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Das, P. K. & Liddell, J. (1970). *J. med. Genet.* **7**, 351.

Dodge, J. T., Mitchell, C. & Hanahan, D. J. (1963). *Archs Biochem. Biophys.* **100**, 119.

Harris, H. (1970). *The Principles of Human Biochemical Genetics*, p. 109. Amsterdam and London: North-Holland Publishing Co.

Watts, D. C. & Moreland, B. M. (1970). In *Experiments in Physiology and Biochemistry*, p. 21. Ed. by Kerkut, G. A. London and New York: Academic Press.

Identification in Urine of a Low-Molecular-Weight Highly Polar Glycopeptide Containing Cysteinyl-galactose

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Several distinct types of glycopeptide linkages are known. These include the β -glycosidic bond of *N*-acetylglucosamine to the amide group of asparagine (Marshall & Neuberger, 1964), the *O*-glycosidic link of serine or threonine (Anderson *et al.* 1964) and the β -glycosidic linkage between galactose and the hydroxyl group of hydroxylysine (Butler & Cunningham, 1966). To date no linkage has been described in which the thiol group of cysteine is involved, although complex glycosides of 1-thio-D-glucose are common in mustard oils (Horton & Hutson, 1963).

We have recently isolated, from normal human urine, an octapeptide in which two galactose residues are *S*-glycosidically linked to cysteine.

Urine was concentrated 300-fold by a method designed to protect labile groups (Weiss & Steven, 1968; C. J. Lote & J. B. Weiss, unpublished work), and applied to a Sephadex G-15 column. The fraction corresponding to a 900–1000 molecular weight was further analysed on a split-stream peptide analyser. Of the 36 peptides separated one appeared to have a covalently bonded sugar. Galactose was the only sugar detected in this peptide by g.l.c. For each 2mol of galactose amino acid analysis revealed 1mol each of aspartic acid, serine, cysteine, glutamic acid, glycine and alanine and 2mol of histidine. Sequential analysis by the dansyl-Edman technique (Beale, 1969) indicated the following structure:

Cys-Glu-His-Ser-His-Asp-Gly-Ala

Alkaline borohydride reduction indicated that serine was not involved in the glycopeptide bond.

Prolonged digestion of the peptide with leucine aminopeptidase (EC 3.4.1.1) at pH 8.4 released a single component, which on mild acid hydrolysis was shown to contain only cysteine and galactose. No galactose was detected in the remaining portion of the peptide.

We conclude that the galactose is linked glycosidically to the sulphur atom of cysteine. A thiazolidine-type structure is excluded by the availability of the amino group of cysteine for dansylation and by the lability of the bond to mild acid hydrolysis. In view of the extreme polarity of the peptide adjacent to the thioglycoside its function as a binding or carrier site cannot be excluded, and we are currently investigating the possibility that this peptide may be part of a membrane glucose-carrier system.

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Anderson, B., Seno, N., Sampson, P., Riley, J. G., Hoffman, P. & Meyer, K. (1964). *J. biol. Chem.* **239**, rc2716.

Beale, D. (1969). In *Chromatographic and Electrophoretic Techniques*, vol. 1, p. 189. Ed. by Smith, I. London: William Heinemann (Medical Books) Ltd.

Butler, W. T. & Cunningham, L. W. (1966). *J. biol. Chem.* **241**, 3882.

Horton, D. & Hutson, D. H. (1963). *Adv. Carbohydr. Chem.* **18**, 123.

Marshall, R. D. & Neuberger, A. (1964). *Biochemistry, Easton*, **3**, 1596.

Weiss, J. B. & Steven, F. S. (1968). *Nature, Lond.*, **217**, 661.

A Sensitive Method for the Detection of Metabolites of Dianabol in Urine in Man

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The mass-spectrometric technique of single-ion monitoring has been investigated as a rapid, sensitive and quantitative method for the detection of major human metabolites of the anabolic drug Dianabol (methandienone; 17 β -hydroxy-17 α -methylandrostan-1,4-dien-3-one).

Single-ion monitoring is the monitoring of a single preselected mass number by mass spectrometry so that a response is obtained from any compound giving a fragment of that mass value. Detection of a characteristic ion at the correct retention time for a particular compound affords a good basis for identification.

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