A CONTROLLED STUDY of LEUCOTOMY.

by

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"This was the most unkindest cut of all".

Julius Caesar.

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NOTE.

No tables are given in the text in order to facilitate reading. The tables are presented in Appendices and are referred to in the text by the Appendix letter and Table number, e.g. A.1, B.1, C. 1 etc.

1.   **INTRODUCTION.**

1. INTRODUCTION.

This study is concerned with assessing the therapeutic effects of prefrontal leucotomy. The main questions examined are whether leucotomy:-

(1) facilitates the discharge of patients from hospital,

(2) cures their symptoms,

(3) restores their social status,

(4) prevents or delays readmission once discharge has been achieved,

(5) reduces the total period of hospitalisation,

(6) improves those patients who are not discharged from hospital,

(7) has any incidental or adverse effects.

For reasons detailed later these assessments cannot be adequately made without a controlled comparison. The general method used therefore is to compare the results in a group of patients subjected to leucotomy with those in a matched control group who did not have the operation.

Just under 400 patients have been considered - the majority personally known to the author during the seven years he has been on the staff of Runwell Hospital. Those not personally contacted after discharge have been followed up through interviews by the psychiatric social workers, by questionnaires to patients and relatives and enquiries to other hospitals. In order to make the follow up as comprehensive as possible a search was made

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for untraced patients through the files of the Board of Control. This enabled the enquirer to ascertain whether these patients had been admitted under the same name to any other mental hospital in England or Wales since discharge from Runwell.

It will be readily appreciated that a study of this type and size can only be undertaken with the help, advice, criticism and encouragement of others. The author is particularly indebted to Dr. W. P. D. Logan, Chief Medical Statistician of the General Register Office, and Miss Eileen Brooke, Professional Statistician of the same department, for statistical advice, and to Professor L. S. Penrose for his encouragement in this aspect of the work.

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2. <u>A BACKGROUND to LEUCOTOMY.</u>

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(a) Personalities.

Egas Moniz who conceived the operation of leucotomy was Professor of Neurology in Lisbon.   It is difficult to be certain from second hand information of his precise function but his earlier major work had been the development of cerebral arteriography and in his monograph (1936) on leucotomy he refers to his collaborator, Cid, also of Lisbon, as "Professor of Psychiatry", thus suggesting that the specialties were separate.   His own wards he calls the "Neurological Service".   The patients chosen for operation were brought to him from the beds of two other units.

Equally important is walter Freeman but for whom Moniz's work might have fallen into oblivion for it was from America and not Europe that the real impetus for the operation of leucotomy (or lobotomy) came.   Freeman, too, was Professor of Neurology - at Washington University - and while it is once again difficult to be sure of his exact function his interests are quite clear.   In the ten years 1940 to 1950 he wrote, according to the Quarterly Cumulative Index Medicus, fifty-six articles.   Thirty-eight were concerned with lobotomy, fifteen with neurological conditions and three with psychiatric conditions.   The first of the latter was a review of "war neuroses", the

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second suggested an endocrine treatment for a sexual
deviation and the third physical exercises for
hypochondriasis.

It is fair to say that a neurologist suffers one
major disadvantage in his dealings with psychiatric
patients.   He is bound to lack prolonged and intimate
contact with case material drawn from outside his specialty,
and especially with psychotics so often treated with the
operation being discussed.   This lack of contact is well
illustrated by an early and erroneous conclusion drawn by
Moniz (1937), who wrote that defects after leucotomy were
transitory and that where, in a few patients, apathy was
observed it may have been there prior to operation as
these patients "were not very well known before".
Nevertheless the influence of Moniz and particularly of
Freeman is reflected in the honours bestowed on them -
Moniz was awarded a Nobel prize - and in the large number
of readily accepted publications in many languages already
referred to.   It was for many years that this combination
of authority from related fields - of enthusiastic
outsiders - of poorly studied cases and, it may be added,
of poor follow up studies was to bedevil the understanding
of leucotomy.

/ (b) Theory.

(b) Theory.

Moniz recounts in his original monograph (1936) the theoretical background which led him to undertake the operation. It is well to go to this source for information as subsequent accounts have distorted events to provide a rationale for the operation which in fact its author did not accept. For some years Moniz had contemplated an operation to relieve mental illness and had indeed discussed the proposal with Lima in 1933. His theory was (1936, p.46) ".... Normal individuals can have the same ideas (as mental patients - A.A.R.) but they are not fixed. Cellular relationships change readily in reaction to other connections and cellular activities....... Mental patients have dominant ideas which absorb all other psychical activity....... The persistent psychical manifestations are related to cellular arrangements and connections which have been rendered more or less fixed.....To cure these patients the fixed arrangements of cellular connections which must exist in the brain and particularly the frontal lobe must be destroyed".

In 1935 Moniz attended the International Neurological Congress and there he heard, among others, the paper by Jacobsen which is supposed to have finally decided him to proceed with the operation. He mentions this paper in less than half a page of his monograph and completely ignores the "clinical" effect on the chimpanzees' experimental

/neuroses

neuroses of the ablations performed.   This is
not surprising as he introduces his monograph with the
remarks: "Animal experiment is generally the first phase
of new semiologic or therapeutic acquisitions.   In the
case of mental illnesses it is not possible to obtain
experimental subjects in animals.....Even in the highest
ranges of the zoological ladder comparisons can only be
very limited and of the most elementary order". It is
quite clear that Moniz was primarily motivated by clinical
considerations and in particular by the evidence which had
been accumulated in studies of brain injuries and tumours.
Ever pragmatic he summarises the choice of the frontal lobe
as the area of operation under two headings: "First because
we attributed a remarkable rôle to these lobes in psychical
life......secondly because we knew of surgical interventions
in which the frontal lobes have been reached without great
inconvenience to the life of the patients and even to
their psychical life.   This guaranteed that we would do
no harm even if we did not achieve success".

      His mechanical conception of the psychoses is further
illustrated by his view that where "results are not
obtained by destroying fibres in the frontal lobes it
appears legitimate - after the first experiments - to
destroy the white matter in other silent areas, for
example the temporal and parietal lobes, which are also
very important for the psychical life".

/Subsequent Theory.

Subsequent theory is little more adequate than this original contribution. A few examples may be given. Fulton (1951) claims that the orbito-temporo-frontal cortex may be divided into two regions (1) the visceral brain and (2) the neopallium which are associated with affect and intellect respectively. Lesions of the visceral brain give rise to autonomic disturbances and tameness (which Fulton equates with "placidity"). No effect is seen on learning capacity or intellectual function. Damage to the neopallium on the other hand is associated with impairment of intellect. Two practical deductions arise in the theory: first, successful leucotomy must encroach on the visceral brain and undesirable side effects "are due to encroachment on the neopallium", and second, that different areas in the visceral brain may be involved in different diagnostic categories.

Fulton bases himself on animal experiments which he believes are applicable to man. In fact the results of cingulectomy (removal of part of the visceral brain) are not markedly different from a clinical viewpoint from those of topectomy in areas 9, 10 and 11 (situated in the neopallium). The latter, as was shown by Mettler et al (1949), does not lead to marked intellectual changes.

Another view has been that leucotomy does not work within the systems just described but rather separates them. In the words of the Board of Control (1947)

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report the purpose of the operation is "to break the connection between the patient's thoughts and his emotions" which according to Heath (1949) is done "by interruption of the thalamocortical Connections linking affective with intellectual mechanisms". Freeman and Watts (1942) express a corresponding view with slightly altered terminology. For them the frontal lobes are concerned with consciousness of self or foresight and the emotional charge of these functions is of thalamic origin. For Rees (1943) "the functions of the lobe are synonymous with Freud's superego so that we may regard the frontal lobes as the seat of the superego. Functional mental disorder....... is due to conflict between the superego and the libido; or to put it in an anatomical terms between the frontal lobes and the thalamus".

Landis (1949) reviewed the theoretical position and concluded: " No existing theory or hypothesis dealing with the psychologic significance of the human frontal lobes is tenable". While we lack knowledge of the function of the frontal lobes we can hardly hope to produce a satisfactory rationale for damaging them. The theoretical issue has, however, not been considered as of first importance. As early as 1937 Moniz declared that the treatment rested not on theory but on the results it achieved. Leucotomy is essentially an empirical therapy and whether its results justify it is the question to be examined in this thesis.

/ (c) Surgical Anatomy.

(c) <u>Surgical Anatomy</u>.

Various distinctive procedures will be mentioned later.   Nevertheless all psychosurgical operations have the following measures in common:-

    (1) Penetration of the dura, leptomeninges, and cortex,

    (2) Widespread division of white matter in the appropriate plane.

In this way damage may be inflicted immediately on:-

    (1) the intercortical or U-fibres,

    (2) the long association fibres or association tracts,

    (3) projection fibres to and from other parts of the brain, and

    (4) small blood vessels.

This damage in turn leads to degeneration in the projection areas - principally the dorsomedial and anterior nuclei of the thalamus and possibly to degeneration in the hypothalamus and even in the brain stem.   Small haemorrhages lead to cyst formation in the white matter.

Cuts in the more posterior planes may involve the heads of the caudate nuclei as well as the posterior orbital cortex.   (Corsellis 1956).

(d) <u>Leucotomy and its Modifications ("selective operations".)</u>

The technique of leucotomy has been advanced primarily by the neurosurgeons spurred on by:-

    (1) the desire for greater safety - lower mortality and fewer physical operative and post-operative

/ complications;

complications;

(2) the "Bipolar Theory" (Tow 1955) that standard
    leucotomy produces good results but unfortunate
    side effects;

(3) the view (Fulton 1951) that certain areas of
    cortex are of specific importance in certain
    diagnostic categories.

Lima (1936) first used injections of alcohol before he
devised the leucotome which he employed in a superior
approach. Watts (1942) used a nasal septum elevator
instead of Lima's instrument and employed a lateral approach
designed to ensure that the motor cortex was avoided. In
Britain McGregor and Crumbie (1941) originated a similar
type of operation from the anatomical point of view but
devised their own leucotome designed to cut 3 cm. cores.

These and other "blind" operations suffered from two
major disadvantages. The neurosurgeon

(1) did not know where he was cutting. There was
    "an unexpected variability in localisation"
    (Meyer and Beck 1954),

(2) did not know what he was cutting - and incurred
    the danger of damaging cerebral blood vessels.

Lyerby (1938) therefore designed an "open" technique to
ensure a better field of operation and greater anatomical
accuracy. Following this principle a number of "selective"
operations were introduced. The most important were
cortical undercutting (Scoville 1949), topectomy (Pool 1949)
and cingulectomy (Whitty et al 1952). Views on the value of
these vary but Scoville (1951) concluded after undercutting

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various areas that the therapeutic results showed little difference regardless of the area attacked.

"Blind" operations were, however, by no means abandoned and the cuts in these were also made more limited. Reitman (1948) reported on the results of orbital leucotomy as performed by Radley-Smith and Pippard (1955) on rostral leucotomy as performed by McKissock - both inferior quadrant cuts. The latter concluded that a "blind" operation gave much better results than an "open" operation in the same area. In America Freeman (1948) took up an idea of Fiamberti and popularised transorbital leucotomy, penetrating the orbital plate with an "ice-pick" in patients stunned by electroplexy.

(e) Complications.

Every new ~~drug~~ treatment which becomes available is "non-toxic" and has "no side effects" until it is widely used. Leucotomy enjoyed this status longer than most. Moniz (1937) declaimed that the operation was not "prejudicial to either the physical or psychic life of the patients". Hutton (1943) found "no record of any deleterious effect. Not a single patient is reported as worse after the treatment than before". Two were presumably improved by death as the operative mortality in this series of 50 was 4%. Garmany (1948) found "no permanent personality change occurs which is ascribable to

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the operation alone".   Rylander (1947), however, reported
that while patients might appear "quite normal to clinical
examination"they "react quite differently to certain
situations from the way they would have done before their
frontal lobes were damaged",   The patients themselves
have no insight into their defects and "asked whether any
unpleasant changes have developed they always reply in the
negative".   Ström-Olsen (1946) reported the changes after
operation to be: selfishness, egocentricity, inconsiderate
behaviour, deterioration of personal habits and manners,
aggressiveness, irritability, lessening of affection,
apathy, lethargy and lack of initiation, volubility,
laziness, emotional facility, childishness, tactlessness,
bad language, fatigue, loss of sense of responsibility
and impairment of sense of time.

On the physical plane Greenblatt (1951) reported the
persistent complications as bulimia, masked facies, plateau
speech, akinesis, vesical and rectal incontinence, aphasia,
convulsions and hemiplegia.   The operative mortality is
variously indicated as from 1 to 4% in individual studies.
Maclay (1953) reports 180 deaths due to leucotomy in
England and Wales between 1947 and 1952 and estimates the
death rate as approximately 2%.   The causes of death were
cerebral haemorrhage (in a third of the cases), cerebral
abscess, subdural haematoma, acute suppurative encephalitis,
post-operative cerebral softening, cerebral oedema, cystic

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degeneration and convulsions. A number of deaths (11%) were caused by respiratory conditions and others by cardiac failure, surgical shock, post-operative coma and uraemia. McLardy (1950) not only reports death directly following operation but also an equal number of "delayed operative deaths" due to uraemia and trophic changes within six months of operation.

The incidence of epileptic convulsions after operation varies according to different authors. It is probable that some of these variations derive from the differences in technique employed. On the other hand some difference is certainly attributable to the length of follow up. Ström-Olsen (1946) reported an incidence of 6.3% in 106 cases (all of whom are included in the series now reported on which has a much higher incidence of epilepsy). Fleming(1944) reviews a series of 386 cases by different authors and reports an incidence of 6.4%. The report of the 1000 cases published by the Board of Control (1947) gives an incidence of 3.3%. On the other hand Stengel (1950) reports a follow up on 330 leucotomies, 200 of which had been previously reported by Frank (1946) four years before, with an incidence of 9% showing post-operative fits. Of 327 non-epileptic patients 36 (11%) now had had at least one epileptic fit following operation and 13 of these had their first fit two or more years post operatively. Medina et al (1954) report that the average period at

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which fits first occurred after operation in their series
was 3.3 years after operation and in their long term
follow up the incidence of post-operative epilepsy was
13%.   Friedman et al (1951) report an incidence of
epilepsy of 7.8% at six months, 9.8% at twelve months
and 12.3% at two years, and say it is evident that
this complication may not make its appearance until
a year or more after operation.

(f) Indications.

(f) Indications.

Practically every diagnosis in the textbooks has been reported as treated by leucotomy. Greenblatt (1951) mentions affective disorders, chronic anxiety states, obsessional neurosis, schizophrenia, paraphrenia and depersonalization as responding. Partridge (1950) mentions psychopathic personalities, drug addiction, mental defect and disorders associated with organic disease among the cases he reviewed. Freeman (1957) mentions that ulcerative colitis, anorexia nervosa, Raynaud's disease, eczema, arthritis and spastic colon as "having yielded to leucotomy". Tuberculosis in association with psychosis he also found responded. Petersen and Love (1949) noted that acne vulgaris improved in a number of their patients.

Early on, however, it was suggested that selection should not be made on diagnosis and Watts and Freeman (1938) proposed that the indication should be seen in certain symptoms - "tension, apprehension, anxiety and agitation". Palmer (1941) added to the symptoms which provide an indication for the operation: destructiveness, restlessness, and mental distress; while Hutton (1943) added inadequacy and guilt. Garmany (1948) remarked that a "good personality free from lifelong marked patterns of reaction and average intelligence...." should be present for the operation to succeed. Greenblatt (1951) gives a

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formidable list of favourable indications which are again
mentioned later - included are marital status, parental
status, college education,good personality etc.

Finally, whereas Watts and Freeman (1938) first
stated that patients selected for operation (1) should
have had their symptoms sufficiently long to indicate an
unfavourable prognosis and (2) should have failed to
respond to every recognised method of treatment, only
adding as a rider that early cases might be treated if
the outlook seemed unfavourable,   Freeman (1957) in
his latest pronouncement stresses the danger of delay,
saying "repeated relapses are apt to lead to scarring of
the personality that is even more serious than the mild
effects of a leucotomy carried out conservatively before
deterioration becomes noticeable".   He now advises
operation "upon the patient who has shown unsatisfactory
progress in the second six months", i.e. within the first
year of illness.

(g) Results.

The first 20 cases of leucotomy (Moniz 1936) were
operated upon between mid-November 1935 and the end of
January 1936.   Watts and Freeman (1938) operated on 20
cases between 14th September 1936 and 19th December 1936.
In Britain the first report of leucotomy was published in
1941 (Hutton et al 1941).   By 1943 about 350 cases had

/had

had the operation (Fleming 1944) and by the end of 1944
one thousand cases had been collected (Board of Control
1947).   Eight years later Maclay (1953) estimated that
8000 operations had been performed.   In the U.S.A. by
1951 over 18,000 operations had been performed (Freeman 1957)
and in 1952 Freeman reports "During twelve days in the
summer 228 patients were subjected to transorbital lobotomy"
in the West Virginia project.

The quality of the reports of leucotomy results has,
however, never kept pace with the quantity of operations.
Possibly the speed with which cases were dealt with militated
against study.   Apart from the controlled studies which
are dealt with later it is not proposed to deal with the
published results in detail as firstly a number of competent
reviews are readily available (Freeman and Watts 1942,
Zeigler 1943, Fleming 1944, Kolb, 1949, Greenblatt 1951,
Freeman 1957), and secondly because the general weakness
of these studies, as is shown later, stultifies their
usefulness.

In general the figures follow the pattern set by the
originator of the operation.   Moniz (1936) claimed 35%
of "clinical cures"; 35% improved; and 30% of his patients
were unchanged.   His follow up was up to three months in
the earliest cases of the series and one month in the later
ones.   Wilson and Warland in the Board of Control (1947)
survey found 35.3% of patients were discharged from hospital

/recovered

recovered or improved.   Of these 9.3% later relapsed.
32.3% of patients improved but were not discharged and
of these 3.7% later relapsed.   24.8% were unchanged
and 1% were reported worse after the operation.   The
only information about follow up is given in the sentence::
"With reference to interval between operation and report
it may here be noted that in our series there were but
few cases in which the interval was as short as three
months.   In many cases it was a year or more.   Not all
hospitals stated the interval".

Arnott, Talbot and Greenblatt (1951) in a study of
205 cases with a follow up of 1 to 4 years reported 26%
'good results', 28% 'fair' and 46% 'poor results'.

Freeman (1957) presents a two-year follow up on 507
private patients, a five-year follow up on 486, a ten-year
follow up on 288 and a fifteen-year follow up on 73 private
patients.   The Tables show the patients as employed,
keeping house, at home, or in hospital.   There is a tendency
for a number of schizophrenics and involutional depressions
to relapse - as far as employment and hospitalisation is
concerned.   The pattern of the psychoneurotics appears
fairly constant.   It is not stated what the status of these
patients was in the categories used prior to operation.
In this rather unusual classification 24 to 30% of
schizophrenics, 10 to 18% of involutional depressions, and
5 to 9% of psychoneurotics remain hospitalised throughout

/the period

the period of study. In the Board of Control (1947) report the discharge rate in manic depressives was 50% and just over twice the discharge rate of 23% in schizophrenics.

Frank (1946) showed social recoveries in 69.2% of affective disorders, 60.9% of paraphrenics and 20.7% of schizophrenics. Despite these good results it appears (Speigel 1951) that Frank later turned to psychoanalysis.

Stengel (1950) studied 330 cases and found 32.5% of 200 schizophrenics had been discharged from hospital and 11% had obtained a full remission. 82% of recurrent depressions, 75% of manic depressives, 75% of involutional depressions also obtained full remissions in the series.

Baker and Minski (1951) claimed that some measure of improvement occurred in all 30 of a group of neurotics.

Ström-Olsen (1946) claimed social recovery in 42% of melancholics, 20% paraphrenics, 11% schizophrenics, 9% epileptics, 44% obsessional neurotics and 17% chronic manias.

