DIMETHYLTRYPTAMINE EXPERIMENTS WITH PSYCHOTICS

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THE so-called experimental psychoses have been in the focus of increased interest recently, as a result of the discovery of new hallucinogenic or psychotic agents and of the fact that the problems can be approached more closely even in the borderline fields of pathopsychological research (biochemistry, electrophysiology, etc.) owing to advance in technique. Thus, it appears that Kraepelin's dream of producing so-called miniature psychoses by the administration of substances foreign to the body will come true after all.

In the research on experimental psychoses the trend has now shifted from the observations made on normal subjects to trials for the eventual usefulness of these agents in therapy, as is proved by the data reported in the literature for mescaline and LSD. There are two trends of thought in the therapeutic use of these agents. The two extremes are represented by the Delay school and by Sandison and associates (1954). The former want to use mescaline essentially for inducing a vegetative shock effect, whereas the latter want to utilize LSD as an aid in psychotherapy. Delay *et al.* (1956) have emphasized also the significance of mescaline in diagnosis and prognosis.

These two best-known psychotic agents have been joined recently by a new group, that of the tryptamine derivatives, of which two members: bufotenine and dimethyltryptamine (DMT) have been described in the literature. These two indolamines are in close structural relationship to a biogen-amine, serotonin, which has been arousing interest recently, and which is chemically 5-hydroxytryptamine. Bufotenine is the dimethyl derivative of serotonin, whereas DMT differs from the former in that it contains no 5-OH group. Fabing (1956) was the first to study the effect of bufotenine on man and claimed that bufotenine widely occurred in nature, its main source being the fungus Amanita.

Our team (Böszörményi, Brunecker, Sai-Halász and Szára) studied for the first time the effect of DMT on man. The drug was synthesized by Szára (1956), a biochemist, who also described the metabolic data. As it had been found that the drug, as administered per os, caused changes in mood and a mild disturbance of perception in a few subjects only, intramuscular injections were given. The experimental subjects were 30 normal individuals, most of them doctors. Double protocols were kept and subjective experiences were recorded later. The experimental psychosis elicited by 0·7 to 1·0 mg./Kg. body weight of DMT begins very rapidly (within 3 to 5 minutes) and is over in about 50 to 70 minutes. This model psychosis is characterized by very intense vegetative phenomena, anxiety, and in some individuals by the neurological signs suggesting a temporary impairment in the function of the so-called non-

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dominant hemisphere, by disturbances in mood and perception, first of all by visual illusions. Alterations in the perception of space and time, loosened associations and in some cases mild ideas of reference also occur. In many of its features this disturbance was similar to the single phases of the LSD effect, but bore no definite resemblance to either the schizophrenic or the other endogenous-psychotic clinical states.

In the following we wish to discuss the experiments we have made on patients with mental diseases. The test subjects were 24 female in-patients at our department, each of whom was given a single dose of 1 mg./Kg. of the drug i.m. In 3 cases the experiment has been repeated with a dose of 1·5 mg./Kg. The majority of the subjects suffered from chronic schizophrenia for from 3 to 20 years (20 cases). The other patients involved had oligophrenia (2 cases), psychopathy (1 case), and conversion hysteria (1 case). To illustrate the experiments, 3 protocols are described.

Case 1. K.V., aged 30 years. Premorbidly she had been sensitive, reserved. Three years before admission she developed hyperthyrosis, loss of weight. Since then she has become more and more unsociable, suspicious and made unfounded accusations against her colleagues.

When first admitted in 1955 sensitive ideas of reference connected with an earlier love affair, overestimations, persecutory delusions and paranoid behaviour were found. Electric shock (E.C.T.) and Largactil treatment resulted in a fading of pathological contents, in a more sociable attitude and she was discharged in an improved condition.

In 1956 she relapsed, developing very extensive, partly systematized paranoid ideas and most unsociable behaviour. E.C.T., insulin and Largactil therapy resulted in improvement.

