A CRITICAL REVIEW

NARCOSIS THERAPY

BY

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TREATMENT by continuous narcosis implies the use of narcotic substances to induce sleep for the greater part of 24 hours, each successive day, for periods ranging up to 14 days and occasionally longer. The expression "continuous" is a misnomer, since a break is always allowed in the 24 hours, during which nourishment is given and the evacuations attended to.

History

Griesinger (1882) says that with the use of ether and chloroform, complete and rapid recovery has occurred in several cases of recent melancholia, but he adds that relapse occurs and "with each inhalation the remission gradually shortens until they can no longer be obtained." McLeod (1900) reported recoveries following the use of massive doses of bromide in acute mania. Williams (1845) quotes Adral and Van Swieten as having seen maniacal states cured by accidentally large doses of opium. Sir Thomas Clouston (quoted by Palmer, 1937) mentioned keeping large "numbers of cases under" (the influence of chloral) "day and night for weeks, and many of them certainly got well," adding: "But I do not believe in it so much now." Wolff (1901) used trianol in three cases of "acute confusional insanity," the treatment lasting 12 days, with two recoveries and some temporary improvement. Later in the same year he treated three cases with one recovery. Epifanio (1915) treated a mixed group of 10 cases, which recovered or improved following treatment. Kläsi (1922) published a report on which most of the subsequent work has been based. He used somnifaine, and treated 22 cases, mainly of schizophrenia, with three deaths. Since his paper the Zurich school has specially interested itself in the treatment, and has devoted itself to an elaboration of the technique, with the object especially of eliminating the dangers suggested by Kläsi's three fatalities. The Zurich patients so treated have been nearly all schizophrenics. The chief publications of the school have been those of Oberholzer (1927), Lutz (1930), and Monnier (1936). Müller (1925) collected 311 cases treated by various authors, with 15 deaths. This percentage of fatalities has been misleading, since the largest proportion of deaths occurred in the smallest series, i.e. at the hands of the least experienced therapists. Barkas and Dawson (1929) using somnifaine reported unfavourably on the treatment, saying
that any improvement was transitory; but Ström-Olsen (1933) points out that they used smaller doses than others found necessary (2 c.c. per day compared with 5 or 6 c.c.) and for a shorter time (4 or 5 days instead of 10 to 14 days). Lutz used luminal or dial, treating 13 cases with the former and 45 cases with the latter. Oberholzer (1927) treated 92 cases, including 186 courses of treatment of which 138 were with somnifaine and 48 with luminal. Monnier (1936) used Cloetta's mixture (vide infra), introduced by Cloetta and Maier at the Zurich clinic in 1934. This was an attempt to produce a balanced hypnotic with the object of eliminating the complications attributed to the use of a barbiturate alone. With the same object Ström-Olsen and McCowan (1934) while retaining somnifaine gave also glucose 1 oz. by mouth and insulin 15 units by injection with each dose of somnifaine. Palmer (1937) used somnifaine and paraldehyde, on the principle of using both a hypnotic which according to Pick's classification acted mainly on the brain-stem and one (paraldehyde) which acted mainly on the cortex.

Much the greatest amount of work, therefore, has been done with barbiturates, of which somnifaine has been the most widely used. Attempts have been made to make the treatment safer by using either a different barbiturate or an admixture of other drugs, of which paraldehyde has been the most frequent. Paraldehyde has been used primarily because it is considered to be safer than barbiturates on account of the general physiological properties. Paraldehyde has therefore been substituted for a portion of the barbiturate that would otherwise be necessary, in the hope of maintaining the prolonged type of sleep that is obtainable with a barbiturate, while avoiding the dangers of a larger total dose of barbiturate alone.

Theories

Presumably the earlier attempts at treatment were based on the assumption that the mere interruption of a habit of the nervous system or the introduction of a period of rest in an excited state might be expected to have favourable results. This might be regarded as the naïve view; but it is clear that advances in knowledge of the physiopathology of the conditions treated have been insufficient to enable any more penetrating theory to be established. In fact, more might be expected to be learned about the physiopathology of psychoses from the phenomena of prolonged narcosis than in the opposite direction.

The vogue for continued narcosis dates from Kläsi's paper (1922), and the theories as to its therapeutic action have followed the two lines indicated, the psychopathological and the physiological, but with wide divergence from the original hypothesis, especially on the physiological side. Kläsi believed the effect to be largely psychological, the patient's weakness during and immediately after the treatment producing a need for help, which was given in the form of simple psychotherapy. He thought also that an anaesthesia was produced whereby stimuli of peripheral or central origin were blocked or obliterated. Cloetta had suggested that in an ulcer centripetal impulses passed to the spinal cord, and reflexly set up centrifugal impulses which impeded the healing process,
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and Kläsi suggested a similar process in psychoses—affective excitement causing restlessness and vice versa. Kläsi quoted E. F. W. Rollers on the effect of an increased acuity of perception of movement, and he considered that parasthesiae could be the foundation of hallucinations and delusions. He admitted that the isolation to which the patient was submitted during the treatment might play a part. He speculated also on the possibility that an alteration in the brain circulation might be induced by the treatment.

Maier (1934) emphasizes the importance of the psychotherapeutic effect. He considers the "rapport" induced to be of the first importance, and says that this is impossible if the treatment is carried out in an open observation ward. Oberholzer considers psychotherapy important and stresses the necessity for a special nurse. Others have pointed out that psychotherapy is not necessary. Meerloo (1933) and Palmer and Braceland (1937) limit their psychotherapy to simple encouragement. Oberholzer (1927) does not consider the helplessness stressed by Kläsi as important, but he lays stress on the "affective loosening"—the dreamy mental state which precedes or ensues upon the deeper state of narcosis. Ström-Olsen remarks that this can hardly be applicable to the effect in manic patients. In the dreamy or "dissociated" phase the patient becomes more accessible, women become like children or become more erotic; and in general a new orientation is gained to the psychosis and to the outside world.

Furrer (1924) attempted to state the hypothetical process in psychoanalytic terms when he said that in drug narcosis complexes were relieved of their excess charge of libido, so that afterwards the ego could assert itself better. Boss (quoted by Palmer, 1937) regarded the ego as a "functional psychic organ" for the differentiation and maintenance of which a certain degree of mental energy is necessary; and sleep as resting the forces which maintain the ego.

On waking, according to Oberholzer, the patient realizes the abnormality of the psychotic symptoms, and finds it troublesome to remember them. Oberholzer also criticizes the theory of interruption of impulses by the anaesthesia induced. Monnier concludes that the method works psychologically in the sense that the patient becomes very suggestible. He bases this conclusion on the fact that the best results (18 social recoveries out of 24 cases) were obtained in schizophrenics with what may be regarded as preponderantly psychogenic states of excitement—hallucinatory anxious states, with sleeplessness, nervousness, and headaches "which made an impression of psychogenesis." He attributes some of the effect to the change of environment and to the fact that they received more attention from the doctors after the cessation of the narcosis.

