

Taurine Excretion and Intelligence in Mongolism.* (30313)

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Mean urinary taurine excretion in mongolism is significantly less than that of normal controls(1). This difference is due in part to the fact that a proportion of mongoloids excrete taurine below the lowest level observed among normal subjects. The difference is believed to be genetically controlled and is compatible with an overdose effect(2).

It was noted that mongoloids with lowest excretion levels tended to be residents of cottages housing patients who are non-ambulatory, profoundly retarded or both. Cottage placement for individuals without physical disabilities is primarily dependent on level of adaptive behavior which is in part determined by their level of intellectual function. These facts encouraged study of the relationships between taurine excretion and cottage placement and between taurine excretion and I.Q. scores.

Methods. The clinical impression of mongolism was confirmed by karyotyping all 41 mongoloid subjects. Accurate 24-hour urines were collected at the infirmary of the Western Carolina Center. Taurine was determined as previously described(3) and creatinine according to Taussky's procedure(4).

The results of previous psychological tests were reviewed by a clinical psychologist at Western Carolina Center. Subjects were retested if previous test results were over 2 years old and the subject was less than 16 years old at time of testing. Tests were also repeated if the previous examiner considered the results invalid or if a range rather than a specific score had been recorded. The Vineland Social Maturity Scale (S.Q.) was used for 11 subjects who were either non-verbal or had a basal age of less than 2 years according to the Stanford-Binet. The Stanford-Binet (Form LM) was used with the 30 re-

maining mongoloids. Doll(5) has pointed out that the Vineland S.Q.'s are statistically and methodologically comparable to Binet I.Q.'s. The psychologist had no knowledge of the taurine excretion data.

Results. All subjects had been assigned to cottages prior to this study. Profoundly retarded individuals are housed in units designated (C), less retarded but non-educable subjects in (B) units and highly trainable or educable individuals in (H) units. Table I presents taurine levels, cottage placement and the I.Q. or S.Q. scores for the 41 mongoloids included in this study. Mean urinary taurine excretion expressed as log (mg taurine/g creatinine) for mongoloids in C, B, and H units were 0.63, 1.03 and 1.25 respectively. The correlation ratio(6) between cottage placement and taurine excretion was $E_{yx} = .41$, significant at the 5% level ($F = 3.38$). The regression coefficient of I.Q. or S.Q. on taurine excretion is $b_{yx} = 7.30$, significant at the 5% level ($t = 2.11$).

Discussion. The observed associations, though statistically significant, account for only a small fraction (10-20%) of the total variability in I.Q. scores among these mongoloids. The presumption that I.Q. scores reflect, in part, a polygenic system(7), the fact that mongoloids are generally trisomic for chromosome 21, and the variability observed in I.Q. scores of mongoloids support the conjecture that several loci on chromosome 21 influence the degree of retardation among mongoloids. If this conjecture is correct, there is little likelihood that any single metabolite will be found which can account for most of the variability in I.Q. scores among mongoloids.

The detected association may, of course, be fortuitous or may reflect the operation of factors common to both taurine excretion and adaptive behavior. However, the difference in taurine excretion among mongoloids does not appear to be due to age, sex or dietary

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TABLE I. Urinary Taurine Excretion, Cottage Placement and I.Q. or S.Q. Scores for 41 Mongoloid Subjects.

Subject	Log (mg taur/ g creat)	Cottage placement	I.Q. or S.Q.
R.M.	1.55	B	40
D.F.	1.47	B	14
M.H.	1.13	B	40
V.S.	1.53	B	8
L.B.	1.92	B	17
R.A.	1.20	B	19
V.F.	.03	B	36
C.S.	.41	B	15
W.M.	.90	B	17
R.C.	1.52	B	20
G.M.	.29	B	12
J.S.	.79	B	8
P.W.	.93	C	3
R.M.	.43	C	7
P.L.	.60	C	14
M.J.	.56	C	14
A.A.	.57	H	34
E.B.	1.67	H	43
C.E.	1.60	H	36
U.S.	1.29	H	24
P.H.	.35	H	24
S.O.	1.71	H	44
M.B.	.99	H	41
R.C.	1.04	H	36
P.B.	1.92	H	17
J.F.	1.25	H	26
S.H.	1.02	H	30
K.W.	1.17	H	20
S.T.	1.42	H	34
W.C.	1.61	H	23
G.B.	1.15	H	18
J.S.	1.73	H	41
R.S.	.65	H	30
A.L.	1.32	H	37
T.S.	1.08	H	21
D.W.	1.17	H	23
W.T.	1.53	H	35
G.S.	.67	H	31
J.K.	1.14	H	20
S.C.	1.35	H	22
C.P.	1.62	H	43

effects(1). Studies now in progress with tracer doses of S^{35} taurine indicate that the lowest excretors among mongoloids convert most administered taurine to at least 2 metabolites other than sulfate. Current experiments also indicate that the low taurine excretion observed among most mongoloids is correctable with pyridoxine hydrochloride.

Summary. Significant positive associations were found between urinary taurine excretion and 2 measures of adaptive behavior, cottage placement and I.Q. scores. The correlation ratio between cottage placement and taurine excretion was $E_{yx} = .41$. I.Q. score regressed on taurine excretion yielded a coefficient of .32. Both associations are significant at the 5% level.

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Effects of *in vivo* Hyperoxia on Erythrocytes IV. Studies in Dogs Exposed to Hyperbaric Oxygenation.* (30314)

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Although the toxic effects of oxygen on erythrocytes have been recognized for several years(1-3), the underlying mechanism of cell damage has not been established. The

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