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THE AMERICAN
JOURNAL OF PHYSIOLOGY

VOL. 127 AUGUST 1, 1939 No. 1

STUDIES ON THE ESTIMATION OF CARDIAC OUTPUT IN MAN, AND OF ABNORMALITIES IN CARDIAC FUNCTION, FROM THE HEART'S RECOIL AND THE BLOOD'S IMPACTS; THE BALLISTOCARDIOGRAM

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Received for publication April 6, 1939

The movements imparted to the human body by the impacts of the blood were first recorded by Yandell Henderson (1905) by means of a "swinging table" and a set of levers. His subjects had to arrest or suppress respiration before a record of movements synchronous with the heart beat could be obtained. A relation between cardiac output and the amplitude of these movements was suggested. On the Pike's Peak expedition (Douglas et al., 1913) a simplified form of the apparatus, a plank supported on piles of corks, was used to ascertain whether altitude affected cardiac output.

Heald and Tucker's (1922) subject stood on a platform suspended from the diaphragm of a drum. Movement was recorded by changes in the current flowing through a hot wire placed in the drum's air inlet. The direction of the movements could not be ascertained from their records. Nevertheless normal respiratory activity did not interfere with the record of the cardiac movements and the effect of the respiratory cycle on these movements was clearly shown. Increased amplitude was demonstrated after exercise, after nitroglycerine, and in a patient with aortic regurgitation.

Angenheister and Laue (1928) published 5 records obtained from a seismograph placed on a rigid table on which their subject lay. Four of these records are similar to those we obtain.

Abramson (1933) built a chair of aluminum alloy suspended from steel springs which were embedded in a cast steel base on a concrete foundation. The movements were greatly magnified by a patented device and photographed. The great nicety of construction was indicated by the high vi

The studies of Starr on the ballistocardiogram stimulated interest in measuring ventricular performance on a beat-to-beat basis and in estimating velocity of ejection of blood as opposed to cardiac output per minute.
Classic Pages

Circ Res. 1970;26:70
doi: 10.1161/01.RES.26.1.70

Circulation Research is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7330. Online ISSN: 1524-4571

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