Physiological Theories.—On the other hand Monnier concludes that the effect must be mainly physical, because of the results obtained in acute "maniform" and catatonic excitements, as well as in chronic depressions and schizophrenic-catatonic psychoses, which he obviously regards as essentially "organic" in origin. Monnier suggests that the treatment is effective because it exalts the parasympathetic system and depresses the sympathetic. The cases which showed this exhibited also the best remissions, while on the contrary catatonics which showed hypersympathicotonia improved only slightly. He adduces the opinion that the mental disturbances are dependent on changes
in the vegetative nervous system, and concludes that the barbiturates produce their effect through their action on the vegetative centres in the diencephalon. Meerloo shares this view and considers from his experience that it is not necessary to produce actual sleep.

Müller (1927) considered that the effect must be mainly pharmacological, since disregard of the precautions of a darkened room, etc., made no difference as to the results. He concluded that actual anaesthesia played no part, but the grounds for this conclusion seem inadequate. As an additional support for the theory of merely pharmacological action he adduced the fact that the clinical alteration for the better might not appear till several days after the cessation of the actual narcosis. He also pointed out that the condition of a manic patient after cessation of the treatment was not so good, i.e. the patient felt less well than during spontaneous recovery, as if some toxic or physiological abnormality of the tissues remained. The fact that, as some authors, e.g. Lutz and Ström-Olsen, believe, sleep deep enough to produce complete amnesia for the period of treatment is necessary, is to be construed as suggesting a physiological rather than a psychological explanation, since the depth of the amnesia is to be taken as evidence of the depth of the narcosis.

Quastel and Wheatley (1932) have shown that narcosis appears to depend on interference with the oxidation in the brain of substances important in carbohydrate metabolism, especially glucose, lactic acid, and pyruvic acid. They have demonstrated that there is a parallel between the narcotic power of a drug and its inhibitory effect. This seems to speak for a cortical anaesthetic effect or for an interruption of neuronic habit. As to the details of physiological action, Magnus (1936) suggests that the resulting ketosis produces relative dehydration of the brain cells, and that this ultimately favours oxygenation. This would be a comprehensible view if the essential cellular physiopathology in psychoses is an anoxæmia. Narcosis would then be effective by stimulating the cells to a reversed effect—of hyperoxidation after a state of suboxidation. Lowenthal (quoted by Ström-Olsen and McCowan) suggests a biochemical explanation, and that the effect depends on improved cellular oxidation, which Lorenz attributes to the surface action of the barbiturates. But one of the effects of the barbiturates is usually considered to be the inhibition of oxidation on all surfaces.

Palmer and Braceland (1937) quote Sakel’s theory regarding the modus operandi of hypoglycæmia—the normal impulses are conceived to be suppressed and the normal activated. Ström-Olsen and McCowan suggest that both a twilight stage and a narcotic stage are necessary: the former by facilitating the discharge of tension from repressed complexes (Oberholzer and Furrer) and the latter by producing actual anaesthesia. Palmer (1937) also suggests that the sudden withdrawal of narcotics after their prolonged use might be a factor, but sudden withdrawal is purposely avoided by others, including the Zurich workers. Nevertheless, when sudden withdrawal produces a convulsion, as sometimes happens, the analogy with the convulsion therapy of psychoses by means of cardiazol suggests a possible mode of therapeutic action.

_Hypothetical Localization of Action._—The predilection of some authors for
placing the seat of action in the subcortical, especially the diencephalic centres, is explained by the now traditional use of barbiturates in this method of treatment. It has been mentioned that the barbiturates act principally on the brain stem, because it is in this region that they are found in greatest concentration after death in animals killed during barbiturate intoxication (Keese 1927). But Sollmann (1936) considers that this merely expresses the ratio of distribution of white matter between cortex and brain stem. Müller supports the theory of a direct action on the brain stem by instancing the presence of hæmorrhages there, increase in the blood sedimentation rate, and changes in the leucocyte count as evidence of action on the vegetative centres. Hadfield (quoted by Palmer) states that various autonomic pictures are reversed during narcosis, e.g. hyperchlorhydria becomes achlorhydria and vice versa. Hess (quoted by Monnier), suggests that the important effect is on the sleep centre in the diencephalon.

There can be little in the view of barbiturate specificity, since bromide and trional have both produced like effects; and it does not seem likely that there is a specific regional effect, or at least that a specific regional effect is a preponderating factor, since bromide is a cortical rather than a subcortical sedative, if Pick's regional classification of hypnotics be accepted. It is conceivable that the manner of action is different with different psychoses; and that while preponderantly physiological anaesthesia with interruption of faulty neuronic habit is the important factor in states of excitement, whether "maniform" or schizophrenic, "affective loosening" or liberation of pent-up affect may be the effective factor in depressions and inhibited states generally. Monnier attributes the results in the psychogenic disturbances of psychopathes to the psychological effects.

It may be also that in excited states the cortex is chiefly involved and in inhibited states the brain stem. Pavlov's dog, in which had been induced a state of excitement as the result of confusion of conditioned reflexes, was restored more rapidly with the help of bromide than with rest alone. On the other hand, the subjective experiences of catatonic patients who have been given a dose of sodium amytal and come temporarily into contact, i.e. became accessible and willing to talk, suggests that their consciousness is quite clear during the catatonic state, but that they are held in a kind of vice which inhibits movement of any kind. The analogy with the immobility induced in experimental animals by bulbocapnine, which affects basal cerebral structures, is suggestive.

In general, the theory of the action of continuous narcosis suffers from the complete uncertainty as to the physiopathology of the morbid conditions to which it is applied. Those who have spun these theories have never taken a comprehensive view of the possible factors—factors which may operate at different levels of physiochemical and neuro-physiological complexity. It is of great value to know that narcotic drugs act at the physiochemical level by inhibiting oxygenation. The cognate speculation that the resulting stage of ketosis may be followed by a reverse state, in which oxygenation is favoured, is suggestive of the way in which a narcotically-induced accentuation of a pre-existing anoxæmia may result, when the narcotic is withdrawn, in a stimulation of a function which was previously at a subnormal level. But the nervous
system is more than a simple combustion engine: its internal energy exchanges are of an electrical kind rather than simple combustion. Moreover, the exchanges can occur in more or less localized fashion: and an electrical (ionic) charge in one part of the nervous system may, by some kind of induction, produce an opposing charge in an adjoining part. In other words, processes of excitation and inhibition accompany one another throughout the nervous system, and exhibit the behaviour or laws which Pavlov especially has deciphered.