30 April, 1956. DMT Experiment (1 mg./Kg. intramuscularly)

Following injection at:

6 minutes	She complains of a strange feeling, tinnitus, buzzing in the ear. The eyebrows show tic-like contractions.
10 minutes	She is smiling silently. When asked why she is smiling she is unable to tell. She still complains of feeling herself inexplicably strange.
15 minutes	She wants to get up, but is unable to do so. Looks around helplessly, turns about in the recumbent position. The pupils are maximally dilated; she complains of dyspnoea and blurred vision.
20 minutes	Nausea and numbness of the left hand are complained of. She feels her whole body rigid, as if she could not move. Blood pressure sinks from 130 mm. Hg to 110 mm. Hg. Pulse rate is unchanged (80/min.).
23 minutes	She tells us laughing that her dyspnoea and nausea have become more intense. She keeps asking: "Why do I feel so strange?"
25 minutes	Complaints unchanged, she looks about vaguely.
30 minutes	Vision is improving, but everything seems to be so strange still. There are buzzing in the ears and numbness of the limbs, particularly in the left hand.
32 minutes	"As if I had no heart and my head, too, feels so strange, I don't know what this is, but I feel as if I were not myself."
35 minutes	She feels herself exaggeratedly light, a rather unpleasant feeling. Extremital numbness has diminished.
38 minutes	"I don't like this feeling, as if my head were beginning to clear up. I saw such strange dreams, but at the beginning only . . . I saw strange creatures, dwarfs or something, they were black and moved about . . . Now I feel as if I were not alive . . . as if I were floating between earth and sky . . ." She feels as if her limbs were not her own.
41 minutes	Her head is clear now, she feels definitely "relaxed". "As if I were not I, such a light feeling." The left hand is still numb.
45 minutes	She has strange feelings in the internal organs only. "As if my heart would not beat, as if I had no body, no nothing, all I feel are my left hand and stomach."
50 minutes	The dilatation of the pupils has ceased. She feels her head "clear". She tells us she feels herself too quiet, an unusual experience, "I don't like to be without thoughts" she has never felt like this before. She tells us that at the beginning she felt as if she had been directed by someone else, things happened not according to her will, when she moved it was as if it had happened against her will.

Afterwards, she thought the experiment to have been an interesting treatment, and did not ask about its purpose. She did not include it into the pattern of paranoid ideas. She kept repeating for long (over months after the experiment) that she was "unusually quiet, as if her head were quite empty". Earlier thoughts lost some of their intensity. After DMT the psychotherapeutic contact with her doctor has considerably improved.

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The reaction of this patient, a case apparently one of sensitive paranoid borderline, stood nearest to that of the normal test subjects; during experiment depersonalization and influential ideas also appeared.

After a period of improvement the patient had to be re-admitted because of typical diffuse paranoid manifestations.

Case 2. Mrs. I.P., aged 25 years. Before disease she had been unsociable, primitive, day-dreaming. She had lost her mother early and had been educated for 10 years in a cloister. She married at the age of 16 years. Although she felt attached to her husband, marriage meant for her a complete seclusion from the world and from independence. After the first complicated parturition she began to feel attracted by a distant male acquaintance and day-dreamed about him. After the second gestation she developed extreme anxiety, self-accusatory ideas, obsessions and hallucinations. She was admitted to our department in 1953 and improved on E.C.T. and Insulin therapy. She was re-admitted in 1954, after one year at her home. When re-admitted, marked "Wahnstimmung", ideas of omnipotence, uncertainty of ego, obsessional qualities were found. While at our department her condition was characterized by self-accusatory ideas associated with extreme anxiety (the world will perish because of her guilt) changing into ecstatic episodes of scenic-wish-fulfilling nature, with sexual hallucinations. The repeated E.C.T. and insulin treatments brought temporary improvement only.

11 October, 1956. DMT Experiment (1 mg./Kg. intramuscularly)

Blood pressure: 140 mm. Hg systolic, 90 mm. Hg diastolic. Pulse rate: 76/min.

Following injection at:

8 minutes Her mood heightens, the pupils dilate and the associations are loose.

10 minutes She is silent, does not answer questions. From time to time she places her hand on her forehead, moving the head. "Oh, now", moves her finger menacingly.

13 minutes Blood pressure is unchanged (140/90 mm. Hg). Pulse rate: 80/min. She does not answer questions, is lying silently, smiling happily. At intervals she whispers almost inaudibly: "Oh, sure . . . then I . . . that is . . . only people should not . . ."

