- Ashby, B. S., Appleton, P. J., and Dawson, I. (1964). *Brit. med. J.*, 1, 1141.
 Berland, B. (1961). *Sarsia*, 2, 1-50.
 Buckley, J. J. C. (1951). *Trans. roy. Soc. trop. Med. Hyg.*, Demonstration, 44, 362.
 Crampton, E. W., Donefer, E., and Schad, D. J. (1960). *J. Fish. Res. Bd Can.*, 17, 501.
 Dollfus, R. Ph. (1956). *J. Cons. int. Explor. Mer.*, 22, 58.
 Freeman, R. S. (1964). *Can. J. Zool.*, 42, 367.
 Galliard, H. (1962). *Bull. Soc. Path. exot.*, 55, 731.
 Grainger, J. N. R. (1959). *Parasitology*, 49, 122.
 Hitchcock, D. J. (1950). *J. Parasit.*, 36, 232.
 — (1951). *Ibid.*, 37, 309.
 Hoeppli, R. (1950). *Chin. med. J.*, 68, 221.
 Hunter, G. W., Ritchie, L. S., and Chang, I. C. (1951a). *Japan Logistical Command Bull.*, No. 2, pp. 1-20.

- — — Pan, C., and Lin, S. (1951b). *Ibid.*, No. 3, pp. 1-29.
 Kuipers, F. C., Thiel, P. H. van, and Roskam, E. T. (1960a). *Ned. T. Geneesk.*, 104, 422.
 — — — Rodenburg, W., Wielinga, W. J., and Roskam, R. T. (1960b). *Lancet*, 2, 1171.
 Myers, B. J. (1963). *Can. J. Zool.*, 41, 147.
 Ortlepp, R. J. (1922a). *J. trop. Med. Hyg.*, 25, 97.
 — (1922b). *Lancet*, 1, 847.
 Ronald, K. (1960). *Can. J. Zool.*, 38, 623.
 Rosen, L., Laigret, J., and Bories, S. (1961). *Amer. J. Hyg.*, 74, 26.
 Sprent, J. F. A., and Barrett, M. G. (1964). *Aust. vet. J.*, 40, 166.
 Thiel, P. H. van (1962). *Parasitology*, 52, 16.
 — — — Kuipers, F. C., and Roskam, R. P. (1960). *Trop. geogr. Med.*, 12, 97.
 Vik, R. (1964). *Can. J. Zool.*, 42, 513.
 Vitzthum, H. G. (1933). *S.-B. Ges. naturf. Fr. Berl.*, 3, 370.

D-xylose Absorption in Patients with Eczema

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Brit. med. J., 1965, 1, 967-968

Eczema can be associated with gastro-intestinal malabsorption (Bennett *et al.*, 1932; Thaysen, 1932; Cooke *et al.*, 1953; Badenoch, 1960; Wells, 1962), and may indeed be the first or presenting feature of the intestinal disorder (Cooke, 1952; Wells, 1962). We have at present no idea what the incidence of intestinal malabsorption might be in patients with eczema; and hence we do not know whether patients with eczema should undergo screening tests for the diagnosis of intestinal malfunction. For this reason, in a previous study, urinary formiminoglutamic acid (figlu) excretion was measured after a dose of L-histidine (Knowles *et al.*, 1963). It was shown that this test is invalid in patients with skin disease, about one-third of whom had an increased urinary excretion of figlu in the absence of intestinal malabsorption; and this is associated with a low plasma folic-acid concentration (Chanarin, Marks, and Shuster, unpublished observations).

The urinary excretion of the pentose D-xylose after an oral dose of 25 g. is widely employed as a screening test for intestinal malabsorption (Fourman, 1948; Gardner and Perez-Santiago, 1956; Benson *et al.*, 1957; Christiansen *et al.*, 1959; Fowler and Cooke, 1960), and we therefore applied it to assessing the incidence of intestinal malabsorption in patients with eczema.

