

or propranolol 5 mg. (Kleiger, R., and others: *Cardioversion and Digitalis*, *Circulation* 33: 878 (June) 1966.)

CARDIOVERSION Precordial direct current shock for the reversion of atrial fibrillation to sinus rhythm was applied to 27 patients with heart disease. Cardiodynamic studies were performed 24 hours before and 24 hours after precordial shock. Six patients who failed to revert constituted a control group and showed no significant changes in cardiac function after precordial shock. In ten patients with mitral valve disease, mean cardiac index increased from 1.99 liters/min./m.² in atrial fibrillation to 2.63 liters/min./m.² in sinus rhythm. Resting mean oxygen consumptions were similar but heart rate were slightly higher in sinus rhythm. Resting stroke volume increased from 57 ml./beat to 65 ml./beat. Peripheral vascular resistance varied inversely with cardiac output while arterial pressure remained remarkably constant. Arteriovenous blood oxygen differences fell from 6.71 ml./100 ml. during fibrillation to 4.72 ml./100 ml. in sinus rhythm. In four patients with dominant aortic stenosis or insufficiency, mean oxygen consumption and heart rate were similar in the two rhythms. Cardiac index increased from 1.76 before to 2.41 liters/min./m.² after reversion. Stroke volume was greater and peripheral vascular resistance fell as blood flow increased in sinus rhythm. Arteriovenous blood oxygen differences fell from 8.29 ml./100 ml. to 6.02 ml./100 ml. in sinus rhythm. Six patients with chronic arterial fibrillation, small hearts, no murmurs, and no evidence of heart failure or ischemic heart disease were termed benign fibrillators. Average values for oxygen consumption, A-V oxygen difference, heart rate, cardiac index, and stroke volume for this group were not significantly different before and after reversion. Data obtained during exercise were essentially similar in the control patients before and after precordial shock. In the group with mitral valve disease, mean cardiac index during exercise increased from 2.74 liters/min./m.² in atrial fibrillation to 3.34 liters/min./m.² in sinus rhythm. Mean A-V oxygen difference fell from 10.16 to 8.48 ml./100 ml. in this group. The increased cardiac

output during exercise reflected the higher resting level, since the changes induced by the exercise were similar in the two rhythms. Reversion from atrial fibrillation to sinus rhythm with precordial shock in the absence of myocardial depressants or changes in drug therapy produces a significant improvement in cardiac output due to an increased stroke volume in patients with valvular disease. In patients with benign fibrillation reversion from atrial fibrillation is not associated with improvement in cardiac output or stroke volume. Exercise heart rates are similar before and after reversion in valvular heart disease but lower in benign fibrillation. After reversion, the increment in heart rate induced by exercise is significantly reduced in patients with valvular heart disease and benign fibrillation. (Killip, T., and Baer, R. A.: *Hemodynamic Effects after Reversion from Atrial Fibrillation to Sinus Rhythm by Precordial Shock*, *J. Clin. Invest.* 45: 658 (May) 1966.)

CARDIAC INNERVATION Electrical stimulation of various sites in the central nervous systems of experimental animals and central nervous system lesions in man can produce changes in the electrocardiogram in the absence of demonstrable heart disease. The effects on the electrocardiogram of section and stimulation of the right and left stellate ganglia were studied in dogs. Right stellate ganglionectomy or left stellate stimulation produced a prolonged Q-T interval and increased T-wave amplitude. Left stellate ganglionectomy or right stellate stimulation produced increased T-wave negativity without measurable changes in the Q-T interval. The left stellate predominantly influences the anterior ventricular walls. The changes in sympathetic tone could be correlated with changes in the ventricular refractory period, i.e., stimulation of the right ganglion or ablation of the left ganglion prolonged the refractory period of the posterior ventricular surface causing an increased Q-T interval and T-wave changes. The electrocardiographic changes produced here are similar to those in patients with CNS disease, suggesting that alterations in sympathetic tone may account for these changes. (Yanowitz, F., Preston, J. B., and Abildskov,