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Emotional and Psychological Factors in Epilepsy: Physiological Background

1. An elementary seizure discharge is characterized by high amplitude, synchronized activity expressed by interlocking brain wave rhythms of different frequencies. Among various components of the electrical changes associated with convulsions, slow waves of polarization may play an important role during both ictal and postictal stages.

2. Rhinencephalic structures show the lowest threshold. Their epileptic discharges show the most intricate organization. Travelling slow waves of polarization are very easy to induce in the olfactory brain, particularly in the Ammon's Formation. Contrasting with the complexity and intensity of the electrical correlates of the seizure discharges, there is a meagerness of its "clinical" expression in animals in terms of motor activity. Awareness is impaired and certain manifestations of emotional disturbances are reported. Experiments with ablation and chemical stimulation confirm the role of the rhinencephalon in emotional control. Experiments

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with sensory stimulation which reveal a high level of intergration also show an unusual reaction of hypersynchronization under certain conditions.

3. An epileptogenic excitation of a limited extent may produce psychological manifestations by a dual mechanism: (*a*) Only partial decrease of awareness may be experienced by the patient as a threat of ego dissolution and thus stir his emotional reactions. (*b*) The involvement of certain specific areas (for instance the rhinencephalon) may be expressed by disturbances of the emotional control.

4. Emotional stimuli may induce a convulsion through either (*a*) a creation of a general excitatory state with an excessive formation of either acetylcholine or insulin; or (*b*) a preliminary conditioning of certain stimuli which set up epileptogenic states in those areas of the brain which participate in the control of emotional processes ("affectogenic" epilepsy).

(Author's Abstr.)

Physiological Concomitants of the Phasic Disturbances seen in Periodic Catatonia

1. A longitudinal clinico-physiological study in the kinetic tradition has been made on 3 cases of periodic catatonia over a 2-year period. Twice- or thrice-weekly EEG records were analysed mainly for alpha rate, incidence, and amplitude, and for activity in other frequency ranges; daily estimations of the capillary blood-oxygen saturation under both resting and stressful conditions were made by an oximetric technique; and the results of all these measures were assessed in terms of objectively recorded changes in the psychiatric state and of other metabolic happenings similarly investigated.

2. In all 3 patients it was found that, starting from a relatively normal baseline in the remission phase, fairly consistent physiological changes occurred with the onset of stupor or catatonic excitement. Both the EEG alpha incidence and alpha amplitude fell sharply and simultaneously with the appearance of a disturbed phase, while the alpha rate rose steeply in 2 patients and decreased in the third at this time. In the periods of semidisturbance, whether these occurred before or after actual stupor or excitement, intermediate changes were seen.

3. A similar cycle of disturbance, closely corresponding to the changing psychomotor state, was noted oximetrically. Stupor or excitement was accompanied by capillary anoxaemia and a fall in the stress responsivity score. Both these variables underwent a recovery as the clinical condition remitted.

4. The metabolic concomitants of atypical stupor patterns and of the exhibition of thyroid extract were analysed in similar fashion and a tentative hypothesis linking these findings to the patients' varied attempts to achieve an homeostatic equilibrium in the face of stress is offered.

(Authors' Abstr.)

An Evaluation of Subcoma Insulin Therapy

In contrast with the accepted definition and efficacy of coma insulin therapy, the status of subcoma therapy is still not clear. From 1942 to 1952, subcoma insulin therapy at the Payne Whitney Psychiatric Clinic was considered to be that which produced a hypoglycemia sufficient to cause clouded consciousness lasting 45–60 minutes, but stopping short of coma. It has been used in the treatment of 212 patients during this period. There was improvement in 79·7 per cent. of 133 schizophrenic patients, and in 76·9 per cent. of 26 patients with affective illnesses. It appears that, in the treatment of certain psychopathologic reactions which occur in schizophrenic and less frequently in manic and depressed patients, subcoma insulin is a useful form of therapy. The psychopathologic reactions which are affected favorably by this treatment are catatonic excitements with marked fear, depression, or elation; acute paranoid reactions with fear, incoherence, elation or depression; schizophrenic episodes of excessive anxiety; manic excitements with marked anger or sexual excitement; and panic phases in depressive illnesses. Catatonic stupors with marked fear reacted favorably. It should be emphasized that, while many distressing symptoms can be controlled or relieved by insulin, the underlying illness is not necessarily altered.

(Authors' Abstr.)

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The Use of Frenquel in the Treatment of Disturbed Patients with Psychoses of Long Duration

In this double-blind study of the effect of Frenquel on 39 chronically hospitalized disturbed psychotic patients, the investigators were entirely unaware of whether the patients were receiving Frenquel or the placebo until after they had committed themselves on the patient's status. Despite the long-standing nature of the disturbances in behavior significant improvement was observed in a large proportion of the patients with various types of schizophrenic reactions. The authors feel these results are most encouraging for further use of this drug in patients with psychoses. (Authors' Abstr.)

Adrenocortical Function in Schizophrenia

Adrenocortical function of chronic schizophrenics was investigated. The concentration of adrenal steroids (17-hydroxycorticosteroids) in the peripheral blood was determined at 8 a.m.; after the intravenous administration of various amounts of ACTH or of a pyrogenic substance (Piromen); and after the subcutaneous injection of regular insulin. These drugs were employed to assess adrenocortical and pituitary-adrenocortical responsivity. Similar studies were made upon a comparable group of normal subjects. The adrenocortical and pituitary-adrenocortical reactivity of chronic schizophrenic and normal subjects were equivalent. There was no evidence of any impairment of adrenocortical physiology in the chronic schizophrenic patient. (Authors' Abstr.)

Four Years' Experience with Prefrontal Lobotomy

On the basis of the authors' observations, it may be said that bilateral prefrontal lobotomy has proved a useful tool in the treatment of many cases of chronic mental disease where conservative treatment has failed. There is no indication, however, that the operation really cures the patient's disease. Rather it seems to produce a new emotional equilibrium on the basis of which he can function more satisfactorily. This advantage is balanced by certain disadvantageous personality changes. Operation should, therefore, be recommended only when the patient is still capable of emotional reactions, when his thinking is not incoherent, and when the pre-psychotic history does not indicate a psychopathic personality. Another important factor is the presence of adequate family resources which would enable the patient to complete his post-lobotomy rehabilitation outside the hospital and provide the necessary guidance in the beginning of a new life in the community. (Authors' Abstr.)

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Neurologic Techniques and Rorschach Test in Detecting Brain Pathology

This study compares the validities of standard neurologic techniques with the validity of a Rorschach sign method (Piotrowski) in the diagnosis of brain disease.

The sample consists of 118 patients, all of whom were admitted to the neurology ward of a Veterans Hospital with various complaints and symptoms referable to the nervous system. All patients received thorough neurologic work-ups, including electroencephalograms, skull X-rays, and lumbar punctures. In addition, a Rorschach test had been administered to each patient as part of a psychological examination. Diagnostic procedures, such as pneumoencephalography, were performed as indicated.

The criterion groups were derived as follows: Two attending neurologists studied independently the completed hospital charts of the 118 patients. In addition, all cases had been examined in consultation by one or the other of them. They judged 84 patients as having pathology above the foramen magnum and the remaining 34 patients as presumably having no such pathology. The groups were found to be comparable in age, intelligence, education, and socioeconomic status. An index of reliability of 0·93 indicated a high agreement between the two neurologists and the pooled ratings of many comparable neurologists.