The results with selective operations are not greatly different from those given above. Tow and Lewin (1953) claimed 35% recoveries and a further 40% improved in 20 mixed cases of schizophrenia, affective disorder and psychoneurosis. Knight and Tredgold (1955) found all their depressions and 90% of anxiety states showed some improvement; 50% depressions and 72% of anxiety states showed marked improvement; 18% of obsessionals showed marked

/improvement

improvement while a further 54% showed some improvement.
With schizophrenics 42% showed marked and an equal proportion
some improvement.   Ström-Olsen and Northfield (1955) in
27 mixed cases treated with orbital undercutting had 8
recoveries, 13 improved and 6 not improved.   It must be
recalled that many of the papers on leucotomy mention
defects occurring alongside the improvement while the
"selective" or more limited operations are said to produce
these to a much smaller extent.

Finally not all authors of uncontrolled studies are
equally enthusiastic about the treatment.   Parker (1946)
remarks that "in schizophrenia, paranoia and paraphrenia
it is doubtful whether leucotomy is more efficacious than
other methods of treatment".   Rothschild and Kaye (1949)
write that "prefrontal lobotomy apparently fails to produce
any noteworthy improvement of the psychopathologic disturb-
ances which are most important in schizophrenic disorders".
Schwarz (1954) in a six-year follow up of 45 patients says
"The results suggest that the group was not significantly
benefited by the procedure".   Heilbrunn and Hletko (1943)
entitle their report on 10 patients "Disappointing results
with bilateral prefrontal lobotomy in chronic schizophrenia".
The unenthusiastic, however, are almost all dealing with
schizophrenia which Moniz (1936, 1937) from the start also
recognised as responding poorly.   As will be seen better
planned studies were required to temper enthusiasm in other

/diagnostic

diagnostic categories where recovery whatever the treatment is not uncommon.

(h) Controlled Studies.

The road to the psychiatrist's hell is certainly paved with good intentions.   Freeman and Watts (1942) in the first edition of "Psychosurgery" raised the importance of controlled studies.   Seven years later Finesinger (1949) wrote editorially in the American Journal of Psychiatry: "Carefully controlled studies are needed if we are to assess lobotomy..."   Finally Solomon (1951) admitted the lack of controls in the work conducted by the Boston team and concluded: "Whether other types of treatment (than lobotomy-
A.A.R.)
can produce the same result is a question that for the present must be left unanswered.   Efforts to answer the question are highly desirable".

The number of published controlled studies as might be anticipated is small and the number of adequately controlled studies smaller.   They may be divided into two groups - those concerned with intramural improvement and those concerned with discharge,   Of the first type there appear to be four studies:

(1) Scherer (1951) reports two groups of 22 matched for age, education, chronicity, psychiatric personality rating and the previous administration of E.C.T.   After three and a half months 55% of the lobotomy subjects were rated improved as against 32% of the controls.   The author, however,

however, remarks that different criteria of improvement
were used in assessing the groups and therefore they are
not really comparable.

(2) Medina et al. (1954) reviewed cases previously
considered by Petersen and Buchstein (1942) twelve years
earlier when the results were described as "not spectacu-
lar". 25 pairs were matched for race, sex, age, pre-
operative diagnosis, age on admission, length of admission,
years of formal education, marital status and occupational
level. Most of the controls were subjects chosen for
operation but for whom permission to operate could not be
obtained. All the subjects were white, ten were
males and fifteen females in each group. 19 were diagnosed
as schizophrenics and 6 with affective disorders in each
group. One of the leucotomy patients was discharged and
none of the controls. The level of intra-hospital
improvement was higher in the leucotomies than in the
controls, 44% of the former showing "marked improvement"
as against 4% of the controls. The mean "social recovery
rating score" of the leucotomies was 4 (a moderate improve-
ment) as against 2 (no change) in the controls. On the
other hand the lobotomised patients' "ability to size up
and comprehend a total situation was markedly (significantly)
reduced".

(3) Fulton (1951) quotes a personal communication from

/Livingston

Livingston who in a series of 51 (of whom 28 had been followed up for a year or more) had performed anterior cingulectomy in three of each group of four patients and merely trephined in the fourth.   15 operatees showed improvement and in no case was there improvement in the unoperated patients.   Reference to a later paper by Livingston (1953) gives more detail about this work.   In fact there were in all only 4 "control" cases and the period of study during which there was no improvement was merely one to three months after the trephining.   After this period all four patients were treated with cingulectomy.

(4) Jenkins and Holsopple (1953) believe that while benefits are to be had from lobotomy they are "not reflected with equal clarity in discharge rates or in social and economic independence".   They therefore conducted a study designed to show intra-hospital changes in 30 cases and their controls.   They show significantly less self-preoccupation, less disharmony in thought and feeling, less anxiety, an increase in productive activity and greater flexibility in the lobotomies.   This report, however, is only three months after operation date.   A later report of the same study (Jenkins et al 1954) deals with a larger number of cases from which 51 to 62 pairs were matched for "total severity of symptoms".   The lobotomies showed greater improvement in symptoms, more nearly approached normality, showed less anxiety, less "resistive isolation",

/paranoid

paranoid projection and schizophrenic disorganization.
This paper is obscure on the point but it may be deduced
that the comparison was likewise made only three months
after operation.   Although the controls are said to have
been "rigorously" matched no further details are given.
It is, however, stated that controls were selected "on a
therapeutic basis", and that the lobotomies had more severe
symptoms.   Jenkins et al note that "patients who initially
have the more severe symptoms tend to show greater improve-
ment on our scales than those having initially less severe
symptoms".

   There were five studies primarily concerned with
discharge.   In these, however, there is further information
concerning intramural changes.

   (1) Penrose (1944) used a method which determined
"whether the number of treated patients found to be still
in hospital after a given period of time is greater or
less than the numbers expected from the knowledge of the
behaviour of a random sample matched for age and duration
of illness".   Twenty patients treated by leucotomy were
considered in this study, nine of whom were 40 years or
older on first admission.   On the books in November 1944
or after 22 months were six patients against an expected
16.87.   In a personal communication Penrose stresses
that the follow up period was relatively short.   At
the time he wrote cautiously: "The criterion of discharge
is not the same as the criterion of recovery though the

two are related......The alteration in personality wrought
by prefrontal leucotomy though powerful enough to enable
the patient to live at home rather than in hospital at
least for a time cannot just for this reason be termed
"cureѕ" in a psychiatric sense but only in a social sense.
Hence the marked difference in the results of leucotomy
and the coma and convulsion therapies with respect to the
criterion of discharge from hospital requires some care
in their interpretation".

(2) Freeman, Davis et al (1954) in describing the
West Virginia Lobotomy Project state: "A control group
was available whose relatives refused permission for
operation. This control group numbered 202 patients.
One year later 5 of these patients were out of hospital
and 2 had died.   Of the 195 patients remaining in hospital
not more than 8 could be considered improved".   Of the
228 lobotomies (transorbital) 85 were out of hospital after
the same period of time.   Freeman mentions this section
of the report quoted in an annual review (Spiegel 1955)
and again in a paper given in London (Freeman 1957) and
it is therefore worth examining the full report in detail.
The following points then emerge:-

(a) The control group is only "matched" for refusal
to have the operation. No further information is given
about the constitution of this group.

(b) The control and treatment groups were not
treated alike.   Apart from the operation the operatees
/were

were treated to lectures on how they were to recover, and mass meetings with improved patients and their relatives.

(c) The patients were preferably discharged within two weeks of operation so that 135 received the benefits of home surroundings. Of these, therefore, 50 relapsed within the year (a relapse rate of 37%) leaving the 85 discharges referred to.

(d) Freeman, Davis et al (1954) note that recovery is not uneventful. In what is called the "echo" period there may be "indolence, irritability, defiance and perhaps resurgence of complaints". In other words the patient may become as bad as ever. Nevertheless "the families were urged to carry through this period with firmness, patience and forbearance, helping the patients to regain some of the social skills lost during the period of illness". In short the patient was to have a course of social treatment at home apart from his operation.

(e) "If the task proved too difficult (for the relatives A.A.R.) they were to bring the patient back to hospital for further treatment..... Rehabilitation of patients with electroshock and other methods is more effective after than before lobotomy...." The number of patients so treated is not stated. All the beneficial results are attributed to lobotomy.

(3) Powell (1955) reviewed 71 West Virginia trans-orbital lobotomy cases five years post-operatively (59

/schizophrenics

schizophrenics, 7 manic-depressives, 1 involutional psychosis, 2 mental defectives and 2 psychoneurotics. 48 patients had a single operation, 19 two operations and 4 three operations. 22 (32%) of the lobotomy patients and 37 (52%) of the controls were able to leave hospital. (For $n = 1$, $X^2 = 5.7$, $p = 0.02$).

In this study the control group included "many cases selected for transorbital lobotomy whose families refused permission for the operation". The control group "comprised the first 71 cases of schizophrenic reaction admitted to hospital during 1948 (except for two who remained in the hospital less than three months, the minimum period of hospitalisation before operation in the transorbital lobotomy group, and 14 cases who subsequently underwent transorbital lobotomy)." Tables are presented designed to "confirm, at least statistically, that the control group was similar to the transorbital lobotomy group in the type of patient and in the severity as well as the duration of the mental illness". If anything these tables appear to show that the groups are not comparable. In the first place the control group was composed entirely of schizophrenics while only 59 of the operatees were allocated this diagnosis. Secondly the table giving "average number of days in hospital" shows the lobotomy cases to have spent a longer period in hospital "from date of admission to date of operation"

/than

than that spent by the controls during their whole admission.   The controls were thus less chronic. Thirdly the number of patients having trial visits in the control group and in the transorbital group before operation is similar but the average duration of visits is three times as long in the controls, suggesting the latter were less severely incapacitated.

(4)   The results of the Colombia-Greystones projects have been published in a number of books and articles.   In the first project (Mettler et al 1949) 48 cases were chosen for operation from 5,700 in the hospital.   On examination ten cases were found unsuitable for operation because of physical disease.   One patient had pneumonia, two duodenal ulcers, two anaemia, etc.   These sick patients automatically became controls.   Two groups were now constructed of psychologically matched pairs.   In each pair where a choice was available as to who should have the operation (i.e. the fourteen physically fit pairs) the patient with the poorer prognosis was made the control.   The two groups matched fairly well for sex and age.   All the manic-depressives (4) were, however, placed in the operated group and the controls were hospitalised on an average 16 months more than the operatees.   The patients were now either operated upon (with lobotomy or topectomy) or in the case of the controls were exsanguinated to an agreed

/degree.

degree.   Rehabilitation was equally intense in both groups.
Although the prognosis had been regarded as virtually
hopeless for all the patients in the study seven months
after operation eleven operatees and four controls had
been discharged (For $n = 1$; $X^2 = 2.46$; $p = 0.1$).   One
year after operation 8 operatees and 3 controls were still
out of hospital (For $n = 1$; $X^2 = 1.89$; $p = 0.1$).   The
results as far as discharge is concerned are not statistic-
ally significant.   Moreover as might be anticipated from
the factors mentioned above (when describing the matching)
when the Columbia-Greystone's second group (Mettler et al
1952) reviewed the prognostic expectation of their control
and operated groups they found: the controls to have a
poorer prognosis - as measured by their occlusive index.
A later study (Crandell et al 1956) with a two to four year
follow up and including Rockland patients showed 18 of 97
operatees (19%) to be discharged from hospital and 5 of 44
controls (11%) (For $n = 1$, $X^2 = 0.06$; $p = 0.8$) out of
hospital.   The final summing up by Crandell et al (1956)
was: "A comparison of the operated and unoperated patients
..... indicated that they did not differ in outcome".

(5) Friedman et al (1951) present a study of 254
lobotomised patients and 100 control patients for whom
permission for operation was refused.   37% of the loboto-
mised patients were released from hospital as compared
with 2% of the controls and the lobotomised patients had

/also

also shown considerable intra-hospital improvement as far as ward work was concerned while the controls had not. A table is presented entitled a "statistical analysis of lobotomized and control patients at end of 2-year observation period". While the text states that "it is evident that the two groups are closely matched" when tests of significance (not actually given in the table) are applied, statistically significant differences as far as sex, age distribution, duration of hospitalization and the distribution of six of twenty-six symptom categories are found.

Finally no further details are available but (Yearbook of Neurology, Psychiatry and Neurosurgery 1954-1955) the order prohibiting lobotomy in the U.S.S.R. published in 1951 reads: "Controls which were performed to check the curative effectiveness of this method, and also the studies of late results have shown that the method not only has no advantage over other methods.... but also leads to irreversible organic changes that make it impossible to treat neuropsychiatric diseases further".

/3. METHODOLOGICAL

3.   METHODOLOGICAL CONSIDERATIONS

in the

STUDY of LEUCOTOMY.

3. <u>METHODOLOGICAL CONSIDERATIONS in the STUDY of LEUCOTOMY.</u>

(a) <u>Fallacies in assessing psychiatric treatment.</u>

The difficulties in assessing any psychiatric treatment
may be classified in three groups:-

(i)   Those arising from the patient;
(ii)   Those arising from the community;
(iii)   Those arising from the psychiatrist.

A selection of these is listed below.

(i)   <u>Fallacies arising from the patient.</u>

<u>A</u>. <u>Spontaneous remission.</u> Psychiatric syndromes are
not static and the most chronic institutionalised patient
is still capable of reaction.   Within the hospital there
is continuous interchange between wards as patients improve
and relapse, and at the same time there is a fairly regular
leak to the community due to "spontaneous remission".   It
is immaterial for the purpose of this study whether the
remission is really "spontaneous" or due to general hospital
care and situational change.   That it is a significant
factor with which to be reckoned is shown by a series of
papers between 1937 and 1939 which contained valuable - and
almost the last - statistical information on this type of
recovery.   Bend and Braceland (1937) had 50% of 626 cases
of psychosis recovered or improved without special treatment.
31% of schizophrenics were improved in this series.
Whitehead (1938) of 105 cases of psychosis had 51% improved,
of which 27% were much improved and 2% recovered.   Hunt et
al (1938) reviewed 641 cases of schizophrenia and showed
53.9% of catatonics improved or much improved, 39.7% of

//hebephrenics

hebephrenics and 29.8% of paranoid schizophrenics likewise
categorized.   49.4% of cases retained remissions from $3\frac{1}{2}$
to $10\frac{1}{2}$ years.   Guttman et al (1939) found 34.5% of a series
of schizophrenics made a social recovery.   Stalker (1939)
reviewed nearly 4000 cases of schizophrenia published by
different authors and found 12% fully recovered, 9% socially
recovered and a further 5% improved and living at home -
26% in all being discharged from hospital.   The Registrar
General's Mental Health Supplement for 1949 (1953) bears
out that even after 20 years or 30 years a few patients
succeed in leaving hospital. (See Table A 1.)   Spontaneous
remission bedevils the observer who is treating mental
patients for he must be uncertain which results are due to
this and which to special treatment.   This is particularly
so when , as in leucotomy, the results of the treatment
administered are not claimed to follow the treatment at once,
but where a "delayed" operative response is also reported.
It is a fallacy to which the younger British psychiatrist -
often employed on leucotomy follow up - is peculiarly
subject (Partridge 1951, Pippard 1955) as the structure of
the Health Service and its Registrar training schemes
entail a nomadic existence for many years and little oppor-
tunity to observe patients over long periods.

B. The Changing Course of Disease.   It is possible for
the course - severity and outcome - of mental illnesses to
change in different eras.   The reason for this is clear

/where

where an effective treatment is introduced and Malzberg (1951)
shows how general paralysis has changed from a relatively
common illness with high fatality and low survival rates to
an uncommon condition with low fatality and high survival
rates.   It has also been demonstrated, however, that of
the functional psychoses schizophrenia has become more
common and further that its prognosis has improved (Harris
and Norris 1954, Hoenig et al 1956) in the last 20 years.
This information, together with the knowledge that diagnostic
criteria are also changing, shows the fallacy of comparing
the results of treatment in patients treated in different
eras.   It is also important to remember that shorter
periods of time may alter the nature of a population.
Scoville (1951) illustrates this point when he compares
the difference in results with the same operation performed
in two hospitals.   In one centre leucotomy had already been
used for some time and the most chronic patients had been
treated.   More acute material was used in the later opera-
tions and the results appeared correspondingly better.

(ii) <u>Fallacies arising from the community</u>.

<u>A</u>. <u>Recovery</u>.   Recovery from a mental illness is rarely
a simple and readily categorized matter.   It may perhaps
be considered to have two aspects - recovery from the
symptoms of the illness and recovery of social function.
These are not directly related as our case records demonstrate
that (1) many patients have shown symptoms for years but

/have

have remained functional in the social sense, and (2) some
patients become worse as far as their symptoms are concerned
e.g. more demented - but quieter behaviourally and therefore
socially more acceptable.   This last point is particularly
relevant to leucotomy as McLardy and Meyer (1949) write:
" Improvement correlates directly with the amount of
prefrontal cortex isolated from the white matter....... The
anatomical correlates of post-operative personality change
would appear to be roughly the same as those of post-
operative improvement":and Freeman and Watts (1942) quote
Ody in the defence of psychosurgery as saying: "Society
can accommodate itself to the most humble labourer but it
justifiably distrusts the mad thinker".   The measurement
of both aspects of recovery is influenced by the subjective
attitudes of the psychiatrist and of the community.   It
follows that if there is disagreement about the diagnosis
when the symptoms are most florid there will be greater
disagreement about the disability when they are less so.
In leucotomy there is an additional problem as the operation
is alleged to introduce new symptoms.   Whether some of these
e.g. loss of concern about the future, represent improve-
ment or deterioration is entirely a matter for individual
judgement.   The fact that a treatment has been carried
out may influence the judgement of both psychiatrist and
relative.   The relatives of the patient,satisfied that
he "has had the treatment" and anxious to see improvement,

/respond

respond to what they regard as a new situation often when
the patient is objectively unchanged.   To sum up -
'recovery' is difficult to assess; the assessment is likely
to be influenced by personal prejudice; and finally part of
recovery has nothing to do with the patient himself but
with the community's attitude to him and his treatment.
Follow up studies conducted too soon after treatment are
particularly subject to the vicissitudes wrought by these
factors.

(iii) <u>Fallacies arising from the psychiatrist</u>.

<u>A</u>. <u>Suggestion</u>. Every therapy includes not only what
is known to be done but also a great deal of which the
psychiatrist is not consciously aware .   It is now
widely recognised that suggestion is conveyed in the
comment: "This treatment will make you better", and that
this accounts for the success of many pills.   It was
some time, however, before it was generally understood
that insulin shock therapy was accompanied by extra nursing,
the organisation of a group and special conditions which
played a large part in its effectiveness.   Lipschutz et
al (1939) have shown that even the most striking effect of
insulin therapy - the gain in weight - was just as great
where saline injections were used.   The staff in this
experiment were told that they were using a new kind of
insulin which did not induce coma but which apart from
this had to be managed in the same way.   The resulting

/special

special feeding was found to be responsible for the gain in
weight.   Leucotomy inherits all the prestige of surgery.
When the patient, his nurses and his relatives see his
shaven sterile head, his stitches and perhaps his critical,
physically disturbed state all react to produce effects
quite apart from those of the treatment itself.   In this
context it must be remembered that the operation is often
performed on chronic patients who have been relatively
neglected for long periods beforehand.   The very fact of
the attention now given to the patient is therapeutically
important.   Yet Hutton (1943) says, discussing leucotomy;
" Rehabilitation after the operation is of the utmost
importance.   Adequate personal attention and encouragement
are essential and where these are lacking the results tend
to be somewhat disappointing".   In short the actual division
of the prefrontal fibres is only a small part of the
procedure and much of the accompanying paraphernalia of
the operation may be of therapeutic importance in itself.
It has already been commented upon that spontaneous remission
must always raise a doubt in the psychiatrist's mind as to
the reason for his good results.   When what amount to two
treatments are performed simultaneously assessment of the
results must be even more difficult.

