

Observations on Glyoxylic Acid Reaction in Mental Disease.* (25092)

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Riegelhaupt(1,2) reported that performance of a modification of the Hopkins-Cole qualitative test for urinary tryptophane(3) yields a positive result in 76% of schizophrenic patients studied. It has been suggested that this reaction might be related to unusual indolic compounds described in schizophrenic urine(2,4). To assess and extend these findings, the diagnostic validity and specificity of the reaction were tested in a controlled series of subjects.

Method. Two ml of fresh, filtered, early morning urine specimen were shaken with 0.5 ml of butanol-acetic acid solvent (n-butanol 60: glacial acetic acid 15: distilled water 25, made fresh daily), allowed to stand and shaken again when separation had occurred. After adding 1 ml of 2% glyoxylic acid, 1 ml of concentrated sulfuric acid was layered slowly into the tube in ice bath. Samples were read at 15 minutes for presence of red-violet color at acid-urine interface which constituted a positive test. Development of predominately brown, yellow, or colorless rings was called a negative test. All intermediate colors were arbitrarily and subjectively assigned to one of the 2 groups. Subjects were selected at random from hospital population and, following a brief trial period, 113 separate tests were made as "unknowns" with respect to contributing subjects status as schizophrenic, non-schizophrenic patient, or normal (employee or staff member). Patients diagnosed as schizophrenic by staff psychiatrists at time of current admission study comprised the schizophrenic group. The non-schizophrenic group included a large number of affective psychoses, neurotics, and character disorders. Post-experimental analysis of non-experimental variables necessitated elimination of 14 patients who were receiving medication (phenothiazine derivatives or meprobamate) known to inter-

fere with the test. This fact is responsible for the slight deficiency in number of schizophrenics relative to the other 2 study groups in Table I. The groups are comparable with respect to age except within the schizophrenic category where females are considerably older and males considerably younger than control groups. Dietary and drug factors were comparable for the study groups; there was no deficiency evident and specific excesses, such as coffee, were controlled when encountered. Results of the test are summarized in Table II. A positive test was associated with clinical diagnosis of schizophrenia in 62.5% of 24 cases studied, whereas only 8% of 75 non-schizophrenic subjects gave a positive reaction. Positive tests were encountered equally among normals and non-schizophrenic patients. Individuals giving positive tests were distributed indifferently within the schizophrenic group with respect to age and sex.

Discussion. Our results are roughly equivalent to those reported by other workers(2,4); a somewhat lower percentage of both schizophrenics and non-schizophrenics gave positive tests which may be related to the concentration of glyoxylic acid used, or simply to subjective differences in the observers. With decreased sensitivity, an increase in discrimination and validity is achieved.

TABLE I.

Diagnostic category	No.	Avg age	♂	Age	♀	Age
Schizophrenic	24	40.0	10	26.5	14	49.1
Non-schizophrenic	75	38.3	24	40.5	51	38.2
Patients	39	39.6	9	38.3	30	40.7
Normals	36	36.8	15	41.1	21	35.6

TABLE II.

Diagnostic category	Positive test	Negative test	Total No.
Schizophrenic	15	9	24
Non-schizophrenic	6	69	75
Patients	3	36	39
Normals	3	33	36

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To what degree does the test permit us to distinguish between the 2 groups, one schizophrenic and the other non-schizophrenic? Chi-square analysis yields a value well in excess of that corresponding to P value of .001 defining the great unlikelihood that this distribution could have occurred by chance. The distinction between schizophrenics and either non-schizophrenic patients or normals is equally non-fortuitous. All of these differences are more striking than can be accounted for by age and sex differences alone though these factors have not been completely controlled in our study.

As a diagnostic test the reaction has obvious limitations; it does not occur in all schizophrenics, its specificity is open to question, and its reproducibility has not been studied.

Conclusions. A positive result with glyoxylic acid test was obtained in 62.5% of schizophrenic patients, while only 8% of non-schizophrenics gave a positive test. Though non-specific the test affords a statistically significant distinction which cannot be explained by the non-experimental variables. Because of the chance that the test has a significant association with the disease, schizophrenia, further investigation seems warranted.

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Maturation of Succinic Dehydrogenase and Cytochrome Oxidase in Neonatal Rat Kidney. (25093)

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It is well recognized that functional differences exist between the kidneys of immature and adult animals(1). Although differences are apparent in organization and structure of such kidneys(2) integration of this data has not been accomplished. A depletion of histochemically demonstrable succinic dehydrogenase and cytochrome oxidase and depressed oxygen consumption have been recently demonstrated in the kidneys of nephrotic rats by Fisher and Gruhn(3,4). These changes could be correlated with the degree of proteinuria exhibited by these animals although it was not evident whether this enzymatic alteration was a causative factor or a sequel of proteinuria. Since several references(5,6,7) to occurrence of proteinuria in newborns have been made it appeared worthwhile to explore the relationship of proteinuria and these respiratory enzymes in kidneys of maturing rats. Information derived from such a study also appeared pertinent in providing cytochemical evidence concerning differences in renal function of neonates and adults since oxidative en-

zymes are considered essential for proper function of the tubular portion of the nephron. Developmental changes in renal alkaline phosphatase have been noted previously(8).

Material and methods. Four to six littermates of the Wistar strain were sacrificed at 1, 7, 12, 15, 18, 24, 27, 30, 39, 63 and 72 days after birth. One kidney was immediately frozen on dry ice and the other placed in Zenker's acetic fluid. Blocks of fresh frozen material were stored at -20°C until the last animal was sacrificed and all fresh frozen material was sectioned at $6\ \mu$ in a cryostat and simultaneously stained for demonstration of succinic dehydrogenase by the method of Rosa and Velardo(9) and cytochrome oxidase (G-nadi oxidase)(10). Previous experience indicated that storage of fresh frozen tissue for similar periods did not alter the appearance of these enzymes. Sections prepared from tissue fixed in Zenker's acetic fluid were cut at $5\ \mu$ and stained with hematoxylin and eosin, periodic acid-Schiff and phosphotungstic acid hematoxylin technics. Each group contained