THE TREATMENT OF THE DEPRESSIVE STATES
BY PROLONGED NARCOSIS

BY

R.M. ELLISON
INTRODUCTION

The object of this thesis is to investigate those forms of mental disorder that benefit most from prolonged narcosis. Special emphasis has been given to the Depressive States, which have been subdivided into groups according to their causative factors.

A brief history of the development of narcosis therapy is given. Some results of previous investigations have been collected in order to complete the history, and to enable a comparison to be made between them and the results of this investigation.

The technique of prolonged narcosis as practised by the author has been described in detail, together with contraindications and dangers associated with the treatment. This has been done because it has been found by experience that unless the treatment is adequately and properly carried out, results will be poor, even in suitable cases.

Some factors, which are of prognostic significance, have been discussed. Special mention has been made of environmental conditions, as exogenous precipitating factors are important in determining which cases will respond to narcosis therapy. The likelihood of future recurrences depends to a large degree on whether these adverse environmental conditions can be remedied or at least mitigated.
"As waking that hurts, by all means must be avoided, so sleep, which so much helps, by like ways, must be procured, by nature or by art, inward or outward medicines, and be protracted longer than ordinary, if it may be, as being an especial help". Robert Burton 1621. Anatomy of Melancholy.

HISTORICAL

The treatment of mental disorder by ensuring that the patient has adequate sleep has been advocated by therapists for many centuries. Thus H.A. Palmer (1937) in an historical survey notes that Celsus quotes Asclepiades as recommending sleep for insane patients, some of whom recover if sleep is obtained. Boerhaave advised that sleep be procured for the treatment of melancholia.

Burton, already quoted above, again stresses the value of sleep in the relief of depression when he writes: "Waking, by reason of their continual cares, fears, sorrows, dry brains, is a symptom that much crucifies melancholy men, and must, therefore be speedily helped, and sleep by all means procured, which sometimes is a sufficient remedy of itself without any other Physick".

In 1870 T.S. Clouston in his Fothergillian Gold Medal prize essay discussed the prolonged use of sedatives on maniacal patients. He used tinct opii (B.P.) in one series and in another potassium bromide alone or combined with cannabis indica. He concluded that acute excitement could be subdued by the bromide, "but this cannot be done without pushing the medicine far beyond
what is safe". Later he reported "Fifty-one cases of various forms of insanity were treated by bromide of potassium alone or along with Indian hemp, and the results were that eighty per cent of these were benefited more or less in some way, and twenty-five per cent were most decidedly benefited".

In 1897 N. Macleod successfully treated a neurasthenic morphine addict with prolonged bromide narcosis and extended this treatment to cases of mania with good results. In 1901 O. Wolff (vide Ström-Olsen) treated with trional, six cases of confusion and, although he was favourably impressed by this form of treatment, it was not generally accepted by the medical profession, largely because of the risk of toxic signs appearing. Although modern methods of inducing prolonged narcosis are much safer, this danger of toxicity is still overstressed by some present day writers.

It was not until 1922, when Kläsi published his results of somnifaine narcosis, that this form of therapy was generally accepted as a useful advance in psychiatric treatment. Kläsi treated twenty-six cases of schizophrenia with somnifaine narcosis and claimed that nearly one-third were greatly improved. The publication of this work stimulated further investigations in prolonged narcosis and conflicting reports were published, mostly based on a small number of cases treated.

An editorial in the Lancet in 1926 gave an encouraging account of this form of treatment done abroad, and while no definite agreement was reached as to which type of disorder was most suitable for treatment it was thought that the "Schizophrenoid group, confusional states and anxiety conditions seem suitable for trial". With the exception of the last, these conditions do not
do well with this form of therapy as judged by the results of this present series.

Somnifaine narcosis was first tried in England at the Maudsley Hospital in 1924 by Dawson and Barkas, who published their results in 1926 of thirteen cases treated with this method. They had a variety of cases, among them patients who would now be considered unsuitable, with conditions such as arterio-sclerotic dementia, puerperal mania and acute hallucinations. Their course of treatment was short—about five days and the longest seven days. Kläsi's technique was used—namely morphine grain 1/4 and hyoscine grain 1/100 intramuscularly; half an hour later 4 ml. of somnifaine were given intramuscularly, followed by 2 ml. of somnifaine 6-8 hourly, and paraldehyde one drachm by mouth when needed. Four cases had to be stopped after 1 to 6 injections because of cardio-vascular complications.

The authors conclude: "Generally speaking one may say that somnifene as a soluble sedative which can be given intramuscularly has its place in the list of available sedatives for psychotic patients but has considerable risk and no special advantages". This unfavourable criticism was based on a poor selection of patients.

Gillespie (1937) in his "Critical Review of Narcosis Therapy" traced its history from Griesinger (1882) up to Palmer (1937); he quoted only fifteen authors who had published results on narcosis therapy during this period of over fifty years. This form of treatment has never been widely adopted in mental hospitals, largely because in the early days after it had been introduced, the mortality rate was high and latterly much confusion
and disagreement existed as to the type of case suitable for treatment.

MODERN VIEWS ON PROLONGED NARCOSIS

In his book "Cybernetics" Wiener, while discussing psychopathology, considers that if a computing machine breaks down there are three methods which may be tried to restore its functions. Firstly, the machine is cleared of all its information. If this fails, it is given a shock either mechanical or electrical, or finally the erring part may be removed. The last two processes he likens to E.C.T. and lobotomy respectively. Of the first process he writes; "Now there is no normal process except death which completely clears the brain from all past impressions; and after death it is impossible to get it going again. Of all normal processes, sleep comes nearest to a non-pathological clearing. How often we find the best way to handle a complicated worry or an intellectual muddle, is to sleep over it! However, sleep does not clear away the deeper memories, nor indeed is a sufficiently malignant state of worry compatible with an adequate sleep".

In prolonged narcosis, however, we have a method of inducing sleep of sufficient depth and duration that will clear the brain and restore normal functions. In order to overcome the toxic complications numerous drugs and combinations of drugs have been tried. In this series in the earlier years somnifaine, and in the last two years sodium amytal, were used.

One of the biggest advances in rendering prolonged narcosis a safer form of treatment was introduced by Ström-Olsen in 1933.
Realising that many of the toxic complications were due to a disturbance of carbohydrate metabolism, he gave some of his patients insulin and glucose during their narcosis; ketonuria occurred in seventy per cent of cases not receiving insulin.

By giving ten units of insulin intra-muscularly with every 2 ml. of somnifaine, this disturbance of carbohydrate metabolism was overcome and toxic effects reduced to a minimum.

Results of his investigations done at Cardiff show that the incidence of toxic complications is greatly reduced by the use of insulin as the following table illustrates:

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<th>Number of treatments</th>
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This disturbance of metabolism he considered to be due to toxic action of the narcotic, either on the islets of Langerhans, resulting in diminished insulin secretion, or on the tissue cells causing them to need more insulin for glucose oxidation. Gellhorn (1949) regards the increased blood sugar to be due to sympathetic-adrenal discharge which in turn is due to a hypo-thalamic release. Barbiturates being cortical depressents release the hypothalamic centres from cortical control.

In spite of these advances in reducing the toxicity, prolonged narcosis is not widely used in mental hospitals in this country. In his survey of Public Mental Hospitals in England in 1948 Pratt found that only twenty-five per cent of the Hospitals he visited carried out this form of treatment. The most extensive
use of prolonged narcosis was at Netherne Hospital where it was employed as a means of quietening all disturbed and excited patients. He states it was not used as a therapeutic agent per se but as a means of ensuring a quiet admission ward, and in preparing patients for future treatments.

