while hyperthyroid were given a seaweed restricted diet for 2 weeks and were then given 10 mg of iodide as KI tid thereafter.

AIU was calculated from thyroid clearance of ^{131}I multiplied by serum inorganic iodide and clearance was calculated from the increment in thyroidal ^{131}I between one and two hours divided by serum ^{131}I. Serum inorganic iodide was determined from the specific activity of urinary iodide. AIU determined by this technique could be considered to be the amount of iodine organified in the thyroid, because a) thyroidal transported iodide is in equilibrium with serum iodide, b) serum ^{131}I is mixed with transported ^{131}I within one hour after the injection of ^{131}I, c) serum ^{131}I one hour after the injection of ^{131}I is not lower than that of two hours, that is, transported ^{131}I one hour after the injection of ^{131}I is not lower than that of two hours, so that the increment in thyroidal ^{131}I between one and two hours should be the increment in thyroidal organic ^{131}I.

In euthyroid subjects, serum inorganic iodide ranged from 0.26 to 10.4 μg/100 ml according to the iodine content in their diet, and AIU increased from 2 to 15 μg/hr as serum iodide increased, while PBI and RSU did not differ with differing serum iodide level. This suggests that thyroids of euthyroid subjects on a diet rich in iodine organify more iodide than they secrete as thyroid hormone and the excess is secreted as non-hormonal iodine.

In hyperthyroid patients, the determination of AIU, PBI and RSU was performed after 2 weeks of seaweed restricted diet and 2 and 4 weeks of iodide treatment. Before iodide treatment, their serum iodide level were from 0.118 to 0.35 μg/100 ml and AIU, PBI and RSU were higher than those of euthyroid. After 2 and 4 weeks of iodide treatment, serum iodide increased to 12-40 μg/100 ml,and PBI and RSU decreased to normal range in all cases.

However, AIU averaged 37.5 μg/hr before iodide treatment increased to 98.5 μg/hr by the iodide treatment. Thyroidal iodine content in untreated hyperthyroid patients was reported to be around 5 mg/thyroid and this increased to about 30 mg/thyroid after iodide treatment. This could not account for the increased AIU observed in this experiment, 2.5 mg/day for 4 weeks. These results suggest that the effects of iodide treatment on hyperthyroid were not to decrease total thyroidal iodine release, but to decrease the release of thyroid hormone by increasing the release of non-hormonal iodine.

4) Heart and Lung

Radiocardiogram; A Method of its Analysis With an Analog Computor as a Radiocardiogram Simulator

H. Akagi

Department of Radiology, Osaka Medical School, Osaka

Dye dilution method has been used for many years and was proved to be valuable in diagnosis of cardiovascular diaeases, and also the radioisotopes are one of the useful indicator for this purpose.

A superiority of the isotope dilution technique (radiocardiogram) compared to ordinary dye dilution method is simplicity of the skill and the other is to detect the abnormality without heavy bleeding of the patients.

A problem of this method is a complexity

of the curves caused by the extra-body counting technique, and the validity or even their underlying principles have not yet been established.

An attempt was made in our laboratory for the analysis of radiocardiogram with four scintillation counters and a special purpose analog computor as a radiocardiogram simulator.

The circulation model assumed was consisted of seven compartment (venous part, right side of heart, pulmonary field, left side of heart, arterial part and two of peripheral circulations), and the delay lines connected between these compartments.

The simulated curve was illustrated on oscilloscope and was projected on the recording paper of radiocardiogram.

A justing the appearance times and the rates of empting of the compartments of the model, the simulated curves were matched to radiocardiograms and as the result of this procedure the characterics of circulation i.e., real appearance times and rates of emptying, was shown on the dials of simulator by means of impulse response of the circuit.

In healthy persons, the estimated values of appearance time between compartments and rates of emptying were 46 ± 8% per sec and 38 ± 3% per beat for right side of heart, 2.16 sec, 20 ± 4% per sec, and 16 ± 4% per beat for lungs and 2.65 sec 50 ± 7% per sec and 42 ± 4% per beat for left side of heart respectively.

In the cases of hyperthyroidism the rates of emptying were increased both in per sec and per beat, and the appearance times were shortend, and contrasted to the hyperthyroidism, patients with hypothyroidism showed low rates of emptying and lated appearance times.

Patients with mitralstenosis had low rate of emptying in right side of heart and lung field, and with mitral insufficiency showed low rate in both side of the heart.

Also the abnormal route of circulation was simulated in cases of VSD and T.F. etc.

The arithmetical method of trial and error was obviously rather tendious, and the fitting analysis was easily carried out by means of electronic simulator, and showed usefullness in diagnosis of cardiovascular diseases.

S. Miyamoto

Nihon University School of Medicine, Tokyo

The extracorporeal circulation based on the maintenance of balance of venous and arterial return can be considered to be a state of induced hemorrhagic shock when the perfusion is not adequate. Therefore in order to make better the postoperative results of cardiac surgery, we should study on the pathogenesis of hemorrhagic shock, but up to now only a very limited information about pulmonary circulation in shock is known. According to our recent study, a positive correlation is observed between the circulating blood volume of normal infants and small children estimated by the use of Volemetron with RISA and body length or weight. However the circulating blood volume of infants and small children suffering from congenital cardiac diseases is increased remarkably compared with normal cases and this tendency is observed clearly in the cardiac patients in whom a large intracardiac shunt was found pre- and postoperatively. As a positive cerrelation between the circulating blood plasma volume and body weight, an increase of circulating blood volume is thought to be due to an increase of red blood cell mass. Such a fact indicates that in case of extracorporeal circulation for infants and small children the flow rate of perfusion should be much more than for adults and postoperatively it is necessary to keep more adequate amount of red cell mas than that of blood plasma volume. We measured experimentally the mean pulmonary circulation time and pulmonary blood volume by radiocardio-