LXX. NOTE ON THE LIMITATIONS OF THE MODIFIED LEWIS-BENEDICT METHOD OF BLOOD SUGAR ESTIMATION.

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(Received June 14th, 1921.)

DURING an investigation into the blood sugar in atrophic infants, in which the modified Lewis-Benedict [1915] technique was used, criticism of this method was encountered. MacLean [1919] and de Wesselow [1919] state that there are other substances in the blood which cause colour changes with picric acid. Following these suggestions, Cowie and Parsons [1920] studied the effect of various blood constituents on the Lewis-Benedict method and came to the conclusion that under pathological conditions epinephrin, acetone and diacetic acid, as well as creatinine to a less marked degree, cause a colour change in the picrate solution. They find that the picric solution is 500 times as sensitive to acetone as to glucose. Normal blood may contain 0.001 to 0.002 g. of ketones, calculated as acetone, per 100 cc. of blood. This would mean that in the normal blood, as tested by this method, 0.5 % of the reading would be due to ketones, while in diabetic bloods, in which the ketones are greatly increased, a very large percentage would be due to them. This increase in ketones added to the increase in sugar would result in observations very much higher than by other methods. This has not been the case in the hands of many competent observers.

In the present investigation decreasing amounts of acetone and ethyl aceto-acetate were added to four different samples of blood and the modified Lewis-Benedict test carried out as usual. Data are summarised in Tables I and II.

An observable colour change occurs when 0.0001 g. of acetone is added to 2 cc. of blood in 2 cc. of a 0.005 % solution. With ethyl aceto-acetate, which is probably broken down to aceto-acetic acid and ethyl alcohol, and further to acetone and carbon dioxide, during the test, no change is noted with the same amounts.

Much larger amounts of acetone and aceto-acetic acid may be added without producing any colour change if the solution is boiled before the addition of the carbonate solution.

Table I. *Acetone added to blood.*

Vol. of blood sample	Aqueous solution of acetone			Blood sugar L.-B. test	
	Amount added	g. per 100 cc. of water	g. added	No. 1	No. 2
2 cc. control	—	—	—	0.066	0.072
"	2 cc.	0.005	0.0001	0.074	0.078
"	"	0.0025	0.00005	0.066	0.070
"	"	0.00125	0.000025	0.065	0.072
"	"	0.0005	0.00001	0.066	0.072

Table II. *Ethyl aceto-acetate added to blood.*

Vol. of blood sample	Aqueous solution of ethyl aceto-acetate			Blood sugar L.-B. test	
	Amount added	g. per 100 cc. of water	g. added	No. 3	No. 4
2 cc. control	—	—	—	0.070	0.079
"	2 cc.	0.005	0.0001	0.070	0.080
"	"	0.0025	0.00005	0.070	0.078
"	"	0.00125	0.000025	0.069	0.079
"	"	0.0005	0.00001	0.070	0.078

This investigation was carried out under the auspices of the Child Life Investigation Committee of the Medical Research Council by whom the expenses were defrayed.

REFERENCES.

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