15 minutes Moves her head right and left, making directing motions with the index finger. She laughs at times: "Oh, sure . . ." Babinski's sign could be elicited weakly on the right side.

18 minutes She is scrutinizing her environment. "People seem to be more serious now." She seems to identify the doctors with old friends. Makes uncertain gestures with the hands.

20 minutes She keeps looking at her left hand, playing with her fingers. "Even the sun has disappeared . . . I had to produce . . . " "Heat from cold, or reversed? But let us not hurt each other, let us not take things so seriously."

23 minutes "So many things have happened . . . it is true that I . . . I do not wish wrong to anyone . . ." She laughs, becomes silent again, makes stereotyped waving movements with her left hand, does not answer questions.

26 minutes She is looking around and can be slowly contacted. She speaks incoherently, with increasing intensity about her earlier experiences at home and in the hospitals, mentioning her children.

30 minutes She is looking out of the window, with an ecstatic smile on her face: "How beautiful? How can this be now? . . . Who have done it? How? . . . All feeling and happiness have been accumulated and filled into me or what . . . what has been left for people? . . ." She notices any small things and finds delight in them, emphasizing that she does not deserve such happiness and does not want to cause sorrow to anyone.

35 minutes The drive to speak lessens, she keeps putting her hands to her head. "I can't understand how they have done it . . ." Her eyes are full of tears for pleasure and delight.

40 minutes The state of ecstasy is over. The pupils are of moderate diameter. She is quiet, slightly vague and suspicious.

Two days after experiment she became agitated, quarrelling and aggressive with her husband and doctors.

(In the mainly hebephrenic patient characterized by some paranoid features the DMT effect caused an illusionistic change in the environment and a short period of ecstasy, similar to, but more intense than what has occurred spontaneously.)

Case 3. Mrs. I.M., aged 38 years. Premorbidly she had been quiet, of jolly mood, living a happy married life. In 1954 her husband was murdered and soon afterwards her only child, too, died. Her second marriage was unhappy, her husband being untrue to her. One of her stepsons often ran away from home and went stealing.

A girl friend of her husband, of whom she is jealous, gave her a small volume of wine, after the drinking of which she developed symptoms of tenebrosity and had to be brought to a mental hospital in 1956. She asked to be put on a tapering-off cure, in the course of which she developed tenebrosity with visual hallucinations and agitation on the ingestion of the smallest doses of alcohol; in every case the contents were those causing her conflict.

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She had been re-admitted in the same year, in a state of tenebrosity after attempting suicide with barbiturate. On re-admission hallucinations closely in contact with her conflict material and agitation characterized her condition. She cleared up after having been given Largactil for a few days.

15 October, 1956. 1 mg./Kg. of DMT is administered intramuscularly

Blood pressure: 150 mm. Hg systolic, 90 mm. Hg diastolic. Pulse rate: 84/min.

Following injection at:

5 minutes She complains of numbness in the limbs. "I don't know what is happening to me." The pupils are dilated. She is making vague movements with her left hand, holding her head. She looks scared, "My vision is so blurred".
Blood pressure: 180/100 mm. Hg. Pulse rate: 100/min.

10 minutes Her lips are trembling, she sighs deeply, plays with the fingers of her left hand, turning her head. She answers questions slowly. She sees her hands coloured.

13 minutes A number of people enter the room. She looks up scared, "Why do these people walk about here". We cover her with a blanket, which she feels with her hands then throws away, "Do not put my husband's cerement over me . . . (looking scared at the ceiling) look, what is there . . . a hanged man . . . oh, cover him with something, I am so scared . . ."

20 minutes She hears noise and talk from the outside. Policemen have come, as she thinks to get her stepson who had run away from home.

25 minutes She continues to talk with the policemen, abuses the girl friend of her husband and menaces her husband. She is walking about agitatedly, touching the furniture. Does not answer questions, sighing deeply, hands trembling. At a table covered by a bed sheet she begins to cry, "Someone has died there, oh my child . . . My God . . . a beautiful cerement, my son's . . ." She looks at the coat-stand with terror in her eyes: "Take off that poor man, he had been hanged for killing my husband . . ." She is still tenebrose and agitated two hours after injection. We give 50 mg. of Largactil, on which she slowly becomes quiet.