This investigation differs from previous research on brain pathology in that there was obtained (1) greater representativeness to actual practice through the selection of cases from a general hospital neurology ward, yielding a continuum of cases from extreme through borderline to no brain pathology; (2) differentiation between the group with brain pathology and the control group on the basis of intensive neurologic work-up rather than of psychiatric diagnosis, and (3) a measure of the reliability of the criterion.

The validity coefficients show that of the six diagnostic procedures studied, the Rorschach method discriminates very reliably between the organic and the non-organic groups. The EEG, the neurologic examination, and the lumbar puncture also differentiate significantly between the groups. The skull X-rays and pneumoencephalograms, however, fail to demonstrate stable differences.

In addition, the findings indicate that high call rates of brain damage are characteristic of the neurologic examination (63 per cent.) and the EEG (62 per cent.); they err mainly in the direction of calling almost 40 per cent. of non-organic cases organic. On the other hand, the Rorschach method, lumbar puncture, and skull X-rays call fewer organic cases (29 per cent., 21 per cent., and 16 per cent., respectively), and their errors are reflected in higher percentages

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of "false negatives". However, the number of "false positives" for these techniques is remarkably low. They reveal a high tool accuracy (94 per cent., 95 per cent., and 88 per cent., respectively) when they call a case organic.

Because the criterion was based in part upon the neurologic techniques, and not upon the Rorschach method, the findings show that as an isolated procedure, the Rorschach is superior to the best of the individual neurologic techniques in detecting the presence of brain disease, and therefore warrants inclusion among the diagnostic consultative procedures of the clinical neurologist.

An hypothesis is stated to explain why our currently used diagnostic techniques give so many false negatives in the presence of actual disease.

(Authors' Abstr.)

Trends in the 17-Ketosteroid Excretion of Male Sex Offenders

The excretion of 17-ketosteroids has been investigated in sex offenders and compared with that of normal controls. The statistically significant findings are twofold, viz. the difference between the 17-ketosteroid day-to-night ratios for the non-aggressive sex offenders and for the controls, and between the 17-ketosteroid day-to-night ratios for the sex offenders as a whole and for the controls. Although lacking in statistical significance, other data revealed trends which appear to be worthy of further study; e.g. as compared with the controls, the average 24-hour 17-ketosteroid excretion is lower, and the average day-to-night ratio of 17-ketosteroid excretion is higher, for the sex offenders.

(Authors' Abstr.)

Arterenol (Norepinephrine) and Vascular Headache of the Migraine Type

Determinations of capillary blood pressure were made by the indirect Hooker capsule technique on 67 healthy (control) subjects and on 100 patients with a variety of psychiatric disorders. The site of examination was the skin of the dorsum of the hand.

It was found that the results of this clinical method were similar to those of the direct microintubation technique and gave a mean capillary pressure of 26·776 cm. of water in the case of the control subjects.

Capillary pressure was found to be significantly higher in the psychiatric patients than the value for the control subjects, however, results for organic dements and psychotics being greater than those for neurotics and psychopaths. The possible influence of age, within a wide adult range, was studied and found to be statistically insignificant.

Correlations between capillary blood pressures and a number of possibly related variables revealed a lack of relationship with the systolic arterial pressure, but significant interdependence with oximetrically monitored percentage capillary oxygen saturation, capillary hemoglobin levels, and capillary fragility as estimated by the positive-pressure method.

The implications of these findings in terms of the vascular anomalies of psychiatric patients are discussed.

(Authors' Abstr.)

Incidence of Seizures, with EEG Findings, in Prefrontal Lobotomy

A survey of the incidence of seizures and EEG findings was made in 181 patients subjected to 193 prefrontal lobotomies at the Veterans Administration Hospital, St. Cloud, Minn., in a period from March, 1946, to February, 1955.

Seizures were primarily of the grand mal type and occurred in 36 patients, previously seizure-free, constituting 19 per cent. of all lobotomies. The convulsions were self-limiting in 21 (59 per cent.) of this group, and nearly half of the remaining 15 patients (8 per cent. of all the lobotomies) had only occasional persistent seizures (Table I).

In general, the seizures tended to improve in the nine epileptic patients subjected to prefrontal lobotomy, and one of these patients had no further seizures after the procedure (Table I).

Seizures occurred for the first time most frequently in the immediate postoperative period. The interval varied from a maximum of 9 months in the epileptic group to 39 months in the nonepileptic group (Graph 1).

Anticonvulsant medication was not given to patients previously seizure-free until seizures occurred at a minimum of three regular intervals or were persistent irregularly.

EEG's were taken before and serially after lobotomy in a series of 100 patients consecutively fulfilling the stated criteria, from August, 1949, to February, 1955.

EEG abnormalities were observed in 18 per cent. of the patients before lobotomy, most of which were due to effects of electrotherapy.

The abnormalities increased to 78 per cent. in the immediate postoperative period, rapidly improved in the next four months, levelled off, and improved again until there were no abnormal EEG's in the patients current at the fourth postoperative year (Graph 2).

The types of abnormalities were primarily of the S-3 type (1 to 3 waves per second) and were located most frequently in the frontal areas.

Focal abnormalities seemed to predominate in the right frontal area, with some tendency to alteration of the focus to the left.

There was little significant relationship of abnormalities of the EEG to clinical results and incidence of seizures.

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There was an apparent relationship between the large number of grand mal seizures from electrotherapy and the increased incidence of seizures after lobotomy.

(Author's Abstr.)

Chlorpromazine (Thorazine) Treatment of Disturbed Epileptic Patients

The period of observation is admittedly quite short and the series small, but the results so far observed among the most disturbed epileptics in the institution indicate the following conclusions:

1. Chlorpromazine (Thorazine) has been highly effective and dramatic in controlling behavior disturbances.
2. The drug can be safely administered with fairly large doses of phenobarbital with minimal risk.
3. Doses of 300 mg. or less are less likely to be involved in complications.
4. A maintenance dose may be necessary to retain control of both episodic and chronic disturbed states.
5. Chlorpromazine does not appreciably reduce the frequency of seizures when maintenance therapy of phenobarbital or diphenylhydantoin (Dilantin) is reduced.

(Author's Abstr.)

A New Treatment of Status Epilepticus

A description is given of the anticonvulsive effect of an intravenously administered local anesthetic (lidocaine) on prolonged epileptic attacks in 10 human cases. Lidocaine in intravenous drip was found to be of great use in the treatment of status epilepticus. It was also found that a barbiturate in doses too small to influence the epileptic attack increases the anticonvulsive effect of lidocaine. Since the supplementary dose of the barbiturate can be kept so low that the complications of its sedative effects are avoided, this combination therapy is to be recommended in the treatment of severe status epilepticus. Therefore this treatment is especially useful against epileptic fits occurring during the early post-operative course in cases of brain operations.

(Authors' Abstr.)

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Combined Reserpine-Chlorpromazine in Treatment of Disturbed Psychotics

Chlorpromazine clinically has a potentiating effect on reserpine. Combined reserpine-chlorpromazine therapy is effective in chronically disturbed psychotic patients and has certain advantages over uncombined reserpine therapy. Experience with more than 300 patients is discussed.

Toxic side-reactions, including jaundice and agranulocytosis, are described.

As a result of drug therapies, it has been possible to eliminate electroconvulsive treatments in the chronically disturbed psychotic patients.

(Authors' Abstr.)

