HÆMOGLOBIN ESTIMATIONS.

METHODS SUITABLE for the WARD TEST ROOM

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While forming part of the laboratory investigation of the patient's blood picture, hæmoglobin estimations are often on the grounds of expediency carried out in the ward test-room. With the use of a suitable instrument there is no great difficulty in even a comparatively inexperienced person obtaining accurate results, provided certain elementary factors are appreciated. There are many methods of hæmoglobin estimation available, rangeing from the very simple but far from accurate Tallqvist's scale to the highly technical and very accurate oxygen capacity method of Van Slyke. Of the methods suitable for the ward test-room there are three deserving of attention, they are : Tallqvist's, Sahli's and Haldane's. While Tallqvist's method is very simple, the greater accuracy of the two latter makes them the methods of preference.

Tallqvist's Method

This simply consists of a book, containing a printed colour-scale, graduated from 10 to 100, together with sheets of absorbent paper. A drop of blood is collected on one of the sheets of absorbent paper and, after a moment or so, directly compared with the printed scale. It is difficult to express the result, at least with any degree of accuracy, in percentage. The method should only be employed when there is no possibility of obtaining a more accurate instrument, certainly it will be found difficult to collate the findings with any blood count that the laboratory staff may make.

Sahli's Method

The principle upon which this method is based is that the hæmoglobin contained in a known amount of blood is converted into acid hæmatin by means of hydrochloric acid. The resultant brown colour is compared with a standard colour tube of a known strength of acid hæmatin.

A compact outfit containing a sealed standard tube, graduated matching tube, a 20-cmm. hæmoglobin pipette, the necessary solutions and a simple type of comparator block, can be obtained from the supply houses.

The technique consists of placing N/10 H.C.L. up to the 20 mark in the matching tube; to this is added 20 cmm. of blood, using the pipette. Incidentally, care must be taken to wipe the outside of the pipette free from excess blood. Make sure all the blood is expelled from the pipette by gently sucking up and down a couple of times. The blood and acid mixture will slowly turn a brown colour; complete conversion to acid hæmatin takes about 30 minutes, but is reasonably complete in ten, certainly readings should not be made under that time. Matching is carried out by adding distilled water, drop by drop, till the colour matches that of the standard. A good light is essential, but direct sunlight should be avoided.

Haldane's Method

The principle employed in this technique is the conversion of hæmoglobin in a known volume of blood into carboxy-hæmoglobin and comparing with a standard colour tube. Suitable outfits can be obtained from the supply houses and the technique is the same as with Sahli's method, except that distilled water and not N/10 hydrochloric acid is placed in the matching tube up to the 20 mark. The action of the distilled water is to " lake " the blood and coal gas is bubbled through the mixture of blood and water for two minutes. This process may be very conveniently carried out by attaching a short length of rubber tube to a gas point and in the other end of the rubber tube inserting a glass tube, one end of which has been drawn out into a fine point. When gassing is complete distilled water is added, drop by drop, till a colour match with the standard is obtained.

Factors Which Must Be Taken Into Consideration

While the methods which have been outlined are simple and accurate, certain factors must be taken into consideration and a few elementary precautions taken.

The first point to be appreciated is that practically every method of hæmoglobin estimation has a different value for its standard; for example, the Haldane standard is equal to 13.8 grams per cent. of hæmoglobin, while the original Sahli is equivalent to 17.3 per cent. It might be as well to point out that not many Sahli standards are nowadays put out with such a high figure as this, mostly they are 16 grams per cent. or even 14 grams per cent. When a new instrument is obtained this information should be given on the apparatus. Unfortunately it is customary to report hæmoglobin estimations in percentages of " normal " and not in grams per cent. Obviously, 100 per cent. on Haldane's scale is not equal to 100 per cent. by Sahli; the answer to this particular puzzle is to either return the answer in grams per cent. or to indicate the method employed. Needless to say, the tubes and pipette used must be scrupulously clean; after use they should be washed out with distilled water and the pipette dried with alcohol and ether. From time to time steps should be taken to have the standard checked, as the colour is not always absolutely permanent; with this end in view it should never be left standing in direct sunlight. Lastly, the collection of the specimen. It is essential that a free flow of blood is obtained from the puncture site and no air-bubbles must be allowed in the column of blood being measured in the pipette.

Hæmoglobin Values

Haldane	*Sahli*	*Grams*	
%	%	%	
30	24	4.2	
40	32	5.7	
50	40	7.0	
60	50	8.5	
70	58	9.8	
80	66	11.2	
90	74	12.6	
100	82	13.8	
113	90	15.6	Normal (men).
98	80	13.7	Normal (women).

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