(Thus, in this case mild visual hallucinations were followed by the development of a hysteric episode, with scenic hallucinations based on her conflict material.)

We have presented the first case mainly because her response to DMT was the most similar among the schizophrenics to the model-psychosis of normal subjects. The second patient showed the most colourful response in the group, experiencing a change in her environment. In the third case the DMT effect was almost completely overmasked by the tenebrosity, similar to what has taken place repeatedly under the influence of alcohol.

The symptoms shown by the 24 test subjects during the DMT effect may be summarized in brief as follows:

Vegetative Disturbances

These began 6 to 12 minutes after injection, with a dilatation of the pupils accompanied by a rise in blood pressure that was marked (30 to 40 mm. Hg) in 3 cases, and moderate (10 to 15 mm. Hg) in 12 cases. Pulse rate increased to 96, 100/min. Blood pressure sank moderately in 5 patients. Tachypnoea, sighing and yawning were noted in a few cases. These symptoms were accompanied by subjective complaints in about 50 per cent. of the cases, as revealed spontaneously or on questioning. The negative change in their condition the patients usually denoted by saying they were feeling "strange". A smaller percentage of patients complained of anxiety, agitation, protested against the "treatment", whereas another group behaved in a seclusive manner.

In 4 patients with chronic schizophrenia 1 mg./Kg. of DMT caused neither vegetative symptoms nor any subjective complaints, the behaviour remaining absolutely unchanged during experiment. In the 3 patients given 1·5 mg./Kg. the symptoms were more intense, accompanied by vomiting in 2 cases.

Psychomotor Disturbances

Unmotivated laughing was seen in 11 cases, of whom 4 pointed out its strangeness.

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"G.J.: Why do you hypnotize me, to laugh at me, what do you want, please, there is nothing funny here . . ."

"G.P.: Now they are doing things to me again . . . they exchange me . . . I have been laughing a short while ago . . . it was not me . . . but the other women I was exchanged for . . ."

Anankastic-like stereotyped motions, such as waving of arms, rhythmic grasping motions, pulling at the clothes, etc. were observable in 8 cases. These motions were discontinued when we asked about them; the patients denied having carried them out, declaring that they did not want to move, they "had" to move. In one hebephrenic the increased motor activity increased to jactitation, accompanied by an ecstatic experience of sexual nature. The patient made embracing motions with the arms and legs, opening her mouth, biting at her clothes and hands. In another patient a stupor-like condition developed during experiment and the only motor activity was the sucking motions in the lip muscles. In the three experiments in which the higher doses were employed intense motor activity developed, with athetoid and partly ballistic motions.

Neurological Symptoms

Owing to the poor co-operation, it was very difficult to examine the patients neurologically. In one patient a positive Babinski's sign could be elicited for about ½ hour on the right side. Ten patients complained of paraesthesia. In most cases disturbances of co-ordination, manifested mainly in an ataxic quality of walking, were also observable.

Changes in Mood

These occurred in the majority of the test subjects. Euphoria was marked in four cases, of whom in the three hebephrenics it was associated with giggling and in two with a feeling of happiness. In further five patients the heightening of mood was manifested mainly in an increased drive to speak and in liveliness. Three patients have become definitely depressed: they were crying, speaking about earlier offences, feeling themselves to be failures. One patient expressed a wish to die, which she has never done before.

Disturbances of Perception

An illusionistic change in the environment, hallucinatory experiences have been spoken about but by a few patients. Two oligophrenics and one psychopathic patient told us about lively visual hallucinations spontaneously, as occurring with the eyes either open or closed.

H.M.: "How funny . . . I see such nice colourful things . . . and everything is moving . . . there are all kinds of figures and your face, too, is so distorted and coloured . . ."

F.M.: "My hands are so beautifully coloured . . . such ornate leaves or whatnot are on the wall . . ." . . . "As if the door had moved, but no . . . even the wall appears to be undulant."

Only one of the schizophrenics saw vague shapes. Acoustic hallucinations have not occurred. Two schizophrenics, who had intense acoustic hallucinations before experiment, were seen to have them greatly increased during experiment, with marked anxiety and agitation.

G.I.: "Oh, what they are telling me . . . why do they make faces at me . . . do not say so! Oh, my God . . . Please, maybe I am not insane at all . . . please, tell them these dirty things."