        B. Diagnosis. Treatment results are often presented
in relation to diagnosis - yet psychiatric reactions can
only rarely be defined in terms of aetiology and the diagnosis

/only

only infrequently be confirmed in the laboratory, e.g. as in general paralysis. This is all especially true of the functional psychoses which constitute the bulk of the cases treated by leucotomy. Linford Rees (1949) says that diagnosis is "at best an incomplete description of the clinical state......many cases do not fit readily into the usual categories.....and schizophrenia may change its predominant symptomatology in the course of the illness..." He concludes: "Psychiatrists do not agree consistently enough in diagnostic categorization for scientific purposes". Ash (1949) reports agreement on major diagnostic categories between pairs of psychiatrists in only 58% to 67% of cases; Hunt et al (1953) in only 33% to 54% of cases. This confusing situation lends strength to the errors arising from the subjective attitude of the psychiatrist. He may unconsciously avoid the diagnosis of schizophrenia in order to maintain therapeutic hope in individual cases, or he may make the diagnosis too frequently to give, paradoxically, false hope in groups of cases. Bond and Braceland (1937) illustrate the latter point with the figures of a Swiss clinic recently become enthusiastic about the new insulin treatment of schizophrenia. Of 800 admissions over 300 were diagnosed as schizophrenics and only 11 as manic depressives. The insulin success rate was 80%. This background clearly detracts from the type of study which indicates the

/proportion

proportion of patients of a single diagnosis claimed as
cured with the objection that diagnoses are not reliable.
Even if this unreliability of diagnosis is not accepted
where a number of diagnoses are compared to indicate the
diagnosis of choice for a treatment a further fallacy
arises.   It has often been pointed out that patients with
affective disorders respond better to leucotomy than
schizophrenics, e.g. with a discharge rate of 50% as
compared with 23% (Board of Control 1947).   Affective
disorders have of course a better prognosis than schizo-
phrenia, regardless of treatment.   Stoddart (1919) writes
of melancholia that " it should always be regarded favour-
ably" and says that in the majority "recovery is achieved
within six months".   Of dementia praecox he says the
majority "progress to profound dementia" and recovery
" takes place in a very small proportion". It is clearly
necessary to show in any particular diagnostic category
that a new treatment produces better results than other
treatments in cases of the same severity within the
diagnosis, before any particular diagnostic group may be
said to respond to the therapy.

C. Other indications. Similar reasoning applies to
many other suggested indications for leucotomy which are
derived from examining the character of the cases which
did well.   The Board of Control (1947) Report states
that the discharge rate improves (within certain limits)

/with

with increasing age, that it is inversely related to the
duration of the mental illness and that males respond better
than females.   Arnott, Talbot and Greenblatt (1951) give
the following indicators of good prognosis also derived
retrospectively from their recovered cases:-

1. Less than two years' hospitalization,
2. Major precipitating factors,
3. Rapid onset of illness,
4. Good pre-illness community, family and work
    adjustment,
5. Depressed or elated - not apathetic.

Stalker (1939) before the advent of leucotomy studied
the prognosis in schizophrenia and gives the following as
of favourable import:-

"1. Healthy habits of reaction in the patient's
     previous life,....
2. A preponderance of psychogenic causes for the
    illness,....
3. An acute or recent onset......
4. Well retained affective response...."

With regard to the discharge rate in males being better
than in females and recovery chances improving with age
Penrose and Marr (1943) show similar trends in Ontario
before leucotomy, while the Registrar General's figures
(Table A 1) show the inverse relationship between chronicity
and recovery.   Indeed once again the indicators of
recovery after leucotomy are the indicators of recovery
regardless of treatment and merely show that the cases with
the best outlook get better.   It is necessary to show that
they get "better still" before asserting that any of these
indicators are really guides as to suitable subjects for
operation.

/D. Short cuts.

D. Short Cuts. The psychiatrist is faced with a mass of human misery and is generally required to treat a much larger number of cases than he can readily cope with. Any new treatment leads to the desire to help the greatest number as soon as possible and the uncontrolled trial is obviously the quickest and easiest to organise if any study of the treatment is to be made. Unfortunately, however, the uncontrolled trial avoids fewest pitfalls and indeed represents a pitfall in its own right. Possibly Freud's (1922) comment that "Every longing is soon transformed into the idea of its fulfilment" is apposite here. The psychiatrist soon follows "I wish to do good" with "I have given treatment" and finally "I have done good". Of 76 uncontrolled trials in one psychiatric journal Foulds (1957) found 75 (99%) claimed success for the product or method examined. Of 19 uncontrolled trials in another journal 16 (84%) claimed success. Of 23 and 12 controlled trials in the same journals 8 (35%) and 1 (8%) respectively claimed success. The psychiatric equivalent of the proverbial "More haste" is reputed to be "Don't get it right; get it written". This accounts for the three to one preponderance of uncontrolled trials in the journals. There is, however, no short cut in assessing the results of psychiatric treatment, and for these results to have any validity the organization of controlled trials is imperative.

/(b) Arguments

(b) <u>The arguments for the proposed design</u>.

It has already been indicated that a simple survey of the alleged effects of a treatment on a group of patients is replete with fallacies. It has also been pointed out that many of these pitfalls can be avoided by taking a suitable standard of comparison. Guttmann, Mayer-Gross and Slater (1939) advise that "the ideal method..... would be the approval of a controlled series of cases selected at the same time and in the same way as a treatment series and by the comparison of these two groups together. The obstacles are, however, very considerable. It is for instance very difficult to refuse treatment to a suitable case for scientific reasons, especially if one has any strong belief in the value of the treatment. The testing of a system of treatment by simultaneous controls can only be carried out at a time when no one has any great faith in the value of the treatment".

Leucotomy is, however, such a serious measure that faith in it may be taken as implicit in anyone who decided to use it. This probably accounts for the paucity of studies carried out in the simultaneous fashion suggested. If faith has to some extent now been undermined, then it must be further pointed out that a study along the lines suggested by Guttman and his colleagues was undertaken by Ackner et al (1957) to examine the efficacy of insulin coma therapy and while the initial results have only just been

/published

published the study was first mooted in 1951.   The view
of this author was that only the minimum delay could be
afforded in assessing leucotomy as even the protagonists
admit that it has relatively permanent negative effects
which are inherent in no other psychiatric treatment,
Apart from this the facilities for the type of investiga-
tion proposed by Guttman et al (1939) were not available
to him.   It was necessary, therefore, to use material
already operated upon in a retrospective study - still
however employing a group of non-leucotomized patients for
comparison.   It is fundamental that the groups compared
should be of like outlook so that it can be said at the
outset that under similar conditions it might be expected
that equal numbers of both groups would recover, improve
etc.   The methodological problem resolved itself, there-
fore, into: (1) noting the factors known to affect prog-
nosis, (2) selecting the most important and workable of
these, and (3) matching the groups accordingly.   It is
important that all the data should be as objective as
possible as it is difficult to avoid the information that
a patient has, or has not, had an operation when working
with patients known to the enquirer, and with case records
available.   Data which needed interpretation might become
biassed in the light of this knowledge.   There are three
items of completely objective information which are, however,
important to prognosis. These are:-

/(i) Length

(i) Length of hospitalization.

(ii) Age on admission.

(iii) Sex.

(i) Length of hospitalization. The importance of chronicity is shown in Table A 1 which has been constructed from two tables in the Registrar General's Statistical Review for England and Wales - Mental Health Supplement (1953) The longer a patient stays in hospital the less are his chances of discharge.   These in fact drop from 1 in 14 after 2 years to around 1 in 200 after 25 years. (Table A 1.

(ii) Age on admission. The effect of age on admission is shown by Penrose (1947) in Table A 2.   It is clear that the earlier the age of admission the larger the percentage of patients still in hospital at 1, 5 and 25 years.   Even in the young and middle age groups, where loss of patients through death would not be an important factor, this effect is still apparent and it may be said that the earlier the onset of the illness the worse the prognosis.

(iii) Sex. The overall effect of sex on prognosis is not great, as is shown in Table A 3 (constructed from the Registrar General's Statistical Review of England and Wales for the year 1949) (Supplement on Mental Health 1953).   It can be seen that the overall chances of discharge in both men and women is 1 in 4.   There is, however, some unevenness in the chances of discharge in the different sexes after different periods of hospitalisation and apparently males do

/rather
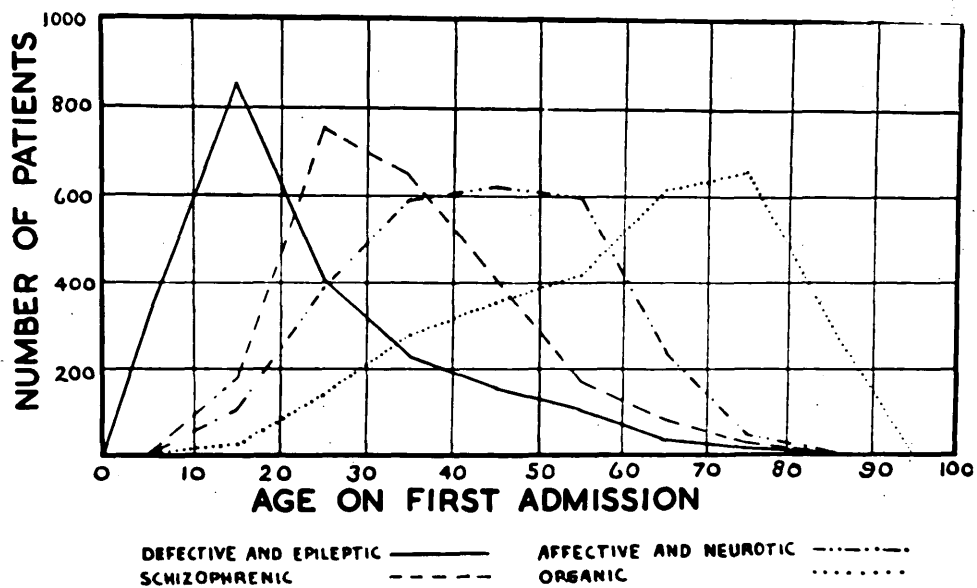
Fig. 1

rather better after 15 years in hospital.   The numbers
involved here are, however, very small.

Similar information - sex, age on admission and
chronicity - has been used by Penrose (1944, 1947) to
study the results of electro-shock and insulin and
latterly of a small number of leucotomies.   Penrose (1947)
wrote that "the main point of difference between the
method described...... and those in general use is the
discarding of diagnosis for the purposes of matching in
favour of unbiased facts about dates and ages of patients".
It can, however, be shown that the discarding of diagnosis
is more apparent than real.

First of akl the relationship between diagnosis and
length of stay in hospital is shown in Table A 4 from a
survey by Duncan et al (1936).   It can be seen that the
longer the stay in hospital the greater chance that the
patient is suffering from schizophrenia.   Secondly the
relationship between age on admission and diagnosis is
shown in the following diagram (Fig. I)concerning first
admissions to Ontario Hospital given by Penrose (1947).
That the information is not peculiar to Canadian hospitals
is borne out by a similar figure (Fig.2) given by the
Registrar General (1953) for schizophrenia and manic-
depressive psychosis in England and Wales.   The correspond-
ence between the age peaks for the two illnesses in the
two graphs will be noted.

/Finally
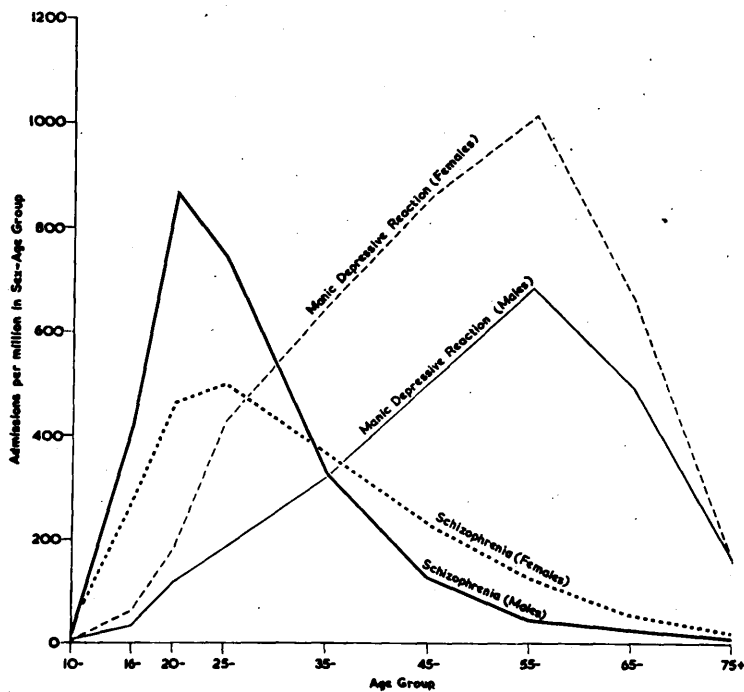
Fig. M.VII. - Mental Hospitals Admission Rates for Schizophrenia and Manic Depressive Reaction. 1949

Fig. 2

Finally from the Registrar General's graph a relationship between sex and diagnosis can be seen.   Schizophrenia is more common in males, manic-depressive psychosis more common in females.   Malzberg (1935) shows in Table A 5 reproduced below that the age of onset of schizophrenia is earlier in males than in females, and of manic-depressive psychosis earlier in females than in males.   In short schizophrenia is a more severe condition in the male, manic-depressive psychosis in the female.

To sum up it can be seen that in taking such data as chronicity, age on admission and sex certain other data, e.g. the diagnosis, is implicit.   The probable reason for this is that we are dealing with a number of interlinked factors.   Just as selection of cases by a horizontal pubic hair line would lead, by and large, to the selection of subjects with large mammae, uteri and ovaries - in short of females - so the selection of psychiatric cases by actuarial data leads to the selection of cases with similar diagnoses and, as will be shown, many other similarities. The actuarial factors chosen are important in themselves as prognostic indications.   They also imply a whole host of incidental similarities.   These reinforce the similarity in outlook in groups matched for the relatively few factors quoted.

(c) The Design.

(c) **The Design.**

The actual method of matching was as follows:-
Each leucotomy patient was matched with a patient of the
same sex, of the same age on admission (in 5-year blocks),
admitted nearest to the date of admission of the leucoto-
mised patient (in 3-month blocks) and still in hospital at
the time when the leucotomised patient had the operation.
Matching for sex was exact.   Matching for age was maintained
as closely as possible working backwards in the admission
register to obtain patients of the same age but of greater
chronicity in the first place, if patients of the same
chronicity were not available.   Where there was no patient
of the same age and the same or greater chronicity, a
patient from the next age block was taken - first on the
younger side and only if this was not possible from the
older side.   It will be seen that wherever perfect pairs
were not possible the disadvantages have been allocated to
the controls if possible.   The complete material comprises
396 patients - 198 subjected to leucotomies, 198 controls.
This series comprises all patients subjected to leucotomy
whose date of admission preceded the 31st December 1950.
The follow up continued until the 31st December 1955.
Twenty of these patients had more than one operation.
These are dealt with separately as "multiple leucotomies".
The vast majority of the patients treated had a "standard"
leucotomy operation; six patients had orbital undercutting;

/one

one a medial undercutting and one patient transorbital leucotomy.

It will be seen that each patient had a minimum total of 5 years observation - taking the periods before and after operation date. (Range 5 to 19 years). The period of follow-up after the operation date extended up to 13 years and is illustrated in a histogram (Fig. 3) which shows the numbers available for different periods of follow-up from 1 to 10+ years.

A further selection was carried out to find pairs not only matched for the above data (age on admission, sex and length of admission to operation date) but also for diagnosis. Workable numbers were obtained with this more precise matching in schizophrenia and in the affective disorders. The follow-up study was directed once again to the collection of simple objective facts e.g. the patient's ward of residence, the period spent in hospital after operation date etc. Apart from this type of information some interpretation was attempted, however, of symptomatic and social improvement by the psychiatric social workers. The details will be more readily seen in the following text.

(d) Statistical considerations.

By and large inspection is the only statistical method which need be employed as the results in the two groups - leucotomy and control - resemble each other so closely. Almost all the results presented are, however, amenable to

/treatment

treatment with the X^2 test and this has been employed with Yate's correction (Fisher 1936) throughout. Probabilities are shown where there may be some doubt as to the significance of differences on inspection.

/4. A CONTROLLED STUDY

4. <u>A CONTROLLED STUDY of LEUCOTOMY</u>.

4. A CONTROLLED STUDY of LEUCOTOMY.

(a) 198 pairs matched for sex, age on admission and length of admission to assess treatment by different forms of leucotomy.

The material studied here comprises all leucotomies (including multiple leucotomies) on admissions up to 31st December 1950 inclusive and their matched controls. 198 pairs have been considered. In each group there were 155 females and 43 males. Each control subject was allocated the operation date of the operatee with which it was matched in order that the periods before and after operation might be compared. In all the tables where periods of admission to hospital are shown, as well as being considered in detail the length of admission is divided into two periods - less than two years in hospital and more than two years in hospital. It will be seen in the Registrar General's Mental Health Supplement (1953) that 90% of patients discharged from hospital had admissions of less than two years duration. Crandell et al (1954) found hospitalisation of more than 600 days to be a critical factor in prognosis. This arbitrary division was made roughly to separate the "chronic" from the "acute" patient and to make the tables more readily appreciated on inspection.

It will be seen that the leucotomy and control groups are matched for (1) Sex   (B.1)
  (2) Age   (B.2) and
  (3) Length of admission to operation date
  (B.3)

Although not matched for the following factors it will be seen that the groups compare closely in:-

  (1) The number

(1) The number of previous admissions to Runwell
     Hospital. (B.4)

(2) The total period of previous admissions to
     Runwell Hospital. (B.5)

The groups also compare as far as the distribution
of diagnoses is concerned except in two minor categories.(B6)
There is a larger number of neurotics and psychopaths in
the leucotomy group and only one organic disorder.   The
position is reversed as far as the controls are concerned
where there are more organic disorders than neurotics.

It can be shown that these two diagnostic groups -
"organics" and "neurotics and psychopaths" - are drawn
from the same area in the pool of cases in this series.
The totals of neurotics and organics in both leucotomy
and control groups are identical (B.7) and the cluster
of cases also compare closely in their distribution of
ages on admission (B.7) and in their length of admission
to operation date (B.8).   It is necessary to determine,
however, at this stage to what extent the exchange of
diagnoses affects outcome in the leucotomy and control
groups as a whole.   It was conceivable, for example,
that all the neurotics would do well and the leucotomy
group benefit relatively, or that all the organics might
die and the control group appear at a disadvantage.   In
fact it can be seen that this end of the diagnostic table
behaves very similarly in both leucotomy and control groups
as far as outcome is concerned (B.8) and the exchange of
diagnosis does not have any significant effect on the

                                              /outcome

outcome of the full groups.

The results in the 198 pairs may now be considered. It will be seen (B.9) that leucotomy does not significantly improve the chances of discharge or reduce the number of patients readmitted.   Finally the number of deaths in hospital in both groups are comparable.   Leucotomy does not accelerate discharge in those patients who leave hospital (B.10), neither does it delay readmission (B.11) in those who return.   The number of readmissions (B.12) and the total period of the readmissions (B.13) to Runwell Hospital are comparable in the leucotomies and the controls.

Leucotomy, it is often claimed, improves patients in hospital - indeed close perusal of many of the "improved" columns in leucotomy statistics shows most of these patients to be in hospital.   This claim has been examined here by assuming that the type of ward in which a patient is resident reflects his behaviour level.   The wards were readily classified into three groups:-

1.   An "open" ward has free access to the grounds and whether or not there is a night nurse caters for patients with the highest level of hospital behaviour.

2.   A "non-observation" ward is a locked ward, without a night nurse however, and is of an intermediate behaviour level.

3.   An " observation" ward is a locked ward with day and night staff and caters for patients with the lowest behaviour level.

/The

The normal ward of each patient who was never
discharged was noted at the date of operation and again
at the date of survey.   By "normal ward" is meant the ward
on which the patient was normally resident before operation,
and not the actual ward at the operation date which would
naturally have been in all leucotomy cases the hospital's
surgical ward.   The numbers of patients on each type of
ward is thus shown (B.14) for leucotomies and controls
before and after operation.   The period after operation
varies as the survey date was fixed (31st December 1955)
while the operations were spread over a long period.   The
initial distribution of wards is significantly different
in the two groups - but it must be remembered that matched
pairs are no longer being considered, merely two subgroups
of non-leucotomised patients in the fully matched groups.
In both leucotomies and controls there is a general trend
towards improvement.   Patients in "observation" wards
become fewer and those in "open" wards increase in number.
The rate of improvement does not differ significantly
between the two groups.   A more detailed study of ward
adjustment was made in non-discharged single leucotomies
and their controls.   The table already presented (B.14)
shows the general position of the two groups (leucotomised
and non-leucotomised) at two dates - before and after
operation.   Individual patients within the groups may have
remained the same, deteriorated or improved, and it was

/possible

NUMBER OF LEUCOTOMY & CONTROL PATIENTS IN HOSPITAL, DISCHARGED & TRACED,
OUT OF HOSPITAL BUT UNTRACED, COMMITED SUICIDE OR DEAD 1-10 YEARS
AFTER OPERATION DATE. IN GROUPS MATCHED FOR AGE, SEX AND CHRONICITY.