Diagnosis and Prognosis in Aphasia

It is suggested that aphasic symptoms be considered, first, in relation to three cerebral systems involved in language processes: the auditory, visual, and sensorimotor systems; and, second, in relation to the four language modalities in which impairment may be observed: understanding what is said, reading, speaking, and writing. Relationships between processes involved and functions impaired are complex, but differential diagnosis is possible through relatively simple procedures. These procedures are described and findings analysed in terms of resulting patterns of impairment.

Observed patterns are stable and can be identified by specific diagnostic criteria, and each carries a specific prognosis.

Recurring patterns were (1) a pattern of severe damage, for which prognosis is poor; (2) impairment of reauditorization (auditory retention and recall), reflected in all language modalities, for which prognosis is excellent, and impairment of reauditorization with (3) coexisting visual involvement, (4) sensorimotor involvement, or (5) generalized brain damage.

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When specific visual involvement was present recovery of speech was good, but progress in reading and writing was slower, and extent of recovery related to degree of involvement. When sensorimotor involvement was present, recovery was slow, but functional skills were obtained in all language modalities. When generalized brain damage was present, speech improved as a result of strong auditory stimulation, but other significant changes did not tend to occur. General principles of treatment are indicated for each group, in order to help the physician make recommendations for treatment. (Author's Abstr.)

A Controlled Study of Reserpine on Chronically Disturbed Patients

The 90 most highly disturbed male patients with chronic mental illness in a 2,000-bed hospital were placed on one ward. Thirty were given 1 mg. of reserpine (Rau-Sed, Squibb) orally b.i.d.; 30 were given an identical-appearing placebo, and 30, no medication, for a period of 12 weeks. They were also studied for four weeks prior to and four weeks subsequent to this period. Measurements were made of behavior, blood pressure, and weight.

Reserpine in oral dose of 1 mg. b.i.d. did not effect a behavioral improvement (as measured by the L–M Fergus Falls Behavior Rating Scale) in chronic disturbed male patients.

Reserpine effected a lowering of blood pressure.

Reserpine effected a slight weight gain.

The greater attention to patients inherent in taking blood pressures and weights and increasing the interest of ward personnel resulted in behavioral improvement in all three groups under study. (Authors' Abstr.)

The Use of Reserpine in an Acute Psychiatric Treatment Setting

One hundred and one cases treated with reserpine were studied in the setting of an acute psychiatric treatment hospital.

The dosage and treatment technique were modified according to the clinical state of the patient. Patients severely disturbed with moderate to marked psychomotor activity were treated with high doses of reserpine (7 to 13 mg. per day), usually for 7 to 14 days. Those with mild to moderate overactivity or severe anxiety were placed on moderate doses of the drug (4 to 6 mg. per day). Patients with less severe symptoms than those in the above categories were treated with low doses of the drug (1 to 3 mg. per day). Modification of dosage was made according to the patient's clinical response and complicating side-effects of the drug.

Common complications of the reserpine therapy were hypotension, weakness and fatigue, dizziness, nasal congestion, and drowsiness. Other side-effects noted, of less frequency, were the Parkinsonian syndrome, feeling of loss of control, diarrhoea, depression, and allergic responses.

The drug appears to be of definite value in the management and treatment of schizophrenia. Secondary symptoms of the illness are reduced or removed, but the primary process is still in evidence. However, this improvement fosters interpersonal contacts of a social and psychotherapeutic nature. Where previously a state of pessimism existed among ward personnel and physicians toward the schizophrenic patients, with reserpine, interests and enthusiasm for their treatment develop, which, in turn, undoubtedly play a very important role in the recovery of the patients.

Slight alleviation of anxiety and related neurotic symptoms occurs with reserpine, but this is frequently a transitory response, and the drug appears not to be a substitute for psychotherapeutic measures.

The drug has value in the alleviation and control of the disturbed behavior and other symptoms of acute and chronic brain syndromes.

This preliminary study indicates the need for more careful and controlled evaluation of the therapeutic efficacy of reserpine. (Authors' Abstr.)

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Combined Hydrogenated Alkaloids of Ergot in Mental and Nervous Disorders Associated With Old Age

A study of hydergine using the double-blind technique was made in 26 patients with psychoses associated with old age. Unequivocal improvement was noted in two patients with chronic brain syndromes due to hypertension who were treated with hydergine. Equivocal improvement was noted in 6 other patients of 13 who received hydergine and in 1 patient of 13 treated with placebos.

The improvement in the patients with chronic hypertensive brain disease was limited to mental and behavioral changes. It was characterized by decreased irritability and confusion, diminished delusions and ideas of reference, and increased sociability. Hydergine seems to be of value in the treatment of mental disorders associated with chronic hypertension.

Hydergine was subsequently found to be of considerable value in the treatment of a patient with an acute brain syndrome due to hypertension and in a patient with an acute cerebral vascular accident. In the latter patient, hemiplegia was nearly completely relieved, the result being comparable to the best results obtained from the use of cervical sympathetic block. Hydergine would appear to be indicated in these conditions, if hemorrhage is first ruled out. (Author's Abstr.)

Treatment of Depression with Meratran and Electroshock

1. A new central stimulant, Meratran, has been studied in a series of patients with depression. The oral dose is 1·0 mg. to 2·0 mg. t.i.d. and the single parenteral dose, 2·0 mg. given intravenously or intramuscularly.

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2. A satisfactory therapeutic response was obtained in patients with reactive depressions, while less frequently favorable results were obtained in the endogenous, psychotic, and involutional types.

3. In patients who require electroshock therapy, the adjunctive use of Meratran appears to hasten the recovery and diminish the frequency of maintenance electrical treatments.

(Author's Abstr.)

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The Electroencephalogram of Psychomotor Seizures in Childhood

1. An analysis was made of interictal and some ictal electroencephalograms of 110 children (age 1½ to 16) with psychomotor seizures.

2. The predominant findings in the waking state were classified as: normal or borderline (37), focal temporal spikes or sharp waves (11), bilateral temporal spikes or sharp waves (1) focal frontal spikes (3), focal slow waves (9), bilateral synchronous 3 c/sec. spike and wave (14), bilateral atypical 1½ to 3 c/sec. spike and wave (20), bilateral synchronous delta (9), random delta (6).

3. Recordings during sleep in 92 cases contributed little more information. In only four cases were focal temporal spikes further delineated; however bitemporal spiking appeared in eight anew. In fourteen cases previously definite slow-wave foci or bilateral spike-wave discharges were either obscured or did not appear.

4. Psychomotor seizures in childhood therefore, may be associated with a variety of electroencephalographic abnormalities. Focal temporal spikes are relatively infrequent and are elicited in only slightly higher incidence by sleep. There is a high incidence of spike-wave discharges of both bilateral synchronous 3 c/sec. and atypical forms in children with and without additional petit mal seizures. This general picture is in great contrast to that in adults with apparently similar psychomotor seizures.

5. The problems of classification with regard to these psychomotor seizures and the so-called petit mal status or petit mal automatism are reviewed. Differential features between these electroencephalograms and those of children with non-epileptic behavior disorders are noted.

6. Possible pathophysiologic factors relating to temporal or limbic cortex, and the midline thalamo-reticular projecting and centrencephalic systems are discussed relevant to the production of these psychomotor seizures and the focal spike and bilateral non-focal spike-wave discharges in the electroencephalograms.

(Authors' Abstr.)

Supersensitivity of the Sensory Cortex Following Partial Deafferentation

1. The loss or diminution of the spontaneous electrical discharges of the sensory cortex following lesions or destruction of the ipsilateral ventral posterior thalamic nuclei is often only transitory (experiments in cats). It may be followed by a tendency to periodic burst discharges or by a continuous activity of increased amplitude that may be subject to spontaneous fluctuations.

