OBSERVATIONS ON THE STATE OF
THE CIRCULATION AFTER AN
ENDURANCE TEST

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The following observations were made in the case of a woman swimmer (Miss Mercedes Gleitze, Auckland, January 16th and 17th, 1931), after an endurance swim of forty-three hours in salt-water baths, at a temperature of 75° F.

At intervals during the trial, particularly in the early hours of the morning, the swimmer became very drowsy for periods of a quarter to half an hour, but revived after taking liquid nourishment. (She is unable to digest solid or semi-solid foods during endurance tests, as they produce epigastric discomfort and distress.)

EXAMINATION

Aged 30 ; height 5 ft. 4 in. ; weight 168 lb.

On Completion of Test.—The general condition was good ; there was no cyanosis or distress, and the feet and lower limbs were warm. Hands and fingers were numb and blanched, appreciably cool, but not cold.

FIG. 1.—Blood pressure: immediately after forty-three-hour endurance swim (A B) ; nine hours after (C D) ; ninety-six hours after (E F). Pulse pressure: A B, 118/100 = 18 mm. Hg ; C D, 108/72 = 36 mm. Hg.

General fatigue was evident. There were occasional general body tremors, and the knee-jerks were markedly exaggerated. The pulse was regular, and of good strength (rate 80 per minute). The apex beat was in the fourth space, internal to mid-clavicular line, and the sounds were clear. Blood pressure was 118/100 mm. (Fig. 1). Electrocardiogram (Fig. 2) showed a moderate degree of left ventricular preponderance.

After Nine Hours' Rest.—The hands and fingers had regained their normal appearance, and the numbness had entirely gone. Blood pressure 108/72 mm., pulse 72 per minute. No abnormal circulatory or nervous signs.

After Ninety-six Hours.—Blood pressure 110/72 mm., pulse 72. An orthodiagram (Fig. 3) showed a heart normal in size (M.L., 6.3 cm. ; M.R., 4.2 cm. ; T.D., 10.5 cm.). The electrocardiogram (Fig. 2) showed a diminution in the degree of left ventricular predominance compared to that taken immediately after the endurance test.

COMMENTS

Besides the alteration in the electrocardiogram, the only change observed was in the blood pressure and the blanching of the hands, which presented the appearance

of a stage in Raynaud's disease. This symptom, previously experienced, and the associated numbness, caused the swimmer some concern. The marked rise in diastolic pressure from 72 to 100 mm., compared with the slight increase in systolic pressure, from 108 to 118 mm., with the consequent development of a small pulse pressure (18 mm.), and an increase in the heart rate of only eight

FIG. 2.—A, Under normal conditions, ninety-six hours after endurance swim ; B, In state of fatigue, immediately after endurance swim. Comparison of curves shows appreciable development of left ventricular predominance during endurance test.

beats per minute, would appear to have an important bearing upon the failure of the circulation in the hands and fingers.

The blood pressure change is of particular interest in view of the fact that the heart showed no sign of embarrassment. It is interpreted as being reflex in nature, arising from the state of nerve fatigue. This would indicate that in the present case, where a healthy circulatory system was subjected to an endurance test to the point of fatigue, a primary failure of the peripheral circulation had occurred in the hands. It is suggested that a healthy swimmer's capacity for an extended endurance swim in tepid water may depend upon the integrity of the peripheral circulation in the first instance,

FIG. 3.—Orthodiagram taken ninety-six hours after swim.

and that a healthy myocardium is not embarrassed at this stage.

If appropriate measures were adopted to lessen the general exhaustion and nerve fatigue during such endurance swims the onset of the vasomotor disturbance might be retarded.