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Composition of bovine submaxillary mucins

The carbohydrate compositions of purified mucins prepared from bovine submaxillary glands have been reported by TSUIKI *et al.*[1], GOTTSCHALK *et al.*[2,3], and DRAUS AND LEUNG[4]. More recently amino acid analyses have been reported for these products by DRAUS AND LEUNG[5], and by HASHIMOTO AND PIGMAN[6]. Amino acid analyses of a very similar ovine submaxillary mucin were given by GOTTSCHALK AND SIMMONDS[7].

Since the analyses are not in complete agreement, a clarification seems desirable. The bovine mucins of DRAUS AND LEUNG[4] and of TSUIKI *et al.*[1] show good agreement in the carbohydrate analyses and are relatively closely similar to that of GOTTSCHALK *et al.* GOTTSCHALK's bovine and ovine products seem to contain much more protein, but his products were prepared by a method essentially different from those of the other workers; these mucins probably represent a small fraction of the total mucins and were selected because of their high agglutination activity towards certain viruses.

The amino acid composition of the product reported by HASHIMOTO *et al.*[6] is closely similar to that given for the ovine submaxillary mucin[7,8] when compared as moles of each amino acid per 100 moles of total amino acid. The composition is noteworthy in that serine, threonine, proline, glycine and alanine are the principal amino acids. The composition is similar to those of other mucins and blood-group substances[6].

The averages of five analyses by us of the amino acids of bovine submaxillary mucin are given in Table I. Similar results were obtained when the hydrolysis was carried out at 115° for 22 h or at 100° for 18 h. DRAUS AND LEUNG used the milder

TABLE I

AMINO ACID COMPOSITION OF BOVINE SUBMAXILLARY MUCIN

(as g/100 g dry mucin as calcium salt)

Amino acid	*6 N HCl; 115° 22 h*	*6 N HCl; 100° 18 h*	*cf. DRAUS AND LEUNG[4] 6 N HCl; 100° 18 h*
Ala	3.61	3.79	4.79
Asp	1.15	1.23	2.67
Cysteic acid	—	—	0.15
CySH (1/2)	—	—	0.19
Glu	3.22	3.04	5.79
Gly	4.42	4.39	4.94
Ileu	0.87	0.71	1.49
Leu	2.18	1.78	3.42
Met	0.08	0.07	0.19
Phe	0.32	—	1.25
Pro	4.58	4.26	5.52
Ser	5.76	5.36	0.74
Thr	5.69	5.55	2.42
Tyr	0.31	—	0.14
Val	2.65	2.68	3.98
Arg	2.48	2.88	2.46
His	0.09	—	0.51
Lys	0.36	0.60	1.61
Total	37.8	36.6	42.3

conditions, and the results of the single determination reported are also given in Table I. Marked differences are evident especially for the aspartic acid, glutamic acid, threonine and serine.

DRAUS AND LEUNG placed 9 mg of hydrolyzed mucin on the column, whereas we used 3 mg. When we used 9 mg, results were obtained generally like those of DRAUS AND LEUNG. It was obvious that the column was overloaded and that resolution of the peaks for the amino acids in question was not achieved. We consider the results of DRAUS AND LEUNG to be in error.

It may be of interest to point out that the bovine submaxillary mucin has a carbohydrate composition much simpler than that of most other known mucins and blood-group substances, and consists mainly of equimolar amounts of sialic acid and *N*-acetylgalactosamine. However, an appreciable amount of glucosamine, fucose and galactose seem to be minor constituents, and several forms of sialic acid are present. GOTTSCHALK's work indicates that ovine submaxillary mucin, made by his method, may have even a simpler composition since he could find no glucosamine and only one type of sialic acid was present.

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