Dax (personal communication) remarks: "We have done between 1,000 and 1,500 cases with something under one per cent mortality even though we have treated many of the acutely disturbed people who might in days gone by have died anyway; for this reason I think it is a life saving procedure in the acute cases. Additionally, it serves as a preparation for other forms of physical treatment and in some cases avoids their use altogether, whilst administratively it has considerable virtues in so far as one can keep a completely open reception ward, no matter how acute the cases. We employ it for three weeks as a regular procedure. I believe the agitated depressive case can be very usefully treated by this means in the first place, prior to convulsive therapy, but I think a few convulsions are fairly regularly necessary."

Henderson and Gillespie (1940) consider that prolonged narcosis is of an "administrative rather than a therapeutic value". In cases of depression "the method therefore succeeds in abbreviating the illness in a proportion of cases, but there is no evidence that the ultimate recovery rate is favourably affected by it". Using the technique employed at Cardiff, namely somnifaine intramuscularly with insulin and glucose, they consider that experienced supervision is needed for safety.

Sargant and Slater (1944) in discussing continuous sleep
Continuous narcosis has remained the most problematic of all methods of physical treatment in psychiatry as its results are the least predictable. From time to time spectacular successes will be scored with individual patients, without corresponding progress in settling the problem of picking the patient who will do well. It is largely because of this random selection of patients for prolonged narcosis therapy that results are so unpredictable. It is proposed later to discuss the cases who benefit most from this form of treatment.

Sargent and Slater also consider that prolonged narcosis has most value as a first aid measure in cases of stable personality who have broken down under exceptional environmental stress. While of undoubted value in such cases, prolonged narcosis may be also employed with good results in more chronic affective disorders.

Palmer (1948) believes that modern psychiatric clinics should have a special Narcosis Unit; he considers the most suitable cases to be those of mental disturbance accompanied by anguish especially when such anguish is related to recent environmental factors.

In the opinion of the Institute of Living, the feeling of American psychiatrists in general to prolonged narcosis is represented by the opinion expressed by Kalinowsky and Hoch (1946): "Prolonged sleep as a treatment for mental symptoms is rather old. However, the systematic use of 'continuous sleep treatment' was introduced by Klaesi in 1922. His method of keeping the patient in a barbiturate narcosis for a considerable time can be considered as the first systematic procedure of organic
treatment in the endogenous psychoses. Many emphasized the psychological features of the treatment. However, in view of the later experiences in shock treatment, it appears very possible that the results obtained were due to physiological changes occurring in the brain during the prolonged state of unconsciousness. Duration and depth of the narcosis seem to determine the effectiveness of the treatment, although opinion to the contrary has been expressed. Results remained so far behind those in shock therapy that today the method is generally abandoned in the psychoses but continued, especially in England, for the treatment of some neurotic reactions. In acute anxiety states as seen particularly during the war it was used as a form of first aid."

Gillespie concludes his critical review of narcosis therapy by remarking: "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", and later "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".
TREATMENT

General

Prolonged narcosis should not be regarded as a short cut in psychiatric treatment, nor was it used in this series merely as an administrative measure for ensuring a quiet and orderly ward. It was employed for its therapeutic value in specified mental disorders.

A full history should be obtained and a psycho-biological survey of the patient made. Causative factors both predisposing and precipitating should be investigated and these factors discussed with him. The procedure of prolonged narcosis should be explained, he will then be able to make certain necessary domestic arrangements, his relatives should be prepared not to receive any letters from him for three weeks. By explaining what is expected of him, the patient will be in a co-operative frame of mind. Cases who can and who will co-operate, and are anxious to have the treatment, do better and need less drugs than those who are reluctant to undergo narcosis.

Contra-indications

A thorough physical examination must be made. The following should be regarded as greatly increasing the risk of the development of toxic signs.

1. Severe physical weakness.

Most cases who are physically weak and much under-weight are not suitable for narcosis treatment. Such cases will do far better with a course of modified insulin treatment, and when their general health has improved then prolonged narcosis may be considered. Cases of depression following a physical illness will
do better under this method. However, in those cases, such as agitated depressions or acute excitement where the debilitated bodily condition is secondary to the mental state, prolonged narcosis should be started at once. As the overactivity is reduced, a concomitant improvement in the physical condition will occur; the patient will look healthier and will be found to have gained weight when the narcosis is finished.

2. Cardio-vascular degeneration.

Uncompensated cardiac disease is a contra-indication. Patients with adequately compensated valvular disease may be given prolonged narcosis with no undue risk. Hypertension per se is not a contra-indication, there is a fall in blood pressure during narcosis due to vaso-dilatation; if associated with urinary changes, there is an increased possibility that toxic signs may develop. In the first recorded cases of prolonged narcosis in this country by Dawson and Barkas, as already mentioned, six cases had to be stopped because of cardiac irregularities. There is a definite danger of circulatory collapse in poorly compensated cardiac conditions.

3. Renal disorders.

Prolonged narcosis throws an additional strain on the kidneys especially if somnifaine is used. Sodium amytal is broken down in the liver and does not depend to such an extent on an intact renal system for excretion.

4. Liver damage.

As sodium amytal and the other quick acting barbiturates are degraded in the liver, hepatic dysfunction is a contra-indication.
5. Diabetes mellitus.

Whether controlled or not, treatment of such cases with prolonged narcosis would involve a great risk, as during the course of the narcosis there is a disturbance of carbohydrate metabolism with a tendency to hyper-glycaemia and ketonuria.


Any acute infection is a contra-indication to treatment, and special consideration should be given to pulmonary infections as any latent pulmonary disease may be activated during narcosis. If there is an epidemic of coughs and colds in the ward, special precautions should be taken and the nursing staff should be free from such infection.

7. Age.

Some authors quote fifty-five as the maximum age limit. In this series this limit was not observed, as many patients older than this are physically fit for prolonged narcosis.


As this condition itself throws an additional strain on the expectant mother's body, prolonged narcosis is contra-indicated. Apart from this, the barbiturates pass through the placenta to enter the foetal circulation and a depressant effect may be exerted on the infant. (Clifford and Irving, 1937).


If the haemoglobin is below seventy-five per cent it is advisable to raise this level by appropriate treatment before narcosis is begun.
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**Diet:** Light = Fluid

**Prolonged Narcosis**

**1st Week**

**Sodium Amyl**

gr VI 6' hourly

**Paraldehyde**

2 drachms

**Insulin**

10 Units f.l.d. ac.

**Date of admission:**

Result 1-12-50.
thereby lessened. This must be done under nursing supervision
as he will be ataxic; attention must be paid to pressure areas
in the usual manner.

When his toilet has been completed the patient is given
10 units of soluble insulin intramuscularly and then has his
meal. This should be largely liquid and sufficiently nourishing,
a diet consisting mostly of eggs, soups, marmite, custards and
fish is suitable. Sufficient vitamin intake must be assured,
especially of vitamin B, since a relative deficiency may occur
as the result of the high carbohydrate intake, two ounces of
glucose being given with each meal.

The fluid intake is very important and a jug of fruit
drink and glucose is kept beside the bed; if the patient wakes
in between feeds, he is given a drink of this glucose mixture
which may be sufficient to settle him down to sleep again. The
fluid intake and output should be measured, the aim being to keep
the intake above 100 ounces in twenty-four hours, and the output
in proportion.

A morning specimen of urine is tested daily for albumen,
glucose and acetone. If there is glycosuria, the dosage of
insulin should be increased up to 15 or 20 units before each feed.

A temperature chart is kept and the patient's temperature,
pulse and respiratory rate are recorded at each feed time; the
hours of sleep are also recorded on the chart, deep sleep by dark
shading and twilight sleep by light shading (see chart).

Attention must be paid to the bowels and an enema is
given on alternate days.
The following complications must receive immediate medical attention:

A raised temperature.
A pulse over 100 or below 60, or irregular in time or force.
Rapid respiratory rate or slow sighing respirations.
Vomiting or hiccups.
Convulsions.
Retention of urine.
Refusal by the patient to take food or drink.

Sedation.