2. The development of a hypersensitivity of the respective cortical area to toxins such as Mecholyl or Metrazol could be demonstrated. Mecholyl may accentuate an existing or bring to light a latent asymmetry of the spontaneous discharges and/or the tendency to burst discharges.

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3. Stimulation of sensory nerves (ulnar, sciatic) is still able to elicit evoked potentials (secondary responses of Forbes) in the sensory cortex deprived of its connections with the ventral posterior thalamic nuclei. On bilateral peripheral stimulation with single shocks, one notices that the secondary response is more pronounced in the sensory area corresponding to the thalamic lesion than in the opposite cortex; this difference becomes more marked under the effect of Mecholyl.

4. These findings may have bearing upon the development of pain and hyperpathia in cerebral lesions extending into the white matter below the sensory cortex.

(Authors' Abstr.)

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The Neurological Basis of Memory Defects Following Electroconvulsive Therapy

1. Five kinds of memory defects following electroconvulsive therapy are listed.

2. The most common of these defects, spotty or lacunar memory defect after the treatment course, cannot be classified as being of "organic" type on either clinical or histopathologic grounds.

3. A theoretical construct is devised to explain the phenomenology of this type of memory defect, as well as the symptom of anxiety which often accompanies it.

4. The Pavlovian concept of the development of the ultraparadoxical phase of cortical activity is invoked to explain these clinical disturbances. It holds that the electroshock stimulus is excessive or ultramaximal, that it produces a perversion of the physiologic state of the brain mantle to one of massive inhibition rather than excitation, that the levels of inhibition are deeper in some areas than others, and that some areas undergo prolonged or refractory states of inhibition.

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5. It is contended that the presence of a mosaic-like distribution of areas of refractory inhibition expresses itself clinically as lacunar memory defect.

6. The development of anxiety is believed to result from the induction of fields of neural excitation around such areas of refractory inhibition.

7. It is held that the areas of refractory inhibition are reactivated by random excitatory stimuli impinging on the brain in the ordinary course of living, so that the memory defect rights itself with the passage of time.

8. Non-convulsive electrical stimulation provides the same kind of varying random excitatory stimuli as does the ordinary course of living, but in a much shorter and more concentrated way, and is a more effective method of allaying the memory defect.

(Author's Abstr.)

Differential Effects of Lesions of the Mediodorsal Nuclei of the Thalamus on Normal and Neurotic Behavior in the Cat

Stereotactic lesions were placed in the mediodorsal nuclei of the thalamus in 8 normal cats and in 9 others which had been trained in various feeding techniques before being made experimentally neurotic. The lesions produced the following effects:

1. Extensive amnesia for previous learning in all animals.
2. Concomitant amelioration of acquired neurotic behavior.
3. Diminution in the speed of and capacity for new learning, in that motivation was retained but the animals were perseverative and stimulus-bound.
4. Impairment of olfactory responses to the extent that the animals could not find food by the sense of smell, were unable to use odors as cues even after from 6 to 11 months of retraining, and showed only a crude, generalized olfactory response.
5. Intensified affective behavior in relation to other animals and toward humans.
6. A change in characteristic social responses, dependent on the preoperative experiences of the animal, i.e. cats which had been made experimentally neurotic were significantly more aggressive after mediodorsal thalamotomy than were normal controls after the same operation.

(Authors' Abstr.)

The Cingulate Gyrus in Relation to Consciousness

1. Bilateral ablation of the rostral cingulate area in monkeys and cats has produced significant alteration in behavior.
2. Removal of the cingulate gyrus alone in the cat causes akinesia and plasticity together with marked automatism.
3. Removal of the homologous area in the more elaborate brain of the monkey causes the syndrome of passive and non-aggressive behavior previously described by others. There is no akinesia or plasticity.
4. When minimal injury to the rostral premotor regions is added, akinesia is marked and apparent apraxia results.
5. Addition of cingulate ablation to either frontal or temporal pole ablation intensifies and modifies the syndromes characteristic of the primary removal of each of these areas.

(Author's Abstr.)

Some Behavioral Effects Associated with Feeding Sodium Glutamate to Patients with Psychiatric Disorders

In a series of observations of patients with psychotic disorders, made over a period of 11 months, examiners, completely unaware of which patients were alternately placed on sodium glutamate or placebo, rated the patients for psychological, physiological, biochemical and behavioral effects. The statistical analyses of perceptual and motor co-ordination tests failed to disclose any significant changes associated with glutamate feeding. Similarly basal metabolic rate, EEG, ECG, pupillary dilatation, blood pressure, heart rate, respiratory rate, oral temperature and weight did not reveal consistent alterations as a result of the medication.

In contrast, 17 of 27 patients receiving monosodium glutamate showed clinical improvement; 16 in action, 12 in emotion, 9 in intellection, 8 in interpersonal relationships, 5 in thought processes and 2 in insight. Equally good results were obtained with 15 grams 3 times daily or 5 grams 3 times daily while toxic side reactions sometimes seen with the larger doses were avoided. The authors realize that they have studied a small group of patients. Whether or not the same conclusions would be revealed by the examination of a larger number of patients can be decided only by further work.

Their biochemical studies disclosed that even with 15 grams of glutamate administered 3 times daily the level of that substance in the blood was raised above the normal for periods of only one-half day or less. In the course of the biochemical studies a possible cause for the discrepancy in the literature was uncovered, namely that previous investigators had fed glutamic acid in three different forms: glutamic acid hydrochloride, glutamic acid and sodium glutamate, compounds not equally absorbable into the blood stream.

(Authors' Abstr.)

Occipital Lobes, Dreams and Psychoses

Since the convex cortex of the occipital lobes, often only on one side, is essential to revisualization of former experiences, to dreams and to some psychoses, it might be possible

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to relieve the psychosis by decortication of one occipital lobe. The patient would be able to retrain the other for new memories but should no longer be disturbed by unintended revisualization of old experiences.

Since this paper was written, two cases of tumor of the left occipital lobe have been studied with loss of ability to revisualize and to dream. In one case there was a right homonymous hemianopia, in the other, an upper right quadrantanopia. In a third case a young woman was struck in the occipital region with a hammer which depressed the skull and caused immediate blindness. Exploration showed both occipital lobes damaged and a double dural tear, one on each side of the midline. Some vision slowly returned but the patient did not dream after the blow.

(Author's Abstr.)

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Induction of Sleep by Autonomic Drugs

1. Atropine, prostigmine and acetylcholine, administered as described by Hoffer, produce drowsiness, light and moderate sleep resembling natural sleep, as recorded in the EEG.

2. Patients whose EEG show paroxysmal abnormalities (epileptics and schizophrenics) are more susceptible to this procedure than patients (schizophrenics) who show no paroxysmal abnormality in their EEG.

3. Normal control groups respond with a mild reaction when compared with Group 1.

4. There seems to be a positive correlation between sympathetic hyper-reactivity and sleep activation.

5. A tentative explanation is offered as to the mode of action of the above drug combination.

(Authors' Abstr.)