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Thought Disorder

In the overwhelming majority of our schizophrenics typical thought disorders existed. During the DMT experiment these increased in some degree quantitatively, with an increased incoherence and a more frequent occurrence of evanescence of thoughts. We have not observed that any pathological productions new in content would have been brought to the surface.

Personality and DMT Effect

It has been found that pre-existent pathological changes in personality have become more plastic during DMT intoxication. This applies first of all to the schizophrenics. As the DMT effect is over in a relatively short time, within 30 to 50 minutes, no more detailed explorations could be carried out, all that could be observed being a typical situative behaviour. In general, every patient was aware of the correlation between the injection and the change she was experiencing. Apart from this, however, they evaluated the situation very differently. Most of the paranoid schizophrenics assumed a hostile attitude toward the treatment, some of them accusing either the doctor or the persons involved in their persecutory ideas of poisoning them. Some patients seemed to care little or not at all with the experience of their life being in danger, whereas others quarrelled and protested actively. Only a few co-operative patients showing good contact with their doctors even before experiment showed evidence of asking for help and of an improvement in contact.

Emotional reactions were seen to develop either to the immediate situation, or to pre-existing pathological ideas. A hebephrenic patient who had been concerned persistently with sexual ideas and voiced erotomanic ideas spoke of ecstatic happiness during the experiment, attributed sexual qualities to everything in her environment, irrespective of sex or object. Another hebephrenic kept repeating her pre-existing erotomanic contents: "You want to marry me, don't you?" she kept asking the experimenter. Four schizophrenics have become definitely autistic during the experiment. A complete stupor was seen in one case. After it ceased, the patient stated to remember nothing, "I must have been unwell". These patients had already exhibited autistic features before the experiment.

Discussion

DMT acts apparently on the area of the meso-diencephalon, first of all on the vegetative centres of the hypothalamus and on the thalamus, and secondarily on the extra-pyramidal nuclei and, less intensely, on certain cortical areas. It may be assumed that here, too, a stimulation of the meso-diencephalic-activating system plays a role, just as it has been substantiated by Himwich (1956) for LSD on the basis of animal experiments. Just like the states produced by mescaline and LSD, the model psychosis elicited by DMT corresponds to one form of the exogenic reaction type of Bonhoeffer. In this the conspicuous feature is what Meggendorfer (1928) stressed for mental disorders due to intoxication, notably that the mental disorder is the result of an interaction between the poison and the poisoned organism. Individual differences are obvious in its manifestations and the differences are the result of an interaction between the continuously varying living conditions and hereditary factors. Even though the DMT psychosis is hyperacute in course, individual differences are obvious, especially with normal experimental subjects: those showing a tendency to anxiety can be differentiated from the mild paranoid querulent types, from

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the well-balanced meditators, etc. In some cases a conspicuous parallelism could be observed between the leading and view of life, on the one hand, and the DMT experience, on the other. Even in the normal test subjects an accentuation of the personality qualities occurred, alongside the loosened consciousness. Subconscious material which had been repressed or held secret did not upsurge in any of the normal test subjects; of course, in this relation great significance is to be attributed to the fact that most of the normal test subjects were doctors (21 out of 30), who have been more or less conscious of the experimental situation throughout the experiment. But even with the non-doctor test-subjects only a very few too-individual manifestations occurred, even when the most dramatic vegetative changes were taking place. Thus, on this basis DMT appears to be unsuitable for use in explorative studies on neurotics.

The question arises whether DMT is suitable for use as an aid in self-experiments of young psychiatrists, or for auto-analysis, or for trying to approach the mental processes of diseased persons, as LSD has been recommended by Felsinger *et al.* When the liver and circulation are normal, when DMT is administered carefully in doses not exceeding 0·9 mg./Kg. there is apparently no danger resulting from its use. Although the mild disturbance of liver function which has occurred afterwards in two test subjects has disappeared within one week, we do not think DMT to be suitable for use. For, as has been seen, the psychic disturbance of suitable degree is accompanied by a very strong sense of ill-being which makes concentration and realization of the experience rather difficult. Persons with marked eidetic qualities may be exempt from this rule; these may respond to smaller doses which do not cause anxiety or such stress effects as may completely overmask the specific effect of the drug. Also the too rapid course of DMT psychosis makes the drug unsuitable for use for this purpose. Thus, in this respect DMT cannot compete with mescaline and LSD.