Unfortunately, psychotic syndromes are not conceived in neurophysiological terms; but it is possible that a reclassification, primarily into states of excitement and states of inhibition, might serve as a first step to their comprehension along neurophysiological lines. If this rough subdivision were adopted—a subdivision into which admittedly it would strain the facts at present to attempt to fit many types of psychoses—it would give a possible basis for the understanding of the action of prolonged narcosis. This suggestion is supported by the work of Serejski and Feldmann (1937), who chose only chronic cases of schizophrenia, especially those with sleep disturbances at night and sleeplike disturbances of consciousness during the day. They divided schizophrenic psychoses into two types: (a) types under 20 years of age, the classical Kraepelienian dementia præcox; and (b) inhibited or “hypnic” forms occurring at an age between 30 and 40, and resulting from factors such as psychic trauma, infection, auto-intoxication and fatigue, producing fatigue of the central nervous system. They adduced Pavlov’s hypothesis that the central nervous system, in severe states of exhaustion, tries to protect itself by inhibition, i.e. by setting aside all work exceeding its capacity. The narcotic then is presumed to work by protecting the brain from stimuli beyond its strength to deal with, and by hindering all the conditions which favour the appearance of Pavlov’s “ultraparadoxical phase.” In states of excitement, on the other hand, it may be supposed that the narcotic works by favouring the inhibitory process, the drug giving an opportunity for the healthy balance of inhibiting and excitatory processes in the central nervous system to be restored. It is conceivable that in inhibited “depressed” states, the narcotic acts by inhibiting a hitherto persisting inhibition, with a similar result. The fact that some states of excitement are due to release of lower centres from inhibition by higher levels of activity, suggests the possibility that the inhibition by the drug of the released excitatory process may give time for inhibition of the lower by the higher to be restored.

The theoretical implication of the effects of emotional catharsis have also not been sufficiently studied. It is well known clinically that the verbal and sometimes other muscular expression of emotion connected with a constellation of ideas is followed by an alteration in or disappearance of certain symptoms. Something similar happens under the influence of narcotics; the patient who has been unable to talk becomes loquacious, and subsequently may improve considerably. This has often been observed, e.g. by Horsley (1936) and Campbell (1938) in the case of single doses of barbiturates in inhibited (depressed inhibited, or actually stuporous) patients. There are depressed patients who are able to talk readily about everyday matters, i.e. on matters with no emotional
"charge": but who become completely inhibited when emotional topics are touched on. There is a localized inhibition induced by the emotional "charge." It is conceivable that such inhibition may spread to all topics, with the resulting appearance of depression or even stupor. Continuous narcosis may work in the psychogenic cases by facilitating the release of emotional tension, e.g. by inhibiting the inhibition set up by the emotional charge.

**Drugs Available**

McLeod used bromide salts: the primary disadvantages being the very large dose required, the toxic by-effects, and the difficulty in regulating the dosage on account of the slow absorption and excretion. Wolff used trianol in 1901. With trianol, Oppler (quoted by Lutz) found that out of 18 cases eight could not be sufficiently narcotized, while three developed acute nephritis and a further three had cylindrical casts in their urine. The introduction of the soluble salts of veronal gave the opportunity of producing quiet sleep of long duration. Many of the more recently introduced barbiturates are rapidly excreted. Ström-Olsen and Quastel describe somnifaine as an alcohol-glucose-aqueous solution of the diethylamine salts of veronal and allylisopropylbarbituric acid. Somnifaine is not diethylallyl-barbituric acid, as has sometimes been described. One ampoule of 2 c.c. he calculated as equal to 5⅓ gr. of veronal. Kläsi used scopolamine at the beginning of the treatment to help to establish the narcosis.

Other barbiturates have been used, or other combinations of barbiturates with other drugs. Claims are made for superior safety with the newer methods, but the impression obtained by a perusal of the foundations of the claims is that it is experienced care that counts together with thoroughness, rather than the particular drug or combination of drugs utilized. In 1928 dial (diallyl-barbituric acid) was introduced; and Lutz in 1930 described 13 cases treated by luminal and 45 with dial. He claimed that dial had less effect on the blood pressure than veronal and luminal and that it was more harmless and more effective than luminal.

In 1930 Maier introduced a mixture compounded by Cloetta, afterwards called Cloetital. The principles of which this was compounded were combined action on cortical and basal structures, minimum depressive effect on the circulation, and avoidance of the effects seen after withdrawal of pure barbituric medication. Cloetta enumerates the following desiderata: the hypnotic chosen must be able to be given intravenously, intramuscularly, or rectally, so as to avoid the danger of aspiration. It must have no depressing effect on the circulation. He pointed out that barbiturate derivatives, like somnifaine, have with long administration of large doses a tendency to produce slowing of the circulation, with congestion in certain localities, febrile disturbances, pneumonia, and anuria. Their use also tends to be followed by states of excitement on the final withdrawal of medication. He excluded intravenous injection on account of haemolysis and intramuscular injection on account of the danger of local irritation, and preferred a solution capable of rectal administration. The solution ultimately compounded contained in each c.c.: paraldehyde, 0·4864 gm.; amylene hydrate, 0·1593 gm.; chloral hydrate, 0·1157 gm.;
alcohol (92 per cent.), 0.1747 gm.; allylisopropyl, barbituric acid, 0.0409 gm.;
digalin, 0.0830 gm.; ephedrine hydrochlor, 2.4600 gm. The last was intro-
duced to counteract depressant effects on the circulation. The proportions are
so arranged that the quantities of barbiturates are held to balance the quantities
of other hypnotic present. The standard solution is shaken to a clear solution
with 10 times its volume of water. This is given rectally and induces sleep in
15–20 minutes.

The routine adopted by the Zurich school differs to some extent from the
usual methods since nothing is given by mouth, but the precautions used are a
fair sample of those necessary. Dilution is done with 4 per cent. glucose to
which is added 1 gm. soda bicarb. per litre or a 0.5 per cent. solution of sodium
chloride may be used instead. The minimum lethal dose is 3.6 times the
minimal hypnotic dose in rats. The hypnotic dose is 0.15 c.c. of the standard
solution per kilo, but it can be increased to 0.30 per kilo, although this is never
necessary.