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Chlorpromazine in the Treatment of Schizophrenia

The effect of Chlorpromazine (Thorazine) was studied in 75 chronic hospitalized psychotic patients. The maximum dosage used in this study was 400 mg. Marked to moderate improvement was obtained in 25 patients. These 25 patients represented all the diagnostic categories found in the state psychiatric hospital. They were all management problems because of their disturbed, regressive behavior. The response to treatment varied from a dramatic change in a few days to a reaction which only began to take place after 8 weeks of treatment. The patients displayed their improvement by becoming quieter, less tense, less reactive to their autistic thinking, and more amenable to the suggestions and care of the nursing staff. Of these 25 patients, three have been discharged from the hospital, and five now have ground parole privileges. Many of the patients who have shown improvement have shown also a gain in weight.

Three of our cases developed transient jaundice. Three cases developed a transient Parkinsonism-like reaction. There were several cases of dermatological reactions.

It is concluded that Chlorpromazine (Thorazine) has brought about a new and effective approach in the treatment of the chronically overactive psychotic patient, and must be considered an important therapeutic agent in the armamentarium of the psychiatrist.

(Author's Abstr.)

Physiologic Pathology in the Schizoid and Affective Psychoses

All the work in this study has gradually led to the recognition of different types of nervous activity, depending upon the varying homeostasis, measurable as physiologic adaptability.

The constitutional inferior or physiologically immature organism has a definite profile of physiologic inadequacy. When this type of individual is subjected to too much stress of any sort, there are abortive attempts at reaching physiologic equilibrium, particularly in the serum globulins. It is this attempt at adaptation that is synchronous with the precipitation of the insanity.

In the immature, or schizoid, type, when well the figures take the physiologic profile of the constitutional inferior. In the very sick immature individual the serum protein figures usually seem to be within standard normal proportions, but this is misleading. The figures are the evidence of challenge and inadequate effort at adaptation.

In the unstable, or manic depressive, type, when sick there is a reversion of the physiology of the physiologically immature, and with this reversion there appears an insanity. When sane thinking appears the physiologic status is reversed from that observable in the insane and this reversed pattern can be considered as the individual's normal or possibly his original constitutional pattern. This physiologic profile makes quite a standard normal picture.

The recognition of the type of activity of a nervous system can be determined by the study of the physiologic adaptability.

We do not know yet why the body reactivity does not function adequately, as in the physiologically immature person; possibly it may be genetically explained, with a poor nervous system, with poor integration, with an endocrine background. This poor reactivity lays the personality open to many derangements by environment, or infection, or other stress.

In the consideration of these points of the equilibriums that are the physiological adaptations there is a means of measuring the ability to meet stress.

(Authors' Abstr.)

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Long Range Treatment of Multiple Sclerosis with Pancorphen

This article deals with the question whether a series of 5 Pancorphen injections which yielded a high percentage of partial remissions of non-permanent nature in a large number of cases should be repeated and how often. Can the author expect on repetition: (1) a cure of the disease? (2) prevention of new attacks? (3) lengthening of intervals between the attacks? (4) shortening or cure of new attacks?

The author bases his conclusions on 7 cases of multiple (more than 3) treatments from Goldwater Memorial Hospital. To these cases he could add 6 more cases from his previously published series. All these cases were treated and followed for years.

His tentative conclusions from these thirteen cases are: (1) even old and advanced cases can still yield partial remissions of various degrees; (2) this result can often be repeated; (3) there is no doubt in most instances about the sequence and the probable causal nexus between treatment and remission; (4) repeated treatments given in time can favorably influence the course of the disease; (5) the treatment in the form hitherto described produces no cure; (6) a repetition of the treatment from 4 to 26 times in its present form does not arrest the disease or protect from relapses in the future; (7) very advanced cases give less favorable results than less advanced; (8) treatments started in the beginning of an attack give much better results than those started late in the attack; (9) treatments given 2 to 3 times per year are probably better than those given at longer intervals; (10) treatments given in a remission period probably further the progress of remission; (11) progressive type of remission is more frequent with Pancorphen treatment than without it; (12) the interval between bouts of disease is not shortened, but the total time spent in attacks is shortened; (13) the duration of an attack is shortened to a point that he can speak of "aborted attacks".

Should the treatment be continued indefinitely 3 times a year in series of five injections? More experience with much longer periods of treatment will be necessary to answer this question conclusively.

The author is convinced that the treatment should be given: (1) in every beginning attack; (2) in progressive (active) attacks no matter of what duration; (3) during inactive as well as progressive remissions. It is true that treatment in active stages requires more caution and still more individualization than in the active stages; it is also true that any aggravation of the disease in a progressive attack is likely to be interpreted not as absence of therapeutic effect but as iatrogenic aggravation. Nevertheless it is logical to assume and corroborated by experience that the active periods of disease, progressive or new attacks as well as progressive remissions, hold more promise for any therapy than the inactive periods of stabilized defenses which also yield therapeutic results.

For the time being he recommends therefore: continuous treatment with series of five intravenous injections, strictly individualized (5) three to four times per year plus extra emergency treatment in case of appearance of new symptoms.

(Author's Abstr.)

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A New Scale for Evaluating Disability in Multiple Sclerosis

A new classification of disability in multiple sclerosis is presented wherein a status number is provided in accordance with the patient's impairment due to neurologic dysfunction. The scale consists of ten progressive steps or classes. The scale has been applicable in the more than 300 patients studied at this hospital, and has proved satisfactory in measuring change in status of these patients during hospitalization.

(Author's Abstr.)

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Vomiting: Neural Mechanisms and Control by Chlorpromazine

1. Vomiting is primarily a function of the respiratory and not of the gastrointestinal system.

2. Vomiting is controlled by a neural mechanism consisting of a superficial area (chemoceptive trigger zone) located in the area postrema in the fourth ventricle and a coordinating center in the lateral reticular formation of the medulla oblongata. The chemoceptive trigger zone is composed of specialized cells which are sensitive to circulating chemical agents, and, when properly stimulated, activates the more deeply placed reticular vomiting center. The latter may also be activated directly by visceral afferents from the gut.

3. Chlorpromazine, a clinically effective antiemetic, has been found to act on both of these areas. In small doses it is believed to compete with circulating emetic agents for receptors in the chemoceptive trigger zone, thus acting as a competitive inhibitor. In larger doses it has been shown to have a depressant effect directly on the reticular vomiting center itself.

(Authors' Abstr.)

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Clinical Trial of a New Anticonvulsant, SKF No. 2599

A clinical trial of a new anticonvulsant, 5,5-diphenyl-tetrahydroglyoxaline-4-one (SKF No. 2599), has been continued for a period of six months in 22 patients with grand mal or psychomotor seizures which were previously uncontrolled despite prolonged treatment with Dilantin and/or phenobarbital. The majority of patients were mentally retarded and 45 per cent. had cerebral palsy.

The epilepsy was controlled completely in 12 (55 per cent.) of the 22 patients, and a practical level of control was obtained in six (27 per cent.). Among the patients whose seizures were well controlled, three had psychomotor epilepsy. The average optimal daily dose was 0·8 gm. (20 mg./kg.).

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Side effects, which resembled those produced by Dilantin, involved the central nervous system and the gastrointestinal tract; the incidence of gum hyperplasia, however, was minimal.

Compared with existing anticonvulsant compounds, (SKF No. 2599) has exhibited definite advantages in this preliminary clinical evaluation, and more extensive trial is recommended, particularly in noninstitutionalized epileptic patients.

(Authors' Abstr.)

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A Study of Free Amino Acids in the Human Cerebrospinal Fluid

1. The tedious procedure of paper chromatography of the cerebrospinal fluid has been modified to allow rapid, accurate routine identification of the constituent amino acids. This has been accomplished by modifying the desalting apparatus of Consden and developing an apparatus for the automatic concentration of spinal fluids in a small spot on chromatographic paper.