The DMT effect is similar to the LSD effect in that only illusions develop in most test subjects. Likewise, the heboid behaviour, the partly empty euphoria, the forced laughing, the weakness of concentration, the loosened and divertible associations, the over-estimation of time, etc. are apparently common features. On the other hand, the frequent occurrence of paranoid reactions resembled the mescaline effect, though these did not reach the degree of references observable in mescaline intoxication; also during the DMT experiment only a relatively few spontaneous paranoid manifestations have occurred, most of the patients mentioning them only afterwards.

The following differences in DMT psychosis between the normal and psychotic test subjects should be pointed out:

(*a*) In schizophrenics the vegetative symptoms developed by an average of 2 to 4 minutes later than, and in the non-schizophrenics at about the same time as in the normal test subjects. In view of the fulminating course of the DMT effect even such a small time lag is significant.

(*b*) In general, the vegetative symptoms were less intense in schizophrenics, four of whom showed no vegetative symptoms at all. In these patients no change in behaviour could be noted and apparently no subjective experiences characteristic for the DMT effect had taken place.

(*c*) Except in a sensitive borderline case, DMT has produced no visual hallucinations in schizophrenics, although such hallucinations occurred as a rule in the four non-schizophrenics. In the three cases in which the experiment has been repeated with the 1·5 mg./Kg. dose no changes suggesting hallucin-

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ations could be observed in the presence of marked vegetative manifestations, anxiety and severe psychomotor agitation.

(*d*) In the patients with schizophrenia no late effects causing changes in mood or behaviour have been noted, nor did such patients relate such subjective experiences afterwards, except for K.V., whose case history was presented first and whose case could be considered to be in part one of sensitive reference.

In both groups DMT accentuated pre-existing pathological features of personality, although in the normal test subjects this could be held under control in some measure by self-criticism. The disturbance of perception placed a greater burden on the normal test subjects than on the psychotics, who, if they had such disturbances at all, accepted them more readily, having been "accustomed" to them by the pre-existent changes in personality.

Just like LSD, DMT causes a severe stress in the normal subjects, who respond to the drug with anxiety and restitutive activity. This secondary response often exceeds the primary one; this feature has been less marked in the cases of schizophrenia, at least in most of them.

The delayed onset and the lesser intensity of vegetative symptoms, the absence of disturbances in perception and of late effects make us agree with Condrau (1949), who asked whether schizophrenia itself may not be the cause of the diminished sensitivity to LSD, or in our case to DMT. This could be brought into correlation with the problem of the pathogenesis of schizophrenia, a problem as old as the conception of the disease itself. In 1896, Kraepelin outlined the symptoms and course of dementia praecox, suggesting an "auto-intoxication" of endocrine nature as the cause. In up-to-date wording this theory would sound like this: schizophrenia is due to a disturbance of the enzymic systems influencing the cerebral synaptic connections. This disturbance may arise as a result of an action by hallucinogenic agents of animal origin (Fabing, 1956); tryptamine, bufotenin and adrenochrome may be the chemical basis of the single schizophrenic syndromes. According to Fabing the new ataraxics (reserpine, chlorpromazine, pipradrol) may exert a favourable action by counteracting some of the metabolic anomalies in schizophrenia, although these agents differ in chemical structure from the indol bases mentioned above. Unfortunately, the role of serotonin in normal cerebral function has not been elucidated and for this reason will not be discussed here.

Nevertheless, on grounds of what has been elaborated above it seems justified to assume that in a certain percentage of schizophrenics metabolites similar to DMT may be formed as a result of a primary or secondary impairment of tryptophane metabolism and may in part be responsible for the pathological symptoms. This would explain the less intense response to DMT. Recent biochemical evidence shows that in schizophrenia the blood contains significantly more ceruloplasmine (an enzyme containing copper) than in normal subjects (Akerfeldt, 1957; Abood *et al.*, 1957), and this, too, may account for the faster rate of DMT breakdown. Another possibility is that in the schizophrenic some receptors are already occupied by endogenous endotoxins and thus the psychotic agent can produce no further symptoms; this may be the explanation for the absence of new hallucinations after the administration of DMT.