Meerloo prefers his "Solutio Barbamidoni": 100 mgm. phenyl-ethyl-
barbituric acid; 100 mgm. diallyl-barbituric-acid; 50 mgm. dimethyl-
amido-antipyrin; 150 mgm. phenyl-cinchonic acid; 100 mgm. caffeine
sodium-benzoate; ½ mgm. strophanthin cryst. (optional), dissolved in 2 c.c.
alcohol-glycerin-water, consisting of glycerin 350 c.c., distilled water 130 c.c.,
alcohol to 1 litre.

Rectal Method.—The Zurich workers give no food or even fluid by mouth.
Patients who have had to be artificially fed for a long time before are avoided
if possible; but where the treatment is undertaken, in such a case, for
several weeks previously he is given fresh vegetables. A quiet dark room is
essential. In the morning, by rectal injection, the first dose is given—0.15 c.c.
per kg. of body weight. Every three or four hours, by rectal drip infusion,
400 c.c. of 5 per cent. glucose solution are given day and night—except that on
one occasion in the 24 hours this is replaced by 400 c.c. physiological salt
solution. The rectal administration of hypnotic is repeated as often as the
patient gets restless and the depth of sleep appears to decrease. An attempt is
made to maintain the sleep by repeating only half the original dose. In the
first three days the mixture has to be given three or four times a day, thereafter
only twice as a rule. Strict record is kept of temperature, pulse, breathing,
stools, and urine. If the temperature goes above 37.5° C. in the axilla the fluid
intake and diuresis are usually found to be insufficient. Subcutaneous saline
infusion especially brings the temperature down, showing that the fever has been
due to dehydration. Higher temperatures are an indication for breaking off
the treatment. Sponging with cold water will often bring down the temperature.
The patient should go to stool at least during the second day; if he does not an
enema of liquid paraffin or an injection of peristaltin is given. For a weak or
irregular pulse, strophanthin ⅛–⅜ mg. or 20–40 per cent. glucose is given
intravenously.

After stopping the hypnotic, full awakening takes place in one or two days
without any symptoms of deprivation. Then comes the time for psychotherapy.
A special nurse for the entire day is fundamentally important. Removal to a
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general ward with mild occupation for body and mind are indicated. Visits of relatives and friends are good. But this, of course, must depend on expert knowledge of the relatives' and friends' attitudes to the patient. Discussion of the patient’s symptoms is bad. He should be encouraged to dwell on the days before his illness to establish his confidence, and Meyer recommends an early return home, within two weeks, to avoid the patient falling back into his schizophrenic autism.

Magnus (1936), who adopted the Zurich technique but used dial, isolated the patient for 48–72 hours beforehand, premedicated him with digitalis, and prepared him in general as for a major operation. He emphasized the importance of instilling confidence. He gave dial by rectum, introduced through a side-junction in a drip infusion tube, using 3 or 4 c.c. of a solution which contained 1½ gr. dial in 1 c.c. The dose rose as high as 15 gr. on the third day and was maintained at 6–12 gr. a day. To enable less dial to be used, morphia and scopolamine was used for the first three days. The patient was turned from side to side every two hours.

When infection was suspected, a leucocyte count was made and the blood sedimentation rate estimated. The patients were provided with a pneumonia jacket. Palmer and Braceland (1937), who used sodium amytil, advocated a preliminary search for and elimination of foci of infection. They also give a preliminary dose of sodium amytil in case of idiosyncrasy. Urotropin is given by Monnier as a routine to prevent bladder complications. Drops of zinc solution are instilled every second day into the conjunctival sac.

The continuity and depth of sleep vary not only with different patients, but with different authors. Thus, while Ström-Olsen claimed that with an average dose of 5 c.c. somnifaine daily the patients could usually be kept asleep most of the time, Ostlind (1936–7) using the same method, found that his patients were as much awake as asleep; the rates being hours sleeping: hours awake or dosing as 153 : 156. It is true that Ostlind did not use the proprietary “Roche” preparation, but “isafen-stra,” which is supposed to be chemically identical.

Quastel and Ström-Olsen (1933) claimed that by giving 50 gm. of glucose and 10 units of insulin with each dose of 2 c.c. of somnifaine, ketosis could be eliminated, as borne out by the disappearance of acetone from the urine; by the absence of signs—cyanosis, coldness of extremities, and vomiting—which they attributed to ketosis; and by a generally “smoother” course.

They claimed also that by this method mortality risk was well reduced. The risk is not, however, eliminated, since Parfitt (1936) using this method recorded three deaths in 66 cases.

Klæsi used scopolamine and morphia at the beginning, to help to induce quiet and the first sleep; so also did Oberholzer, especially in agitated cases, but most workers have since dispensed with this.

Intravenous Method.—This has been used when it has been difficult or impossible to induce sleep by oral or rectal administration, but as Oberholzer points out, it is just in these cases in which it is difficult to induce sleep that it may be dangerous to flood with somnifaine.

The following is a sample of the more usual method in which nourishment
is given by mouth. In this régime (Palmer, 1937) somnifaine is supplemented by paraldehyde. The morning dose of somnifaine is given at 9 a.m. and the evening dose between 4 p.m. and 7 p.m. A dose of somnifaine is never given until eight hours have elapsed from the previous dose. If the patient is wakeful in the intervening period, paraldehyde is given instead. A more or less fixed amount of somnifaine is used and a variable amount of paraldehyde is used to maintain narcosis. In this way, it is claimed, the danger of accumulation of barbiturate is avoided. Nevertheless, Palmer occasionally found it necessary to give somnifaine at 1 a.m. as well. Somnifaine is injected intravenously; paraldehyde is given either by mouth or by rectum or even intramuscularly. Palmer followed McCowan and Ström-Olsen in using insulin and glucose. Nursing attention is given mainly in two periods, 8–9 a.m. and between 5 and 6 p.m. The patient is got out of bed and made to walk at least 25 paces, and during that time he is engaged in therapeutic (i.e. encouraging) conversation. At least 60 oz. of fluid is given in the 24 hours, consisting of milk, barley water, and sweetened lemonade. In the milk are two eggs daily and ¼ oz. butter. No patient is allowed to go more than 24 hours without moving his bowels or receiving an enema. The urine is tested twice a day for acetone or ketone bodies and the total quantity measured.

The patient is nursed in a pneumonia jacket. Any nurse who has a cold is excluded. The patient is seen once every quarter of an hour. The temperature of the room is kept at 65° F. The patient is given a tepid friction twice daily. He is not allowed to lie for more than six hours in one position. “Particularly quiet” patients are given an inhalation of O₂ 95 per cent. and CO₂ 5 per cent. twice daily (Palmer).

The Zurich workers are emphatic that treatment can only be carried out safely with a specially trained staff and in a special institution. The personality of the nurses is considered to be very important during the treatment (Palmer, 1937) and afterwards to facilitate the simple psychotherapy that is required (Maier, 1934).

