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7795 C

Spectroscopic Determination of Gum Acacia in Blood. Rate of Disappearance in Normal Dogs.

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In the use of gum acacia in the treatment of nephrosis it is important to maintain a definite minimum concentration in the blood stream in order to derive satisfactory results. There is, therefore, need of a method for an accurate quantitative estimation of acacia on a sufficiently small sample of blood so that the test may be frequently repeated, especially when small children are involved. Acacia is a pentosan and all the methods now employed are based on the production of furfural by heating with dilute acid, steam distilling the furfural and determining it either by weighing as the phloroglucide[1] or by forming a color-complex between furfural and analine acetate.[2] Both methods require samples too large to make them practical for this purpose. Another method based on the Shaffer-Hartmann procedure for the determination of reducing sugars freed by hydrolysis of the Folin-Wu filtrate, as suggested in a personal communication from Dr. Hartmann, is some improvement. We have used this procedure on duplicate samples for comparison with a new spectroscopic method which we present herewith.

Our method is essentially a reversal of the Pettenkofer test for bile salts, with conditions so arranged as to make it quantitative for furfural. The details are as follows: 0.5 to 1.0 cc. of blood is precipitated according to the standard Folin-Wu technic. Five-tenths to 2 cc. of the filtrate, sufficient to contain 0.5 to 1.0 mg. of acacia, is pipetted into a 10 cc. volumetric flask with enough distilled water added to give a total volume of 2 cc.; and then 2 cc. of 80% sulfuric

[1] Meek, W. J., and Gasser, H. S., *Am. J. Physiol.*, 1918, **47**, 302.

[2] Youngburg, G. E., *J. Biol. Chem.*, 1927, **73**, 599.

acid are added. The contents are mixed and heated in a 100°C. water-bath for exactly 30 minutes (to assure complete hydrolysis) and are promptly cooled to room temperature in running water. Five cc. of 80% sulfuric acid and 1 cc. of 1% bile salts in 70% alcohol are added, mixed, and to bring out the color, the flask is placed in a 57°C. water bath for 20 minutes. The contents are immediately cooled to room temperature and after standing at least 10 minutes and not over 40 minutes are read in a spectrometer. The characteristic absorption band lies between E and b. A standard consisting of a dilute acacia solution is treated exactly as the Folin-Wu filtrate, 0.5 mg. and 1.5 mg. standards usually being sufficient. The color developed is always of the same tint and gives the same absorption band regardless of the concentration of the acacia. However, the intensity of color is accurately proportional to the amount of acacia in the sample. For satisfactory estimations the samples should be compared with standards of approximately the same concentration. With the 2 standards suggested, samples containing from 0.25 to 2 mg. may be satisfactorily compared. The conditions specified have been chosen to give maximal color production. This quantitative method is accurate within 5% for a 1 to 25 mg. sample but will detect 0.05 mg. qualitatively.

This method was used to determine the rate of disappearance of acacia from the blood stream in 5 normal dogs. Purified acacia in 20% solution was slowly injected in doses of 0.5 to 1.5 gm. per kg. and the acacia content of the blood was followed by our spectroscopic method and by that of Hartmann. The hemoglobin was

TABLE I.

Comparative estimates of acacia in blood samples by spectrometric and Hartmann methods.

Time Sample Was Taken After Acacia Injection 1 gm./kg.	Hemoglobin Gm./100 cc.	Blood Acacia, Gm./100 cc. Spectrometric Method	Hartmann Method
0	14.7	.00	.03
17 min.	13.0	.94	.85
35 "	12.7	.88	.92
1 hr.	11.8	.83	.83
2 "	11.5	.73	.72
4 "	12.0	.73	.80
8 "	12.6	.74	.71
12 "	12.3	.70	.62
24 "	11.6	.64	.52
36 "	11.1	.48	.45
48 "	10.1	.41	.36
72 "	10.9	.12	.13
96 "	12.6	trace	—
120 "	11.9	trace	—

determined colorimetrically using pure hematin as a standard. No other toxic symptoms than transient nausea and vomiting were noted. The results show a marked increase in blood volume in all cases, and indicate that several days are required for complete elimination of the acacia. The results of the spectroscopic method, herewith described, and of the Hartmann method are in good agreement as a whole, as shown in Table I. But it is to be noted that the Hartmann method is much more laborious, time-consuming, and requires a larger blood sample.

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Action of Dilaudid on the Gut.*

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David[1] has reported a comparative study of metabolic and other effects of dihydromorphinone hydrochloride ("Dilaudid" N.N.R.) and its parent substance, morphine. This new keto-derivative has a narcotic potency 5 to 10 times that of morphine, but apparently its use is not attended by freedom from the undesirable side-effects of morphine to quite the extent suggested by Alvarez.[2] Study of the relative addiction tendencies of the 2 drugs in human subjects is of great importance but will require competent clinical observation over an extended period because of the intrinsic difficulties in such a comparison. Meanwhile it is of interest to investigate the more easily measurable physiological side-actions of the new agent, as has been done for certain subjective and objective effects by David.

In regard to the effect of dilaudid on the gastro-enteric tract, David found no marked difference from morphine in the occurrence of nausea, vomiting, diarrhea, and constipation in student volunteers to whom there was administered subcutaneously a dose equivalent in narcotic efficacy to a therapeutic dose of morphine. Of 74 subjects receiving 0.01 to 0.04 mg. per kg. of dilaudid, 58% were nauseated, 20% vomited, 8% showed diarrhea and 30% con-

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[1] David, N. A., *J. Am. Med. Assn.*, 1934, **103**, 474.

[2] Alvarez, W. C., *Proc. Staff Meet., Mayo Clinic*, 1932, **7**, 480.