2. Multiple analysis of the amino acids in normal cerebrospinal fluid has permitted the identification and quantitation of 15 amino acids, including aspartic acid, alanine, arginine, alpha-amino-butyric acid, glycine, glutamic acid, glutamine, gamma-amino-butyric acid, lysine, phenylalanine, serine, tyrosine, threonine, valine, and leucine.

3. The analysis of 193 specimens of cerebrospinal fluid from patients with central nervous system disorder has demonstrated three additional amino acids, including proline, histidine, and cystine. Statistically significant alterations in the free amino acid content were noted in cases of hereditary cerebellar ataxia, multiple sclerosis, and presenile psychosis. Suggested changes were present in albinism, Huntington's chorea, and tabes dorsalis.

4. It is anticipated that further studies will demonstrate amino acid alterations in the cerebrospinal fluid of other central nervous system diseases.

(Author's Abstr.)

Effect of Barbiturates on Latent Motor Deficits

1. One hundred and forty-four patients were studied for motor weakness under sodium Amytal injection, including 37 control patients. In none of these controls was a motor deficit elicited under the sodium Amytal test.

2. In the experimental group of patients with lesions involving a part of the central nervous system which mediates motor function, the injection of 150 to 500 mg. of sodium Amytal brought out motor weakness which was not elicited in the premedication examinations.

3. A minimal or suspicious motor deficit was made more conspicuous under sodium Amytal injection.

4. The sodium Amytal test is simple and sensitive for detecting motor weakness of central origin. It is recommended as a supplementary procedure whenever its use is indicated. A positive result indicates damage to the central nervous system.

(Authors' Abstr.)

Isonicotinic Acid Hydrazide in Multiple Sclerosis

1. A series of 32 patients with multiple sclerosis were given either INH or placebo preparation in a double blind procedure and observed for a period of three months. Two methods of clinical assessment were used.

2. On the Kurtzke-Berlin scale of functional improvement, 25 patients remained in the same category. No patient improved by more than one category. Three patients improved by one category. All three received INH and were initially seen during an acute exacerbation. Four patients were worse by one or two categories. Two received INH and two received the placebo.

3. The second scale of clinical assessment was based on a general estimate of the patient's status at the end of the therapy. Seven patients from the INH group and three patients from the placebo group improved. Five patients from the INH group and four patients from the placebo group were worse. Thirteen patients remained unchanged.

(Authors' Abstr.)

Treatment of Headache with Reserpine

Reserpine was given orally to 220 patients with chronic headache. Preliminary clinical evaluation in patients with hypertension showed considerable improvement, those with tension headache showed moderate improvement, and those with migrain obtained no definite relief. The present report is too short a survey time in treatment to draw final conclusions as to the effectiveness of reserpine in the treatment of chronic headache.

(Author's Abstr.)

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The Limbic System ("Visceral Brain") in Relation to Central Gray and Reticulum of the Brain Stem

The limbic system has been defined, and a number of anatomical details have been briefly considered. Reference has been made to the body of evidence that has shown this system to be fundamentally implicated in emotional and viscerosomatic functions.

Attention has been directed to the unexplained similarity of some of the psychiatric aberrations seen in cases of encephalitis lethargica and in patients with epilepsy secondary to lesions in or neighboring the frontotemporal portion of the limbic cortex. A possible explanation has been suggested by an inferred interplay between limbic structures and circumscribed region of the brain stem that von Economo, on the basis of his pathological study of encephalitis lethargica, believed to be of vital significance in emotional processes. The region he delineated includes central gray and reticulum and lies in contiguous parts of the diencephalon and midbrain.

Behavioral and electrophysiological observations have been described which offer supporting evidence of the interdependence of limbic structures and the region delineated by von Economo in emotional processes. Some of the psychological and psychiatric implications of these studies have been considered.

(Author's Abstr.)

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Electroencephalographic Changes in Man Correlated with Blood Alcohol Concentration and Some Other Conditions Following Standardized Ingestion of Alcohol

A standardized oral dose of 1·25 g. of ethyl alcohol per kg. of body weight was administered to 10 male hospital attendants and 10 hospitalized male alcoholics.

Blood alcohol concentrations, electroencephalograms, electrocardiograms, and degree of ataxia were determined, recorded and observed at constant intervals during 4½ hours. Blood-sugar values were determined at the end of each experiment.

The following main results were obtained:

1. The blood-alcohol curves during the experiments were largely the same in both attendants and patients. The maximums ranged between 108 and 196 mg. per 100 ml. and were somewhat (but not significantly) higher in the patients.

2. EEG frequencies shifted between 0·7 and 3·0 c.p.s. toward slower ranges (average 1·4–1·5 c.p.s.), and the amplitudes at the same time increased by about 50 to 100 per cent.

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There was no statistically significant difference between the two groups, although the frequency drop seemed a little less in the patients than in the attendants.

3. In the patients the maximum EEG changes coincided with maximum blood alcohol concentrations, whereas in the attendants, who were significantly younger and less habituated to alcohol, the EEG changes remained on the average 45 minutes after the maximum blood alcohol concentrations. This was probably due to the drowsiness that followed direct intoxication in the attendants. It is suggested that this lag, which concerns not only the EEG but also sensory functions, may have considerable importance as a risk factor in traffic.

4. The heart rate underwent marked changes. Following a preliminary short excitation, a retardation—most obvious in the attendant group—became prevalent. In the attendants, but not in the patients, a new abrupt increase associated with nausea was observed, and finally another decrease associated with drowsiness.

5. The patients were in every way less affected by the alcohol, although their blood alcohol concentrations were slightly higher. The drop in EEG frequency was not as great nor as protracted (difference not statistically significant), and the pulse reactions were less pronounced (almost significant) and less complex. There was hardly any nausea and still less drowsiness. The degree of ataxia caused by the ingested alcohol was less pronounced in the patients than in the attendants (difference almost significant). The difference in the general state of intoxication was readily observed. The greater stability of the patients might be explained by their greater habituation to alcohol but not by their higher age.

(Authors' Abstr.)

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Biochemical Actions of Toxic Substances on the Nervous System. Elliott, K. A. C. [*Research Pubs., Assoc. Research Nervous Mental Disease*, **32**, 422 (1953).]

The Toxic and Metabolic Effects of General Anesthetic Agents on the Central Nervous System. Dripps, Robert D. (*Univ. of Pennsylvania, Philadelphia*). [*Ibid.*, 432-8.]

Effects of Ionizing Radiation on the Adult and Embryonic Nervous System. Hicks, Samuel P. [*Ibid.*, 439.]

Effects of Heavy Metals on the Central Nervous System. Aring, Charles D., and Trufant, Samuel A. [*Ibid.*, 463.]

The Effects of the Organic Solvents and Industrial Poisonings on the Central Nervous System. Baker, A. B., and Tichy, Fae Y. [*Ibid.*, 475.]

The Effects of Bacterial Toxins on the Nervous System. Gammon, George D. [*Ibid.*, 506.]

The Effect of Alcohol on the Nervous System. Victor, Maurice, and Adams, Raymond D. [*Ibid.*, 526.]

W. M. SPERRY (Chem. Abstr.)

The Qualitative and Quantitative Determination of Thorium in the Brain of Subjects Injected with Thorotrast for X-ray Examination. Brusa, A., et al. [*Arch. ital. anat. embriol.*, **57**, 162 (1952): *Biol. Abstr.*, **27**, 1526 (1953).]

