ADAPTATION OF THE HEART TO EXERCISE

Investigations were carried out with the aid of a bicycle ergometer with the aim of studying changes in heart rate, stroke volume and cardiac sympathetic tone during exercise. The normal straight line relationships between work load, cardiac output, heart rate and oxygen uptake were compared with those of patients whose ventricular rates were controlled by artificial pacemakers. When the ventricular rate was held constant the cardiac output increased with the usual tachycardia. The oxygen uptake was shown to be independent of heart rate but varied in the normal way with work load. Filling time and ejection times were compared at low and high work loads in normal patients. At low rates the major change in cycle time occurred in the filling period but at high work loads there was a proportionately greater change in the ejection time. The rate of flow of blood into the ventricles during diastole was shown to be directly related to the work load. By means of the beta sympathetic blocking drug Propranolol it was shown that the effect of increased sympathetic tone on exercise is to increase the rate, decrease the stroke volume and increase the rate of ejection of blood from the ventricles.

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