

Diabetic Retinopathy: Lack of Correlation with Vitamin B₁₂ Excretion

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DIABETIC retinopathy is one of the major complications facing all diabetic patients today, and diabetes itself accounts for an increasing percentage of blindness. This threat to vision in the diabetic is being encountered at all age levels, from adolescence onwards, notwithstanding the gains made by insulin, diet, and antibiotics in extending his life expectancy.

Diabetic retinopathy is also one of the earlier and more readily detectable expressions of what is being generally recognized as a widespread vascular disorder peculiar to diabetes. Neither diabetic retinopathy nor the generalized diabetic angiopathy can be correlated satisfactorily with the age of the patient or the duration, severity, or treatment of the disease. It would be desirable to have some method or indicator to predict in which patients the vascular disease might appear in an accelerated form, and to serve as a possible guide for the evaluation of a therapeutic regimen.

To date there has been a single finding¹ purporting to differentiate the diabetic with and without retinopathy. These authors report that in diabetics with retinopathy, following a vitamin B₁₂ load test, there is an abnormally high urinary excretion of the vitamin as compared with normal nondiabetic indi-

viduals. An abnormally low amount was excreted by diabetics without retinopathy.

In subsequent articles Becker^{2,3} and his co-workers interpreted their findings as indicating relative adrenal cortical hyperactivity in patients with diabetic retinopathy, in contrast to subjects without retinopathy who were presumed to have adrenal cortical hypofunction. This hypothesis was correlated subsequently by their anatomic studies of the adrenal cortex in diabetic patients with and without retinopathy.

An additional possible clinical correlation with the theory of adrenal cortical hyperfunction stemmed from the observations of the amelioration of diabetes and its vascular complications following spontaneous hypopituitarism⁴ or surgical removal of the pituitary or adrenal glands.^{5,6}

PROCEDURE

Normal healthy controls and diabetic patients with and without retinopathy, none of whom were receiving any form of vitamin therapy, were studied. All ocular fundi were carefully examined by an ophthalmologist who had no knowledge of the results of the tests. Likewise, the ophthalmologic findings were not known to the other investigators until the microbiologic determinations were completed. All patients were given 50 µg of vitamin B₁₂ intramuscularly and urine specimens were collected thereafter for eight hours in amber-colored bottles containing a volatile preservative.⁷ Three methods of microbiologic assay were employed, using *Lactobacillus Leichmanii* 4797,⁸ *Euglena Gracilis*,⁹ and *Ochromonas Malhamensis*¹⁰ as the test organisms. All specimens were determined by

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TABLE I
Urinary Excretion after Injection of Vitamin B₁₂ (50 μg)

Subjects	Number of subjects*			Vitamin B ₁₂ excreted ($\bar{x} \pm SE$)†		
	O	E	L	Ochromonas	Euglena	Lactobacillus
Diabetics without retinopathy	22	23	13	10.9 ± 1.2	14.8 ± 1.8	23.2 ± 3.5
Diabetics with retinopathy	17	17	8	17.1 ± 3.1	13.5 ± 2.2	13.5 ± 2.2
Healthy controls	22	25	10	15. ± 2.1	19.1 ± 2.1	21.2 ± 2.6

* O—Ochromonas, E—Euglena, L—Lactobacillus used as test organisms.

† ($\bar{x} \pm SE$) Mean and Standard Error.

Euglena and most of these also by *Ochromonas*. A number were assayed using *Lactobacillus*, the method used by Becker *et al.*

RESULTS

The results are shown in Table I and Figures 1-3. As can be seen, these results do not agree with those of Becker, Lang, and Chow.¹ By all three methods there is a random scatter of the excretion values for the control group and both diabetic groups. Using standard statistical methods for calculating probability, no P values of less than 0.1 were found between any two groups, indicating

a total lack of significance for the average differences found between groups in all three methods.