■ IN HOSPITAL.
☐ DEAD.
▨ SUICIDE.
▥ NOT IN HOSPITAL UNTRACED.
▨ NOT IN HOSPITAL.

TIME IN YEARS ——→
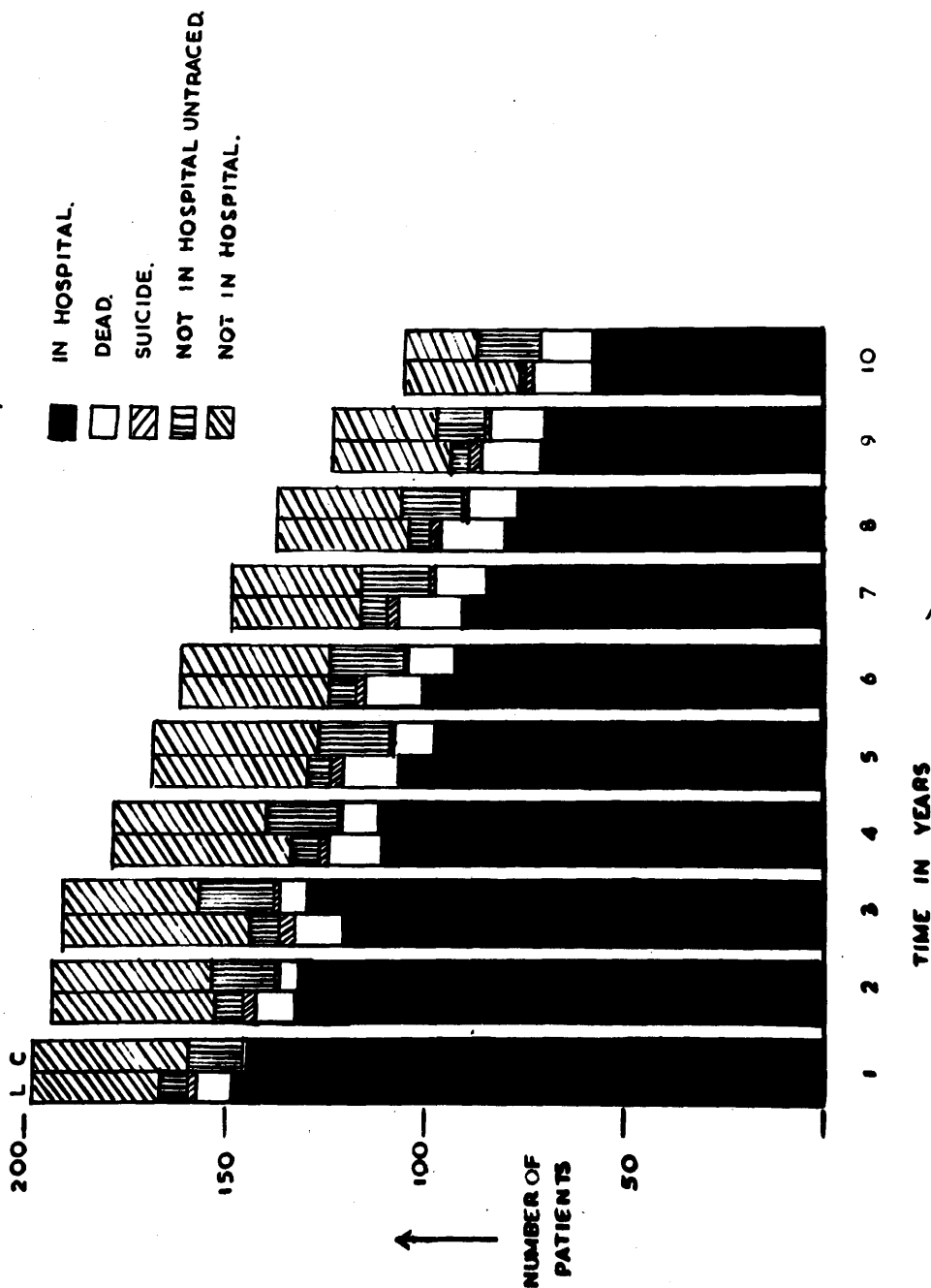
NUMBER OF PATIENTS

FIG. 2.

possible that significant movements in opposite directions had cancelled themselves out in the final table. As far as the patients on " closed" wards before operation were concerned there was a sufficient number of cases to determine what in fact did happen to make the final result. These patients might remain in "closed" wards, improve one step (to " non-observation") or finally two steps (to "open" wards). The proportion of patients improving in the leucotomy and control groups is the same (B.15). In patients resident in "non-observation" wards before operation the figures are smaller (B.16) and while it may appear that the controls do better than the leucotomies this result must be treated with caution. In general, however, the previous finding that leucotomy does not improve ward level is fully borne out.

Finally the death roll has been considered in more detail (B.17) and it is shown that the diagnostic distribution of the dead is comparable in the leucotomies and controls as is the age distribution of the dead (B.18). The number of leucotomised patients dying within six months of operation is not significantly greater than the number of controls, but it must be added that the number of "delayed operation deaths" (McLardy 1950) which might be expected from 200 patients would be small (about 4 to 6) and would not be amenable to statistical examination.

A histogram (Fig. 3) has been constructed to show the

/position

position of patients 1 to 10 years after operation date.
The patients are shown as (1) resident in a mental hospital,
(2) discharged and contacted, (3) discharged and not con-
tacted but not resident in same name in a mental hospital,
and (4) dead.   The similarity in the two groups is self
evident.

To summarise, therefore, 198 patients treated by
leucotomy when compared with a matched series of non-
leucotomised patients do not have:-

(1) improved chances of discharge from hospital,

(2) an accelerated discharge,

(3) reduced chances of readmission,

(4) a delayed readmission,

(5) a reduced number of readmissions,

(6) a reduced total period of readmission

(7) improved hospital behaviour as judged by ward level,

(8) a significantly increased death rate.

(b) **A comparison**

(b) A comparison of "recovered" patients.

It will be seen that 80 patients - 42 leucotomised,
38 controls - having been discharged from hospital have
not since been readmitted to Runwell or any other mental
hospital in England and Wales under the same name. These
have been designated "recovered" patients and thus one
control who was not readmitted having committed suicide had
to be excluded. Comparisons between the leucotomy and
control 'recoveries' have been made (B. 19 et seq.)

First the level of recovery is compared. This
comparison is marred by the larger number of untraced cases
in the control series. Experience has shown that untraced
patients later traced - between January 1956 and July 1957 -
tended to be doing well as far as work and symptom status
were concerned. Indeed they had lost contact with the
hospital as support was no longer needed. On the other
hand it is possible that the untraced patients may be
dead or, in the case of the younger single females, married
and admitted to a mental hospital in another name. The
death rates in the two groups are so comparable as far as
the patients traced are concerned that it is difficult to
believe that a large number of the untraced controls can
be dead. The number of eligible females is small and,
as it were, three disasters have to be assumed for patients
to be lost in this second way - first, marriage and second,
readmission, finally insufficient interest by the psychia-

trist in the patient's previous illness treated in Runwell for a request to be made for her case record or for a report. A record is kept of such enquiries and some patients were traced in this way.

It can be seen, however, that both as far as work status (B.19) and symptoms (B.20) are concerned (even excluding the untraced patients) the level of the controls already matches that of the leucotomies in the best adjusted categories. As, therefore, similar numbers recover to roughly the same extent it is of great interest to know whether similar patients are involved in the recoveries. The distribution of diagnosis is very similar indeed (B.21), as is the age distribution (B.22) and the length of stay prior to operation date (B. 23).

Finally of the 42 "recovered" leucotomy patients 13 were discharged more than two years after operation - some of these 5 to 10 years after operation. Six controls were discharged more than 2 years after operation date (for n = 1, X^2 = 0.7, p = 0.5). To sum up similar patients recover after leucotomy in similar numbers to those who recover in a matched control group not so treated. The number of controls who make 'delayed responses' is not significantly different from the number of leucotomies and there is thus no evidence for a 'delayed operation response'. In fact these responses seem likely to be 'spontaneous remissions'.

/ (c) 20 pairs matched

(c) 20 pairs matched for sex, age on admission
and length of admission to assess treatment
by "multiple leucotomy".

The " multiple leucotomies" and their controls have
been treated in exactly the same way as has already been
described for all leucotomies. (B. 24 to 33). It so
happens that only female patients were concerned. The con-
trol patient   was matched in each case, as far as
operation date is concerned, with the first operation.
The results in all respects are similar to the results
already reported. It can now be added   that having
more than one leucotomy does not improve the patient's
prospects in comparison with untreated controls.

(d) 43 male pairs matched for age on admission
and length of admission to assess single
leucotomy operations.

The method, the results and conclusions are as
before (B. 34 to 43).

(e) 135 female pairs matched for age on
admission and length of admission to
assess single leucotomy operations.

The method, the results and conclusions are as
before (B. 44 to 53).

(f) The results in 178 patients treated with a single
leucotomy operation compared with the results in
controls matched for sex, age and chronicity.

Only the final table is given (B. 54) as the earlier
tables can be obtained by adding the male single and female
leucotomy tables. The results presented show no significant

/advantage

advantage to be gained by leucotomy.

     (g)   The value of leucotomy in relation
         to diagnosis - first method.

                            et seq.)

In the following tables (B. 55 ∧ it will be seen that
the material has been extracted in relation to diagnosis
only.   For example all cases of schizophrenia have been
taken out of the series and then divided into two groups -
patients treated with leucotomy, and non-leucotomised
subjects.   The groups were not then composed of matched
pairs or of equal numbers.   They are nevertheless shown
to be comparable in other respects than diagnosis alone.

    (i)   Schizophrenia. 91 cases of schizophrenia were
found to have been treated by leucotomy and 97 cases were
not so treated.   These two groups were comparable in their
sex (B.55) and age (B.56) distributions, and in their periods
of stay in hospital to their operation dates (B.57). (Each
non-leucotomised patient retained the operation date orig-
inally allocated to him or her.)   The results in the two
groups when discharge from Runwell alone is considered
suggest that leucotomy offers at least some initial advantage.
While the distribution of the tables as a whole is not quite
significant at the .05 level the single line concerning
discharge does show a statistically significant difference
favouring leucotomy (B. 58).   The favourable discharge
rate, however, is temporary.   The number of readmissions
(B. 59) to Runwell and other hospitals is greater in the

                                         /leucotomy

91 LEUCOTOMIES COMPARED WITH 91 CONTROLS SUFFERING
FROM SCHIZOPHRENIA 1-10 YEARS AFTER OPERATION DATE

TOTAL NUMBER
OF PATIENTS

L   C
91 97   87 91   84 89   77 82   72 77   68 73   67 72   57 70   57 64   48 58

■ IN HOSPITAL

▨ NOT IN HOSPITAL

□ DEAD

PROPORTION
OF PATIENTS
AT RISK

1   2   3   4   5   6   7   8   9   10

TIME IN YEARS ⟶
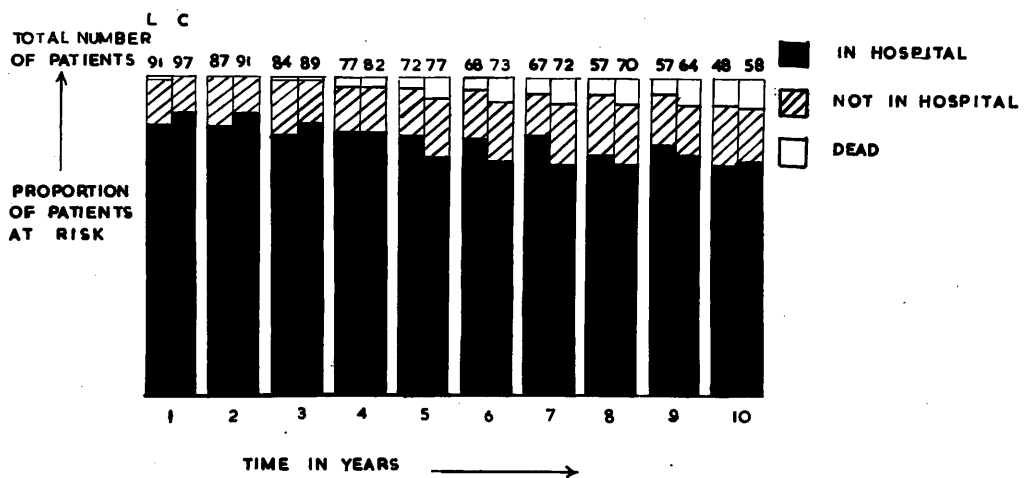
FIG. 4

leucotomy group and by the time of the final survey (31st December 1955) the number of discharged patients is comparable in the two groups. The total period spent in Runwell (B. 60) and in all mental hospitals (B. 61) after operation date shows no difference between the treated and untreated groups. The histogram (Fig. 4) opposite shows the similarity in the results in the two groups one to ten years after operation date.

Patients discharged and not readmitted to hospital (under the same name) are those already designated "recovered" and are dealt with in more detail. The period since discharge is given in table B. 62. The work and symptom status of the two groups is not dissimilar (B. 63, B. 64). The age distribution (B. 65), the period in hospital prior to operation date (B. 66) and the period from operation date to discharge (B. 67) are likewise comparable. Again similar patients get better in the same time.

Finally the status of schizophrenic patients who were discharged but later readmitted to hospital is shown as far as work status (B. 68) and symptoms (B. 69) are concerned.

(ii) Affective Disorders. 52 cases with affective disorders were found to have been treated by leucotomy and 48 cases were not so treated. These two groups were comparable in their sex (B. 70) and age distribution (B. 71) and in their period of stay in hospital to their operation date (B. 72). (Again each non-leucotomised patient retained the operation date originally allocated to him or her). The

/distribution

52 LEUCOTOMIES COMPARED WITH 48 CONTROLS SUFFERING FROM AFFECTIVE DISORDERS 1-10 YEARS AFTER OPERATION DATE.
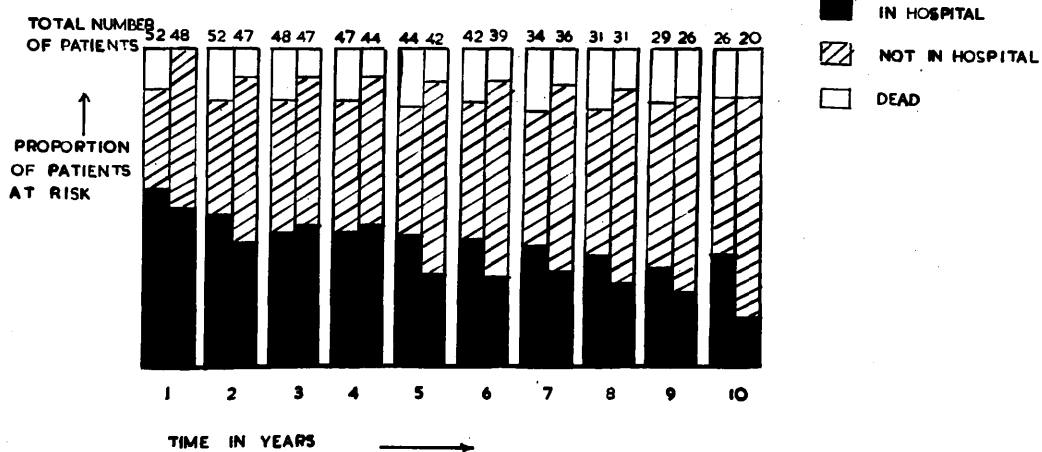
FIG. 5

distribution of diagnoses within the affective group is also shown (B. 73) and later results are written out so that single diagnoses - mania, melancholia, manic-depressive psychosis - may be followed. The results as far as discharge are concerned are not significantly different (B. 74, B. 75) and are also shown in a histogram (Fig. 5).

The two "recovered" groups, leucotomy and control, have been discharged for similar periods (B. 76) and compare (as far as can be ascertained) in their work status (B. 77) and symptom status (B. 78). At least it is clearly impossible for the controls to do worse as a group than the leucotomies if the results in the untraced patients are made available later. The age distribution (B. 80) and periods in hospital prior to operation date (B. 81) are comparable in these "recovered" patients. Leucotomy does not accelerate discharge (B. 82) and the total period spent in Runwell (B. 83) and in all mental hospitals (B. 84) after operation date is similar. The work status of readmitted patients and their symptom status while out of hospital is shown in tables B. 85 and B. 86.

(iii) Depression. Dealing with affective disorders as a cohesive group gives larger numbers and this is probably one of the reasons why this presentation is used. It can be seen, however, (B. 87) that the three diagnostic subgroups behave rather differently as far as outcome is concerned.

/The numbers

The numbers here are small but (regardless of treatment) manic-depressives (cyclothymes) are most frequently discharged and also most frequently readmitted; depressives almost as frequently leave hospital and the majority remain well while manias have a tendency to chronicity although when they do recover they do well. It is conceivable that this is an artefact which arises from psychiatrists allocating recurring cases to the manic-depressive group. On the other hand if it is a real effect it can be seen that the distribution of these diagnoses in the affective group will affect the expected results of the group as a whole. Only in depressions, however, was a sufficient number of cases available to examine the question further. 39 cases of depression were treated with leucotomy and 30 without the operation (B. 88). The results in these cases are closely comparable.

(iv) <u>Paraphrenia (Paranoid psychosis)</u>. The vast majority of this group were diagnosed as suffering from "paraphrenia" and only four cases were classified as "paranoid psychoses" - two controls and two leucotomies. 22 patients were treated with leucotomy and 17 were not so treated. The sex distribution (B. 89), age distribution (B. 90) and period of stay in hospital to operation date (B. 91) were comparable in the two groups. The results likewise closely resemble each other.

(v) <u>Epilepsy</u>. 14 epileptics were treated with

/leucotomy

leucotomy and 13 were not so treated.   Once again the results in the two groups (B. 92) resemble each other closely.

In summary, therefore, no diagnostic category appears to benefit from leucotomy in relation to controls of the same diagnosis and comparable in the sex, age and chronicity distributions.   While initially more schizophrenics appear to be discharged from hospital after leucotomy a larger number of leucotomised schizophrenics is readmitted.

Finally those patients who are discharged from hospital never to be readmitted - the cases designated "recovered" - appear to be comparable in the leucotomy and control groups in those diagnoses where sufficient numbers were available for analysis.

5.   <u>A CONTROLLED STUDY of LEUCOTOMY</u> (contd.)

5.   A CONTROLLED STUDY of LEUCOTOMY (contd.)

(a)   60 pairs matched for sex, age on admission,
      length of admission and schizophrenia.

It will be recalled that initially diagnosis was
not used and three criteria - sex, age on admission and
length of admission - were employed.   Of the 198 pairs
then assembled 60 were found to match also for the
diagnosis of schizophrenia.   These cases were studied
in greater detail.

A. A comparison of the treatment and control groups.

Of the leucotomised patients 52 had a single operation
and 8 had more than one operation.   The 60 pairs corres-
ponded exactly in their sex distribution (C. 1), closely
as far as age on admission (C. 2) and period of admission
prior to operation (C. 3) were concerned.   This matching
of course had been designed.   By examination of the case
records the leucotomised and control groups thus selected
were, however, shown to be comparable also as far as:-

(1) Total length of previous admissions to Runwell
    Hospital (C. 4)

(2) Total length of previous admissions to other
    mental hospitals (C. 5)

(3) Civil state (single, married, etc.)   (C. 6)

(4) Occupational record as far as stability is
    concerned (C. 6)

(5) Family history of mental illness and suicide (C. 6)

(6) Type of school attended and progress (C. 7)

/   (7) Heterosexu
                al

(7) Heterosexual attainment - a history of hetero-
sexual friendships, an engagement, etc. (C. 7)

(8) Intemperate habits (C. 7)

(9) Personality type (C. 7)

(10) Age at onset of first symptoms (C. 8)

(11) Type of onset of symptoms - acute or insidious (C.8)

(12) Response to electroplexy (C. 8)

(13) The number of remissions in the illness (C. 9)

(14) The occlusive index (C. 9)

(15) The immobility index (C. 9)

(16) The mean weight (in pounds) on admission and
at the operation date (C.9)

were concerned.