Sodium amytal (Sodium iso-amylethyl barbituric acid) 6 grains is given in the evening and thereafter four or more times daily during treatment. It may be administered in a capsule or dissolved in water, cases receiving it by the former method are less troubled by nausea. Paraldehyde 2 drachms may be needed to supplement the sodium amytal. It takes about twenty-four hours before a satisfactory depth of narcosis has been reached and the need for increased dosage of sodium amytal or the addition of paraldehyde can be ascertained.

No set rules can be laid down, the needs of the individual patient must be studied and sedation regulated accordingly. Sodium amytal is a relatively quick acting drug, its onset of action being from thirty to forty-five minutes after oral administration, its duration of action is about eight hours. Some patients go to sleep soon after 6 grains of sodium amytal, but wake up again in four hours time, they should be given sodium amytal 6 grains four times a day or more often if needed. Other patients do not go to sleep after 6 grains sodium amytal, they should receive
2 drachms of paraldehyde at the same time as they have their sodium amytal. Such cases will then often sleep well for eight hours and need the two drugs given together only three times in twenty-four hours.

Paraldehyde may be administered orally and many patients take it quite well like this. It may be given shaken up with water or in an emulsified form.

R/ Paraldehyde 2 drachms

Tincture of Quillaja 10 minims

Water to 1 fluid ounce.

If gastric irritation results, paraldehyde may be given per rectum in 4 drachm doses diluted with water.

No fixed time is made for giving the meals or drugs, but the patient must be raised and general nursing attention carried out, and his meals given three times in twenty-four hours. If he cannot be roused sufficiently, the depth of narcosis is too deep and the amount of sedation must be reduced. The amount of drugs needed varies greatly, some patients are very deeply narcotized on 6 grains of sodium amytal twice daily, while some will require much more. Delay (1948) quotes a case of acute mania who received 100 grains daily, after which the patient was "sociably elated", and Palmer and Braceland (1937) gave one of their patients 220 grains before satisfactory narcosis was obtained. In this series the heaviest sedation used was sodium amytal 9 grains six-hourly with paraldehyde 2 drachms t.i.d.

Duration.

The length of treatment in the great majority of cases was between ten and fourteen days. Patients receiving a longer course
than this did not show better results, and the danger of toxic signs developing is increased as the narcosis is prolonged beyond fourteen days.

Kläsi's original cases received from five to seven days treatment and most of the earlier workers kept to this period. Ström-Olsen in his series of cases aimed at twelve to fourteen days. He remarks that several authors noted good results with shorter treatments, but considers that for severe forms of mania, melancholia and in schizophrenia a longer period is needed.

In this series good results have not been obtained with treatment of less than ten days duration.

Termination of treatment.

The sedation must not be stopped abruptly for convulsions may occur, the reason for this is two-fold. The activity of the cerebral cortex has been depressed during the narcosis, and if there is a sudden release, cortical over-activity will result. Secondly, towards the end of narcosis, there is a fall of blood calcium. Fischer and Cloette showed that a fall to ten per cent below normal occurred during sleep and narcosis, as quoted by Ström-Olsen, who himself found a fall of eighteen per cent in the blood calcium of cases he investigated. Hennelly and Yates (1936) studying cases of prolonged narcosis, induced by somnifaine and receiving insulin and glucose, found a fall in blood calcium of twelve per cent. This was not dependent on diet and there was a quick return to normal on cessation of treatment; they found a bigger fall in cases not receiving insulin. This lowered blood calcium renders the cortical cells hyper-excitible which predisposes to convulsions.
Meerloo (1933) gave the following as abstention symptoms:

(a) Sudden changes in the psychotic symptoms.
(b) Epileptic convulsions.
(c) Anomalous moods.
(d) After several days a temporarily repressed psychosis breaks through with renewed vigour.
(e) Variations of temperature.

Heldt (1947) reporting on the use of prolonged sodium amytal narcosis in America states: "the therapeutic technique is usually so planned as to produce a toxic delirium after the cessation of drug administration". This is quite contrary to the technique and rationale of narcosis as described in this series, and can hardly be described under the heading of 'narcosis'.

The aim in this series has been to avoid such delirious states after treatment, by a gradual withdrawal of the sedative.

The evening dose of sodium amytal grains 6 is maintained for the next few days. The patient is allowed up for a few hours after lunch on the day after his treatment was stopped, and thereafter for increasingly longer periods. In cases benefiting from the treatment, mental improvement is immediately noticeable, but physically the patient will be weak and unsteady. Five units of soluble insulin are given before meals for one or two weeks after cessation of treatment, together with a nourishing diet rich in vitamins and calcium; after which time the patient will have regained his full physical strength.

If the patient's condition does not improve, or having improved deteriorates, a second course of prolonged narcosis may be given with benefit.
Convalescence.

During convalescence, apart from building up the patient physically, psycho-therapy in the form of explanation and reassurance is important. Most patients are worried as to why they became ill, they fear that they are going mad, they are apprehensive about further attacks of their illness, and are often anxious as to whether the condition will be inherited by their children. Environmental problems should be discussed and advice about the future given, the psychiatric social worker will be of great value in helping the patient sort out the difficulties of his home life.

Occupational therapy too is of great value in preparing the patient to be able to enter fully into his work and social activities again after he has been discharged from hospital.
COMPLICATIONS

If insulin and glucose are given with each meal and the fluid intake is kept up to 100 ounces in twenty-four hours, complications will be reduced to a minimum.

Vomiting.

This is one of the commonest complications and generally occurs during the first three days of treatment. When it happens, treatment need not be stopped entirely, atropine sulphate grains 1/100 should be injected hypodermically and the diet made more fluid. The next dose of sodium amytal should be omitted and if paraldehyde is being given, it should be discontinued. Particular attention should be paid to the bowels and an additional enema given. If, however, the vomiting is severe and persists for more than twelve hours, treatment should be stopped. The possibility of causes of the vomiting other than the narcosis must not be overlooked.

Rise of temperature.

During narcosis the temperature is generally subnormal, the heat regulating mechanism of the body is depressed and the body tends to become poikilothersmic; thus a temperature occurs which is dependent on the environment; hence the importance of keeping the patient in a warm room of uniform temperature.

A slight rise of temperature, unaccompanied by other physical signs, is not an indication for stopping treatment, for it will in many cases return to normal or below in a few hours. A rise of temperature will often subside if treatment is temporarily halted for twelve hours. If it persists or is very high, treatment must be stopped and a careful watch kept, especially for pulmonary
infection.

**Pulse abnormalities.**

An increasing pulse rate accompanied by a falling blood pressure is an indication for immediately stopping treatment, or else circulatory collapse may occur. Normally the blood pressure is not taken every day, but if the pulse rate increases it should be checked regularly. An abnormally slow pulse or a pulse irregular in time or force may be an indication of an impending circulatory collapse. Such circulatory complications generally occur in the later stages of treatment.

**Venous thrombosis.**

Thrombosis of the veins of the legs occasionally occurs, but can be avoided in most cases if the patient gets out of bed and his legs are massaged each day to improve peripheral circulation.

Palmer (1959) records three cases of thrombo-phlebitis in the legs and one case of cerebral thrombosis during prolonged narcosis. The cerebral thrombosis occurred in a patient aged fifty-five, which age he regards as past the border-line for safety.

**Respiratory changes.**

A marked increase in the respiratory rate or shallow breathing should be regarded as warning signs of a more serious condition developing. Persistent hiccups is an indication for stopping treatment.

**Refusal of food.**

If the patient does not take a sufficient diet and especially if his fluid intake is low, there is a danger of toxic signs appearing. In such cases some workers resort to tube feeding; while this may be done on one or two occasions, in this series of
cases, treatment was stopped if the patient persistently refused food.

Retention of Urine.

This occurs mainly in patients deeply narcotized, and may necessitate catheterization, it is not generally associated with diminished renal function. Patients should be assisted out of bed for purposes of toilet, as many find it difficult to use a bed pan.

Rash.