**Duration of Narcosis**

This ranges from 4 to 5 days (Kläsi, in some cases, and Barkas and Dawson) to as long as 22 days (Palmer and Braceland) or even 27 days (Demole, 1921). Kläsi gives 7 days as an average duration of treatment. Müller advises 7. Palmer and Paine (1932) 9, Segerath (1931) 12, and Ström-Olsen 14. Oberholzer contradicts those authors who suggest that the danger increases with the duration of the narcosis. Broder (1936) disapproves of a set standard, maintaining that a more flexible method enables the physician to choose the best time for psychotherapy. Monnier declares that the more one is dealing with a “process-schizophrenia”, the longer the treatment should be (at least 16 days), while with psychogenic excitements 4 days may be enough. On the whole the satisfactoriness of the results appears to be greater with longer treatment (10 days or more), and with larger rather than smaller doses, i.e. where the patient is kept decidedly under the influence of the drug all the 24 hours.

Some cases, especially psychopaths, show excitement rather than sedation
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(Meerloo). Some developed catalepsy. After cessation of the treatment, fits have appeared (Meerloo, Palmer, and Braceland) but are possibly of therapeutic value. In some patients cessation of the treatment is followed by increase in the psychotic symptoms, above the pre-narcosis level.

Complications

Palmer (1937) has divided these into: (1) "Natural accompaniments," i.e. physiological consequences of the use of barbiturates, e.g. inco-ordination. (2) "Tissue-reactions" which he exemplifies with bradycardia, extreme flaccidity of the muscles, and transitory œdema. (3) Accidents, e.g. nerve palsies, fractures. (4) True complications—due to intolerance or excessive doses. Dangerous complications can arise in the course of treatment, and the utmost vigilance is required. They are principally cardiac, respiratory, and urinary. They have been attributed to a general interference with oxidation as the result of the action of the barbiturates; and it has been held that the simultaneous administration of glucose and insulin obviates this (Ström-Olsen and McCowan). The avoidance of these complications is, however, more a matter of experienced vigilance than of any adjuvant. Measured by death rate, there appears to be nothing to choose between the results of those who use insulin and those who dispense with it.

Cardiovascular.—Weakness, frequency, and irregularity of the pulse have all been noted. A pulse rate over 90 and especially above 120 is regarded as a danger-signal. According to Oberholzer, cardiovascular complications are much commoner with somnifaine than with luminal; and so much less severe with the latter that treatment never had to be broken off on this account, in comparison with the use of somnifaine. Collapse is specially likely in the early stages, up to the third day. Müller (1925) considers this to be the most dangerous complication. It is characterized by deep stupor, cyanosis, quick thready pulse, quickening of respiration, and often high fever of sudden onset. He quotes five cases from his own experience—all schizophrenics. Ström-Olsen considered that by the use of insulin and glucose the danger was certainly avoided, as he had no cases of collapse in 107 cases treated with this modification. Bradycardia (pulse under 50) has been recorded. A fall in the blood pressure under 90 is regarded as a danger-signal (Palmer) and so also is any cyanosis.

Respiratory.—Shallow or laboured breathing, with respirations exceeding 25 a minute, lobar pneumonia and bronchopneumonia, especially the latter, are the more serious complications. They are to be attributed to the direct effect of the hypnotic—depression of the respiratory centres, partial paralysis of the capillaries by the barbiturate, and the postural congestion from lying always in one position. Swallowing of the tongue is recorded in one case by Palmer and Braceland. Mucus in the throat is recorded frequently by Palmer and Braceland. Cheyne Stokes breathing has been observed (Serejski and Feldmann, 1937) and the same authors describe nose-bleeding. Hiccups has been recorded by Meerloo.

Urinary.—Oliguria, anuria, and albuminuria may all occur. The first two
cases (Monnier). With the rectal clumsiness pyrexia has been recorded. Atropin is occurs ally of hyperemia to toxic cedema, and appear they in diuresis of fluids, and, as Oberholzer suggests, by giving luminal instead of somnifaine. Retention is a fairly common complication, e.g. 12 out of 40 cases of Ström-Olsen’s had had to be catheterized and 17 out of 100 cases in Monnier’s series. This complication is more common in “toxic” cases. Cystitis may, of course, result.

Fever.—Fever up to 101° is not considered by some an indication for breaking off, in the absence of signs of infection. Fever is often associated with a failure of diuresis; when the latter is re-established, the temperature falls. Hyperpyrexia has been recorded.

Skin Conditions.—Skin conditions are known to occur in cases of barbiturate medication (in 3 per cent. of persons, it has been estimated) and occasionally they appear in narcotized patients. Monnier mentions simple exanthems, toxic oedema, and bullous eruptions. He ascribes a partial lagophthalmos to hyperaemia of the conjunctiva.

Gastro-intestinal Tracts.—Retching or vomiting occurred in 53 out of 100 cases (Monnier). They occurred as often with the uncomplicated cases, Atropin is contraindicated as obscuring the clinical picture. Jaundice occasionally occurs (Meerloo). Urobilinogen may appear in the urine (Müller, 1927). Two cases of Monnier’s had a perirectal abcess, attributable presumably to some clumsiness with the rectal tube. Furrer recorded pytalism and pains in the limbs without local signs.

Nervous System.—Epileptiform seizures have been reported, e.g. in four of Monnier’s cases and in five out of 500 cases treated at Santpoort (Kooy, 1934). These occurred in the first or second day. Sudden withdrawal of the hypnotic may precipitate a convulsion. One of Monnier’s schizoid psychopaths afterwards exhibited spastic paralysis of both legs. Radial paralysis has been recorded (Oberholzer) and can obviously be avoided by nursing precautions.

Loss of Weight.—Monnier’s cases (i.e. with Cloetta’s mixture) lost 4–5 kg. in weight during the treatment. He regarded this as of therapeutic value in that it is a sign that metabolic processes are altered.

Ketosis.—70 per cent. of patients develop ketosis (Ström-Olsen, 1933). When insulin and glucose are used, ketosis is absent.

