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ESTIMATION OF CARDIAC FUNCTION AFTER MITRAL VALVE REPLACEMENT BY USING STRESS-DIGITAL PERFUSION IMAGES(STRESS-DPI). T.Tanaka,
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Postoperative cardiac function was estimated by changes of DPI under exercise in patients treated with mitral valve replacement at Heart Institute Japan.DPI are composed of 3 main isocount contours,i.e. hyper, moderate,and hypo-perfusion area.Marked changes of hyper and/or moderate area are expressed as significant changes. DPI at rest are devided into normal,slightly abnormal and abnormal according to hyper area. Master-single exercise was loaded on patients.Patients without symptom after exercise were subdevided into 6 classes according to DPI at rest and changes of DPI.Note that the cardiac functional class I° of NYHA were further classified objectively,non-invasively,easy,without risk into 6 classes. To study the pathophysiological meaning and utility of stress-DPI further follow-up study were performed.

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STRESS DIGITAL PERFUSION IMAGES(STRESS-DPI).
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To detect noninvasively the redistribution of pulmonary blood flow,changes of DPI, caused under various stress,two injection method was introduced as followings. For control DPI before exercise 1mCi Tc-99m MAA was injected and then data were collected during 225 seconds period of quiet breathing. After any stress test 15mCi Tc-99m MAA was injected and then data were collected during 15 seconds.By comparing both DPI changes of DPI were evaluated,i.e. changes of DPI were tentatively defined as the 10% or more changes of hyper and/or moderate perfusion area and changes of DPI were studied in 50 cases.The whole process is stress-DPI.Although DPI represented the same distribution of pulmonary blood flow, changes of lateral DPI were often noted without accompanying changes of anter-posterior DPI(34/50=68%),i.e. lateral-DPI are sensitive to detect changes of DPI.Theoretical consideration about this sensitivity of lateral DPI were discussed and new concepts,positive and negative volume effects,were introduced.Accuracy of 2-nd DPI were theoretically considered and it is concluded that the changes of DPI are detected qualitatively without errors. Pathophysiological relationship between stree-DPI and Frank-Starling mechanism are also discussed

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PULMONARY BLOOD VOLUME IN MITRAL VALVE DISEASE.
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In 54 patients with various heart diseases, pulmonary blood volume(PBV) was measured from the technic of RI angiocardiography with Tc-99m-PYP. PBV was calculated from the product of pulmonary mean transit time(PMTT) and pulmonary blood flow(PBF). PMTT was calculated from the difference of mean transit time with left atrium and pulmonary artery. PBV was calculated by RCG and total blood volume (TBV) measured with RISA.
PBV in mitral valve disease($504\pm155 ml/m^2$) was significantly increased than that of normal controls($259\pm105 ml/m^2$), ischemic heart disease($283\pm58 ml/m^2$) and cardiomyopathy($342\pm153 ml/m^2$). In mitral valve disease, PBV was compared with cardiac catheterisation data, mean pulmonary wedge pressure(Ppw), mean pulmonary artery pressure(Ppa), mean pulmonary distending pressure(Pi) and pulmonary arteriolar resistance(PAR) respectively. There was no correlation between PBV and Ppw, Ppa and Pi. PAR in all patients were 250 dyne/sec/cm^{-5}. Correlation between PBV and PAR was 0.363, and PBV and TBV was 0.434.
PBV was supposed to be computed by pulmonary vascular elasticity and pressure. However, in this experiments, significant correlation could not be obtained between them.

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COMPARISON BETWEEN THE FIRSTPASS METHOD AND SIMPSON'S RULE IN THE CULCULATION OF THE RIGHT VENTRICULAR EJECTION FRACTION.
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Little attention has been given to the right ventricular(RV) function, because the RV function is difficult to quantitate by conventional means. In 36 confirmed cases, we used a noninvasive radionuclide technique to measure the RV ejection fraction(EF) by means of the firstpass method and the left ventricular(LV)EF by means of the ECG gated blood pool scan. These 36 cases included 9 idiopathic hypertrophic cardiomyopathy(HCM), 7 congestive cardiomyopathy (CCM), 15 myocardial infarction(MI) and 5 other heart diseases. In 11 cases, bilateral right ventriculography was performed, and RVEF was calculated by Simpson's rule. The RVEF which was determined from the firstpass method correlated closely with that determined from Simpson's rule(r=0.91). In HCM cases, the RVEF and LVEF averages remained in normal range. In CCM cases, the LVEF ($31.9\pm8.1\%$)was more markedly reduced than the RVEF($42.0\pm3.9\%$). In MI cases, there was no significant difference in RVEF between anterior MI and inferior MI, but LVEF in anterior MI($52.6\pm10.7\%$) was lower than in inferior MI($62.0\pm11.5\%$).