Traces of Th were found in all cases (5 tumors and 2 postmortem brains) by radiographic examination of sections. The amount of Th established by the Geiger-Muller autoscalar and by spectrography, 6 days after injection of 24 ml. of thorotrast (=6 g. of ThO_2), gave the following results: 0·138 g. of ThO_2 in the brain; 0·057 g. of ThO_2 in the spleen.

A.M.M. (Chem. Abstr.)

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Fluoroacetate and Fluorobutyrate Convulsions in the Isolated Cerebral Cortex of the Dog. Hendershot, Leland C., and Chenoweth, Maynard B. [*J. Pharmacol. Exptl. Therap.*, **113,** 160 (1955).]

In curarized dogs (artificial respiration) Na fluoroacetate (I) or Me γ-fluorobutyrate (II) was injected into pieces of cerebral cortex isolated from the rest of the cerebrum by circumscribed cutting and undercutting. Electroencephalograms from leads placed in various parts of the brain showed that (I) and (II) produced localized convulsive seizures. Citrate accumulated in the brain cells involved. Antidotes specific for (I) (glycerol monoacetate) and (II) (glycerol monobutyrate) prevented the convulsive seizures but did not prevent the accumulation of citrate; this indicates that the high citrate levels occurring in fluoro-fatty acid poisoning are not responsible for the appearance of toxic symptoms. Furthermore, the convulsive activity can spread from the isolated piece of cortex to adjacent areas without an increase in citrate in such areas.

L. E. GILSON (Chem. Abstr.)

The Antihyaluronidase Content of the Serum in Multiple Sclerosis. Konyves-Kolonic, L., et al. [*Monatsschr. Psychiat. Neurol.*, **128,** 153 (1954).]

The antihyaluronidase content of blood serum, determined by the method of Haas, was lower in most of 17 patients with active multiple sclerosis (m.s.) than in 54 patients with chronic or slowly progressing (m.s.). Most of the values in (m.s.) patients were within the wide range found in control subjects.

WARREN M. SPERRY (Chem. Abstr.)

Disturbances in Copper and Amino Acid Metabolism in Hepatocerebral Degeneration and Their Treatment with BAL. Steger, J., and Steger, R. [*Deut. Z. Nervenheilk.*, **172,** 321 (1954).]

The average α-amino N(I) excretion in urine in mg./24 hours, determined by the method of Pope and Stevens, was 180 (91–270) in 13 control subjects (26 determinations) and 271 (19–624) in 4 patients (109 determinations) with hepatocerebral degeneration (h.c.d.). The average concentrations in mg. 1/100 ml. urine were, respectively, 25·4 (14–44) and 35·4 (13–102). The average concentrations of (I) in mg./100 ml. blood serum were 3·83 (3·4–4·5) in 4 control subjects and 5·89 (4·4–7·3) in 4 patients with (h.c.d.). The average Cu excretion in urine in γ/24 hours, determined by the method of Eden and Green, was 19·6 (15·7–34·7) in 6 control subjects, 27·0 (3·9–88) in 15 patients (45 determinations) with multiple sclerosis (m.s.), 26·5 (16·8–51·0) in 5 patients (19 determinations) with (h.c.d.). The average concentrations in γ Cu/100 ml. urine were 2·6, 3·1, 2·9, and 27·4 respectively. The average Cu concentrations in γ/100 ml. blood serum were 128, 134, and 83 in control subjects and patients with (m.s.) and (h.c.d.) respectively. The urinary excretion of Cu by (h.c.d.) patients during the 4 hours after the intramuscular injection of 200 mg. of 2,3-dimercaptopropanol (BAL) was greatly increased. Continued treatment with large amounts of (BAL) (maximum, 2·8 g.) caused a large elimination of Cu with increased concentrations in the blood serum. In 1 patient the Cu excretion in bile (determined in duodenal fluid) was increased by (BAL) injection. (BAL) had no effect on (I) excretion.

WARREN M. SPERRY (Chem. Abstr.)

Amino Acid Metabolism and Wilson's Disease. Chessa-Perle, Elio., Careddu. Paolo. [*Pediatria*, **62,** 411 (1954).]

Amino N(I) of serum was 4·5 and 8–9 mg. per cent. respectively, at fasting and after a high protein diet in a patient (II) with Wilson's disease and a healthy individual (III). The urinary excretion of (I) was 350–400 and 150 mg. per 24 hours respectively, for the 2 subjects; the high protein diet did not influence it as much in (II) as in (III). Paper chromatograms of urinary amino acids showed glycine and alanine in (III), and aspartic acid, glutamic acid, serine, taurine, lysine, arginine, leucine, phenylalanine, and tyrosine in (II). The high protein diet caused the appearance of phenylalanine and tyrosine in (III). After cystine administration, a small amount appeared in serum chromatograms of (II) (more in (III)) but urine chromatograms showed appreciable amounts. The origin of aminoaciduria in the above disease is ascribed to the kidney.

C. SCANDURA (Chem. Abstr.)

Significance of Adrenal Function in Carbohydrate Metabolism in Nervous Disease. Schmidt, R. M., and Schliecker, W. [*Arztl. Wochschr.*, **10,** 221 (1955).]

For adequate determination of the work capacity of the neuro-endocrine system, the Albrich-Bertschinger adrenal-function test should supplement the adrenaline test. Ten cases of muscular disease, after 15 minutes of exertion, failed to show the work hyperglycemia (I) exhibited by 10 normal subjects after subcutaneous injection of 1 unit of insulin (II) per 6·5 kg. body weight. The fasting blood sugar (III) in both groups returned to normal within 3 hours. Five cases with disorders of the vegetative system reacted with normal (I) after (II), but (III) remained below normal after 3 hours. The diagnostic value of these tests is discussed.

JEAN PINCHACK (Chem. Abstr.)

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The Influence of Shock on Cerebral Hemodynamics and Metabolism. Fazekas, Joseph F., et al. [*Am. J. Med. Sci.*, **229**, 41 (1955).]

Patients in shock showed a reduction in rate of cerebral blood flow, and variation in cerebral metabolic rate from normal to markedly reduced values. Cerebral arteriovenous O differences showed considerable variation, from greatly increased to reduced extraction of O. The results suggest that in some persons compensatory mechanisms may maintain the cerebral metabolism despite a reduction of arterial pressure and cerebral blood flow.

MARION HORN PESKIN (Chem. Abstr.)

Metabolism of Human Brain Cortex in vitro. Sutherland, V. C., et al. [*Am. J. Physiol.*, **180**, 195 (1955).]

The total O consumption during endogenous metabolism is greater than can be accounted for by the endogenous carbohydrate content determined as glucose and lactic acid. Endogenous lactic acid production and, to a limited extent, endogenous O consumption are suppressed by the addition of 0·01 M glucose. Experiments with 0·01 M radioactive glucose indicate that the glucose taken up is oxidized to some extent, converted to lactic acid, and assimilated or stored in the tissue. The amount of radioactive glucose oxidation accounted for only approximately 50 per cent. of the total O consumption in the presence of glucose. Lactic acid produced in the presence of 0·01 M extracellular glucose is derived exclusively from exogenous glucose. Aerobic lactic acid accumulation increases when glucose is present in combination with pyruvate or glutamate but not with alanine.

E. D. WALTER (Chem. Abstr.)

Regulation of Water Exchange by the Hypothalamus and Hypophysis. Pupilli, G. C. [*Terapia* (*Milan*), **34**, 129 (1949).]