A rash may occur as a result of sensitivity to sodium amytal or to insulin. This is not common and soon fades when treatment has been concluded, it is not an indication for premature termination of treatment.

Convulsions.

In this series convulsions have not been encountered during narcosis. Six cases had convulsions within the three days following cessation of treatment; these convulsions are due to a sudden withdrawal of the sedative and hyperexcitability of the cortex because of a low blood calcium. A gradual reduction of sedatives will generally avoid this complication.
Drugs used.

In this series sodium amytal has been largely used during the last two years, previous to this somnifaine was the main narcotic. Paraldehyde was given to reinforce both drugs when needed and glucose and insulin were given in all cases.

Somnifaine was the drug most employed in prolonged narcosis in the past. In this series 2 ml. were given intramuscularly initially, this dosage being repeated when necessary, not more than 6 ml. being administered in twenty-four hours; if further sedation was needed paraldehyde was used.

This form of treatment combined with insulin means that the patient receives six injections daily for a fortnight. Walsh (1947) treated eighty-six mixed cases by giving somnifaine by mouth. Two preparations of somnifaine are available, one for intra-muscular injection containing a local anaesthetic, and an oral preparation which contains a flavouring agent. Walsh used an average of 5 ml. daily for fifteen days and obtained good results. In this series fifteen patients were treated in this manner and the results were satisfactory, but sodium amytal was found to be superior to somnifaine given either by injection or by mouth.

Sodium amytal gives an easier narcosis, it has a quick action ($\frac{1}{2} - \frac{3}{2}$ hours), is quickly eliminated (8 hours), and the patient is less confused and ataxic than with somnifaine. Some cases of agitated depression and anxiety are difficult to treat with somnifaine, and in spite of large doses do not sleep but become increasingly confused. Sodium amytal is an excellent
drug for treating anxiety, while for cases of acute excitement other drugs such as somnifaine are more suitable. Delay (1948) suggests that the sleep following sodium amytal is due to relief from anxiety rather than to its hypnotic action.

**Mode of action.**

Gillespie in 1939 reviewed some of the many theories on the action of prolonged narcosis. The fact that so many theories have been put forward indicates the difficulty and uncertainty that exists as to the mode of action of narcosis; some of the theories are highly speculative.

**Psychological aspects.**

Kläsi considered that a state of central anaesthesia was produced, whereby outside stimuli were prevented from causing any psycho-motor agitation. He also thought that psycho-therapy applied during the narcosis was of great value. But, as many authors have since pointed out, the patient, if undergoing a sufficiently deep narcosis, should be too confused for adequate psycho-therapy during his waking periods. Patients are certainly in a suggestable state which helps in the establishment of a good rapport after the narcosis has been finished.

Mc. Donald in discussing the psychological aspect of somnifaine narcosis at an R.M.P.A. meeting in 1936, considered that prolonged narcosis inhibited, for the time being, habitual modes of faulty thought and action, resistance to which in the wakened state, had been weak and futile. The enforced period of rest allowed the patient to acquire new habits of thought and action, or rather to select and make better use of ideas already acquired. He gave as examples, how a compulsive repetition of
a popular tune cannot be removed from consciousness until the attention has been commanded by a more compelling situation, or how a problem which is causing much worry and fruitless thought is solved after having 'slept over it'.

He quoted Palmer and Paine of Philadelphia on "Prolonged Narcosis as Therapy in the Psychoses", in which they remark "that form of treatment which was most debilitating and produced the greatest degree of toxaemia and physical prostration resulted in the largest number of recoveries. In addition to a possible chemical interpretation this result had a definite psychological significance. It would seem that the degree of forced dependance upon the environment is directly related to the prognosis. The amount of activity of the physicians and the nursing staff and their constant presence in the picture both during the active treatment and the convalescent phase appear to be important factors in recovery". To ensure the "greatest degree of toxaemia and physical prostration" they reinforced the prolonged narcosis (induced with luminal and sodium amytal intravenously and orally, and hyoscine) with hyper-pyrexia and chills induced by intravenous typhoid vaccine. This form of treatment did, no doubt, ensure the constant attention of doctors and nurses.

It is frequently observed that an intercurrent physical illness has a temporary alleviating effect on mental disorders. In these cases, the enforced dependence on the environment that results is of therapeutic value; but in prolonged narcosis this is by no means the only mechanism at work. Indeed under deep narcosis the patient is less in contact with his environment than before he began treatment, for in such cases there is clouding of
consciousness even during the waking intervals.

For the treatment to be adequate, amnesia for the whole period of the narcosis should occur, a twilight state is not deep enough and no lasting benefit will result. This amnesia, produced by prolonged narcosis, is the non-pathological clearing of the brain from all past impressions that Wiener recommends in discussing cybernetics and psychopathology.

The benefit from prolonged narcosis is due to the narcosis itself and not to any specific action of the drug. It is probably immaterial what drug is used so long as a deep narcosis is produced. From experience gained in this series, sodium amytal is considered to be the most suitable drug for this purpose. Marked relief from anxiety can be obtained by small non-narcotic doses of sodium amytal; such doses of two to three grains are of great value in treating or preventing anxiety attacks. For treating the more continuous and uninterrupted anxiety state, prolonged narcosis is needed.

In physical medicine it is often necessary to treat the patient after the primary cause of the illness has been removed. So too in mental illness, although precipitating factors may have been brought to light and discussed, symptoms may still remain. In such cases prolonged narcosis is a valuable remedy for restoring equilibrium.

Insomnia in a depressed patient may be due to a subconscious resistance to sleep with which the patient associates death, Virgil described sleep as the "kinsman of death". Prolonged narcosis by its ritual may be to the depressed patient a symbolic entombment and resurrection and will dispel the fear of death and the
accompanying delusions of unworthiness and suicidal thoughts.

In discussing "The sleeping and waking mechanism— a theory of the Depressions and their Treatment", Myerson (1947) considers that depression is due to the impairment of two mechanisms. The first and most important is the sleep producing mechanism of the body, the second is the waking mechanism. He coins the term "Dysomnia" for this impairment of the sleeping and waking mechanisms. The insomnia at night causes anxiety and builds up an anticipation neurosis about further restless nights. This results in a vicious spiral, since the effects do not remain circular but increase in intensity. Many psychoneurotics get into such a vicious spiral and if this can be checked by a course of prolonged narcosis a state of normality may be restored. The lassitude and lack of ardour common in the morning in cases of depression, Myerson attributes to impairment of the waking mechanism.

In a hospital where prolonged narcosis is done on an extensive scale with good results, many patients come into hospital expecting to receive this form of treatment in which they have great faith. This of course applies to any form of therapy; but it is certainly one of the reasons why in those patients, who willingly accept prolonged narcosis, that the best results are obtained.

Physiological Aspects.

In the R.M.P.A. symposium on prolonged narcosis, already referred to, Ford Robertson (1936) suggested a phylactic theory as an explanation of its therapeutic action. The narcosis produces a phylaxis or protection of the C.N.S. against the toxin that is
presumed to be causing the mental disorder. This is very theoretical as no toxin has been detected.

Quastel and Wheatly (1932) showed that narcosis depends on the interference in the brain cells of substances important in carbohydrate metabolism, and that there was a direct relationship between the inhibitory effect of the drug and its narcotic action.

Several authors have drawn attention to the apparent beneficial effect of sudden withdrawal of the drug after prolonged narcosis. Thus Meerloo (1933) in summarising his results of narcosis therapy says: "Prolonged treatment of psychotic patients with barbital is of great therapeutic value. The effect of this may be compared with that of non-specific stimulant therapy. Sudden disintoxication is an important factor here, and sleep constitutes no very real element." Palmer and Paine, as mentioned earlier, aimed at producing the greatest degree of toxaemia and physical prostration during the narcosis. Heldt in treating cases with prolonged narcosis aims at producing a toxic delirium after the cessation of sedation.

