

THIOCYANATE COMPOUNDS IN THE URINE OF SCHIZOPHRENICS.

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By thiocyanate compounds is meant a group of salts of thiocyanic acid (HCNS). Together with compounds of glycuronic and sulphuric acids, these salts are products of several detoxication processes. In the urine they are the end-products of the detoxication of substances formed during the breakdown of protein.

Recent investigations (A. I. Yushchenko, Prof. Shalisov, I. A. Polishchuk, and Buscaino and his school) have shown that in schizophrenia certain processes of detoxication take place. These are represented by sulphur-containing substances in the urine, in particular the thiocyanates, i.e. schizophrenia is accompanied by a toxicosis, and the intensity of this is reflected in the urinary thiocyanate content.

As is well known, hyposulphite easily parts with sulphur, which can then combine with toxic substances to produce harmless compounds. Polishchuk injected 10 c.c. of a 1 per cent. solution of hyposulphite into the veins of schizophrenics; after the injection, the excretion of thiocyanates in the urine was followed up. A patient whose urine on testing at frequent intervals showed a nearly constant thiocyanate content of 6-9 mgm. per cent. passed 40 mgm. per cent. one and a half hours after the injection of hyposulphite; a second reading showed 27 mgm. per cent. and the amount gradually fell, until six hours later it was at the level normal for the patient. A control experiment on a non-schizophrenic showed no change in the thiocyanate level.

That this sulphur-binding reaction takes place in the tissues and not in the urine itself is shown by the fact that hyposulphite added to urine produces no increase in thiocyanates.

We have carried out investigations on the urine of schizophrenics, both in the acute stage (at onset and also during exacerbations) and in chronic stages, in patients with marked remissions with and without improvement, and in addition on healthy subjects and on a few patients suffering from diseases other than schizophrenia. Apart from these we collected a few data on the dynamics of urinary thiocyanates during treatment with "Cloetta" and insulin. Altogether 80 individuals were investigated, of whom 8 were schizophrenics; 640 tests were done, using Polishchuk's method.

As regards the length of history there were 45 recent cases (up to 6 months) with exacerbations and 22 chronic cases. In 8 cases suffering from various (non-schizophrenic) psychoses the urinary thiocyanates varied within the normal range—from 14-30 mgm. per cent.; in isolated cases it was as low as 11 mgm. per cent. In one schizophrenic (with a history of more than 50 years) 39 thiocyanate estimations were done. The results varied from 4.5 (this low figure was obtained once) to 40.23 with an average of 25.2 mgm. per cent. In 22 chronic schizophrenics the range was 16 to 30 mgm. per cent.

Thus in chronic schizophrenics the thiocyanate is within normal limits. However, in some patients we occasionally found pathologically low figures. Thus, in patient S— we found the following: 49.9, 22.8, 13.7, 8.5 mgm. per cent.; in patient G— 60.8, 7.8, 21.6, 52.8 mgm. per cent.; in patient P— 4.5, 7.8, 38.9 mgm. per cent. Correlating these figures with the clinical picture we found that these patients showed more or less transitory exacerbations (excitement, depression). It is possible that they corresponded with a temporary reinforcement of an almost "burnt-out" toxicosis.

As regards recent cases, a pathologically low level of thiocyanates was encountered remarkably often. The fact is that isolated cases showing a low thiocyanate level in the urine give us no definite indication of the acuteness or chronicity of the process. The picture is rendered somewhat clearer if we compare the frequency of very low figures in recent and chronic cases. Thus a thiocyanate level of less than 10 mgm. per cent. is found in 33 per cent. of all recent cases and in only 20 per cent. of chronic cases.

The following observation is noteworthy: Among our recent cases there were three with mixed cyclo-schizophrenic syndromes (depressive and manic); in all three the amount of thiocyanate in the urine was very high. In patient I—the average of five determinations was 48.0; in P—the average of four was 57.7; in O—the average of three was 58.6.

We now come to the patients treated with insulin or "Cloettal." Insulin commonly brought about an increase in thiocyanate level. For example, in patient R—the following figures were found: 17.6, 50.6, 10.5, 53.6; in patient P—10.0, 16.2, 35.4; in patient B—9.1, 29.2, 35.0, 48.0. Sometimes a normal figure was raised by insulin to extraordinary levels—above 50–60 mgm. per cent.

We calculated the mean figures in 20 patients who received insulin. In 17 insulin produced a considerable rise, and in 2 a negligible one.

In treatment with "Cloettal" we obtained, during the actual coma, a decrease in thiocyanate level in the majority of patients. Thus, for instance, in patient M—the figures were 36.7, 37.6, 19.4; in patient S—51.6, 16.2; in patient R—26.0, 16.3; in patient B—40.1, 6.4. From these we may conclude that therapeutic sleep leads to a weakening of the detoxication process.

In this connection the effect of natural sleep on thiocyanate excretion is of some interest. In a series of patients the morning and evening urine was investigated separately. Of 45 cases 41 had more thiocyanates in the evening specimen than in the morning, i.e. during sleep the excretion of thiocyanates fell—sometimes only a small amount, sometimes to less than half. This is probably one of the reasons for the decrease that occurs also after therapeutic sleep.

Of considerable importance here, doubtless, is the exclusion of proteins from the food. The following are some preliminary data referring to two patients who had refused food and were being artificially fed:

Patient.	Quantity of thiocyanates in urine (mgms. %).		
	Complete fasting.	On carbohydrate feeds.	On milk feeds.
K—	23.0	9.0	12.0
L—	56.0	22.0	40.0

Thus carbohydrate feeding decreases the urinary thiocyanates. This agrees with data obtained in carbohydrate feeding during therapeutic sleep. We are unable to explain the high figure during complete fasting.

CONCLUSION.

(1) In schizophrenia of recent onset the quantity of thiocyanates in the urine is usually lowered as a result of weakening of the detoxicating processes.

(2) In chronic schizophrenics, in whom the disease process is "burnt out," the detoxicating processes are not disturbed. Nevertheless, even in these cases very low thiocyanate levels are met with. This is observed more rarely than in recent cases and can be explained by a temporary exacerbation of the process.

(3) Insulin-therapy usually increases thiocyanate excretion.

(4) Therapeutic sleep is accompanied by a decrease in thiocyanate excretion; the same occurs in natural sleep.

(5) Three cases of mixed cyclo-schizophrenia showed very high thiocyanate figures.

(6) The character of the diet is very important in the study of urinary thiocyanates.