The " occlusive index" was designed by the Columbia
Greystone second group (Mettler et al 1952) as a prognostic
test as was explained in a later paper (Mettler et al 1954)
because "cases with pre-operative histories of interrupted
institutionalization had better chances of post-operative
release than did cases having equally long (and even
shorter) histories of institutionalization without any
extramural intervals". This positive prognostic sign was
called "mobility" (Crandell et al 1954) and the index was
designed to measure it. The index is obtained (Mettler
1952 p.317) by " dividing the sum of the months all patients
in a group have been institutionalized by the sum of the
number of all interruptions occurring in the records of
institutionalization". An " interruption" was defined as
/ "an absence

"an absence from the hospital lasting 14 days or longer", (Crandell 1954). The index may of course also be used to assess the prognostic potentiality of a control group and indeed Mettler (1952) used it in this way.

The "immobility index" (Crandell et al 1954) is a finer measure using the same principles but allegedly suitable for individual cases. It has been validated in a large series of patients admitted in 1939 to New Jersey State Hospital and followed to determine outcome for 13 years. "The immobility index for individuals is obtained by dividing the total number of days of hospitalisation within the first two years after the first admission by the number of moves into hospital, counting the first admission as move I." A fourteen day break again counts as a discharge. Crandell et al (1956) later conceded that the index might be calculated in months and not days.

Finally a comparison of physical treatments used on the leucotomy and control groups before operation date was undertaken (C. 8) and this showed similarity in the frequencies of employment of five of the six treatments considered. As far as prolonged narcosis was concerned a significantly larger number of leucotomies had thus been treated than controls. Whether this is meaningful or not

it is difficult to say. By chance in a large number of comparisons some (1 in 20 if the 5% level of confidence is used) may be expected to appear significant. That it is improbable that the use of narcosis was based on some fundamental symptom or aspect of behaviour in the leucotomy group is shown in the following study.

B. Time sampled behaviour ratings.

Whatever the findings of this retrospective study the psychiatrists who employed leucotomy on the cases considered (including this author, in admittedly a small number) believed at the time that leucotomy was prescribed for certain indications which were present. These indications over the years may have become very mixed. Every other treatment may have already been used on one case and leucotomy ventured as a final desperate measure. Alternatively another patient may have been seen early, the prognosis thought to be guarded and the view taken that as early cases do well the operation should be prescribed before electroplexy (as has happened). Violence may have been noted on a ward round, even on several, and the fact that the patient was apathetic for a long time in years gone by overlooked. If the leucotomy patients' behaviour immediately prior to operation had been examined and compared with the control group for whom the operation date allocated, was just a random moment in time, then conceivably the leucotomies would have shown a preponderance of some

/features

features e.g. violence.   As has been suggested, however,
this does not mean that the leucotomy group was fundament-
ally more violent than the control group but merely that
a psychiatrist was impressed on one particular day or
over a particular period with the presence of this
symptom.

In order that an accurate comparison might be made
of behaviour equally favourable to both groups the method
of time sampling was used.   In fact the patients'
behaviour was studied from the case records in each case
for three months after admission.   This period was selected
as the patients had then been submitted to the same proce-
dure and therefore this period of time was equally meaning-
ful in both groups.   Secondly psychiatric notes tend to
be much more detailed in the early days after admission
and to become progressively more routine thereafter.

The behaviour rating was based on the Malamud-Sands
Scale (1947) but the items were adapted in the light of
Runwell Hospital case records which are written according
to a fairly uniform pattern and thus provide , fairly
uniform information.

It will be seen that this time sampled behaviour
record (C. 10 etc.) shows the leucotomy and control groups
to be comparable in:-

(1)   General appearance (C. 10)
(2)   Motor activity (C. 10)
(3)   Aggressiveness (C. 10)

/ (4) Suicidal

(4) Suicidal inclination (C. 10)

(5) Sleep rhythm (C. 10)

(6) Socialization (C. 11)

(7) Attention (C. 11)

(8) Speech (C. 11)

(9) Nutrition (C. 11)

(10) Hospital work undertaken (C. 12)

(11) Mood (C. 12)

(12) Affect (C. 12)

(13) Awareness (C. 12)

(14) Presence of thought disorder (C. 13)

(15) All categories of thought content studied
     except delusions (C. 13)

Delusions were expressed more frequently by the leucotomised group.   Once again it must be borne in mind that this could be a chance difference.

Apart from showing the comparability of the two groups this part of the study reinforces the earlier claim that groups selected for a small number of leading factors will automatically become comparable in many other associated ways.

/ C. Results.

NUMBERS DISCHARGED (TRACED & UNTRACED) UNDISCHARGED & DEAD IN
LEUCOTOMY & CONTROL GROUPS MATCHED FOR SCHIZOPHRENIA, AGE, SEX
& CHRONICITY 3/12 – 10 YEARS AFTER OPERATION.

Traced and out of hospital.

Untraced and probably out of hospital.
(Not recorded by B/C to be in hospital in
England or Wales under the same name)

Dead.

In hospital.

Number of
Patients

L C →

3/12 6/12 1 2 3 4 5 6 7 8 9 10
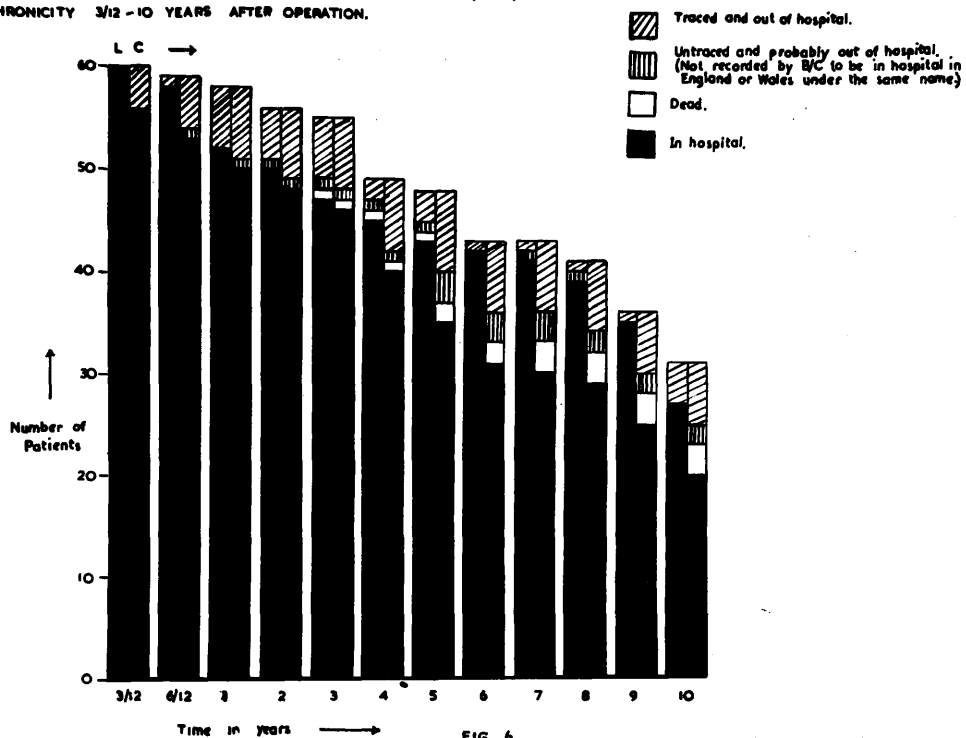
Time in years ──────→   FIG. 6

C. Results.

The general results (C. 14) show leucotomy to offer
no advantage in the treatment of schizophrenia.   Once
again a larger number of discharges in the leucotomy
group is counterbalanced by a larger number of readmissions.
The total period spent in Runwell(C. 15) after operation
and in all mental hospitals (C. 16) is comparable in the
treated and untreated groups.   Finally (C. 17) just as
many leucotomised patients required physical treatments
after operation as controls.   The position of the patient
from three months to ten years after operation date as far
as discharge and death are concerned is shown in the
histogram (Fig. 6.) opposite.

D. Post-operative health.

Items considered here (C. 18) have been recorded in
the case sheets.   It is fairly safe to assume that major
illnesses are all noted.   A good deal of minor ill-health
is, even if discovered, often not recorded.   It is clear
that the epilepsy in the leucotomy series results from the
operation.   No other items of ill-health (and even certain
obvious combinations of these) produce significant differ-
ences between the two groups.   The incidence of post-
operative epilepsy in this group would be 18% - a high
figure reflecting the long follow up.

E. Weight.

As is common in mental hospitals patients in Runwell

Hospital have their weight recorded on admission and thereafter monthly. It has already been stated that the leucotomy and control groups had comparable mean weights on admission and at the operation date. The patient's weight was now extracted from the record from six months to ten years after operation depending on how long the patient remained resident, and expressed as a percentage of the weight at the date of operation. An arbitrary percentage (105%) was chosen [1] on the basis of inspection of the tables, and [2] because gains greater than this represented roughly a gain of more than 6 lbs. on the basis of the mean weights recorded. The results are presented in detail (C. 19) and for easy inspection (C.20). It is clear that for roughly two years in diminishing degree larger numbers of the leucotomy patients show significant gains in weight. Thereafter there is no difference in the evidence collected in the two groups. This might have been because the fat leucotomies are discharged and corpulence is a peculiarly favourable prognostic sign of leucotomy. In fact the evidence (C. 21) is against this and patients who showed a significant gain in weight six months post-operatively were equally divided between the never-discharged and discharged groups. By the falling away of the effect after the lapse of time from operation it looks as if the gain in weight is related to the operation or its accoutrements.

/The

The experience with insulin (Lipschutz 1939) already mentioned is apposite here and while the gain may be some physical (? hypothalamic) effect it may equally be due to special nursing in the period after the operation.

F. Hospital behaviour.

Hospital behaviour has already been considered in a rough way by taking the type of ward on which the patient was resident. A more detailed study was made using the rating scale already described. Initial ratings were made from the case records as before. Ratings of current behaviour were made by the charge nurses of the patient's ward in June 1957. To obviate bias here, the rating scales were issued through the psychology department where some totally different research on schizophrenia, quite unconnected with leucotomy, has been in progress for over a year. The charge nurses were led to believe that the rating scale was part of this project. 43 leucotomy patients and 38 controls were still in hospital on the date mentioned. The ratings show that leucotomy does not appear to alter:-

    (1)   General appearance (C. 22)

    (2)   Motor activity (C. 22)

    (3)   Aggressiveness (C. 22)

    (4)   Suicidal inclinations (C. 22)

    (5)   Socialisation (C. 22)

(6) Attention (C. 23)

(7) Speech (C. 23)

(8) Nutrition (C. 23)

(9) Sleep (C. 23)

(10) Mood (C. 23)

(11) Affect (C. 24)

(12) Awareness (C. 24)

(13) Thought disorder (C. 24)

(14) Thought content (C. 24)

More leucotomised patients, however, were employed in occupational therapy and fewer controls were so employed. (For $n = 1$; $X^2 = 4.6$; $p = < .05$). This may be a chance finding, an isolated improvement resultant on leucotomy or perhaps the continuation of a habit established in the period of rehabilitation. At any rate the control patients who no longer attend occupational therapy appear to have been directed into ward work and into the utility departments, both of which, being remunerative employment, are rated as better adjustments than therapy, in the hospital.

/ (b) <u>19 pairs matched</u>

(b) 19 pairs matched for sex, age on admission,
    length of admission and affective disorders.

There is no significant difference in the results
(C.28) of two groups matched as above (C.25 et seq.)

(c) 12 pairs matched for sex, age on admission,
    length of admission and depressive reaction.

There is no significant difference in the results
(C.32) of two groups matched as above (C. 29 et seq.)

/SUMMARY and CONCLUSIONS.

6.   <u>SUMMARY and CONCLUSIONS</u>.

6.   SUMMARY and CONCLUSIONS.

<u>A</u>. (i)   A selective review of the literature shows
leucotomy to have been based on shaky theoretical founda-
tions, and first promoted by practitioners who had only
limited contact with the case material on which the
operation has been largely employed.

(ii)   Modifications of leucotomy do not appear
to have affected the therapeutic results claimed, although
side effects are said to be fewer.

(iii) Most of the results published are based
on uncontrolled studies.

(iv)   The few controlled studies are examined in
detail and most are shown to suffer from poor matching,
and short follow up periods.   The results of these are
inconclusive although there is a tendency to show intra-
mural improvement without much long term effect on
discharge rate.

(v)   The complications of the operation make
it a procedure which should not be lightly employed.

<u>B</u>. (i)   The arguments for a controlled study
designed to avoid certain common fallacies are presented.

(ii)   The rationale of the design employed which
compares treated and untreated groups matched for sex, age
on admission and length of admission, and the details of
the method are discussed.

/ (iii) A more

B. (iii)   A more refined control group matched for diagnosis, sex, age on admission and length of admission is also proposed.

C. It is shown that leucotomy does not:-

    (1) improve chances of discharge,

    (2) accelerate discharge,

    (3) reduce chances of readmission,

    (4) delay readmission,

    (5) reduce the number of readmissions,

    (6) reduce the total time of readmission,

    (7) improve hospital behaviour as judged by ward level,

    (8) significantly alter the death rate,

when the results in a group of leucotomised patients are compared with an untreated group matched as above.

D. The patients who recover in the leucotomy and control groups are shown to be similar in numbers and type.   Recovery in the control group occurs as frequently, more than two years after operation date, as in the leucotomy group, thus suggesting that the so called 'delayed operative response' is nothing more than 'spontaneous remission'.

E. (i)   A second leucotomy operation does not improve the therapeutic results.

    (ii) When the sexes are examined separately leucot-

/omy

omy is not shown to have particular therapeutic effect in either males or females.

F. (i)   Diagnoses are examined separately in groups selected by diagnosis - the first method.

(ii)   Schizophrenics are more often discharged after leucotomy but are also more frequently readmitted, so that in the end as many patients with the malady are in hospital as in the untreated group.

(iii) The period out of hospital in the extra discharges after leucotomy is small and the total period of hospitalisation in the leucotomy and control groups after operation is comparable.

G. Affective disorders as a group, depression as an entity, paraphrenia and epilepsy do not appear to benefit by leucotomy when examined by the first method.

H.(i)   Groups matched for schizophrenia,   sex, age on admission and length of admission are also shown to be comparable as far as:-

(1)   Total length of previous admissions to Runwell Hospital.

(2)   Total length of previous admissions to other mental hospitals.

(3)   Civil state (single, married, etc.)

(4)   Occupational record as far as stability is concerned.

/ (5)

(5) Family history of mental illness and suicide.

(6) Type of school attended and progress.

(7) Heterosexual attainment - a history of hetero-sexual friendships, an engagement, etc.

(8) Intemperate habits.

(9) Personality types.

(10) Age at onset of first symptoms.

(11) Type of onset of symptoms - acuteness, etc.

(12) Response to electroplexy.

(13) Number of remissions in the illness.

(14) Occlusive index.

(15) Immobility index.

(16) Mean weight (in pounds) on admission and at operation date.

(17) All physical treatments (apart from prolonged narcosis) used priot to operation date.

H. (ii) A behaviour rating scale also showed the leucotomy and control groups to be comparable as far as 15 items of behaviour were concerned.

(iii) The therapeutic results in schizophrenia with the second method of matching are as given before.

(iv) The incidence of epilepsy after leucotomy is markedly higher than in the control group.

(v) The gain in weight following leucotomy appears to disappear about two years post-operatively and is not an indication of prognosis.

/ (vi)

(vi) Leucotomy does not significantly improve behaviour in schizophrenia as measured by a behaviour scale, comparing periods before and after operation in leucotomy and control groups.

I. Leucotomy does not appear to benefit affective disorders and in particular depression, when groups are compared, matched for diagnosis, sex, age on admission and chronicity.

7.   **APPENDIX A.**

Miscellaneous Tables.

A.1

CHANCES OF DISCHARGE IN 1949 FROM MENTAL HOSPITAL

IN ENGLAND AND WALES BY LENGTH OF ADMISSION IN SURVIVORS

(Constructed from M.22, M.29, Registrar General's Statistical Review for 1949,
Mental Health Supplement (1953))

Period in hospital in years	2 - 3	3 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	+30
Number discharged in 1949	582	482	482	252	120	82	42	66
Number resident on 31st December, 1949	7472	11745	22524	21391	15697	11302	9262	11799
Number at risk during 1949	8054	12227	23006	21643	15817	11384	9304	11865
Chance of discharge - 1 in	14	25	48	86	132	139	221	180

TABLE IV.—PERCENTAGES OF PATIENTS ON HOSPITAL BOOKS* AFTER A GIVEN LAPSE OF TIME

| Age on first admission | ─────Lapse of time since first admission───── | | | | | |
| | 1 year | | 5 years | | 25 years | |
	Male %	Female %	Male %	Female %	Male %	Female %
0–19	65	76	38	53	28	30
20–39	58	50	32	29	25	27
40–59	50	48	17	24	13	16
60–79	43	66	9	20	1	2
80 +	29	70	0	0	0	0
All ages	52	57	23	30	18	20
All ages—both sexes	55		26		19	

*Some patients represented here will have been continuously in hospital all the time since first admission and others readmitted to hospital.

A 2

A.3   CHANCES OF DISCHARGE IN 1949 FROM MENTAL HOSPITAL IN ENGLAND AND WALES

BY LENGTH OF ADMISSION AND SEX IN SURVIVORS

(Constructed from M.22 and 29 as A.1)

Period in hospital in years	1 – 30	2 – 3	3 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
Chance of discharge in males in 1949 1 in –	4	13	27	49	86	128	126	183
Chance of discharge in females in 1949 1 in –	4	14.5	24.5	47	86	135	151	279

TABLE II.—RESIDENT POPULATION ANALYSED ACCORDING TO LENGTH OF TIME SINCE ADMISSION
(SEVERALLS MENTAL HOSPITAL)

Type of disorder	First admissions (1934)	0–5 yrs.	5–10 yrs.	10–15 yrs.	15–20 yrs.	20 years +
	%	%	%	%	%	%
Schizophrenia ..	33·3	45·3	53·5	55·0	57·4	69·8
Organic	40·8	32·3	23·4	12·9	8·8	8·0
Manic-depressive	17·5	14·8	13·6	16·2	13·9	7·4
Epileptic	4·3	4·6	6·9	6·8	11·1	2·2
No psychosis (mostly defective)	4·1	3·0	2·6	9·1	8·8	12·6
Total number	463	899	346	309	216	364

TABLE III.—FIRST ADMISSION AGES (MALZBERG, 1935)

Diagnosis	Sex	Number of cases	Mean of first admission age in years	Standard deviation of first admission age in years
Dementia	Male	4,163	31·8	10·5
Præcox	Female	3,376	36·5	11·6
Manic-depressive	Male	1,530	38·3	13·7
psychosis	Female	2,316	36·2	12·4

8. <u>APPENDIX B</u>.

<u>Tables relating to Section 4.</u>

B.1.   ALL LEUCOTOMIES (198) ON ADMISSIONS

UP TO 31st DECEMBER, 1950, & THEIR

MATCHED CONTROLS

Sex Distribution

	Leucotomies	Controls
Males	43	43
Females	155	155
Total	198	198

B.2.   AGE ON ADMISSION
                       _____

Age on admission	Leucotomies	Controls
16 - 20	10	5
- 30	59	57
- 40	53	61
- 50	39	40
- 60	28	26
+ 60	9	9
Total	198	198

(For $n = 5 : X_2 = 2 : p = .8$)

B.3.

CHRONICITY –

PERIOD IN HOSPITAL

FROM ADMISSION TO OPERATION DATE*

Period from admission to operation date	Leucotomies	Controls*	Leucotomies	Controls*
1/12	35	26		
- 3/12	12	15		
- 6/12	10	16	96	97
- 1 yr	15	15		
- 2 yrs	24	25		
- 3 yrs	24	24		
- 4 yrs	16	11		
- 5 yrs	9	11	102	101
-10 yrs	46	48		
+10 yrs	7	7		
Total	198	198	198	198

*Each control subject has been allocated the operation date of the subject with which it was matched.