In this series and in the majority of other published works on the subject, the aim in prolonged narcosis is to produce a deep sleep with a minimum of toxic signs, and the sleep is gradually terminated in order to avoid after effects such as toxic delirious states and convulsions. As the results are just as good by this method, the mode of action of prolonged narcosis cannot be due to the physical prostration or to the effects produced by sudden withdrawal of the narcotic drug.

In his thesis on the Physiological Basis of Shock Therapy, Gellhorn (1949) includes prolonged narcosis in his discussion. In
barbiturate sleep treatment (Dauerschlaf) cortical activity is depressed as shown by grouped sleep-like potentials in the E.E.G. and E.Co.G. Barbiturates raise the blood sugar temporarily, this effect is due to a sympathetico-adrenal discharge since it is absent after adreno-demedullation. This interpretation is supported by the fact that barbiturates cause a temporary dilatation of the chronically denervated pupil, which suggests that there is a release of adrenalin.

This sympathetico-adrenal discharge is not due to a direct excitation of the autonomic centres but to a release from cortical control. It is due to hypothalamic release and not to hypothalamic excitation as occurs during E.C.T.

"Activation of the hypothalamus, directly or reflexly, is accompanied by excitation of the ipsi-lateral and contra-lateral cortex which takes place primarily via the dorso-medial nucleus of the thalamus. This "upward" discharge occurs also in conditions in which cortical excitability is reduced or abolished and is therefore interpreted as the result of hypothalamic excitation through cortical disinhibition. These hypothalamic-cortical changes are believed to be responsible for the alteration in behaviour-patterns which may be seen after successful treatment in clinical cases as well as in experimental animals."
RESULTS

In all 500 patients were treated, 300 female and 200 male. A questionnaire was sent out to every patient who had received a course of prolonged narcosis and had been discharged from hospital during the last ten years. The questionnaire was set out in the following manner:

1. I have not had any return of my previous nervous trouble.
2. I have had to consult my doctor because of my nerves but have continued at work or housework. Give dates.
3. I have had to give up my work because of my nerves. Give dates.
4. I have had to go into hospital again because of my nerves. Give dates.

Please put an X against the paragraph that applies to you.

Any comments about sleep treatment that you would like to make would be welcome.

A total of 228 replies were received. Many patients treated during the war gave temporary addresses and could not be traced. Cornwall being considered a "safe area" received a large influx of people from London and other blitzed cities, many of whom were suffering from neurosis. These patients appeared to do extremely well with treatment with prolonged narcosis, and it is unfortunate that many cases could not be traced through their Cornish temporary address.
Results of the follow up.  

<table>
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<th>Diagnosis</th>
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<th>Relapsed</th>
<th>Total</th>
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Results of the follow up.  

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<td><strong>22</strong></td>
<td><strong>23</strong></td>
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Results of all cases treated. Table C.

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<td>2</td>
<td></td>
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<td><strong>TOTAL:</strong></td>
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Cases were not regarded as recovered, unless they had been discharged from hospital free from the symptoms for which they had received treatment, and were able to return to work and to resume their previous social life, and this condition was maintained as shown by the follow-up investigations where these had been carried out. Where the follow-up was not possible, the patients' freedom from symptoms and his ability to resume work, were used to assess the degree of recovery.

The treatment was largely carried out in a small nursing home, where only voluntary patients were admitted. All cases recommended for treatment had been carefully selected by the
psychiatrist at the various clinics associated with the nursing home. The cases selected were of good prognosis, the illness was of short duration and the personality intact. Behaviour was such as not to have a disturbing influence on the other patients. The more acutely ill patients were treated at the main mental hospital, under whose management the nursing home came. Many of these patients of poorer prognosis were treated with prolonged narcosis at the main hospital with satisfactory results.

The great majority of cases in table C, and all those in tables A and B were selected cases treated in the nursing home. This is the reason for the relatively few cases of mania and schizophrenia and the high proportion of depressions and anxiety states. The average length of stay in the nursing home was five weeks. There was no significant difference between the sexes as regards diagnosis or results.
PROGNOSTIC FACTORS

In these results in general and in the reactive depressions in particular, certain conditions are of important prognostic significance. These conditions may be divided into three main groups. Firstly the patient's previous personality, secondly his environmental conditions, and thirdly symptomatic factors.

Patient's Previous Personality.

Patients of good intelligence are generally conscientious in regard to their work, and realise the full responsibilities of their duties. I have observed on numerous occasions, both in this investigation and in previous military psychiatry, that such patients do not readily break down. Although under severe strain, they persevere with their work, and if a mental illness develops, medical treatment is not sought until symptoms are severe and of longstanding. Such cases generally have a good prognosis and recurrence of the illness is unlikely. They can readily understand the explanations and advice given concerning the causation of their illness and the prevention of recurrences.

Less conscientious patients of lower intelligence seek medical treatment early, as soon as symptoms are noticed. The more recent and mild the symptoms in any type of case, the better the prognosis for immediate recovery. However, in those patients of poor intelligence, the illness often recurs. They make a quick recovery but frequently break down again, in spite of adjustments in their home or working conditions. Such patients find it difficult to adapt themselves to changes in their environment, and they develop further mental symptoms when subjected to only mild degrees of strain.
Patients of stable previous personality, whose symptoms developed as a result of acute precipitating factors have a good prognosis, although their symptoms may be severe. Prognosis is good, both for immediate recovery and for the absence of recurrences. The more endogenous the causation, the greater the likelihood of a recurrence.

**Environmental Factors.**

The more exogenous the precipitating factors, the better the prognosis for complete and lasting recovery. While patients may recover satisfactorily from their illness, it is of great importance to try to eradicate those precipitating factors that contributed to the development of the illness. If such factors persist when the patient has been discharged from hospital, they may again precipitate a similar mental illness.

One of the commonest precipitating factors is domestic disharmony, either in a social sphere or in a sexual one. This latter is often remediable by psychotherapy and advice to one or both parties. Difficulty in general social relationship is less easy to remedy. It may however be due to disharmony in the sexual life, in which case much can be done to remedy the unsatisfactory home life. Care must be taken to differentiate between domestic disharmony as a cause of mental illness, and as a symptom. Irritability and lack of tolerance are common symptoms of mental illness.

Shortage of adequate housing accommodation is another problem met with today, which may be a precipitating factor in a nervous breakdown. Lack of accommodation, or having to share either with other members of the family or with strangers, are frequently
mentioned in the psychiatric social workers' reports. In house
proud women these difficulties may assume an importance out of
proportion, and ideas of unworthiness as a wife can easily develop.
Although such conditions are recognised, it is difficult, even
with strong medical recommendation, to obtain better accommodation.

Unsuitable work is often another factor especially in
male patients. Men of good intelligence doing work that is menial
and that does not tax their abilities sufficiently, feel frustrated
and may develop a complete nervous breakdown. A similar condition
may develop in men whose work is beyond their intellectual abilities.
Such adverse environmental factors can generally be adequately
re-adjusted, and men placed in more suitable occupations. The
Rehabilitation Officer is of great assistance in these cases.
Cause and effect must be distinguished in regard to difficulties
at work. Inability to concentrate properly and lack of energy
or drive are common symptoms of a mental illness, and will result
in a lowered standard of work. The work appears to become
increasingly difficult and is regarded as the cause of the mental
breakdown which eventually is diagnosed. Most men given a sound,
secure domestic background, can undergo prolonged strain at work.
Any weakening or uncertainty in the domestic background, will
quickly be reflected in a deterioration of a man's efficiency,
which will be noticed first at his work.

Another precipitating factor, that has been encountered
in this series, is loneliness. It was seen in elderly ladies,
living alone and without friends, the mental picture being one of
depression. Such patients quickly respond to treatment in
hospital, largely because of the company they have there. The
problem of disposal is difficult, for if they are sent home, their loneliness will be relatively increased by the companionship found at the hospital. Such cases on admission are often undernourished, and suffering from vitamin deficiency. Their mental state is one of a retarded, confused depression.