Idiosyncrasy to Barbiturates.—Müller (1927) quoted the case of an 18-year-old girl who died after 4 c.c. somnifaine had been given. Meerloo (1933) quotes a case of a 27-year-old female who died after 90 drops of somnifaine had been given by mouth and 4 c.c. intramuscularly. Oberholzer (1927) records a patient who developed a high fever on the fifth day, with cardiac weakness, and who during a second course of treatment developed pneumonia. He concludes that this patient had an idiosyncrasy for barbiturates. Palmer and Braceland always gave a preliminary smaller dose of sodium amytal, to guard against the occasional patient with hypersensitiveness.
NARCOSIS THERAPY

Contra-indications

Emaciation, tuberculosis, and liver, kidney, circulatory, and metabolic diseases are contra-indications (Maier). Also the time of menstruation has to be avoided. The patient recovering from an influenzal attack should not be treated until some time has elapsed; and the presence of a mild epidemic of influenza postpones treatment (Meerloo). Tracheitis is a contra-indication (Oberholzer). Dozy (quoted by Meerloo), however, treated patients with compensated heart lesions, with the aid of digalin throughout, and without mishap. Ström-Olsen does not exclude patients with valvular disease of the heart, provided that it is well compensated. Manic patients with toxæmic signs are dangerous to treat by this method.

Physiological Changes During Treatment

Monnier describes three types of course: (a) Consists of those cases with an uncomplicated course—"physiologische Dauerschlafl." Hours of sleep are about 22 out of the 24. The blood pressure is slightly lowered, the pulse of good tension, regular, somewhat increased in rate (86–90 per minute) and the breathing similarly increased (about 21 per minute). The temperature runs between 36-7° and 37-1° C. Reflex excitability is diminished. Micturition and defaecation occur usually spontaneously. The maximum dosage required is reached on the second day and thereafter diminished to the fifth day. After the fifth day the dosage has to be gradually increased again. (b) These are cases with a labile, slightly complicated course. This second group consists of those cases in which the pulse, temperature, and breathing reach a higher level than in group (a), and higher dosage is required to produce and maintain a satisfactory depth of sleep. The fluid intake is less. (c) Those with a very complicated course. Out of 125 courses of treatment, 25 had to be broken off. In this group larger doses of hypnotic were necessary, the hours of sleep were less, the temperature and pulse higher and more irregular, the breathing was considerably more rapid, and the fluid intake considerably less.

Meerloo describes a flattening of the temperature curve after the third day, except with very large doses which produce violent fluctuation. Temperature alterations persist after the treatment. In five cases out of 50, Meerloo observed fever develop after the 14th day of treatment.

Broder (quoted by Palmer and Braceland) found no significant change in the blood composition in pH, CO₂, or NPN content. Dameshek, Meyerson, and Loman (1934) record a fall in the B.M.R. up to 7 per cent.; and a fall in the CO₂ and dextrose uptake by the brain. Lindemann (1934) recorded that the chronaxie returned to normal during narcosis, and believes that this demonstrates a parallelism between mental and physical responsiveness. The systolic and diastolic pressures both fall.

Deaths During Treatment

It has been remarked that deaths are more common in small series than in large: i.e. that the death rate varies inversely with the experience of the doctor.
Müller (1925) collected 315 cases from the literature with 15 deaths, but the latter occurred to a disproportionate extent in the small series. He says these deaths can be divided into three groups: (1) Five cases who during life showed acute heart failure and in whom at post-mortem no special organic findings were made. These cases must be considered as pure poisonings: they suffer from the kind of collapse condition already mentioned. It is not clear how the poisoning had this fatal outcome. Animal investigations by Redonnet (1919–21) do not shed any light on the question. In this group are one case of Moser (1923), one of Furrer, two of Wyler (1924), one of Gundert (1924–25). (2) Six cases with lung complications which showed pneumonia at post-mortem (Kläsi one, Furrer one, Demole one, Mollenhof (1924) one, Müller two). Kläsi and Furrer considered that the doses their patients had received were insufficient to cause death; Müller thinks, however, the deaths were undoubtedly due to somnifaine poisoning and that the treatment can predispose certain patients to the onset of pneumonia. (3) Four cases in which pre-existing diseases have led to death during treatment (Kläsi two, Mollenhof one, Wyler one). Mollenhof's case had bronchitis which developed into pneumonia during treatment and Wyler's case was a pneumonia (otherwise undiagnosed). Müller considers that all these 15 deaths are attributable to the somnifaine.

Oberholzer says that all the fatal cases reckoned up to that time (1929) had been asthenic or very thin in physique, except where physical ailments already existed. Kläsi's three deaths were respectively with parenchymatous nephritis, sinus thrombosis, and pneumonia. One of Dozy's cases had generalized œdema with albuminuria, another had meningitis, and two developed pneumonia in the course of an influenza epidemic. Other fatal cases were elderly—59 (Kläsi), 66, 59, and 54 (Wyler). Two of Dozy's cases were respectively 53 and 46. Oberholzer remarks that when young, healthy patients died they have been very acutely agitated cases.

Post-mortem findings in fatal cases from simple overdosage have been rarely recorded, e.g. by Honi and Hasselt (quoted by Kooy, 1934), who recorded the case of a female dying of cardiac and respiratory failure after large doses of somnifaine (four injections per day for three days and one on the fourth day). There was degeneration of ganglion cells in the nucleus dentatus, hypothalamus, striate and medulla oblongata.

**Sequels of Treatment**

(Monnier.) Improvement sets in gradually. Some patients weep a little and are at first restless. Those with a manic depressive constitution show some euphoria. Many chronic schizophrenics show a childlike dependence on those around them. In many schizophrenics dream-like experiences and hallucinations appear, the hallucinations being not only auditory but optic and haptic. The skin paraesthesia are attributed by Monnier partly to the fact that Cloettal is excreted through the skin and mucous membranes. Memory for the events of the treatment is slight and confused (Ström-Olsen, 1933). Ostlind (1936–7) declared that in the majority of his cases there was no amnesia for the treatment.

When relapse occurs it is possible to see the psychotic ideas once again
invading the patient's mind, with ever-increasing strength. The patient begins by realizing this to some extent. Some patients show an initial improvement, followed by partial relapse, and then by final cure after about 10 days.

In one of their cases Serejski and Feldmann describe in the first two days of awakening a series of neurological signs, resembling an encephalitis or mild meningeal syndrome (facial immobility, posture rigidity, localized cramps). Four days after awakening, vegetative disturbances are prominent—slight rise in temperature, genito-intestinal disturbances, sweating, frequent micturition. They remark other symptoms: bodily weakness, tremor of the hands, sweating, fainting, and mental fatiguability; and on the other hand, deliria with hallucinations and illusions.

Results

Meerloo says that results can never be foretold. Surprise is certainly possible with an individual case. For example, Maier (1934) expressed his astonishment at the lasting improvement shown by a chronic exceptionally excited catatonic woman. Men are less suitable subjects than women. They require higher doses to produce and maintain sleep. Monnier decided to abandon the method with male schizophrenic patients, following a series of five male cases with severe lung complications (lung edema or bronchopneumonia) and one who could not be got to sleep with the aid of Cloettal. On the other hand, of 79 women who underwent in all 120 courses of treatment only 21 had a complicated course and only one died. These figures refer to schizophrenic cases (schizophrenic in the Zurich sense). Müller (1927) records that schizophrenics of pyknic body type give better results than those with asthenic physique. Palmer (1937) makes the same comment for his cases as a whole.

