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The nature and detection of diabetic acidosis.

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Simultaneous determinations by the following three methods were made on diabetics in various stages of acidosis.

1. *The alveolar carbon dioxide, by Fredericia's method.*

2. *The carbon dioxide capacity of the oxalate plasma.* The plasma is shaken with air containing 6 per cent. CO_2, and the CO_2 content of the plasma is then determined. A simple apparatus was devised which permits, in three or four minutes, a determination of the CO_2 content, with an accuracy within one per cent. It consists essentially of a 50 c.c. pipette, provided with three-way stopcocks at the top and bottom, and connected with a mercury bulb. The pipette being full of mercury, 1 c.c. of plasma, washed in with 1 c.c. of water and 0.5 c.c. of *N*/1 acid, is introduced through the upper cock. The mercury is then drawn out from below by lowering the mercury bulb until a Torricellian vacuum is obtained in the pipette. The carbon dioxide escapes from the solution as the result of a few seconds shaking, and the water solution is drawn out of the pipette at the bottom. The mercury is then let in again through the other entrance of the 3-way cock at the bottom, and the volume of the carbon dioxide is read in the upper stem of the pipette, which is calibrated in 0.02 c.c. divisions. Normal serum binds about 75 per cent. of its volume of CO_2. In acidosis we have seen the figure as low as 20 per cent.

3. *The H^+ concentration of the plasma after addition of known amounts of HCl.* The H^+ concentration of the untreated plasma itself is about the same in normal condition and in acidosis. In the latter condition, however, as follows from the reasoning of L. J. Henderson, the ability of the blood to maintain its reaction when treated with acid must be lowered. This is demonstrated by our results. Addition of 1 volume of *N*/50 HCl to normal

plasma, previously freed from CO_2 gas in a vacuum, gives a practically neutral solution ($P_H = 7.0$). Plasma from patients in acidosis has been observed to give a $P_H = 4.8$ under the same conditions. The results by this method run parallel to those by the CO_2 capacity method, and both blood analyses give figures from which the alveolar CO_2 tension can be predicted within about 5 mm.

The above results indicate that while in acidosis the H^+ concentration of the blood is not altered, its *reserve alkalinity* (ability to retain normal reaction despite addition of acid) is decreased, and that the decrease can be measured by any of the above three methods.

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The Abderhalden reaction II.

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The technique described in the PROCEEDINGS for May 20, 1914, has been modified to the following, which permits more accurate determination of small differences in proteolysis as measured by the amino acid nitrogen: 0.1 gram of dried placenta substrate, or an approximate equivalent of wet substrate, prepared according to Abderhalden, is incubated with 2 c.c. of serum. The mixture is then diluted with about 20 c.c. of water, heated to boiling, and Merck's dialyzed ferric hydrate (Rona-Michaelis method) is added, 1 c.c. for serum alone, 2 c.c. for serum and substrate. The excess iron is precipitated by adding 0.5 c.c. of 1 : 1 solution of crystalline $MgSO_4$, and the solution is filtered and washed into a small evaporating dish. The solution is concentrated on the water bath to dryness; the residue is redissolved in a few drops of water, and washed completely into the micro-amino-nitrogen apparatus. Serum alone gives 0.18 to 0.28 c.c. of nitrogen gas, duplicates on the same serum agreeing within 0.01 c.c. or closer. The increase due to placenta may be as high as 0.25 c.c. Normal male sera give results varying over about the same range as pregnant sera, although a somewhat greater proportion of pregnant than of male sera give results near the upper limit of the range.