Symptomatic Factors.

Reactive conditions, where agitation and facilitation are prominent features, respond well to narcosis therapy. Reactive depressions are usually agitated, recurrent depressions are more often retarded. In markedly retarded cases prolonged narcosis may not be effective and needs to be followed by a course of E.C.T. Involutional cases, although often agitated, do not do well with narcosis therapy. Fixed delusions of unworthiness are not of good prognostic omen with narcosis therapy. Cases who show a well preserved personality and who have insight into their condition have a good prognosis. Patients, whose symptoms had an acute onset, have a better prognosis than those cases whose symptoms developed slowly and insidiously.

The following cases are typical of those that responded to treatment.

Case 1. Reactive Depression. Summary: A happily married lady aged twenty-eight, who until her present illness showed no symptoms of mental illness. Married seven years, one child aged six. Parents alive, father nervous. Husband joined the army two years ago, since when she has been living with her mother. Soon after this her husband went to the Middle East, and she became depressed. She developed pneumonia which increased her depression. On admission she was depressed, agitated, and suffered from lack of appetite and insomnia. She was given a course of prolonged narcosis
with somnifaine for fifteen days. Two days after this she was considerably brighter and more self confident, she was eating and sleeping well. She was discharged as recovered after a total stay in hospital of seven weeks on 28.3.42.

In reply to the follow-up questionnaire on 12.1.50. she wrote "I enjoy the best of health and never get any nervous trouble at all".

Case 2. Anxiety State. Summary: A single lady aged thirty, of superior intelligence, who had been a school teacher for eighteen years. She was brought up by her mother, as her father had been drowned at sea soon after she was born. She was engaged to be married when she was twenty-eight, but this was broken off. Two years before admission to hospital she had an affair with a married man, who was killed in action a year later. During this last year she found her work increasingly exhausting and uninteresting, and had to force herself to carry on with it. She got on well with her colleagues at the school. During this time an aged aunt came to live with them, but later went to a nursing home where she died. Patient blamed herself for this. On admission she was anxious and apprehensive, lacking in energy and had difficulty in concentrating. Anxiety attacks with palpitations occurred frequently. She was put on fifteen days of prolonged narcosis induced with somnifaine. After treatment she was immediately improved and left after another two weeks. She was discharged as recovered on 28.3.43.

On 9.2.50. to the follow-up questionnaire she replied "Sleep treatment in my case was successful. I made a good recovery from the nervous exhaustion that caused me to become a patient,
and have since experienced no further nerve trouble of any sort.
This may perhaps be due to the fact that the cause of the trouble,
in my case, was removed, first by my transfer to a school where
work was less arduous, and second, by my leaving the teaching
profession for marriage at the end of 1947. I consider that sleep
treatment is a pleasant experience, and for me gave a result that
would otherwise have been obtained only after a prolonged rest".

Case 3. Anxiety State. Summary: A girl aged twenty-one, engaged
to be married. Unsatisfactory sexual relationship with fiance.
No previous history of mental upset. Two months before admission
to hospital suffered from an influensal illness. On admission
was apprehensive and depressed, with fears of insanity. After
ten days of somifaine narcosis she shewed improvement. She was
discharged as much improved after a total stay in hospital of five
weeks, on 12.7.47.

On 7.2.50. to the follow-up questionnaire she replied
"I have not had any more nerve trouble or been under doctors care
after having sleeping treatment. I can thoroughly recommend it
to any person suffering from nerves. I have since married and
am able to look after my own home".

Case 4. Reactive Depression. Summary: A married lady aged
thirty-seven, in good general health. Three children, eldest
aged seventeen. Husband served in the Far-East during the war,
this worried her a lot. Two twin half brothers were both killed
at Arnhem, she was very fond of them. She managed, however, to
keep well until a few weeks before her admission to hospital.
Then she received two crosses from the War Office for the dead
twins. This precipitated the depressive illness for which she
received treatment. On admission she was emotional and depressed with strong suicidal ideas. Her thoughts were largely about the dead twins and she said she could hear their voices. She had lost interest in her work and was irritable and unsociable. She had a twelve day course of prolonged narcosis induced with sodium amytal. She was discharged on 3.4.48. after four weeks in hospital much improved.

On 6.2.50. to the follow-up questionnaire she replied "I have benefited greatly from the sleep treatment and cannot speak too highly of it".

The cases described were all patients of good personality, who had not suffered from any previous mental illness. Acute precipitating factors were present, their illness was of a reactive exogenous type.

Before prolonged narcosis was begun, their past history and the precipitating factors of the illness were investigated. Where possible these factors were removed or adjusted. They all made good recoveries, and the follow-up enquiries showed that this condition had been maintained.
DISCUSSION

Nomenclature.

There still exists among psychiatrists much disagreement over the diagnosis of depression and anxiety, so that when compounding results of a particular form of treatment it is necessary to be explicit in describing the types of case treated.

Depression is often a prominent feature in anxiety states, while anxiety is not uncommon in depression. Gillespie (1929) realising these facts postulated two types of depression: a psychoneurotic depression with anxiety, and a psychotic depression without it. In the former he stressed the reactivity of these cases in contrast to the classical endogenous manic-depressive psychosis of Kraepelin (1921).

These views were supported by many writers. Yellowlees (1930) stated "Neurotics generally are made not born. I believe it to be far otherwise with the psychoses the causes of which are more deeply and more mysteriously biological. Psychotics are born not made". He considers that the popular phrase that melancholia was a caricature of normal depression was misleading, unless it was made clear that caricature implied a difference in kind as well as in degree.

Symonds (1939) considered that there was no essential difference between a neurosis and a psychosis except that of degree; he quotes Mapother and Lewis who regarded a case as neurotic if he had insight into his condition, was co-operative and was unlikely to need care in an institution. They considered that the distinction between neurosis and psychosis was without substance.

The usual differentiation between a neurosis and a psychosis
is that in the former relationship to reality is intact, it is a part reaction, a merergasia in Myers' (1912) terminology. As Ross (1937) put it "The psychotic lives, in so far as he is psychotic, in a world of phantasy. The neurotic lives in a real world".

Rogerson (1940) considers that in depressive states, a differentiation between psychosis and neurosis is valid and useful, but the degree of depression is no criterion. In view of the close relationship between anxiety and depression a similar differentiation between neurosis and psychosis in anxiety states would be useful. He writes "the psychoses whether mainly anxious or depressed are generally termed depression. The neuroses on the other hand have frequently been termed anxiety states. If one is justified in separating anxiety and depressive neurosis one should also distinguish anxiety and depressive psychoses. Many of the agitated depressions should be classified as anxiety psychoses".

A different approach is taken by Good (1946) in discussing the depressions. He dislikes the terms "endogenous" and "exogenous". All depressions, he considers, are ultimately endogenous and would not occur save in the predisposed. Of the term "reactive depression" he says all depressions are reactive in the first instance, though in some cases the reactive element cannot be elicited at once. He regards the terms "mild", "moderate", and "severe" applied to depression as comparable to classifying diseases of the respiratory systems by the degree of cough, the underlying pathology being ignored. He recognises two types of depression, melancholic and schizophrenic. Senile and involutional
depressions are not a clinical entity but merely a chronological classification. He postulates a basic insanity - a complete ego disintegration, various psychotic syndromes are stages of arrest in this disintegrative process. He quotes Henderson and Gillespie who traced a case with anxiety symptoms through an obsessional compulsive state to a final paranoid schizophrenic picture.

This classification seems to be too rigid and to be based on theoretical grounds rather than on clinical, nor is the close association of anxiety and depression taken into account.

Cameron (1945) makes an interesting study of the relationship between anxiety, excitement and depression. He regards these affective disorders as a series, having in common the fact that the total tensional level is raised.

What determines the affective type is the ratio of facilitation to inhibition.