Results are best discussed under the heading of the syndromes or reaction types. At the same time, it is necessary to remember that diagnostic criteria may vary considerably from one clinic to another and even in the same clinic at different times. Thus at the Burgholzli, where so much of this treatment has been done, the admission ratio of manic depressive psychoses is in the ratio of 1.5 per cent. of the total admissions; whereas in British and American mental hospitals those diagnosed as manic depressives amount to 15 per cent. of the total. This makes the results of different hospitals very difficult to compare, and makes the assessment of the results in general difficult also.

Affective Psychoses.—In trying to assess the results obtained in the psychoses generally, it is best to keep apart the figures of British and American authors on the one hand and of Continental authors on the other. This reduces the statistical difficulties arising from differing criteria of classification. Nevertheless this device hardly eliminates the recurring difficulty of classification differences. Thus of his series of 92 cases, of whom 21 were classed as either manic or depressive, Oberholzer remarks: "The greater part of the 92 patients who submitted to one or more 'sleep cures' were schizophrenics. In the group of manic cases there may be a few who would in other places have been designated
as suffering from manic depressive insanity. Yet all these cases showed clearly schizoid traits, they were ‘mixed’ manics, paranoid traits were frequent in them, the trend of thought showed a schizophrenic sprunghaftigkeit (leaping from one topic to another) near to a flight of ideas; and the affective rapport is poor for a manic.” Of the 24 cases he refers to, 15 were described as manic and six as depressive. Seven of the manic cases improved enough to be discharged; but none of the depressions showed more than a temporary improvement. In “chronic manics” (19 cases) the method was a failure.

Ström-Olsen and MacCowan published the following results of 45 cases, which belonged in their opinion to the group of affective psychoses:

<table>
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<tr>
<th>Type of Psychosis</th>
<th>Recovered</th>
<th>Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manic</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Chronic manic</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Melancholic</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Benign stupor</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Involutional melancholia</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>17</strong></td>
<td><strong>13</strong></td>
<td><strong>15</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

They append the significant remark: “All cases except four sooner or later made a complete recovery.” The chief advantage therefore appears to be that attacks are curtailed, especially manic attacks.

McNiven (1936) treated 25 cases that he regarded as belonging to the affective reaction-type. Four successes were reported: one case of mania of 6 months’ duration; one of depression of 6 months’ duration; one of depression and paranoid tendencies of 2 years’ duration; and one case of depression of 8 months’ duration. This is not an impressive proportion, but at least three of the cases could be regarded as having been curtailed. In addition nine permanent improvements were recorded in five cases of mania and four of melancholia. Palmer (1937) classed 27 patients among the affective reaction types. He says that both cases of acute mania showed permanent improvement or recovery. Of three cases of recurrent mania one showed permanent improvement, one made a complete remission and relapsed, while another was unchanged. The results were relatively more impressive with 15 cases of simple depression, of whom five cases recovered and four made a “permanent improvement.” Of seven agitated depressions in middle age, two recovered. These results have to be collated with those of subsequent recovery, especially when it is noted that the percentage of cases in which success was obtained (33 per cent.) certainly does not exceed, in fact, does not equal the spontaneous recovery rate.

Palmer and Paine recorded five recoveries out of nine manic depressive psychoses (five manic and one depression) and two considerably improved. Adding the results obtained in manic depressive conditions by ten authors—Palmer and Paine, Parfitt, McNiven, Ström-Olsen, and MacCowan, Palmer, Palmer and Braceland, Hennelly (1934), Kearney and Courtney (1938), Day (1936–7), and Wilson and Gillman (1938) the following table is obtained:
These results (just over one-third of recoveries) were obtained preponderatingly with manic excitaments. The two series (McNiven and Palmer) in which recoveries in depressions predominated were too small to have any statistical significance.

It will be observed at once that the percentage recovery rate produced by the method falls short of the recovery rate of the same conditions when allowed to run their natural course in hospital. The observation of Ström-Olsen and McCowan (vide supra) is relevant here that cases that failed to respond to treatment by continued narcosis recovered subsequently. It appears in fact that in affective psychoses what prolonged narcosis does in all probability is to hasten recovery in those cases which would have ultimately recovered spontaneously if treated by the more conservative method. Whether the method does more than this could only be settled by following the fate over a number of years of a large series of cases treated with prolonged narcosis, which failed to respond, and thus to ascertain what the final recovery rate of the whole series was, in contrast with the recovery rate of a similarly large number of cases not treated by this method. But it seems improbable that there would be any discernible difference, at least in the case of the manic excitaments. With depressions there is wider scope for improvement in the spontaneous recovery rate, but the much poorer results obtained by prolonged narcosis from depressive rather than from manic cases makes a significant difference on the ultimate recovery rates very improbable here also. On the other hand, one series at least has shown a higher percentage of immediate recoveries than this: although again less than the ultimate spontaneous recovery rate. Kooy records 43 immediate recoveries out of 80 cases (44 manics with 29 recoveries, and 29 melancholics with 14 recoveries), but no particulars are published.

In addition to the advantage of cutting short an attack of manic excitement it has been argued, e.g. by Bond (quoted by Palmer and Braceland, 1937) that prolonged narcosis prevents the "permanent damage to the psychic mechanism" of the patient which he believes the experience of an acute manic attack inflicts if it goes on in full force and untrammelled. This is purely a speculative advantage as far as permanent damage is concerned, since permanent deterioration after a single manic attack must be almost unknown. A better justification, is the saving of time, of hospital accommodation, and of strain on the nursing staff resulting from curtailment of the attack.
In involutorial psychoses, although only a small minority of cases are cut short completely, the treatment is useful in others in relieving agitation and tension.

Schizophrenic Psychoses.—The data from the four principal papers by the workers at Zurich, beginning with Kläsi's paper in 1922, when put together show the following results:

<table>
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<th>CASES</th>
<th>DISCHARGED</th>
<th>IMPROVED (LASTING)</th>
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</thead>
<tbody>
<tr>
<td>Kläsi</td>
<td>22</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Oberholzer</td>
<td>69</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Lutz</td>
<td>83</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td>Monnier</td>
<td>84</td>
<td>40</td>
<td>13</td>
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</tbody>
</table>

I have excluded those cases of Oberholzer's which he labelled manic or depressive, although he himself seemed to think that few of them were exempt from schizophrenic traits. But such methods tend to class everything as schizophrenia.

