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Blood Oxygen Changes After Passive Vascular Exercise of the Extremities.

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Alternating negative and positive pressure applied to an extremity produces changes in the blood flow. If the flow is increased beneficial results might be expected. Increase in blood flow should increase the oxygen saturation of the venous blood. Therefore, oxygen saturation determinations from the superficial and deep venous blood of the treated extremity made before and after one hour trial treatment should indicate the degree of increased blood flow. We have applied this test to a series of 18 arteriosclerotic cases presenting vascular symptoms of the lower extremities.

In this series 9 cases presented only exercise pain, 5 cases rest and exercise pain with cyanosis of toes, 3 cases presented dry gangrene of one or more toes, and one case presented only severe night ischemic pain. Each case was studied in the basal state. Samples of blood were drawn from the superficial veins of the dorsum of the foot, or near the ankle, and from the popliteal vein. These samples were collected under oil and the percentage of oxygen saturation was determined by the Van Slyke method. Each patient was then given one hour of alternate suction and pressure therapy, using 4 short cycles per minute. The pressure ranged from minus 80 to plus 20 mm. Hg. Immediately after completion of one hour of treatment samples of blood were collected from the same locations and compared with the first specimens. These patients were then placed on regular treatment of one to 2 hours daily. They received from 16 to 240 hours. The average treatment per patient was 83.6 hours.

We are now able to draw some conclusions as to the clinical results obtained by this form of therapy. We can also correlate these results with the oxygen saturation changes and determine the value of this test as a prognostic aid. Our cases have been placed in 3 groups. In the first group (Table I) are the cases that have been markedly improved or entirely relieved of their symptoms.

As shown in Table I there was a rise in the percentage of oxygen

TABLE I.

Cases Presenting symptoms	% O ₂ Saturation Venous Blood				Treatment Hr. per case
	Rest period		1 hr. treatment		
	Superficial	Deep	Superficial	Deep	
Exercise pain	62	50	92	72	190
'' ''	69	38	75	60	50
Gangrene	43	34	58	49	32
'' ''	55	45	60	60	26
Rest pain	95	28	85	35	126
Exercise pain	59	36	67	—	71

saturation of the superficial venous blood in 5 cases, and a fall in one case. There was an increase in the percentage of oxygen saturation of the deep venous blood in 5 cases, and in one case the percentage was not recorded.

In group II, Table II, are the cases in which clinical improvement followed treatment, but the symptoms have not been relieved.

TABLE II.

Cases Presenting Symptoms	% O ₂ Saturation Venous Blood				Treatment Hr. per case
	Rest period		1 hr. treatment		
	Superficial	Deep	Superficial	Deep	
Exercise and rest pain					
Cyanosis of toes	59	42	69	59	25
Exercise pain	43	43	72	62	145
'' ''	78	83	83	53	35
Exercise and rest pain					
Cyanosis of toes	70	30	63	40	16
Exercise and rest pain	79	25	74	25	240
Exercise and rest pain					
Cyanosis of toes	55	25	55	35	106

As shown by Table II there was a rise in the percentage of oxygen saturation of the superficial venous blood in 3 cases. There was a fall in 2 and one remained the same. There was a rise in the percentage of oxygen saturation of the deep venous blood in 4 cases, a fall in one and one remained the same.

TABLE III.

Cases Presenting Symptoms	% O ₂ Saturation Venous Blood				Treatment Hr. per case
	Rest period		1 hr. treatment		
	Superficial	Deep	Superficial	Deep	
Exercise pain	84	57	84	33	145
'' ''	85	93	85	85	147
'' ''	72	61	72	61	67
'' ''	70	42	56	53	42
Exercise and rest pain					
Cyanosis of toes	53	27	53	27	26
Gangrene of great toe	42	42	51	—	16

In group III, Table III are the cases in which treatment has failed to produce any improvement.

As shown in Table III there was a rise in the percentage of oxygen saturation in only one case. There was a fall in one case and 4 remained the same. There was a rise in the percentage of O₂ saturation of the deep venous blood in one case. There was no change in 2, and a fall in 2. In one case the percentage was not recorded for the deep venous blood after treatment.

These observations show that the oxygen saturation test does *not* offer an absolute standard as to prognosis in treatment of arteriosclerotic vascular disease of the extremities with the alternate suction and pressure method. Generally speaking, however, an increase in oxygen saturation of either the superficial or the deep venous blood, or a rise in both, after one hour trial treatment indicates that some improvement will follow this form of therapy. When there is no change or a fall in the oxygen saturation after one hour trial treatment the prognosis is quite poor. There may be a wide discrepancy between the changes of the oxygen content of the deep and superficial venous blood after treatment with alternate suction and pressure therapy.

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Thermotherapy in Experimental Tuberculosis.

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The possible value of various meteorologic factors in the prevention and treatment of pulmonary tuberculosis cannot be determined with certainty from an analysis of the fluctuating morbidity and mortality rates, which are so much more responsive to other influences.¹ Methods recently used in the attempt to explain the existing variations in the tuberculosis-rates in different parts of the United States on the basis of climatology would give quite different conclusions if applied to the figures of half a century ago.²

An enormous clinical experience has yielded a similar diversity of conclusions. Davos and Saranac Lake, Florida and the Riviera, Asheville and Italy, Colorado and Egypt, offer every combination of

¹ Evans, G. A., *Handbook of Historical and Geographical Phthisiology*, 1888.

² Cowles, A., and Chapman, E. N., *J. Am. Stat. Assn.*, 1935, **30**, 517.