In excitement, facilitation is maximal and inhibition minimal.
In depression, inhibition is increased and facilitation reduced.
In anxiety state, both facilitation and inhibition are increased and give rise to a state of curbed overactivity.

In the present series, diagnosis of cases is made in the following manner:-

**Reactive Depression** is an exogenous depressive illness, where precipitating factors were clearly demonstrable. Retardation is not prominent and the patient is often agitated, it is the neurotic depression described by Gillespie.

**Recurrent Depression** is used to denote a depression of an endogenous type without marked demonstrable precipitating factors, and which
has occurred previously. Patients show a cyclo-thymic personality, retardation and ideas of unworthiness are marked. Inhibition is increased and facilitation reduced. It is the psychotic depression described by Gillespie, and is Kraepelin's manic-depressive type.

**Involutional Depression** is a depressive illness occurring at the climacteric in men or women, of previously rigid over-meticulous personality. It is an agitated depression with auto-accusatory delusions of failure and remorse over past misdemeanours. Many conform to Regerson's anxiety psychosis.

**Anxiety States** show predominantly features of anxiety though depression also exists. Ross describes them as "Those patients whose chief symptom is either frank mental anxiety or its somatic manifestations of which palpitations, sweating, flushing and tremor, are the chief".

It shows the state of curbed over-activity resulting from an increase in both facilitation and inhibition as described by Cameron.

**Summary of some results by other authors.**

Meerloo in 1933 reported on 175 patients treated with somnifaine narcosis, his chief findings being: - 26 patients considerably improved, with lasting and complete success; all were circular psychoses except one confusional case.

In 1934 Ström-Olsen and McCowan reported on a series of 107 cases treated with somnifaine prolonged narcosis at Cardiff. No patient was regarded as "recovered" unless there was complete restoration of his normal mental health, resulting in his discharge.
No follow-up of these discharged patients was recorded.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Recovered</th>
<th>Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia</td>
<td>4</td>
<td>19</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>Mania</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Chronic Mania</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Manic Mood Disorders</td>
<td>11</td>
<td></td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Mania</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Melancholia</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>Psychosis</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Anxiety State</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Chronic Neurasthenia</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Obsessional Neurosis</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Hysteria</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

McCowan in 1936 reported the following results with somnifaine narcosis:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Recovered</th>
<th>Improved</th>
<th>No Better</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dementia Praecox</td>
<td>10%</td>
<td>40%</td>
<td>50%</td>
<td>100</td>
</tr>
<tr>
<td>Manic/Depressive</td>
<td>33.3%</td>
<td>33.3%</td>
<td>33.3%</td>
<td>150</td>
</tr>
<tr>
<td>Neurosis</td>
<td>40%</td>
<td>20%</td>
<td>48%</td>
<td>50</td>
</tr>
</tbody>
</table>

MacNiven in 1936 gave the following results with somnifaine narcosis:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Recovered</th>
<th>Permanent</th>
<th>Temporary</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mania</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Melancholia</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Involutional melancholia</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Paraphrenia</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
By recovery he meant "Those patients who showed a marked improvement almost amounting to recovery following the treatment, and who progressed steadily, so that they were able to be discharged in a few weeks time". No follow-up was reported.

Hennelly in 1936 gave these results of 88 cases after somnifaine narcosis:

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mania</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>35</td>
</tr>
<tr>
<td>Melancholia</td>
<td>18</td>
<td>13</td>
<td>17</td>
<td>48</td>
</tr>
<tr>
<td>Involutional Melancholia</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Benign Stupor</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Recovery means restoration to normal health. He summarized his results by:— "Roughly speaking Manic/Depressive attacks can be cut short by 2 - 3 weeks in 50% cases".

Horsley in 1937 reported on 40 cases treated with soneryl administered by various routes:

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Relieved</th>
<th>Temp. Improved</th>
<th>Not Improved</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Manic/depressive</td>
<td>2</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>

In 1937 Palmer and Braceland published results of cases treated with sodium amytal narcosis:

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Permanently Improved</th>
<th>Temp. Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manic/depressive</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Mixed Manic/ Schizophrenia</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Psycho-neurosis</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
A follow-up which was carried out on these cases six years later showed that of the recoveries:—

One manic had 2 recurrences.
One manic had 1 recurrence.
One schizophrenic had 1 recurrence and was ill ever since.

Of those permanently improved:—
Two manics and one manic/schizoid were completely recovered.
One catatonic was re-admitted to hospital after three years.

Of those temporarily improved:—
One manic/schizoid socially recovered.

In another series the following results were obtained:—

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Permanently Improved</th>
<th>Temporarily Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manic-Depressive Mania</td>
<td>19</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Depressed</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Agitated Depression</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>Involutional Psychosis</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Psycho-neurosis</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

By recovery they meant prompt remission of the psychosis or discharge of the patient from the institution, so that he maintained a social and occupational status considered normal.

Palmer in 1937 gave results of 50 cases treated with somnifaine narcosis:—
<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Permanently Improved</th>
<th>Temp. Improved</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Mania</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Recurrent Mania</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Depression</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Agitated Depression</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Anxiety State</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Alcoholism</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cases broken off within 5 days</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
</tbody>
</table>

These figures show a 33.1/3% recovery rate, the best results occurring in anxiety states. Palmer considered that agitated depressions presented as favourable a field as the simple depressions.

By recovery was understood that the patient left the hospital free from the symptoms, for which he had presented himself for treatment, and in the majority of cases was considered fit to follow his employment.

Kearney and Courtney in 1933 gave results of 38 patients treated with somnifeaine narcosis:

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Improved</th>
<th>Not improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mania</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Melancholia</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>3</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Paraphrenia</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

In the same year Wilson and Gillman gave results of medinal-luminal narcosis. They used a mixture containing medinal 5 grains.
and luminal 1 grain. They were of the opinion that results in mania were excellent, out of ten recent cases treated seven were cured. Good results were in melancholia, out of thirty-two cases treated fourteen showed improvement. Schizophrenia did not respond to narcosis therapy.

Brody in 1940 gave results of cases treated with dial and paraldehyde narcosis. He used a mixture of:

Dial grains 1½
Paraldehyde drachms 1½
Liq. atropinae minim 1

Two - three doses of this mixture were given daily.

<table>
<thead>
<tr>
<th></th>
<th>Recovered</th>
<th>Lasting Improvement</th>
<th>Temp. Improvement</th>
<th>No Change</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mania</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Depression</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

The criteria for assessing the results were similar to Palmers.

Parfit in 1946 made a comparison between prolonged narcosis and convulsion therapy in mental disorder, each form of treatment being used alone or combined. He did not subdivide melancholia, with the result that the effect of treatment on involutional, reactive or recurrent depression cannot be assessed individually, but he obtained good results with the group. In schizophrenia he considered prolonged narcosis gave as good results as E.C.T. To induce narcosis he used somnifaine, the average dose being 7.3 ml. daily or a mixture of medinal and luminal.

Walsh in 1947 gave results of cases he had treated with
somnifaine narcosis. In his first series somnifaine was given intra-muscularly, the average dose was 5.3 ml. and the duration 13.6 days.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Recovered</th>
<th>Relieved</th>
<th>Not Improved</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melancholia</td>
<td>83</td>
<td>17</td>
<td>24</td>
<td>124</td>
</tr>
<tr>
<td>Mania</td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Confusional States</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Anxiety States</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>14</td>
<td>5</td>
<td>25</td>
<td>44</td>
</tr>
</tbody>
</table>

In the second series somnifaine was given orally, the average was 5 ml. and the duration 15 days.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Recovered</th>
<th>Relieved</th>
<th>Not Improved</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melancholia</td>
<td>22</td>
<td>10</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Mania</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Confusional States</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Anxiety States</td>
<td>20</td>
<td>6</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>6</td>
<td>8</td>
<td>22</td>
<td>36</td>
</tr>
</tbody>
</table>

By recovery was meant that patients showed a return to normality directly after the treatment and maintained this state so that they were recommended for discharge from hospital. No follow-up of discharged cases was reported.