B.4.   PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL -

NUMBER OF ADMISSIONS

Number of previous admissions to Runwell Hospital.	Number of Patients	
	Leucotomies	Controls
1	30	29
2	14	14
3	8	7
4	2	3
Total number previously admitted	54	53
Total not previously admitted	144	145
Total cases	198	198

B.5.   PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL -

TOTAL PERIOD

Total time spent in all admissions	Number of Patients			
	Leucotomies	Controls	Leucotomies	Controls
1/12	4	10		
- 3/12	10	5		
- 6/12	15	7	51	45
- 1 yr	10	11		
- 2 yrs	12	12		
- 3 yrs	2	6		
- 4 yrs	1	0		
- 5 yrs	0	2	3	8
-10 yrs	0	0		
+10 yrs	0	0		
Total previously admitted			54	53
Total not previously admitted			144	145
Total cases			198	198

B.6.   DIAGNOSIS

		Leucotomies	Controls
1.	Schizophrenia	91	97
2.	Paraphrenia (Paranoid Psychosis)	22(2)	17(2)
3.	Melancholia (Hypochondriasis)	39(2))	30(1))
	Mania)Affective)Disorders	9)52	5)48
	Manic Depressive Psychosis	4)	13)
4.	Congenital Mental Defect	2)	6)
	Epilepsy	14)16	13)19
5.	Neurosis (Psychopathic Personalities)	16(3)	7(4)
6.	Organic Disorders	1	10
	Total	198	198

(For n = 5 : $X_2 = 13 \cdot 2$: p = $\cdot 05$)

(Excluding "organic disorders" : for n = 4 : $X_2 = 4 \cdot 7$: p = $0 \cdot 5$)

B.7.   COMPARING COMBINED PSYCHONEUROTIC AND ORGANIC

CASES IN LEUCOTOMY AND CONTROL GROUPS

	Leucotomies	Controls
Psychoneuroses	16	7
Organics	1	10

<u>Ages on admission</u>

	Leucotomies	Controls
- 30	5	3
- 40	6	4
- 50	4	5
- 60	2	2
+ 60	0	3

B.8.   PREVIOUS STAY - ADMISSION TO DATE OF OPERATION

	Leucotomies	Controls
Previous Stay: (Admission to date of operation)		
- 1/12	8)	6)
- 3/12	4)	3)
- 6/12	3) 15	3) 16
- 1 yr	0)	2)
- 2 yrs	0)	2)
- 3 yrs	0)	0)
- 4 yrs	1)	0)
- 5 yrs	0) 2	1) 1
-10 yrs	1)	0)
+10 yrs	0)	0)
Ever discharged	14	14
Not discharged	3 (Died 2)	3 (Died 2)
Discharged*-		
Not readmitted	7	11
Readmitted	7	3

$$* (n = 1 : X_2 = 0.85 : p = 7.3)$$

B.9.   RESULTS IN 198 CASES OF LEUCOTOMY

COMPARED WITH MATCHED CONTROLS

	Leucotomies	Controls
1. Never discharged [x]	102	113
2. Transferred to other Hospitals	12	5
3. Total discharged from Runwell Hospital	84	80
4. Discharged and re-admitted to Runwell Hospital [xx]	31	33
5. Discharged and not readmitted to Runwell Hospital	53	47
6. Discharged and re-admitted to other Mental Hospitals	11	9
7. Not readmitted to Mental Hospitals since discharge	42	38

[x] Died - same admission	20	19
[xx] Died - subsequent admission	2	4
	22	23

B.10.   PERIOD FROM OPERATION

           TO DISCHARGE (+ TRANSFERS)

	Leucotomies	Controls
1/12	10 (3) ⎞	19 ⎞
- 3/12	18 (3) ⎟	22 (1) ⎟
- 6/12	11 (1) ⎬ 65 (9)	13 ⎬ 69 (2)
- 1 yr	14 (2) ⎟	9 (1) ⎟
- 2 yrs	12 ⎠	6 ⎠
- 3 yrs	7 (1) ⎞	3 ⎞
- 4 yrs	1 (2) ⎟	1 (1) ⎟
- 5 yrs	2 ⎬ 19 (3)	3 ⎬ 11 (3)
- 10 yrs	8 ⎟	3 (2) ⎟
+ 10 yrs	1 ⎠	1 ⎠
Total discharged	84 (12)	80 (5)

(For $n = 1$: $X_2 = 2.75$: $p = 0.1$)

B.11. PERIOD BETWEEN DISCHARGE AND READMISSION

	Leucotomies	Controls	Leucotomies	Controls
Up to 1/12	3	4		
- 3/12	4	4		
- 6/12	4	4	20	21
- 1 yr	2	4		
- 2 yrs	7	5		
- 3 yrs	1	5		
- 4 yrs	2	3		
- 5 yrs	4	1	11	12
-10 yrs	4	3		
+10 yrs	0	0		
Total Readmitted	31	33	31	33

B.12.   NUMBER OF READMISSIONS IN PATIENTS

READMITTED TO RUNWELL HOSPITAL

UP TO DECEMBER 31st, 1955

Number of Readmissions	Leucotomies	Controls
1	19	16
2	6	9
3	5	3
4	1	2
5	0	0
6	0	3
Total readmitted	31	33

B.13   TOTAL PERIOD OF READMISSION IN PATIENTS

READMITTED TO RUNWELL HOSPITAL

UP TO DECEMBER 31st, 1955

Total period of readmission	Leucotomies	Controls	Leucotomies	Controls
1/12	2	2		
- 3/12	3	5		
- 6/12	3	3	17	21
- 1 yr	4	6		
- 2 yrs	5	5		
- 3 yrs	2	0		
- 4 yrs	2	4		
- 5 yrs	1	0	14	12
- 10 yrs	8	7		
+ 10 yrs	1	1		
Total Readmitted	31	33	31	33

B.14.   CHANGES IN THE WARD ADJUSTMENT OF PATIENTS

NEVER DISCHARGED FROM RUNWELL HOSPITAL

Type of Ward	Leucotomies		Controls	
	Ward at date of operation	Ward at date of survey	Ward at date of operation	Ward at date of survey
"Open"	1	7	11	21*
"Non-observation"	8	17	38	32**
"Observation"	73	58	45	41***
Total	82	82	94	94

An "Open" Ward has free access to the grounds and, whether or not there is a night nurse, caters for the Patients with the highest level of hospital behaviour.

A "Non-observation" Ward is a locked Ward without a night nurse, and is of an intermediate level.

An "Observation" Ward is a locked Ward with day and night staff, and caters for Patients with the lowest behaviour level.

$*$ $(n = 1 : X_2 = 0.6 : p = 0.5)$
$**$ $(n = 1 : X_2 = 1.47: p = 0.3)$
$***$ $(n = 1 : X_2 = 0.12: p = 0.7)$

B.15   WARD ADJUSTMENT OF NON-DISCHARGED PATIENTS IN

"CLOSED" WARDS AT DATE OF OPERATION

(FEMALE AND MALE SINGLE LEUCOTOMIES AND CONTROLS)

Type of Ward	Leucotomies	Controls	Total
"Open"	4 (6.5%)	5 (12.5%)	9
"Non-observation"	14 (22.5%)	6 (14.5%)	20
"Observation"	45 (71%)	30 (73%)	75
Total	63	41	

$(n = 2 : X_2 = 1 \cdot 7 : p = \text{not sig.})$

B.16   WARD ADJUSTMENT AT TIME OF SURVEY OF

NON-DISCHARGED PATIENTS IN

NON-OBSERVATION WARDS AT DATE OF OPERATION

(FEMALE AND MALE SINGLE LEUCOTOMIES AND CONTROLS)

Type of Ward	Leucotomies	Controls	Total
"Open"	2 (25%)	8 (25%)	10
"Non-observation"	2 (25%)	22 (66%)	24
"Observation"	4 (50%)	3 (9%)	7
Total	8	33	

$$(n = 2 : X_2 = 8 \cdot 2 : p = < 0 \cdot 05)$$

B.17.   FURTHER INFORMATION ON DEATHS

OCCURRING IN RUNWELL HOSPITAL

Diagnosis of deceased	Leucotomies (at risk)		Controls (at risk)	
Schizophrenia	4	(91)	7	(98)
Manic Depressive Psychosis	10	(52)	6	(48)
Paraphrenia	4	(22)	2	(17)
Congenital Mental Defect	0	(3)	1	(5)
Epilepsy	1	(14)	5	(13)
Neurosis (Psychopathic Personalities)	2	(16)	0	(7)
Organic Disorders	1	(1)	2	(11)
Died within 6/12 of operation date	9		3	
Deaths in patients never discharged from hospital	20		19	

B.18   FURTHER INFORMATION ON DEATHS

OCCURRING IN RUNWELL HOSPITAL

AGE AT DEATH OF PATIENTS DYING IN RUNWELL HOSPITAL

Age at death	Leucotomies	Controls
21 - 30	3	4
- 40	4	3
- 50	8	6
- 60	5	7
+ 60	2	3
Total	22	23

Work status of patients discharged
after operation date and not subse-
quently re-admitted to Mental
Hospital ("Recovered patients").

B.19.

Rating	Leucotomies	Controls
As competent as before illness	14	18
Coping	20	4
Incompetent or Idle	5	0
Not contacted	3	15
Total	42	37

Symptom status of all patients
discharged after operation and
not subsequently re-admitted to
Mental Hospital ("Recovered patients").

B.20.

Rating	Leucotomies	Controls
No symptoms	15	18
Symptoms better	18	2
Symptoms same	6	2
Symptoms worse	0	0
Not contacted	3	15
Total	42	37

Diagnosis of all patients discharged
after operation and not subsequently
re-admitted to Mental Hospital
("Recovered patients").

B.21.

Diagnosis	Leucotomies		Controls	
	No. recovered	(No. at risk)	No. recovered	(No. at risk)
Schizophrenia	14	(91)	10	(97)
Affective Disorders	15	(52)	14	(48)
Paraphrenia	5	(22)	3	(17)
Epilepsy: Mental Defect	3	(16)	1	(19)
Psychoneurosis: Psychopathy	5	(16)	5	(7)
Organic brain disorder	0	(1)	4	(10)
Total	42	(198)	37	(198)

Age on admission of all patients
discharged after operation and not
subsequently re-admitted to Mental
Hospital ("Recovered patients").

B.22.

Age on admission	Leucotomies	Controls
under 20	3	1
- 30	8	10
- 40	10	11
- 50	12	4
- 60	7	10
+ 60	2	1
Total	42	37

$$n = 2: \quad X_2 = 3.9: \quad P = 0.2$$

Length of admission to operation date
of all patients discharged after operation
and not subsequently re-admitted to Mental
Hospital ("Recovered patients").

B.23.

Length of admission to operation date	Leucotomies		Controls	
- 1/12	12		8	
- 3/12	2		6	
- 6/12	2	23	6	31
- 1 yr.	4		7	
- 2 yrs.	3		4	
- 3 yrs.	6		2	
- 4 yrs.	4		1	
- 5 yrs.	4	19	0	6
- 10 yrs.	5		3	
10 yrs.	0		0	
Total	42	42	37	37

$$n = 1: \quad X_2 = 1.5: \quad P = 0.2$$

B.24.   MULTIPLE   LEUCOTOMIES
                        ─────────────────────────

AGE ON ADMISSION

Total - 20

Sex   Female 20:

Male   0:

Age on admission	Leucotomies	Controls
16 - 20	3	3
21 - 30	10	9
31 - 40	3	4
41 - 50	2	2
51 - 60	2	2
Total	20	20

B.25   MULTIPLE LEUCOTOMIES

PERIOD IN HOSPITAL PRIOR TO
1st OPERATION DATE

Age on admission	Leucot-omies	Controls		Leucot-omies	Controls
1/12	2	1	)		
- 3/12	1	0	)		
- 6/12	0	1	)	10	9
- 1 year	3	4	)		
- 2	4	3	)		
- 3	2	4	)		
- 4	2	0	)		
- 5	1	2	)	10	11
- 10	2	2	)		
+ 10	3	3	)		
Total	20	20		20	20

B.26. MULTIPLE LEUCOTOMIES

PREVIOUS ADMISSION TO
RUNWELL HOSPITAL

Total number of previous
admissions to Runwell Hospital

No. of Admissions	Leucotomies	Controls
1	7	3
2	2	0
3	1	1
4	0	0

B.27. MULTIPLE LEUCOTOMIES

PREVIOUS ADMISSION TO
RUNWELL HOSPITAL

Total time of previous
admissions to Runwell Hospital

Total time spent in all admissions	No.of Patients Leucot-omies	Controls	Leucot-omies	Controls
1/12	0	0		
- 3/12	2	1		
- 6/12	5	0	8	2
- 1 year	1	1		
- 2	0	0		
- 3	2	2		
- 4	0	0		
- 5	0	0	2	2
- 10	0	0		
+ 10	0	0		
Total previously admitted	10	4	10	4
Total not previously admitted	10	16	10	16
Total	20	20	20	20

B.28.   RESULTS OF 20 MULTIPLE LEUCOTOMIES
COMPARED WITH MATCHED CONTROLS

	Leucotomies	Controls
Never discharged[x]	10	11
Discharged and not readmitted	4	6
Discharged and[xx] readmitted to Runwell Hospital	6	3
Total	20	20
Died – same admission[x]	0	1
subsequent[xx] admission	0	0

B.29.   PERIOD BETWEEN DISCHARGE AND
READMISSION IN MULTIPLE LEUCOTOMIES

Period between discharge & readmission	Leucot- omies	Controls	Leucot- omies	Controls
- 1/12	1	1)		
- 3/12	2	0)	4	2
- 6/12	1	1)		
- 1 year	0	0)	0	0
- 2 year	2	1)	2	1
Total	6	3	6	3

B.30.　　　　　NUMBER OF READMISSIONS IN
　　　　　　　　EACH PATIENT READMITTED
　　　　　　　　UP TO 31/12/55

No. of readmissions	Leucotomies	Controls
1	3	1
2	2	2
3	1	0
Total	6	3

B.31.   TOTAL PERIOD OF READMISSION IN
      EACH PATIENT READMITTED UP TO 31/12/55

Total period of readmission	No. of Patients Leucot-omies	Controls	Leucot-omies	Controls
1/12	0	0	)	
- 3/12	1	2	)	
- 6/12	1	0	) 3	2
- 1 year	0	0	)	
- 2	1	0	)	
- 3	1	0	)	
- 4	1	0	)	
- 5	0	0	) 3	1
- 10	1	1	)	
+ 10	0	0	)	
Total	6	3	6	3

B.32.　　　PERIOD FROM OPERATION TO DISCHARGE
IN MULTIPLE LEUCOTOMIES AND MATCHED
CONTROLS

Period from operation date to discharge	Leucot- omies	Controls		Leucot- omies	Controls
1/12	2	2	)		
- 3/12	0	2	)		
- 6/12	0	1	)	5	6
- 1 year	3	0	)		
- 2	0	1	)		
- 3	0	1	)		
- 4	1	1	)		
- 5	1	1	)	5	3
- 10	3	0	)		
+ 10	0	0	)		
Total discharged	10	9		10	9
Never discharged	10	11		10	11
Total	20	20		20	20

B.33.

WARD ADJUSTMENT OF MULTIPLE LEUCOTOMIES AND
MATCHED CONTROLS NEVER DISCHARGED FROM HOSPITAL

Type of Ward	Leucotomies			Controls		
	Ward at 1st Op.	Ward at 2nd Op.	Ward at Survey	Ward at 1st Op.	Ward at 2nd Op.	Ward at Survey
"Open"	(0)	(0)	0	(1)	(1)	2
"Non-Observation"	(0)	(1)	2	(5)	(4)	5
"Observation"	(10)	(9)	8	(4)	(5)	3
Death	-	-	0	-	-	1
Total	-	-	10	-	-	11

B.34.

SINGLE LEUCOTOMIES
IN MALE PATIENTS

_____

Age on Admission

Total - 43
in each group

Age on Admission	Leucotomies	Controls
16 - 20	3	1
21 - 30	20	20
31 - 40	6	8
41 - 50	8	8
51 - 60	6	6
60	0	0

B.35.

SINGLE LEUCOTOMIES
IN MALE PATIENTS

Period in Hospital prior to Operation

Period from admission to date of operation	Leucot-omies	Controls		Leucot-omies	Controls
1/12	6	6	)		
- 3/12	4	1	)		
- 6/12	4	5	)	18	18
- 1 year	0	2	)		
- 2	4	4	)		
- 3	9	8	)		
- 4	2	4	)		
- 5	5	3	)	25	25
- 10	8	9	)		
+ 10	1	1	)		

B.36.

SINGLE LEUCOTOMIES
IN MALE PATIENTS

PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL

Number of previous admissions
to Runwell Hospital

Number of previous admissions	Leucotomies	Controls
1	5	8
2	2	3
3	7	3
4	1	1
Total	15	15

B.37.

SINGLE LEUCOTOMIES
IN MALE PATIENTS

Total time of all previous admissions
to Runwell Hospital

Total time of all previous admissions	Leucot-omies	Controls		Leucot-omies	Controls
1/12	1	2	)		
- 3/12	2	0	)		
- 6/12	3	2	)	14	12
- 1 year	3	6	)		
- 2	5	2	)		
- 3	0	3	)		
- 4	1	0	)		
- 5	0	0	)	1	3
- 10	0	0	)		
Total	15	15		15	15

B.38   RESULTS IN 43 MALE SINGLE
LEUCOTOMIES AND MATCHED CONTROLS

Result	Leucotomies	Controls
Never discharged	23	30
Discharged and not readmitted	11	7
Transferred	1	0
Discharged and readmitted to Runwell Hospital	8	6
Total	43	43
Died – same admission	3	4
subsequent admission	0	2
Total deaths	3	6

B.39.   RESULTS IN 43 MALE SINGLE
         LEUCOTOMIES AND MATCHED CONTROLS

Period between discharge and readmission	Leucot-omies	Controls	Leucot-omies	Controls
1/12	1	0	)	
- 3/12	0	0	)	
- 6/12	2	2	) 4	4
- 1 year	0	1	)	
- 2	1	1	)	
- 3	1	1	)	
- 4	1	0	)	
- 5	2	1	) 4	2
- 10	0	0	)	
+ 10	0	0	)	
Total readmitted	8	6	8	6

B.40   NUMBER OF READMISSIONS IN
        EACH PATIENT READMITTED
        UP TO 31.12.55.