Materials and Methods

Patients Studied.—Seventy male and female patients were investigated, all under 65 years of age. The object was to study every patient admitted with eczema to one in-patient skin unit (St. John's Hospital for Diseases of the Skin) over a period of several months. The group included patients with all types of eczema, hospital admission being for severity or special investigation. The first 50 patients were consecutive admissions of eczema, but unfortunately a number of the patients admitted subsequently were not studied and the remaining 20 patients were not consecutive. As there was no obvious difference in the findings the results are presented as one group.

Procedure.—Food and fluid were withheld from the patients for at least eight hours overnight. They had no breakfast, and, after voiding, each patient took 25 g. of D-xylose dissolved in 250 ml. of water, followed by another 250 ml. of water. The urine passed in the next five hours was collected. A sample of venous blood was taken two hours after the ingestion of

the D-xylose. Blood-and-urine xylose was measured by the method of Roe and Rice (1948). On five of the patients the whole procedure was repeated several days later. Small-intestinal biopsy was performed on a number of patients (see below).

Results

The five-hour urinary excretion of xylose was less than 4.1 g., the lower limit of the normal, in 11 of the patients (see Fig.). The test was repeated in 5 of these 11 patients, and in all instances the five-hour urinary excretion of xylose was again less than 4.1 g. The plasma xylose concentrations were, however, above the level expected in patients with intestinal malabsorption (see Fig.). A small-intestinal biopsy was taken in 10 of the 11 patients and the mucosa was normal in all 10. It was noted that each of these 11 patients had widespread skin disease.

Discussion

Normal subjects excrete in the urine 4.1 g. or more of a 25-g. oral dose of D-xylose in five hours (Fourman, 1948; Benson *et al.*, 1957; Christiansen *et al.*, 1959; Fowler and Cooke,

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1960), and the findings in 11 of the 70 patients with eczema were suggestive of intestinal malabsorption. However, the normal small-intestinal biopsy in 10 of the 11 patients probably excludes this diagnosis. Furthermore, the plasma xylose concentration two hours after the oral dose was above 24.7 mg./100 ml. in all 11 patients, which indicates satisfactory absorption of this pentose from the small bowel (Benson *et al.*, 1957; Bezman *et al.*, 1959). The low urinary excretion of xylose in some patients with eczema may therefore be due to abnormal metabolism of xylose or else to impaired renal excretion of the sugar.

The impaired renal clearance of xylose in patients with pernicious anaemia (Helmer and Fouts, 1937; Butterworth *et al.*, 1959; Bezman *et al.*, 1959) has in part been attributed to the low haematocrit (Bezman *et al.*, 1959). The 11 patients reported here who had a low urinary xylose excretion and a normal plasma xylose concentration all had widespread eczema. Patients such as these have an increased plasma volume (Shuster and Wilkinson, 1963; Fox *et al.*, 1965) as well as an increased venous pressure (Shuster, 1963; Fox *et al.*, 1965), and this could well explain the reduced renal excretion of xylose.

In practical terms, the standard D-xylose absorption test may give false-positive results in patients with skin disease, although the incidence of such false-positive results is less than with the figlu excretion test.

From the combined findings of the D-xylose absorption test and small-intestinal biopsy, none of the 70 subjects studied was considered to have intestinal malabsorption: taking eczema by and large, therefore, intestinal malabsorption is unlikely to be an important precipitating cause. Eczema, however, comprises a very heterogeneous group of skin diseases, and it remains to be seen whether intestinal malabsorption is particularly associated with any one of these diseases.

Summary

The urinary xylose excretion test was carried out as a screening procedure for intestinal malabsorption on 50 consecutive

patients admitted with all types of eczema and on 20 similar patients whose admission was not consecutive. Eleven of the 70 patients had a reduced excretion of xylose in the urine but with a normal increase in the plasma xylose concentration. This is thought to be due to impaired renal clearance of xylose. Small-intestinal biopsy was done in 10 of the 11 patients and was normal in each. Thus no evidence of gastro-intestinal abnormality was found in any of the 70 patients, and it is concluded that intestinal malabsorption is not a major precipitating factor in eczematous skin disease.