Discussion of results in the present series.

The results shown in Table C, indicate that the reactive depressions benefit greatly from prolonged narcosis. Of 132 cases treated, 87 or 66% recovered, and 27 or 21% were improved permanently. In ten other cases who received a course of narcosis, a short course of E.C.T. was needed before full recovery occurred. Reactive depressions who are agitated, and where acute precipitating
factors are marked have the best prognosis.

Anxiety States too showed great benefit from narcosis therapy, of 111 cases treated 63 or 57% recovered, and 27 or 24% were permanently improved. Narcosis therapy is combined with psycho-therapy, and patients of good intelligent do well and obtain an insight into their condition.

Of 110 cases of recurrent depression treated 40 or 36% recovered, and 36 or 33% were improved, 16 or 15% did not improve or relapsed after initial improvement. In these manic-depressive states treatment shortened the length of the illness but there was no evidence to suggest that further attacks were prevented or delayed. In very retarded cases E.C.T. is needed, 16 such retarded cases were successfully treated by this method, after narcosis had proved ineffective.

Of 54 cases of involutional depression treated with narcosis therapy, only 4 or 7% recovered, and 5 or 9% improved. Of the cases treated with prolonged narcosis which subsequently needed further treatment, 23 or 35% were cases of involutional depression; of these, 26 recovered after a course of E.C.T. From these figures it is evident that only a small proportion of involutional depressions benefit permanently from prolonged narcosis. In several cases symptoms were aggravated and hallucinations developed. Moulson (1934) mentioned two such cases who were made worse after narcosis therapy.

Of the cases of involutional depression treated with E.C.T. after the failure of prolonged narcosis, there was a recovery rate of 92%. Impastato and Alansi (1943) obtained a recovery rate of 63% after treating 202 cases of involutional
depression with E.C.T. Although the former recovery rate is considerably higher, there are too many factors involved to warrant the deduction that prolonged narcosis enhances the effect of a subsequent course of E.C.T.

Another type of case, that was not mentioned in the tables of results, is what was termed "battle exhaustion" in the last war. Such cases are patients of sound personality who have broken down under exceptionally severe environmental stress. As a psychiatrist attached to a division during the last war, I had many such cases to treat. Cases occurred in men chosen for their physical and mental fitness, who had been subjected to severe prolonged strain fighting or watching in the jungle without adequate sleep. These men were treated within a few hours of their symptoms developing. After five or six days of prolonged narcosis with somnifaine, most of them were sufficiently recovered to return to their units in action.

Comparison of these results with those of other authors.

In many of the quoted results of other authors, the number of cases treated were too small to be of much significance when considered separately, but by compounding the figures the following results were obtained:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Recovered</th>
<th>Relieved</th>
<th>Not Improved</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melancholia</td>
<td>169 (49%)</td>
<td>97 (28%)</td>
<td>81 (23%)</td>
<td>347</td>
</tr>
<tr>
<td>Mania</td>
<td>66 (46%)</td>
<td>35 (24%)</td>
<td>44 (30%)</td>
<td>145</td>
</tr>
<tr>
<td>Anxiety State</td>
<td>55 (50%)</td>
<td>27 (24%)</td>
<td>29 (26%)</td>
<td>111</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>52 (26%)</td>
<td>107 (52%)</td>
<td>175 (52%)</td>
<td>334</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>342</td>
<td>266</td>
<td>329</td>
<td>937</td>
</tr>
</tbody>
</table>
The percentage of recoveries in these results is higher than that found by Gillespie (1939) after adding together various authors' results of manic-depressive psychoses treated with prolonged narcosis. He found that out of 455 cases treated, 133 recovered and 90 showed lasting improvement, and he remarked that these results of just over one third recovery rate fell short of the recovery rate of the same conditions when allowed to run their natural course in hospital.

In this series the recovery rate in recurrent depressions is 36% and approximates closely that found by Gillespie, whose results confirm the opinion, already expressed in this paper, that prolonged narcosis may cut short the existing attack in a manic-depressive illness, but there is no evidence that further recurrences or relapses are prevented.

In the quoted results of various authors, depression is generally regarded as a diagnosis without subdivision or emphasis on the underlying psychopathology. In this series depression has been regarded as a reaction pattern and diagnosis was based on the precipitating and predisposing factors. Depression resulting from well marked precipitating environmental factors is particularly amenable to treatment with prolonged narcosis.

In many of these quoted results the lack of follow-up investigations of the patient after he was discharged from hospital as recovered, renders the results less convincing. The degree of recovery can only be adequately assessed once the patients have returned to the responsibilities of home and work. Many while living in the sheltered environment of a hospital remain free from symptoms, but again show mental symptoms after they have been
Gillespie in concluding his critical review of narcosis therapy wrote:— "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 excitements, and considerably less successful with depressions of the manic depressive type. With recent schizophrenic disorders, its effect 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".

These conclusions are largely confirmed by the results in this series, which show primarily that the reactive exogenous depressive illnesses greatly benefit from prolonged narcosis therapy. The difficulty of variations in diagnostic criteria is constantly occurring, but it is hoped that the definitions given in this paper have minimised the ambiguity that so often arises in investigations of a particular method of treatment. Any form of medical treatment will quickly fall into disrepute if it is applied indiscriminately to any form of illness, and an attempt has been made in this paper to indicate those forms of mental disorder that are amenable to prolonged narcosis therapy.
CONCLUSIONS

Therapeutic

To obtain the best results in prolonged narcosis, much depends upon the attitude of the patient towards the treatment and the environment in which he receives it. The less severe forms of mental illness benefit most from narcosis therapy, and the admission ward of a mental hospital is not the best place for the treatment of such cases. To overcome this difficulty, patients may be treated either in a "nerve unit" in the grounds of a mental hospital, or in a special ward of a general hospital. At this hospital a different arrangement has been used. A country house in pleasant surroundings about a mile from the mental hospital, has been converted into a nursing home which can accommodate twenty-five male and female patients. It is under the administration of the mental hospital and has a trained staff for nursing mentally ill patients. The stigma of a mental hospital does not exist, the patients are all voluntary and selected for their willingness and ability to co-operate in their treatment.

Prolonged narcosis is best induced with sodium amytal and paraldehyde, while toxic complications may be minimised by the routine use of glucose and insulin with a high fluid intake.

Narcosis therapy is a valuable therapeutic procedure if used in suitable cases, disappointing results will be obtained if it is used indiscriminately without regard to diagnosis. Cases that respond best are those of short duration, occurring in patients of good previous personality and precipitated by acute environmental factors. Reactive depressions and anxiety states
where the causation is largely exogenous do well. Prolonged narcosis restores the equilibrium in those cases of depression or overactivity, that are not too acutely ill. It may be likened to a rider on a laboratory balance, which by itself, can restore equilibrium when not too great an adjustment is necessary.

Recurrent affective disorders either of mania or depression show improvement, the length of the illness being shortened. There is no evidence to suggest that the cyclothymic processes are affected, for recurrences will occur. The more severe depressions, where retardation is marked, may need a course of E.C.T. Involution depressions do not respond well and may become confused and hallucinated. If active measures of treatment are needed, E.C.T. will give good results in many cases.

Early schizophrenics do not respond satisfactory to prolonged narcosis and should be treated with insulin coma as soon as possible. Chronic schizophrenics who are excited can be calmed down by narcosis therapy, but the disordered mental processes are not fundamentally altered.

Patients, who are too agitated or overactive to benefit from psycho-therapy, can be restored by a course of prolonged narcosis to a more co-operative and receptive calm.

Administrative.

Prolonged narcosis is a useful procedure for quietening and calming excited patients. In an admission ward such patients can be kept quiet and under control, and apart from the benefit to the patient, the ward remains orderly. New admissions are not frightened by noisy and excited patients when they enter the ward.
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