Total No. of readmissions	Leucotomies	Controls
1	5	3
2	3	1
3	0	0
4	0	2
Total readmitted	8	6

B.41   TOTAL PERIOD OF READMISSION IN
          EACH PATIENT READMITTED UP TO 31.12.55

Total period of readmission	No. of Patients				
	Leucot- omies	Controls		Leucot- omies	Controls
1/12	0	1	)		
- 3/12	1	0	)		
- 6/12	1	0	)	5	2
- 1 year	2	0	)		
- 2	1	1	)		
- 3	0	0	)		
- 4	0	1	)		
- 5	1	0	)	3	4
- 10	1	3	)		
+ 10	1	0	)		
Total readmitted	8	6		8	6

B.42   SINGLE LEUCOTOMIES IN MALE PATIENTS

PERIOD FROM OPERATION DATE TO DISCHARGE

Period from operation date to discharge	Leucotomies	Controls	Leucotomies	Controls
- 1/12	0	5)		
- 3/12	6	3)		
- 6/12	5	2)	15	11
- 1 yr	2	0)		
- 2 yrs	2	1)		
- 3 yrs	2	1)		
- 4 yrs	0	0)		
- 5 yrs	1	0)	5	2
- 10 yrs	2	0)		
+ 10 yrs	0	1)		
Total discharged	20	13	20	13
Never discharged	23	30	23	30
Total	43	43	43	43

B.43   COMPARING WARD ADJUSTMENT OF MALE LEUCOTOMY

AND MATCHED CONTROL PATIENTS

NEVER DISCHARGED FROM HOSPITAL

Type of Ward	Leucotomies		Controls	
	Ward at operation	Ward at survey	Ward at operation	Ward at survey
"Open"	1	1	3	2
"Non-observation"	0	3	7	6
"Observation"	19	16	16	18 *

* $(n = 1 : X_2 = \cdot 01 : p = 0 \cdot 9)$

B.44

SINGLE LEUCOTOMIES IN FEMALE PATIENTS

AGE ON ADMISSION

TOTAL 135 in EACH GROUP

Age on admission	Leucotomies	Controls
16 - 20	4	1
21 - 30	29	28
31 - 40	44	49
41 - 50	29	30
51 - 60	20	18
+ 60	9	9
Total	135	135

B.45   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

              PERIOD IN HOSPITAL PRIOR TO OPERATION

Period from admission to operation date	Leucotomies including transfers	Controls .	Leucotomies	Controls
1/12	27	19		
- 3/12	7	14		
- 6/12	6	10	68	70
- 1 yr	12	9		
- 2 yrs	16	18		
- 3 yrs	13	12		
- 4 yrs	12	7		
- 5 yrs	3	6	67	65
- 10 yrs	36	37		
+ 10 yrs	3	3		
Total	135	135	135	135

B.46   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL

NUMBER OF PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL

Number of admissions	Leucotomies	Controls
1	18	18
2	10	11
3	0	3
4	1	2
5	0	0
6	0	0
Total	29	34
Not previously admitted	106	101
Total	135	135

B.47   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL

TOTAL TIME OF ALL PREVIOUS ADMISSIONS TO RUNWELL HOSPITAL

	Leucotomies	Controls	Leucotomies	Controls
1/12	3	8		
- 3/12	6	4		
- 6/12	7	5	29	31
- 1 yr	6	4		
- 2 yrs	7	10		
- 3 yrs	0	1		
- 4 yrs	0	0		
- 5 yrs	0	2	0	3
- 10 yrs	0	0		
+ 10 yrs	0	0		
Total previously admitted	29	34	29	34
Not previously admitted	106	101	106	101
Total	135	135	135	135

B.48   RESULTS IN 135 FEMALE LEUCOTOMIES

AND MATCHED CONTROLS

Results	Leucotomies	Controls
Never discharged	69	72
Discharged and not readmitted	38	34
Transfers	11	5
Discharged and readmitted to Runwell Hospital	17	24
Total	135	135
Died - same admission	17	14
subsequent admission	2	2
Total deaths	19	16

B.49   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

PERIOD BETWEEN DISCHARGE AND READMISSION

Period between discharge and readmission	Leucotomies	Controls	Leucotomies	Controls
- 1/12	1	3		
- 3/12	2	4		
- 6/12	1	1	10	14
- 1 yr	2	3		
- 2 yrs	4	3		
- 3 yrs	0	4		
- 4 yrs	1	3		
- 5 yrs	2	0	7	10
- 10 yrs	4	3		
+ 10 yrs	0	0		
Total readmitted	17	24	17	24

B.50   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

NUMBER OF READMISSIONS IN EACH FEMALE PATIENT

READMITTED TO RUNWELL HOSPITAL UP TO 31.12.55

Total number of readmissions	Leucotomies	Controls
1	11	12
2	1	6
3	4	3
4	1	0
5	0	0
6	0	3
Total readmitted	17	24

B.51 SINGLE LEUCOTOMIES IN FEMALE PATIENTS

TOTAL PERIOD OF READMISSION IN EACH FEMALE PATIENT

READMITTED TO RUNWELL HOSPITAL UP TO 31.12.55

Total period of readmission	Number of Patients		Number of Patients	
	Leucotomies	Controls	Leucotomies	Controls
1/12	2	1		
- 3/12	1	3		
- 6/12	1	3	9	17
- 1 yr	2	6		
- 2 yrs	3	4		
- 3 yrs	1	0		
- 4 yrs	1	3		
- 5 yrs	0	0	8	7
- 10 yrs	6	3		
+ 10 yrs	0	1		
Total readmitted	17	24	17	24

$$(n = 1 : X_2 = 0 \cdot 7 : p = 0 \cdot 3)$$

B.52   SINGLE LEUCOTOMIES IN FEMALE PATIENTS

PERIOD FROM OPERATION DATE TO DISCHARGE

(Transfers in Parenthesis)

Period from operation date to discharge	Leucotomies	Controls	Leucotomies	Controls
1/12	8 (3)	12	)	
- 3/12	12 (3)	17 (1)	)	
- 6/12	6 (1)	10	) 45 (9)	53 (2)
- 1 yr	9 (2)	10 (1)	)	
- 2 yrs	10	4	)	
- 3 yrs	5 (1)	1 (1)	)	
- 4 yrs	0 (2)	0	)	
- 5 yrs	0	2	) 9 (3)	6 (3)
- 10 yrs	3	3 (2)	)	
+ 10 yrs	1	0	)	
Total discharged (Transferred)	54 (12)	59 (4)	54 (12)	59 (5)

/B.53 COMPARING WARD ADJUSTMENT OF FEMALE LEUCOTOMIES

AND MATCHED CONTROL PATIENTS NEVER DISCHARGED

FROM HOSPITAL

Type of Ward	Leucotomies		Controls	
	Ward at operation date	Ward at survey	Ward at operation date	Ward at survey
"Open"	0	6	7	17 [x]
"Non-observation"	8	17	26	24 [xx]
"Closed"	44	29	25	17 [xxx]
Total	52	52	58	58

[x] $(n = 1 : X_2 = 1 : p = 0.3)$
[xx] $(n = 1 : X_2 = 2 : p = 0.2)$
[xxx] $(n = 1 : X_2 = .01: p = 0.9)$

B.54   RESULTS IN ALL SINGLE LEUCOTOMIES,

MALE AND FEMALE

TOTAL 178 IN EACH GROUP

Results	Leucotomies	Controls
Never discharged (Died)	92 (20)	102 (18)
Discharged and not readmitted	49	41
Discharged and readmitted to Runwell Hospital (Died)	25 (2)	30 (4)
Transfers	12	5
Total	178	178

$$(n = 3 : X_2 = 4.76 : p = 0.2)$$

B. 55 and 56.

DIAGNOSTIC GROUPS - FIRST METHOD.
SCHIZOPHRENIA.

B. 55. <u>Sex Distribution</u>.

Sex	Leucotomies	Controls
Male	20	24
Female	71	73
TOTAL	91	97

B. 56. <u>Age Distribution</u>.

Age on admission	Leucotomies	Controls
- 20	8	4
- 30	44	41
- 40	28	35
- 50	9	14
- 60	2	3
+ 60	0	0
TOTAL	91	97

B. 57.   DIAGNOSTIC GROUPS - FIRST METHOD.

SCHIZOPHRENIA.

Length of admission to operation date.[*]

Length of Admission	Leucotomies.		Controls	
- 1/12	8)		3)	
- 3/12	2)		2)	
- 6/12	3) 33		6) 32	
- 1 yr.	7)		9)	
- 2 "	13)		12)	
,- 3	10)		10)	
- 4	7)		6)	
- 5	5) 58		7) 65	
-10	31)		36)	
+10	5)		6)	
TOTAL	91	91	97	97

$(n = 1, X^2 = .14, p = 0.7)$

[*] It will be recalled that in the original matching each control was allocated the operation date of its matched leucotomy subject.   These dates have been adhered to here.

B. 58

Results in 188 patients diagnosed as
suffering from SCHIZOPHRENIA and treated
in groups known to be comparable for sex,
age distribution and chronicity.

	Leucotomies	Controls
Never discharged [*]	53 (59%)	72 (74%)
Discharged at some time	33 (37%)	20 (20%) [**]
Transferred	5	5
TOTAL	91	97

$(n = 2, \; x^2 = 5.738, \; p = \; > .05)$

[*] Died in hospital
on first admission   4   7

[**] $(n = 1, \; x^2 = 4.4, \; p = \; < .05)$

Further results in discharged patients
diagnosed as suffering from Schizophrenia.

B.59.

	Leucotomies	Controls
Total discharged at some time	33	20
Since re-admitted to Runwell Hospital	13	6
Never re-admitted to Runwell Hospital	20(22%)	14(14%)
Re-admitted to other hospitals excluding transfers	6	4
Total not re-admitted to mental hospital since discharge	14(15%)	10(10%)

$$* \quad (n = 1, \ X^2 = 1.8, \quad p = 0.5)$$

SCHIZOPHRENIA - FIRST METHOD.

PERIOD IN HOSPITAL SINCE OPERATION

(a) Runwell Hospital.

B.60.

	Leucotomies		Controls	
- 1/12	5		3	
- 3/12	5		2	
- 6/12	3	23	3	19
- 1 yr.	4		7	
- 2 yrs.	6		4	
- 3 yrs.	5		6	
- 4 yrs.	6		7	
- 5 yrs.	6	68	10	78
- 10 yrs.	25		18	
+10 yrs.	26		37	

$$n = 1$$
$$X_2 = < 1$$
$$p = > 0.3$$

SCHIZOPHRENIA - FIRST METHOD.

PERIOD IN HOSPITAL SINCE OPERATION

(b) all Mental Hospital.

B.61.

	Leucotomies		Controls	
- 1/12	2		3	
- 3/12	2		2	
- 6/12	2	16	2	16
- 1 yr.	5		2	
- 2 yrs.	5		7	
- 3 yrs.	4		5	
- 4 yrs.	6		7	
- 5 yrs.	7	75	11	81
- 10 yrs.	29		19	
+10 yrs.	29		39	

$$n = 1$$
$$X_2 = < 1$$
$$p = > 0.3$$

B. 62
B. 63.
B. 64

SCHIZOPHRENIA - FIRST METHOD.
ANALYSIS of " RECOVERED" PATIENTS.

B. 62. Period since discharge.	Leucotomies	Controls
- 1 yr.	2 [*]	1 [*]
- 2	1 [**]	0
- 3	3	0
- 4	1	1
- 5	3	0
- 10	3	5
+ 10	1	3
TOTAL	14	10

[*] Still out in 1957.
[**] In Mental After-Care Home

B. 63. Work Rating.

	Leucotomies	Controls
As competent as before illness	5	6
Coping	5	1
Idle or incompetent	3	0
Not contacted	1	3
TOTAL	14	10

B. 64. Symptoms Rating.

	Leucotomies	Controls
None	5	5
Better	6	2
Same	2	0
Worse	0	0
Not contacted	1	3
TOTAL	14	10

B.65.

AGE ON ADMISSION OF "RECOVERED" SCHIZOPHRENICS.

Age on admission	Leucotomies	Controls
- 20	3 c.c.c.	1
- 30	5 u.c.i.	5 u.u.
- 40	4 c.i.	3 u.c.
- 50	2 i.	1
Total	14	10

i = incompetent
c = coping
u = not contacted

B.66.   LENGTH of ADMISSION to OPERATION DATE

of "RECOVERED" SCHIZOPHRENICS.

Length of Admission	Leucotomies	Controls
- 2 years	5 ccii	6 cuuu
+2 years	9 ccciu	4
TOTAL	14	10

c — coping

i = incompetent

u = not contacted

B.67.   LENGTH of STAY in HOSPITAL after

OPERATION DATE of "RECOVERED"

SCHIZOPHRENICS.

Period of Stay	Leucotomies		Controls	
- 1/12	0)		2 u)	
- 3/12	1)		2)	
- 6/12	2 ci)	7	2 uu)	7
- 1	1 i)		1 c)	
- 2	3 ciu)		0)	
- 3	1 c)		0)	
- 4	0)		0)	
- 5	1)	7	2)	3
- 10	5 cc)		0)	
+ 10	0)		1)	
TOTAL	14	14	10	10

c = coping

i = incompetent

u = not contacted

B. 68.   WORK STATUS during PERIOD of DISCHARGE

of SCHIZOPHRENIC PATIENTS DISCHARGED

but READMITTED to RUNWELL HOSPITAL

or OTHER MENTAL HOSPITALS.

Rating	Leucotomies	Controls
As competent as before illness.	1	2
Coping	6	2
Idle or incompetent	12	6
Not contacted	0	0
TOTAL	19	10

B.69.   SYMPTOM STATUS during PERIOD of DISCHARGE
of SCHIZOPHRENIC PATIENTS DISCHARGED but
READMITTED to RUNWELL HOSPITAL or other
MENTAL HOSPITALS.

Rating	Leucotomies	Controls
No symptoms	1	3
Symptoms better	6	0
Symptoms same	8	7
Symptoms worse	4	0
Not contacted	0	0
TOTAL	19	10

B. 70.
B. 71.

DIAGNOSTIC GROUPS - FIRST METHOD.

AFFECTIVE DISORDERS.

B. 70. Sex Distribution.

Sex	Leucotomies	Controls
Male	11	6
Female	41	42
TOTAL	52	48

$$(n = 1, \quad x^2 = 1, \quad p = .3)$$

B. 71. Age distribution.

Age on admission	Leucotomies	Controls
- 20	0	0
- 30	2	7
- 40	11	12
- 50	11	9
- 60	20	15
+ 60	8	5
TOTAL	52	48

B. 72.   DIAGNOSTIC GROUPS - FIRST METHOD
B. 73.   AFFECTIVE DISORDERS.

B.72.
Length of admission to operation date.

Length of admission	Leucotomies		Controls	
- 1/12	18)		15)	
- 3/12	4)		6)	
- 6/12	2)	31	5)	33
- 1	3)		1)	
- 2	4)		6)	
- 3	6)		8)	
- 4	5)		3)	
- 5	1)	21	1)	15
- 10	7)		2)	
+ 10	2)		1)	
TOTAL	52	52	48	48

(n = 1, X^2 = 1.06,   p = .3)

B. 73. Diagnostic sub-groups.

Melancholia	39	30
Mania	9	5
Manic-depressive psychosis	4	13
TOTAL	52	48

(n 2, X^2 5.2,   p≠7 .05)

Results in 99 patients diagnosed as suffering
from Affective Disorders (Melancholia, Mania,
Manic Depressive Psychosis) and treated in
groups known to be comparable for age, sex
distribution and chronicity.

B.74.	Leucotomies	Controls	
Total	52	48	
Never discharged*	21 (13)	14 (10)	n = 1
	(7)	(2)	X_2= 1.5
	(1)	(2)	P. = .3
Discharged at some time**	26	34	
Transferred	5 (4)		
	(1)		
	(0)		
*Died in first admission	8 (7)	4 (4)	
	(1)	(0)	
	(0)	(0)	
**Died on subsequent admission	1 (1)	2 (1)	one
	(0)	(0)	died
	(0)	(1)	in 1956
Total dead	9	6	

DISCHARGE RESULTS IN AFFECTIVE DISORDERS.
FIRST METHOD,

B.75.

	Leucotomies	Controls
Total discharge at some time	26	34
Discharged but subsequently re-admitted	10	17
Never re-admitted to Runwell Hospital	16 (15) (1) (0)	17 (13) (3) (1)
Re-admitted to other hospitals encluding transfers	1	2
Committed suicide after discharge	0	1
Total not re-admitted to Mental Hospital since discharge	15	14

B. 76.
B. 77.
B. 78

AFFECTIVE DISORDERS - FIRST METHOD

ANALYSIS of " RECOVERED" PATIENTS.

B. 76. <u>Period since discharge</u>

Period since discharge	Leucotomies	Controls
- 1 yr.	0	0
- 2	0	0
- 3	0	0
- 4	1	1
- 5	1	1
- 6	2	0
- 7	3	1
- 8	1	1
- 9	2	2
- 10	1	1
+ 10	4	7
TOTAL	15	14

B. 77. <u>Work rating.</u>

Work rating	Leucotomies	Controls
As competent as before illness	6	5
Coping	9	1
Idle or incompetent	0	0
Not contacted	0	8
TOTAL	15	14

B. 78. <u>Symptom rating</u>

Symptom rating	Leucotomies	Controls
None	6	6
Better	8	0
Same	1	0
Worse	0	0
Not contacted	0	8
TOTAL	15	14

B. 80.   AGE on ADMISSION of " RECOVERED" PATIENTS

with AFFECTIVE DISORDERS.

Age on admission	Leucotomies	Controls
- 30	0	3 u
- 40	3 cc	3 u
- 50	4 cu	1 u
- 60	6 cccc	7 cuuuuu
+ 60	2 cc	0
TOTAL	15	14

c = coping

i = incompetent

u = not contacted

B.81.   LENGTH of ADMISSION to OPERATION DATE

of " RECOVERED" PATIENTS with

AFFECTIVE DISORDERS.

Length of Admission	Leucotomies		Controls	
- 1/12	8 cccccu)		5 uuuu)	
- 3/12	1 c)		3 cu)	
- 6/12	0)	9	1)	11
- 1	0)		1)	
- 2	0)		1)	
- 3	2 c)		2 uu)	
- 4	2 c)		1 c)	
- 5	1 c)	6	0)	3
- 10	1)		0)	
+ 10	0		0	
TOTAL	15	15	14	14

c = coping

i = incompetent

u = not contacted

B. 82.   LENGTH of STAY in HOSPITAL after OPERATION
DATE of " RECOVERED" PATIENTS with AFFECTIVE
DISORDERS.

Period of stay	Leucotomies		Controls	
- 1/12	3 cu)		4 uuu)	
- 3/12	4 ccc)		4 uuu)	
- 6/12	1 c)	12	0)	12
≐ 1	2 c)		1)	
- 2	2 cc)		3 cuu)	
- 3	1)		1)	
- 4	0)		0)	
- 5	0)	3	0)	2
- 10	2 c)		1)	
+ 10	0)		0)	
TOTAL	15	15	14	14

c = coping

i = incompetent

u = not contacted

B. 83.   PERIOD of STAY in RUNWELL HOSPITAL

after OPERATION DATE of all PATIENTS

with AFFECTIVE DISORDERS.

Period of Stay	Leucotomies		Controls	
- 1/12	7)		5)	
- 3/12	7)		5)	
- 6/12	3) 27		3) 29	
- 1	6)		6)	
- 2	4)		10)	
- 3	2)		2)	
- 4	4)		5)	
- 5	1) 25		1) 19	
- 10	11)		9)	
+ 10	7)		2)	
TOTAL	52	52	48	48

B. 84.   PERIOD of STAY in MENTAL HOSPITALS
          after OPERATION DATE of all PATIENTS
          with AFFECTIVE DISORDERS.

Period of Stay	Leucotomies		Controls	
- 1/12	5)		5)	
- 3/12	6)		4)	
- 6/12	4)	26	3)	28
- 1	6)		6)	
- 2	5)		10)	
- 3	3)		2)	
- 4	3)		5)	
- 5	1)	26	2)	20
- 10	11)		9)	
+ 10	8)		2)	
TOTAL	52	52	48	48

B. 85   WORK STATUS during PERIOD of DISCHARGE

of PATIENTS with AFFECTIVE DISORDERS

DISCHARGED but READMITTED to RUNWELL

HOSPITAL or other MENTAL HOSPITALS.

Rating	Leucotomies	Controls
As competent as before illness	0	9
Coping	1	3
Idle or incompetent	10	6
Not contacted	0	1
TOTAL	11	19

B. 86.   SYMPTOM STATUS during PERIOD of DISCHARGE
           of PATIENTS with AFFECTIVE DISORDERS
           DISCHARGED but READMITTED to RUNWELL or
               other MENTAL HOSPITALS.

Rating	Leucotomies	Controls
No symptoms	0	9
Symptoms better	1	4
Symptoms same	9	5
Symptoms worse	1	0
Not contacted	0	1
TOTAL	11	19

RESULTS IN AFFECTIVE DISORDERS

B.87.   REGARDLESS OF TREATMENT

	Never Discharged	Discharged never Re-admitted	Discharged and Re-admitted	Total
Manic Depressive Psychosis	2 (12.5%)	2 (12.5%)	12 (75%)	16
Mania	9 (64.3%)	5 (35.7%)	0 (0%)	14
Depression	23 (33.3%)	32 (46.4%)	14 (20.3%)	69

$$n = 4$$
$$X_2 = 26.68$$
$$P = <.001$$

DEPRESSION - FIRST METHOD.

B.88.