SUMMARY

In this study 50 μg of vitamin B₁₂ was injected intramuscularly into three groups of subjects, consisting of normals, diabetic patients without retinopathy, and diabetics with retinopathy. Using three microbiologic methods of analysis, no statistically significant differences were found in the amount excreted in the urine in eight hours among the three groups. The

THE URINARY EXCRETION AFTER INTRAMUSCULAR INJECTION OF VITAMIN B₁₂ DETERMINED BY OCHROMONAS MALHAMENSIS

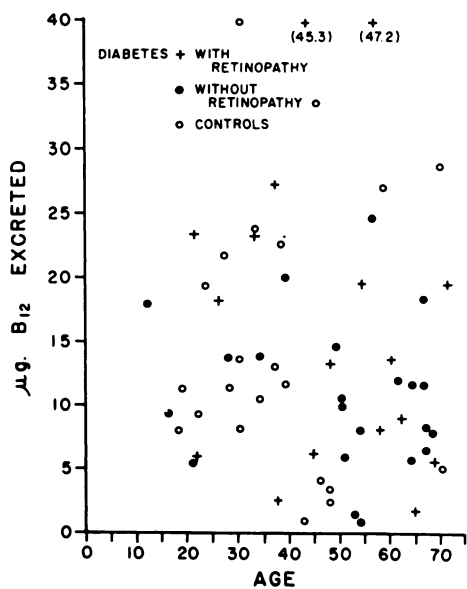


Figure 1.

THE URINARY EXCRETION AFTER INTRAMUSCULAR INJECTION OF VITAMIN B₁₂ DETERMINED BY EUGLENA GRACILIS

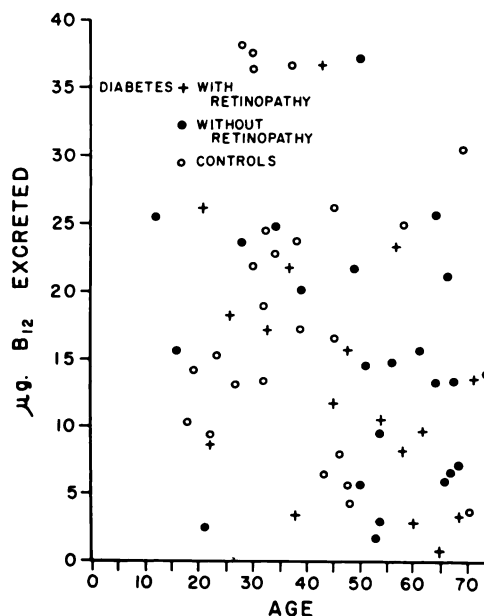


Figure 2.

THE URINARY EXCRETION AFTER
INTRAMUSCULAR INJECTION OF VITAMIN B₁₂
DETERMINED BY
LACTOBACILLUS LEICHMANNII (A.P.C.C. 4797)

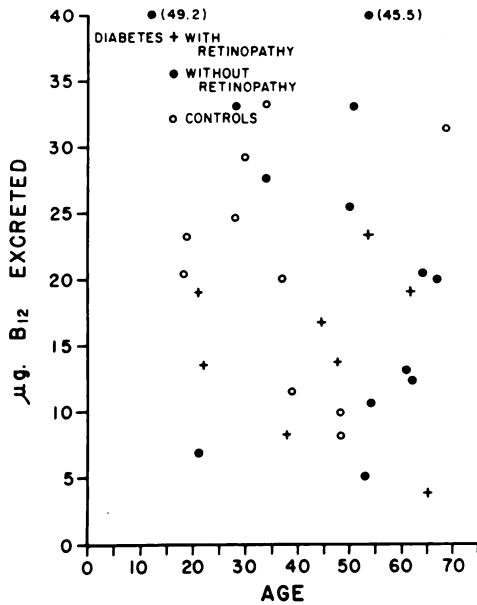


Figure 3.

previously reported difference in vitamin B₁₂ excretion by diabetic patients with retinopathy versus those without retinopathy could not be confirmed.

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