airway disease has become important, but any conventional means have failed to detect it. Recently this type of change was known to cause premature closure of the small airway especially at dependent part of lung at lower lung volume, which is clearly evidenced by so-called "Closing Volume" as measured by the single expiratory curve using a bolus of tagging material such as 133-xenon. In this sense, it seems to be essential to validate this phenomena on the basis of regional lung function. At present, the closing volume was identified by means of scintillation camera imaging using 133-xenon.

Each of four healthy males under the age of fourty-five years old with or without history of cigarette smoking have been investigated, respectively. By rebreathing 133-xenon within a closed circuit, volume distributions (V) in lung at various level of respiration (RV, FRC, TLC) were recorded to be compared each other as spacial distribution. Upon normalizing averaged V distributions in a vertical direction, loss of volume changes from RV to FRC especially at dependent part of lung were significantly noticed in a group of smoker, whereas evenly distributed V changes were noticed in a group of non-smoker.

After intravenous injection of 133-xenon solution, the washout process from lung by tidal ventilation were also investigated to be expressed as a distribution of ventilation rate (λ) by computer processing. One of four smokers showed remarkable focal washout delay at dependent part of lung, while three of four smokers showed a evidence of regional washout delay or decrease of ventilation rate by the conventional compartmental analysis. Upon normalizing averaged distribution in a vertical direction, this tendency of decreased ventilation rate (λ) at the dependent part of lung was seen more evident in the smoking group than in the non-smoking group. By examining the relation between ventilation ($\dot{V}$) and perfusion ($\dot{Q}$) distribution, it was suggested that the loss of ventilation rate at the dependent part of lung at tidal ventilation might constitute the so-called physiological shunt effect on overall gas exchange efficiency of lung as was predicted by the computer simulation studies calculating A - a Do_2 theoretically by inputing the distributional relation between $\dot{V}$ or $\dot{Q}$ and $\dot{V}/\dot{Q}$.

^{131}I-MAA Lung Scans Processed by the Electronic Computer

K. Machida, H. Yasutochi, T. Sugawara, M. Ohshima, and K, Uno

Department of Radiology, University Branch Hospital Faculty of Medicine. University of Tokyo

As previously reported[1)2)] we record lung scans in the paper tape with the routine scintigrams simultaneously. By using these tapes we processed the scintigrams with TOSBAC 40 TIME SHARING SYSTEM electronic computer. The anterior and posterior scintigrams were recorded with the Toshiba scintiscanner (φ : 3in) with the 37 hole collimator (the distance of focus: 10cm), after intravenous administration of ^{131}I-MAA to the sitting patient.

The quality of the images were compared

among original scintigram, the non-smoothed digital printed by the computer, and the smoothed digital. By smoothing the original, the image of lung scans were improved remarkably and appeared to be useful in clinical use. The computer displayed the each point in 10 different marks according to the number of counts, which enabled us to recognize the radio-activity of the points semiquantatively.

Furthermore the integral counts of the both lung fields were calculated. The normal anterior values were 43.2±4.9% (N=10) in the left and 56.8±4.9% in the right; posterior values were 46.7±2.7% (N=6) in the left and 53.3±2.7 in the right.

The ratio of each level of the counts between left and right lung was also compared. All these data were obtained very easily by the computer and expected to be useful clinically.

1) H. Yasukochi, S. Tada, K. Machida, F. Kumura and M. Ohshima: Acta radiologica japonica 34 : 33, 1974.

2) K. Machida, H. Yasukochi, S. Tada, F. Kumura and M. Ohshima: Kakuigaku 11 : 186, 1974.

The Influence of the Input Curve on the Configuration of Radiocardiogram

M. Saito, S. Motohara, T. Sakurai, A. Hirakawa

3rd Medical Clinic, Kyoto University

M. Kuwahara

Automation Research Laboratory, Kyoto University

The influences of the inflow process of injected radioisotopes into the heart (input curve) on the configuration of radiocardiogram(RCG) are reported. The input curve is recorded bya scintillation counter placed over the axilla of the injection side simultaneously with RCG. ^{131}I human serum albumin is injected into an arm vein by a cuff releasing method. A good input curve with a sharp peak and a steep single-exponential down slope is obtained as the results of complete bolus injection of radioisotopes. However, a poor input curve with a steep down slope followed by a gentle down slope (diphasic) is sometimes obtained according to a poor injection technique and/or conditions of the vein.

The input curves thusly obtained are simulated by two different analog models; single mixing chamber model (model 1) and two mixing chamber model with different time constants (model 2). The parameters obtained by the simulation of the input curve are used for the analysis of RCG by the analog simulation circuit previously reported. When a poor input curve is analyzed with the usage of model 1, the overestimation of the left heart volume is resulted. The over-estimation of the left heart volume is corrected when the model 2 is applied. However, the accuracy of the simulation results is insufficient even when the model 2 is used because of the deterioration of the configuration of RCG. Concequently, the conditions of the input