	Leucotomies	Controls	P
Total	39	30	
Never discharged ✗	13	10	.7
Discharged at any time	22	20	
Transferred	4	0	
Re-admitted to Runwell Hospital ✗✗	7	7	
Re-admitted to other Mental Hospitals and suicides	1	3	
Not re-admitted since discharge	15	10	.7
✗ Died on first admission	7	4	
✗✗Died on subsequent admission	1	1	
Total	8	5	

PARAPHRENIA (Paranoid Psychoses) - FIRST METHOD.

	Leucotomies	Controls
Total in each group:	22	17

B.89. SEX.

	Leucotomies	Controls
Male	3	1
Female	19	16

B.90. AGE ON ADMISSION.

	Leucotomies	Controls
-30	1	0
-40	3	6
-50	13	8
-60	4	2
+60	1	1

B.91. CHRONICITY.
Period from admission to operation date:

	Leucotomies		Controls	
- 1/12	1)		2)	
- 3/12	3)		2)	
- 6/12	0) 10		2) 10	
- 1 yr.	0)		1)	
- 2 yrs.	6)		3)	
- 3 yrs.	6)		1)	
- 4 yrs.	1)		1)	
- 5 yrs.	2) 12		0) 7	
- 10 yrs.	3)		5)	
+10 yrs.	0		0)	

$$n = 1$$
$$X_2 = .4$$
$$P = .5$$

B. 92

RESULTS in 39 CASES DIAGNOSED as PARAPHRENIA
and TREATED in GROUPS KNOWN TO BE COMPARABLE
in AGE, SEX DISTRIBUTION and CHRONICITY.

	Leucotomies	Controls
Never discharged	14	11
(Died)	(4)	(2)
Discharged at some time	7	6
Transferred	1	0
TOTAL	22	17
Readmitted to Runwell Hospital	1	2
Readmitted to other mental hospitals	1	1
Not readmitted to hospital since discharge	5	3

EPILEPSY - FIRST METHOD.

B.93.

	Leucotomies	Controls
Total	14	13
Never discharged *	10	8
Discharged at some time	3	5
Transferred	1	0
Discharged and re-admitted ** to Runwell Hospital	0	3
Discharged and re-admitted to other Mental Hospitals	1	1
Never re-admitted to Mental Hospital	2	1
* Died on same admission	1	3
** Died on subsequent adm.	0	2

9.

APPENDIX C.

Tables relating to Section 5.

C.1.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Single Leucotomies   52

Multiple Leucotomies 8

Total Leucotomies   60

	(a) SEX DISTRIBUTION.					
	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
Men	15	15	1	1	16	16
Women	37	37	7	7	44	44
Total	52	52	8	8	60	60

C.2.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA.

(b) AGE DISTRIBUTION.						
	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
16 - 20	5	2	2	2	7	4
21 - 30	24	24	6	6	30	30
31 - 40	20	23	0	0	20	23
41 - 50	2	2	0	0	2	2
51 - 60	1	1	0	0	1	1
61 - 70	0	0	0	0	0	0
Total	52	52	8	8	60	60

C.3.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA.

(c) CHRONICITY.					
Period of admission to Runwell Hospital					
Period from admission to operation date	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
< $\frac{1}{12}$	2	1	0	0		
- $\frac{3}{12}$	0	0	0	0		
- $\frac{6}{12}$	2	3	0	0	15	16
- 1 yr.	1	5	2	1		
- 2 yrs.	7	4	1	2		
- 3 yrs.	5	4	1	1		
- 4 yrs.	5	5	0	0		
- 5 yrs.	5	2	0	0	45	44
-10 yrs.	22	25	2	2		
+10 yrs.	3	3	2	2		
Total	52	52	8	8	60	60

C.4.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA

Previous admissions to Runwell Hospital				
Total period	Leucotomies	Total	Controls	Total
$< \frac{1}{12}$	0		2	
$- \frac{3}{12}$	0		2	
$- \frac{6}{12}$	4	14	3	18
-1 year	4		7	
- 2 years	6		4	
- 3 years	0		1	
-4 years	0		0	
- 5 years	0	0	0	1
-10 years	0		0	
+10 years	0		0	

C.5.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Prior Admissions to other Hospitals				
Total Period of admission	Leucotomies	Total	Controls	Total
$< \frac{1}{12}$	1		3	
$- \frac{3}{12}$	1	11	3	20
$- \frac{6}{12}$	0		3	
- 1 year	5		7	
- 2 years	4		4	
- 3 years	4		1	
- 4 years	3		2	
- 5 years	1	19	0	18
- 10 years	7		11	
+ 10 years	4		4	
TOTAL 30			38	

n = 1
X_2 = 1.1
P = 0.2

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and

SCHIZOPHRENIA.

Material excerpted from Case Records.		
	Leucotomies	Controls
Civil State:		
Single	46	49
Married	14	9
Separated	0	2
Occupational Record:		
Stable	22	19
Unstable	16	14
No information	22	27
Family History:		
Parents ill and in Mental Hospital	5	5
Parents ill and no Mental Hospital	7	6
Suicide	1	1
"Others" ill and in Mental Hospitals	6	8
"Others" ill and no Mental Hospital	5	8
Suicide	1	1
No Family History	25	22
No Information	6	9
1st degree relatives in Mental Hospital or suicide	10	6
2nd degree relatives in Mental Hospital or suicide	4	7

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and

SCHIZOPHRENIA.

Material excerpted from Case Records.		
	Leucotomies	Controls
School Attended:		
Elementary	35	36
Central	2)	4)
Grammar	7) 9	5) 9
Private Tutor, "Special", Orphanage, etc.	7	7
No information	9	8
"Backward"	7	9
Heterosexual attainment:		
Friendship	10	10
Engagement	3	2
Marriage	14	11
No friendships	19	18
No information	14	19
Habits:		
Intemperance mentioned, Sexual licence, alcohol	7	4
Personality:		
Extraverted	18	12
Introverted	30	30
No information	12	18

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and

SCHIZOPHRENIA.

Material excerpted from Case Records			
	Leucotomies	Controls	P
Age at onset of first symptom:			
Less than 20	17	11	
21 - 30	32	38	
31 - 40	11	8	
No information	0	3	
Type of onset:			
Acute (symptoms less than 3/12 duration)	15	9	0.2
Insidious	31	33	
No information	14	18	
Treatment before Operation:			
ECT (Electroplexy)	38	35	
Lept. (Leptazol)	23	20	
IST (Insulin Shock Treatment)	29	23	0.3
MI (Modified Insulin)	3	5	
PN (Prolonged Narcosis)	17	6 x	<0.05
Drugs, etc.	4	7	
ECT Response:			
Good	6	5	
Fair	8	14	
Poor	25	22	
Not used	22	19	

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY
and SCHIZOPHRENIA.

Material excerpted from Case Records		
	Leucotomies	Controls
Remissions in history:		
0	35	34
1	13	14
2	5	6
3	2	1
+3	3	2
No information	2	3
Occlusion Index:	135.5	131.1
Immobility Index:	17.87±9.05	17.87±7.47
Mean Weight in lbs.		
On admission	117.4±20.6	122.0±26.6
At date of operation	116.9±20.0	119.5±18.6

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA

Time sampled behaviour record.

(Behaviour exhibited in first
3 months after admission

	Leucotomies	Controls	P
Appearance:			
Neat	30	35	
Untidy	30	25	0.5
Motor Activity:			
Excited	15	17	
Normal	28	34	
Stuporose	17	9	0.1
Aggressiveness:			
Aggressive	32	24	0.2
Normal	9	19	
Withdrawn	9	17	0.1
Suicidal:			
Attempt	3	3	
Ideas	0	1	
Nil	57	56	
Sleep:			
Insomnia	10	6	
Normal	50	54	

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Time sampled behaviour record. (Behaviour exhibited in first 3 months after admission.)		
	Leucotomies	Controls
Socialisation:		
Mixing	7	15
Solitary	53	45
Attention:		
Alert	27	24
Dull	33	36
Speech:		
Garrulous	10	11
Normal	31	31
Mute	19	18
Nutrition:		
Bulimia	2	0
Normal	44	51
Anorexia	12	9
No information	2	0

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Time sampled behaviour record. (Behaviour exhibited in first 3 months after admission.)		
	Leucotomies	Controls
Hospital Work:		
Occupational Therapy	21	19
Ward	10	14
Utility - Department	1	3
Unemployed	23	18
No information	5	5
Mood:		
Euphoric	8	7
Normal	35	32
Depressed	17	21
Affect:		
Apathy	26	34
Normal	15	14
Tension	17	12
No information	2	0
Awareness:		
Confusion	30	31
Sensorially clear	27	25
No information	3	4

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY
and SCHIZOPHRENIA

Time sampled behaviour record.

(Behaviour exhibited in first
3 months after admission.)

	Leucotomies	Controls	P
Thought Disorder:			
Present	56	49	
Absent	2	9	
No information	2	2	
Content:			
Hallucinations	42	37	
Delusions	44	28 �	0.02
Ideas of Reference	12	9	
"Dilapidation"	6	8	
Hypochondriasis	0	2	

C.14.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA.

GENERAL RESULTS

	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
Never Discharged[*]						
Men	10	14	1	1	11	15
Women	24	25	4	5	28	30
Total	34	39	5	6	39	45
Discharged and out of Runwell Hospital						
Men	2	1	0	0	2	1
Women	7	8	1	1	8	9
Total	9	9	1	1	10	10
Discharged and Re-admitted [**]						
Men	2	0	0	0	2	0
Women	6	2	2	1	8	3
Total	8	2	2	1	10	3
Transfers						
Both Sexes	1	2	0	0	1	2
GRAND TOTAL	52	52	8	8	60	60
Died						
1st Admission[*]	1	4	0	1	1	5
Subsequent Adm.[**]	1	0	0	0	1	0

$n = 1$
$X_2 = 0.99$
$P^2 = 0.3$

C.15.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA

Total period spent in Runwell Hospital since operation date				
Total period	Leucotomies	Total	Controls	Total
$< 1\frac{1}{2}$	1		2	
$- \frac{3}{12}$	1		2	
$- \frac{6}{12}$	1	10	2	13
- 1 year	2		4	
- 2 years	5		3	
- 3 years	4		3	
- 4 years	3		8	
- 5 years	3	50	4	47
-10 years	18		13	
+ 10 years	22		19	
TOTAL	60	60	60	60

C.16.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY
and SCHIZOPHRENIA.

Total period spent in Mental Hospitals since operation date.				
Total period	Leucotomies	Total	Controls	Total
$<\frac{1}{12}$	1		2	
$-\frac{3}{12}$	0		2	
$-\frac{6}{12}$	0	7	2	12
- 1 year	2		2	
- 2 years	4		4	
- 3 years	3		3	
- 4 years	3		7	
- 5 years	4	53	5	48
- 10 years	18		13	
+10 years	25		20	
TOTAL	60	60	60	60

$$n = 1$$
$$X_2 = 1$$
$$P^2 = 0.2$$

C.17.
C.18.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA

Post Operative results during further
stay in Runwell Hospital.

C.17.	Leucotomies	Controls	P
Treatment:			
ECT (Electroplexy)	23	17	
Lept. (Leptazol)	9	6	
IST (Insulin Shock Treatment)	0	0	
MI (Modified Insulin)	0	1	
PN (Prolonged Narcosis)	0	3	
Drugs etc.	8	1	
C.18. **Health:**			
Epileptic Seizures	11	0 ✗	0.01
Chronic Suppurative Otitis Media	3)	1)	0.5
Cellulitis	3)	1)	
T.B. Cervical Glands	1	0	
Pulmonary Abscess: Bronchopneumonia	1	1	
P.T.B.	0	4	0.1
Appendicitis	1	1	
Impetigo	0	1	
Enuresis	1	0	
Anaemia	2	3	
Infestation - worms	0	3	0.2
Rectal prolapse	1	0	

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Post Operative results during further stay in Runwell Hospital.		
	Leucotomies	Controls
Health (Contd.)		
Megacolon	0	1
Syncope	1	1
Herpes Zoster	1	0
Hypertension	1	1
Glaucoma	1	0
Fibroids	0	1
Carcinoma	1	1
Osteoarthritis	1	1

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA.

	Post Operative results during further stay in Runwell Hospital.									
	Weight: Post operative weight of each patient expressed as % of weight at date of operation. $\left(\dfrac{\text{Post operative weight (lbs.)}}{\text{operation weight (lbs.)}} \times 100\right)$									
%	Leucotomies					Controls				
	$\frac{6}{12}$	1 yr.	2 yrs.	5 yrs.	10 yrs.	$\frac{6}{12}$	1 yr.	2 yrs.	5 yrs.	10 yrs.
< 80	0	0	0	1	0	1	0	1	1	0
- 85	0	0	1	0	1	0	2	1	0	1
- 90	3	1	3	1	0	2	2	2	6	0
- 95	4	4	6	2	1	3	3	9	3	1
-100	8	8	5	6	2	20	19	16	5	5
- 105	11	11	6	3	4	17	11	3	6	5
- 110	9	7	3	6	2	7	8	9	5	0
- 115	7	10	10	6	4	1	4	5	3	1
- 120	6	3	5	3	1	2	0	1	3	1
- 125	2	5	3	3	1	0	1	2	0	0
+ 125	3	3	7	7	7	0	1	0	4	5
No information	7	8	11	22	37	8	9	11	24	41

C.20

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY
and SCHIZOPHRENIA

Post Operative results during further
stay in Runwell Hospital.

Extract to show significant gains in weight				
Period after Operation	% Change	Leucotomies	Controls	
$\frac{6}{12}$ after operation	<105	26	42	$n = 2$ $X_2 = 13$ $P = 0.001$
	>105	27	10	
	No information	7	8	
1 yr. "	<105	24	37	$n = 2$ $X_2 = 7.49$ $P = 0.02$
	>105	28	14	
	No information	8	9	
2 yrs. "	<105	21	32	$n = 2$ $X_2 = 4.97$ $P = 0.1$; $n = 1$ $X_2 = 4.1$ $P = <0.05$
	>105	28	17	
	No information	11	11	
5 yrs. "	<105	13	21	$n = 2$ $X_2 = 1.69$ $P = 0.5$; $n = 1$ $X_2 = 3.4$ $P = >0.05$
	>105	25	15	
	No information	22	24	
10 yrs. "	<105	8	12	$n = 2$ $X_2 = 4.17$ $P = 0.1$; $n = 1$ $X_2 = 2.32$ $P = 0.3$
	>105	15	7	
	No information	37	41	

C.21.

SIGNIFICANT WEIGHT GAIN AT 6/12 AFTER OPERATION IN RELATION TO DISCHARGE IN 60 SCHIZOPHRENICS TREATED WITH LEUCOTOMY.				
	>105% weight at op.	<105% weight at op.	No Information	Total.
Discharged at some time from hospital.	10	7	3	20
Never discharged.	16	20	4	40
Total.	26	27	7	60

$$(N = 2: \quad x^2 = 1.24: \quad p = 0.5)$$

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY

and SCHIZOPHRENIA.

Results as far as behaviour rating is concerned in survivors in hospital (in June, 1957), comparing 43 leucotomy patients with 38 controls and showing change in behaviour from admission ("Before Operation") to June, 1957 ("After Operation). Ratings in June, 1957 estimated by nursing staff. Ratings on admission from case records by author.

Behaviour Rating	Leucotomies		Controls		P
	Before Operation	After Operation	Before Operation	After Operation	
Appearance: Neat	20	17	21	15	0.5
Untidy	23	26	17	23	
Motor Activity: Excited	12	24	11	17	0.3
Normal	22	17	21	15	
Stuporose	9	2	6	6	
Aggressiveness: Aggressive	23	29	15	14	0.3
Normal	15	7	12	11	
Withdrawn	5	7	11	13	
Suicidal: Attempt	1	0	1	0	
Ideas	0	0	0	0	
Nil	42	43	37	38	
Socialisation: Mixing	5	11	6	5	0.3
Solitary	38	32	32	33	

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA					
Behaviour Rating	Leucotomies		Controls		P
	Before Operation	After Operation	Before Operation	After Operation	
Attention: Alert	20	18	13	10	
Dull	23	25	25	28	
Speech: Garrulous	8	14	6	9	
Normal	23	22	19	18	
Mute	12	7	13	11	
Nutrition: Bulimia	2	0	0	0	
Normal	33	42	31	37	
Anorexia	8	1	7	1	
Sleep: Insomnia	8	8	2	3	
Normal	35	35	36	35	
Hospital Work: Occupational Therapy	15	19	13	3 x	0.05
Ward	8	14	10	17	
Utility	0	0	3	8	
Unemployed	18	10	11	10	0.5
No information	2	0	1	0	
Mood: Euphoric	8	14	5	9	
Normal	23	21	18	18	
Depressed	12	8	15	11	

C.24.

60 PAIRS MATCHED FOR SEX, AGE, CHRONICITY and SCHIZOPHRENIA.					
Behaviour Rating	Leucotomies		Controls		P
	Before Operation	After Operation	Before Operation	After Operation	
Affect: Tension	11	10	5	5	
Normal	22	11	8	10	
Apathy	18	22	25	23	
No information	2	0	0		
Awareness: Confusion	21	15	20	19	
Sensorially clear	19	28	18	19	
No information	3	0	8	0	
Thought Disorder: Present	42	34	31	34	0.3
Absent	0	9	5	4	
No information	1	0	2	0	
Content: Hallucinations	31	21	27	22	0.7
Delusions	35	19	17	17	.3
Ideas of Reference	5	5	5	1	
Hypochondriasis	0	2	1	0	
Phobias	0	2	0	2	
Obsessions and Compulsions	0	8	0	7	

C. 25 and 26.

19 PAIRS MATCHED for SEX, AGE on ADMISSION, LENGTH of ADMISSION and AFFECTIVE DISORDER.

C.25
Sex Distribution.

Sex	Leucotomies	Controls
Male	2	2
Female	17	17
TOTAL	19	19

C.26.
Age Distribution.

Age on admission	Leucotomies	Controls
- 40	2	4
- 50	0	1
- 60	12	10
+ 60	5	4
TOTAL	19	19

C.27. 19 PAIRS MATCHED for SEX, AGE on ADMISSION, LENGTH of ADMISSION and AFFECTIVE DISORDER.		
Length of Admission to Operation Date.		
Length of Admission	Leucotomies	Controls
- 1/12	8)	7)
- 3/12	1)	3)
- 6/12	1) 15	0) 13
- 1	3)	1)
- 2	2)	2)
- 3	2)	3)
- 4	1)	2)
- 5	0) 4	1) 6
- 10	0)	0)
+ 10	1)	0)
TOTAL	19 19	19 19

C.28. 19 PAIRS MATCHED for SEX, AGE on ADMISSION, LENGTH of ADMISSION and AFFECTIVE DISORDER. RESULTS.		
Results	Leucotomies	Controls
Never discharged (Died during 1st admission)	5 (2)	7 (3)
Discharged Readmitted Not readmitted (Died on subsequent readmission)	11 5 6 (1)	12 5 7 (0)
Transferred	3	0
TOTAL	19	19

C. 29 and 30.

12 PAIRS MATCHED for SEX, AGE on ADMISSION,

LENGTH of ADMISSION   and   DEPRESSION.

C.29. Sex Distribution.		
Sex	Leucotomies	Controls
Male	1	1
Female	11	11
TOTAL	12	12

C.30. Age Distribution.		
Age on admission	Leucotomies	Controls
- 40	0	2
- 50	2	1
- 60	7	6
+ 60	3	3
TOTAL	12	12

C.31.　12 PAIRS MATCHED for SEX, AGE on ADMISSION,

LENGTH of ADMISSION and DEPRESSION.

Length of Admission to Operation Date.

Length of Admission	Leucotomies		Controls	
- 1/12	6)		5)	
- 3/12	1)		3)	
- 6/12	1)	10	0)	11
- 1	1)		1)	
- 2	1)		2)	
- 3	2)	2	0)	1
- 4	0)		1)	
TOTAL	12	12	12	12

C. 32   12 PAIRS MATCHED for SEX, AGE on ADMISSION
LENGTH of ADMISSION and DEPRESSION.
RESULTS.

Results	Leucotomies	Controls
Never discharged	3	3
(Died during 1st admission)	(1)	(1)
Discharged	9	9
Readmitted	4	2
Not readmitted	5	7
(Died on subsequent readmission)	(1)	
Transferred	O	O
TOTAL	12	12

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