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### Concentrations of Uric Acid in the Sweat of Control and Mongoloid Children. (30755)

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(Introduced by William J. Harrington)

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The presence of uric acid in human sweat was reported some time ago on the basis of studies employing colorimetric methods(1,2,3). However, it has more recently been reported that uric acid could not be detected in sweat using the enzymatic spectrophotometric method(4). In the course of studies on the metabolism of uric acid in a syndrome of uric acid overproduction and central nervous system dysfunction(5), uric acid was found in thermal sweat from a patient with this syndrome. It appeared of interest, therefore, to investigate the presence or absence of this compound in the sweat of children who did not have this disorder.

It was found that appreciable quantities of uric acid could be detected in sweat using the enzymatic spectrophotometric method.

*Materials and methods.* The subjects ranged in age from 8 months to 21 years. They were: convalescent pediatric patients in the Jackson Memorial Hospital; ambulatory retarded children from the Haven School; and a volunteer student laboratory assistant. The subjects were all healthy at the time of the experiment and were eating regular diets. The population of retarded children at the Haven School contains a relatively large proportion of mongoloid children, and it became evident early in this study that they should be considered as a separate group. Nonmongoloid retarded children from the same institution were included among the controls.

Sweat was collected in plastic bags after the subjects were given a bath with soap, rinsed with tap water, then with distilled

water, and dried. Two types of bags are in use in the laboratory: a full body bag in which the subject's entire body except the neck and head are contained, and a half body bag in which the area from the lower neck to waist is contained. The bags were made in a variety of sizes. Once in the bag, the subject was covered from neck to toe with blankets. The experiment was usually performed in rooms without air-conditioning. It was possible to collect as much as 700 ml in 1 hour with full body bag and 100 ml with the half body bag. The sweat was collected from the inside of the bag with a syringe, centrifuged, decanted, and frozen until tested.

Concentrations of uric acid were assayed using the enzymatic spectrophotometric method(6). The amounts of sweat used in the cuvette ranged from 0.25 to 1.0 ml, depending on the optical density.

*Results.* Appreciable quantities of uric acid were detected in the sweat of each of 29 subjects studied (Table I). The lowest concentration obtained in this series was 0.09 mg/100 ml.

These data represent collections of sweat

TABLE I. Uric Acid Concentration—Sweat.

	No. of subjects	Uric acid (mg/100 ml)
Mongoloid	13	.637 ± .156
Control	16	.202 ± .029
	t = 3.02	P < .01

The values are mean concentrations ± standard errors.

in the full body bag, with the exception of one mongoloid child in whom the half body bag was used. The concentration of uric acid in the sweat of this child was 0.60 mg/100 ml, which closely approximates the mean for the group. The amount of uric acid found in the sweat of the mongoloid children was greater than that of controls. The difference between the means of the groups was statistically significant.

*Discussion.* These results indicate that uric acid is present in human thermal sweat. The concentrations are sufficiently small that relatively large aliquots of sweat are required to carry out this assay. One would not expect to detect this compound with these methods in the amounts of sweat obtainable with pilocarpine iontophoresis and filter paper discs (7). A rigid cleansing procedure would appear to exclude urinary contamination as a source of the uric acid found. The experiment with the upper half body bag strengthens this conclusion.

The values obtained in control individuals were similar to those reported by many of the earlier investigators who used colorimetric methods. Concentrations of uric acid in sweat were reported to range from 0.05-0.18(1); 0.3-0.6(2); 0.07-0.25(3); and 0.1-1.7(8) mg/100 ml, respectively. In addition, Lobitz and Mason(8) reported that the concentration of uric acid in palmar sweat increased following the intravenous injection of lithium urate.

The finding that the sweat of mongoloid individuals had greater concentrations of uric acid than that of controls is consistent with available information on concentration in the serum. Levels of uric acid in the serum have been reported to be higher in mongoloid individuals than in controls by a number of investigators(9,10,11) The magnitude of the difference in the sweat was greater than in the serum. The ratio of the means of

the concentrations of uric acid in the sweat of mongoloid and control in this study was 3.1, while the ratios for reported values in serum were 1.26(9), 1.28(10), and 1.4(11). The significance of elevated uric acid concentrations in the mongoloid is not clear. However, data on the incorporation of C<sup>14</sup>-glycine into urinary uric acid in a mongoloid child did not reveal a difference from control children(5).

*Summary.* The occurrence of uric acid in thermal sweat has been investigated in a series of control and mongoloid children. Appreciable quantities of uric acid were detected using the enzymatic spectrophotometric method in all individuals studied. Significantly higher concentrations were found in a group of mongoloid patients than in control individuals.

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