It will be seen that the social recovery rate is approximately 25 per cent. These are all comparatively recent cases, so far as can be ascertained from the records. This is in close agreement with Palmer and Braceland's figures—22 per cent. remissions in 46 cases—who probably were less apt to place a patient in that class. The percentage of recoveries is less than the figures accepted as representing the standard spontaneous recovery rates for schizophrenic patients in Swiss mental hospitals, which has recently been stated, generously perhaps, at 30 per cent.

It is important to observe that this figure of nearly 25 per cent. recovery rate is disproportionately influenced by the inclusion of Monnier's series of 84 cases, which had a nearly 50 per cent. recovery rate. His best group represented what he called psychogenic reactions in schizoid psychopaths—i.e. not in what he considered to be schizophrenic psychoses of the more usual kind. The Swiss authors in general find it necessary to make a distinction between the "organic" and "process" schizophrenics and those schizophrenic reactions which are dependent mainly on psychological factors. This distinction is not usually made by British or American authors. In "process" schizophrenia Oberholzer considered that results were specially likely to be obtained when the acute "organic" or "toxic" process had subsided and when the symptoms were consequently in his view only residual symptoms. Maier (1934) holds a similar view.

That criticism of these figures is justified is suggested by Müller's very considerable collection of cases from the literature (1925). Of these 24 showed much improvement, 70 were improved, 159 remained in status quo, and 15 died. This gives a percentage of 8.9 much improved, 26 per cent improved, and 59 per cent unimproved. These figures are in close accord with Lutz and Oberholzer's data for schizophrenic patients who "recovered," i.e. became well enough to be discharged from hospital. (In the above data generally I have treated as "recovered" those who were well enough to be discharged, i.e. who made at least social recoveries.)
Eight or nine per cent. thus appears to be the figure obtained for social recoveries immediately following the treatment when schizophrenics, apart from psychogenic disturbances in schizoid psychopaths, are excluded. This is not a very impressive figure; and again the same criticism is suggested as for affective psychoses—that the treatment accelerates recovery in a proportion of cases (much smaller than in manic excitement), and that it is doubtful whether it influences the ultimate recovery rate. This was long ago suggested by Moser (1920). This is supported by inspection of Ostlind's (1937) data, which show that of 19 cases of less than 5 years' duration, none were discharged immediately, three were discharged after 3 months, and a further five after 6 months—i.e. the treatment was given, without success to eight patients (out of 19) who recovered in the course of time.

**Chronic Schizophrenics.**—The benefits of prolonged narcosis are, however, possibly not confined to cutting short some schizophrenic episodes which otherwise would in time probably have subsided. Some chronic cases can be influenced to the extent of social recovery. Serejski and Feldmann (1937) chose, unlike most other authors, to make chronic schizophrenic patients (cases which had been in the hospital for 2 years) their special study, obtained five complete recoveries out of 28 cases and 17 recovered sufficiently to be discharged. These remarkable results contradict to some extent the suggestion that continued narcosis only hastens recovery in otherwise recoverable cases; but such results are so at variance with the general experience as to require further explanation. Most of the case records are omitted. For example, out of 45 cases of more than 2 years' duration collected by Müller from the literature, only five were recorded as "much improved." Other chronic cases are improved to an extent which enables them to live in the quiet instead of the disturbed wards. In other cases individual symptoms can be influenced or abolished, e.g. a hallucination or stereotyping of thought or action.

As regards the various syndromes chronic agitated depressed patients give fair results. Katatonic and hebephrenic cases of acute onset are regarded by Maier as the most favourable. Kläsi found favourable results in katatonic "encapsulated" cases, that is cases with vegetative and artistic characteristics, and cases with much anxiety and agitation. Katatonic stupor does not give favourable results (Monnier). Acute katatonic states of excitement (of severe degree) present special dangers owing to the risk of overdosage from the large quantities of narcotic necessary. Oberholzer made the generalization that all cases tending to periodicity, to remission or relapse offer the possibility of a good result, provided the stage of "organic" dementia has not been reached. Maier (1934) opined that cases in which pronounced manic and depressive components appear are specially favourable, provided no chronic catatonic symptoms occupy the foreground. Müller's conclusion was similar in that excited and depressed forms of schizophrenia were particularly successful. Oberholzer similarly felt that the treatment was most effective with manic states, whether they were manic depressive or schizophrenic.

**Paraphrenia.**—Occasional unexpected successes are recorded, e.g. by Parfitt (1936) in two women of 44 and 47 respectively, in one case after three years.
Psycho-neuroses.—The claims of Ström-Olsen that of 13 "psycho-neuroses" treated eight recovered is unfortunately barely borne out on inspection of the case records given in his paper. A considerable proportion of his small series seem to have been examples of psychotic states.

Organic Brain Disease.—Demole records that even the negativism accompanying organic brain disease may be relieved. He instances a case in which the patient, a general paralytic, became considerably more co-operative after a course of continuous narcosis.

Conclusions

1. Continuous narcosis if thoroughly carried out, is still fraught with some danger, in spite of modifications in treatment. The degree of freedom from risk is proportionate to the experience and care of those undertaking the treatment, rather than dependent on any particular modification of technique.

2. The recovery rate in continuous narcosis in recent psychoses never exceeds and usually falls short of the ultimate spontaneous recovery rate. Its therapeutic value is therefore confined mainly to curtailing the duration of psychotic conditions which would sooner or later recover spontaneously. It is most successful in this way with manic excitement, and considerably less successful with depressions of the manic depressive type. With recent schizophrenic disorders, its effects in curtailing the duration of the illness are seen mainly in excited schizophrenics of the agitated fearful type and in hebephrenics, in each case where the onset has been acute. Psychogenic schizophrenic disturbances in schizoid psychopaths are particularly amenable to this method. Little success is obtained with paranoid schizophrenics and with catatonic stupor. In general, the more a psychotic illness follows a relapsing, recurring, or periodic course, and the more acute the onset, and the more exogenous the causation, the more likely is continuous narcosis to curtail the episode. These are essentially the more spontaneously recoverable types. Apart from curtailment of a psychotic illness of the more recent kind, continuous narcosis has an administrative value in that it fairly frequently has the effect of making chronic psychotic excitement more manageable. Occasional unexpected social recoveries are produced in chronic depressive (affective) psychoses and in chronic schizophrenics; while recently two observers have in a small series of cases recorded an unprecedentedly high recovery and discharge rate in a group of schizophrenics of over two years' duration.

3. The treatment is still entirely empirical, and its efficacy is very difficult to estimate in any precise fashion on account of the varying diagnostic criteria employed by different workers in different clinics.

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A CRITICAL REVIEW: NARCOSIS THERAPY

R. D. Gillespie

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