was noted that a slight increase in the amount of $^{24}$Na in the stomach cancer tissue compared with that in the noncancerous stomach tissue.

A detailed information on the significance of the increase or decrease in the amount of inorganic elements which appear in the cancer tissue will be given in the next report.

Most of the radioactivity which remained after 7 days cooling time, was found to be $\beta$-rays. The measurement of the half life of this radioactivity and of the $\beta$-ray energy with the aid of aluminum absorber revealed that radioactivity of this sample was almost
of $^{32}$P. The cancer tissue showed a high concentration of $^{32}$P in the autographic localization while the noncancerous tissue did not. The relationship of the cancer tissue to the localization of $^{32}$P is under study.

Effect of Sexual Hormones on the Uptake of Radioactive Phosphorus Into Mammary Carcinoma Tissue
— In vitro Test for Prediction of Hormone Dependency

R. SUDA, S. FURUKAWA, T. SASAKI, M. SENGOKU and R. NAGAI
Second Department of Surgery, Nagoya University School of Medicine, Nagoya

It has been well established that some of mammary carcinoma are dependent on hormones. According to our experience, after patients with mammary carcinoma had each been treated with endocrine ablative therapy, only half of them were effective. Therefore, the prediction of hormone dependency of individuals before definitive surgical therapy should be of great importance.

To know the hormone dependency, an in vitro test by incorporation of radioactive phosphorus into nucleic acids of breast cancer cells under the influence of estradiol-17β and testosterone was investigated.

There were two types of mammary carcinoma classified; one was accelerated uptake of $^{32}$P by the administration of estradiol and effective to ablative therapy, and the other was not accelerated and ineffective. The influences of testosterone were not so remarkable as to those observed on estradiol. In the almost cases, the reverse results were obtained.

Accordingly, this in vitro test using estradiol by the uptake of radioactive phosphorus is considered to be useful in the preoperative evaluation of hormone dependent mammary carcinoma.

Tumor Scanning with Radioisotope Labeled Tumor Affinity Compounds

S. OHBA, K. HISADA, T. HIRAKI, S. FUJITA and T. MISHIMA
Department of Radiology, School of Medicine, Kanazawa University, Kanazawa

On a scintiscan tumor is delineated as a filling defect conventionally (negative delineation) and there is some limitation in the size of the defect to be detected due to various factors. In scintigraphically positive delineation of a tumor, theoretically extremely small tumor should be detectable provided they are much more radioactive than the surrounding tissue. For this reason, a series of basic experiments has been carried out on Yoshida sarcoma-bearing rat using 27 kinds of radioisotope substances. Among these substances, $^{131}$I-antifibrin antibody, $^{131}$I-fibrinogen, $^{131}$I-fibrinolysate, $^{131}$I-albumin, $^{99m}$Tc-albumin, $^{197}$Hg-chloromerodrin, $^{203}$HgNO$_3$, $^{203}$Hg-hematoporphyrin-NA$_2$ and $^{131}$I-γ-globulin were proved to have affinity to solid tumor transplanted subcutaneously, and these several materials have the value of clinical trials. However, $^{197}$Hg-chloromerodrin renders the detection of deep situated lesions difficult because of marked absorption of the photons by overlying tissues. Moreover, radioactive compounds having a high affinity to the liver and kidney are not suitable for scanning of the abdominal tumor.

We have reported tumor scanning of the patients using $^{131}$I-RISA previously. $^{99m}$Tc was substituted for $^{131}$I as a labeling nuclide of albumin. 6 patients with cancer were...