The data heretofore obtained do not permit us to draw final conclusions as to the use of DMT in the treatment of mental disease. Although a temporary improvement has resulted in three cases, it is very difficult to tell whether this could be ascribed to the effect of DMT or to the increased attention devoted to the patient during experimentation. Unfortunately, the majority of the patients

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could be given but a single dose of the drug, except for the three patients tested with DMT twice. Thus, our observations cannot be compared to those made in connection with the therapeutic effect of LSD, as far as precision is concerned. No deterioration ascribable to the DMT effect had been noted in our cases. We are planning to study schizophrenics who will be given smaller doses of DMT over prolonged periods of time. Nevertheless, DMT seems to be more suitable for use as a diagnostic and prognostic aid in the differentiation of the different schizophrenic defect states, as it has been found that the less numerous were the symptoms, i.e. the more "burnt out" was the patient, the response to DMT was the poorer. This, however, cannot be stated with certainty until further observations have been made.

On grounds of the evidence obtained in the trials with DMT we have drawn the conclusion that every psychotic drug should be tried out in psychotics also, so as to enable us to obtain a more plastic picture of its effects. Although in psychoses the personality is already distorted in some measure and some of the responses are less marked, it is usually possible to make a more detailed and frank analysis of the pre-morbid and pathological personality than with the normal test subjects. Moreover, to use Marti-Ibanez's phrase (1956), the psychotic agents, as chemical keys, may help to open certain doors through which we may gain insight into the symptoms or even into the pathomechanism of psychosis. Thus, the additional strain represented by the poisoning may magnify latent subclinical anomalies and thus may open them up for observation. It is the task of the future to decide which psychotic agent is the most suitable for this purpose.

Summary

The authors have tested the response of 24 female patients to experiments with dimethyltryptamine, using 1 mg./Kg. body weight single doses. The majority of the patients (20) were chronic schizophrenics.

After presenting an analysis of 3 illustrative protocols the differences in response between normal test subjects and psychotics are discussed.

Importance is attributed to the fact that in schizophrenics the onset of vegetative symptoms was delayed, the vegetative manifestations were less intense and were even absent in 4 cases.

The drug produced no new hallucinations. After-effects have not occurred.

The reaction given by the non-schizophrenic psychotics was similar in course to that given by normal test subjects.

The reduced sensitivity to dimethyltryptamine observed in schizophrenics suggests the possibility that a disturbance of cerebral metabolism is in the background of the psychic process of schizophrenia, as has been postulated by many authors in connection with LSD experiments.

It is believed that the drug may prove to be a useful aid in the appraisal of prognosis in schizophrenia.

References

ABOOD, L. G., *et al.*, *Arch. Neurol. Psychiat.*, 1957, **77**, 325.
AKERFELDT, S., *Science*, 1957, **125**, 117.
CONDRAU, G., *Acta Psych. et Neurol. Scand.*, 1949, **24**, 9.
DELAY, J., *et al.*, *Ann. Méd.-Psychol.*, 1956, **114**, 292.
Idem, *ibid.*, 1956, **114**, 300.
FABING, H. D., *Amer. J. Psychiat.*, 1956, **113**, 409.
Idem, Ref.: *Excerpta Med. VIII*, 1956, **9**, 365.
v. FELSINGER, J. M., *et al.*, *J. Clin. exper. Psychopath*, 1956, **17**, 414.
HIMWICH, H. E., *Dis. Nerv. Syst.*, 1956, **17**, 109.
MEGGENDORFER, F., *Intoxicationspsychosen. Handb. d. Geisteskrankheiten.* Bd. VII, 1928. Berlin, Springer.
SANDISON, R. A., *et al.*, *J. Ment Sci.*, 1954, **100**, 491.
SAI-HALÁSZ, A., BRUNECKER, GY., and SZÁRA, ST. To be published.
SZÁRA, ST., *Experientia*, 1956, **12**, 441.
MARTI-IBANEZ, F., *J. Clin. exper. Psychopath.*, 1956, **17**, 360.

https://doi.org/10.1192/bjp.104.435.445 Published online by Cambridge University Press