We are grateful to Miss Anne Stevington for her able technical assistance, to the staff of the in-patient branch of St. John's Hospital for Diseases of the Skin for their co-operation in this study, and to the Medical Research Council for a grant to S. S. and a grant to R. M. H. M.

REFERENCES

- Badenoch, J. (1960). *Brit. med. J.*, **2**, 879.
 Bennett, T. I., Hunter, D., and Vaughan, J. M. (1932). *Quart. J. Med.*, **1**, 603.
 Benson, J. A., jun., Culver, P. J., Ragland, S., Jones, C. M., Drummey, G. D., and Bougas, E. (1957). *New Engl. J. Med.*, **256**, 335.
 Bezman, A., Kinnear, D. G., and Zamcheck, N. (1959). *J. Lab. clin. Med.*, **53**, 226.
 Butterworth, C. E., Perez-Santiago, E., Martinez de Jesus, J., and Santini, R. (1959). *New Engl. J. Med.*, **261**, 157.
 Christiansen, P. A., Kirsner, J. B., and Ablaza, J. (1959). *Amer. J. Med.*, **27**, 443.
 Cooke, W. T. (1952). *Modern Trends in Gastroenterology*, edited by Avery Jones, Vol. 1. Butterworth, London.
 ———, Peeney, A. L. P., and Hawkins, C. F. (1953). *Quart. J. Med.*, **22**, 59.
 Fourman, L. P. R. (1948). *Clin. Sci.*, **6**, 289.
 Fowler, D., and Cooke, W. T. (1960). *Gut*, **1**, 67.
 Fox, R. H., Shuster, S., Williams, R., Marks, J., Goldsmith, R., and Condon, R. E. (1965). *Brit. med. J.*, **1**, 467.
 Gardner, F. H., and Perez-Santiago, E. (1956). *Arch. intern. Med.*, **98**, 467.
 Helmer, O. M., and Fouts, P. J. (1937). *J. clin. Invest.*, **16**, 343.
 Knowles, J. P., Shuster, S., and Wells, G. C. (1963). *Lancet*, **1**, 1138.
 Roe, J. H., and Rice, E. W. (1948). *J. biol. Chem.*, **173**, 507.
 Shuster, S. (1963). *Lancet*, **1**, 1338.
 ———, and Wilkinson, P. (1963). *Brit. J. Derm.*, **75**, 344.
 Thaysen, T. E. H. (1932). *Non-Tropical Sprue*. Oxford Univ. Press, London.
 Wells, G. C. (1962). *Brit. med. J.*, **2**, 937.

Studies on Tyrosinosis: 2, Activity of the Transaminase, Parahydroxy-phenyl-pyruvate Oxidase, and Homogentisic-acid Oxidase

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Brit. med. J., 1965, **1**, 968–969

The original report on a case of tyrosinosis was given by Medes in 1932. She suggested that there was a complete block of the *p*-hydroxyphenyl-pyruvate oxidase with a slowing down of the steps before.

La Du (1960) re-evaluated the significance of the biochemical findings of Medes. To explain the different biochemical findings of Medes he suggested that the metabolic block was at the tyrosine transaminase step and not at the *p*-hydroxyphenyl-pyruvate oxidase step.

We have recently studied three cases with an excessive urinary excretion of tyrosine and *p*-hydroxyphenyl pyruvic, lactic, and acetic acids. In addition these patients had rachitis, renal

tubular defects, cirrhosis of the liver, and elevated serum tyrosine. Two of them were sisters. These cases were similar to those reported by Sakai and Kitagawa (1957) and by Fritzell, Jagenburg, and Schnürer (1964).

To obtain more information about the pathogenesis of these cases we had already given one of them a diet restricted in phenylalanine and tyrosine (Halvorsen and Gjessing, 1964). The over-excretion of tyrosine and *p*-hydroxyphenyl metabolites disappeared and the level of tyrosine in the serum and the kidney function became normal. These results suggested that there was a block of the *p*-hydroxyphenyl-pyruvate oxidase.

In order to confirm this finding we examined the enzyme activity of the liver and the kidney from another of these patients.

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