Mainly neurological and physiological. In experimental operative diabetes insipidus, the secretion of antidiuretic hormone is deficient owing to interruption of the supraoptic-hypophyseal path.

W. C. TOBIE (Chem. Abstr.)

Effects of Acetylcholine on Phosphate Turnover in Phospholipides of Brain Cortex in vitro. Hokin, Lowell E., and Hokin, Mabel R. [*Biochim. et Biophys. Acta*, **16**, 229 (1955).]

The effects of acetylocholine (I) on the phospholipides of guinea-pig brain cortex slices were studied with P^{32} and glycerol-1-C^{14}. (I), with eserine, stimulated the incorporation of P^{32} in all the phospholipide fractions studies, but to unequal degrees. The stimulatory effect of (I), with eserine, increased with increasing (I) concentration; the minimum effective concentration was 10^{-6} to 10^{-5} M. The increased incorporation of P^{32} into the glycerophosphatides was due to an increased phosphate turnover in preformed lipides, rather than to increased synthesis of phospholipides de novo. (I) Failed to increase the incorporation of glycerol-1-C^{14} into brain cortex slices under conditions conducive to increased incorporation of P^{32}. (I) In a concentration of 10^{-2} M stimulated to about the same extent the incorporation of P^{32} into the glycerophosphatides of the various cell fractions, i.e. nuclei, mitochondria, microsomes, and supernatant fluid. Atropine at low concentrations (10^{-6} M) destroyed the stimulatory effect of (I), and decreased phosphate turnover to a level lower than that found in slices without (I) and eserine. At high concentrations (10^{-4} to 10^{-2} M) it stimulated incorporation of P^{32} into the phospholipides.

MORTON PADER (Chem. Abstr.)

Alteration of the Activity of Central Nervous System during Phosphorus Poisoning in Animals. Krasnov, S. K. [*Zhur. Vysshei Nervnoĭ Deyatel. im. I.P. Pavlova*, **4**, 558 (1954).]

Subcutaneous administration of P to white rats (10 mg./kg.) induces changes in the activity of the central nervous system, characterized by a complete or partial inhibition of previously established conditioned reflexes, natural reflexes to food, followed by lowering of unconditional reflexes. The symptoms of P poisoning develop considerably later than the observed inhibitions in the activity of the central nervous system.

J. A. STEKOL (Chem. Abstr.)

Effect of Hexamethonium Chloride on the Bioelectric Activity of the Dog Brain. Imbriano, Aldo E., et al. [*Semana méd.* (*Buenos Aires*), **1**, 274 (1955).]

Intraperitoneal injections of 15 mg./kg. change the α- and depress the β-waves. δ-waves of polymorphous character appear. The changes are attributed to a lack of O.

A. E. MEYER (Chem. Abstr.)

Metabolic Studies in Wilson's Disease using Copper-64. Bearn, A. G., and Kunkel, H. G. [*J. Lab. Clin. Med.*, **45**, 623 (1955).]

Cu^{64} was administered both orally and intravenously in doses of *f*0·1–1 mc. Following parenteral administration there was an extremely rapid fall in serum radioactivity in normal subjects which was subsequently followed by a large increase in serum radioactivity. This increase was due to the incorporation of the Cu^{64} into ceruloplasmin. In patients with Wilson's disease a slightly slower fall in the radioactivity and almost no incorporation into cerulo-

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plasmin was observed. The Cu^{64} associated with serum albumin was increased and persisted longer in patients with Wilson's disease than in the controls. The persistence of excess Cu^{64} associated with albumin appears to be an important factor in the pathogenesis of the disease. The total urinary Cu^{64} excreted by Wilson's disease is greater than in normals. A delayed rise in urinary Cu^{64} was noted in normals. Patients with Wilson's disease showed a diminished fecal excretion of Cu^{64} following both routes of administration.

FRANK IBER (Chem. Abstr.)

Uric Acid Metabolism in Hepatolenticular Degeneration. Mahoney, J. P., et al. [*Proc. Soc. Exptl. Biol. Med.*, **88**, 427 (1955).]

In all of 16 patients with hepatolenticular degeneration (Wilson's disease) the serum uric acid level was below normal and the amount of uric acid excreted in the urine was increased. After intravenous injection of uric acid these patients excreted uric acid in the urine more rapidly than did normal subjects. No correlation was observed between the excretion of Cu and of uric acid. It is suggested that the alteration in uric acid metabolism is due to an inability of the renal tubules to reabsorb uric acid efficiently.

L. E. GILSON (Chem. Abstr.)

The Distribution of Phosphomonesterases and Pyrophosphatase in the Particulate Fractions of Dog Cerebrum. Waked, Nabil and Kerr, Stanley E. [*J. Histochem. Cytochem.*, **3**, 75 (1955).]

Dog cerebrum homogenized in 0·25 M surcrose can be fractionated by differential centrifugation into a nuclear sediment (I), 3 cytoplasmic fractions, and a final supernate (II). Although all fractions contain acid and alkaline (III) phosphatases, 5′-nucleotidase, and pyrophosphatase (IV), the activity of only (III) is marked in (I) while (II) is the principal source of (IV).

JOHN F. LHOTKA (Chem. Abstr.)

Relationship of Hallucinogens to Adrenergic Cerebral Neurohumors. Marrazzi, Amedeo S., and Hart, E. Ross. [*Science*, **121**, 365 (1955).]

Adrenaline, amphetamine, and mescaline have been shown to be cerebral synaptic transmission inhibitors. Because of the structural similarity of N,N-diethyllysergamide (LSD-25) and serotonin to adrenaline and its breakdown product, adrenochrome, they were tested as synaptic inhibitors. Serotonin is 6 to 8 times as potent as LSD-25 and 25 to 30 times as potent as adrenaline. The potency of serotonin is of the same level as acetylcholine suggesting a normal role as a neurohumoral inhibitor. Gamma doses do not affect blood pressure.

H.W.G. (Chem. Abstr.)

Blood-sugar Changes Induced by Electrical Stimulation of the Hypothalamus of the Cat. Anand, B. K., and Sua, S. [*Indian J. Med. Research*, **43**, 123 (1955).]

A rise in blood-sugar level resulted from stimulation of the posterior hypothalamic and mammillary regions as well as the lateral parts of the middle and anterior hypothalamic and supraoptic regions (sympathetico-adrenal effect). A fall in blood-sugar level (vago-insulin effect) resulted from stimulation of the medial parts of the supraoptic and anterior and middle hypothalamic regions.

C. J. CARR (Chem. Abstr.)

The Ventricular System in Hydrocephalic Rat Brains Produced by a Deficiency of Vitamin B_{12} or of Folic Acid in the Maternal Diet. Overholser, M. D., et al. [*Anat. Record*, **120**, 917 (1955).]

Congenital hydrocephalus in albino rats due to a deficiency of Vitamin B_{12} or of folic acid in the diet of the dam is caused by occlusion of the cerebral aqueduct in the embryo between the 16th and 18th day of gestation.

EDWARD J. VAN LOON (Chem. Abstr.)

Experimental Study of Oxygen Deficiency in the Brain and its Clinical Significance. Petrov, I. R. [*Fiziol. Zhur. S.S.S.R.*, **41**, 9 (1955).]

A review with many references. Experimental results in rats subjected to O deficiency are presented. A block of the activity of the central nervous system caused by narcotics or total body cooling raises the resistance of the brain to O deficiency to an extent that might be useful in clinical applications.

G. M. KOSOLAPOFF (Chem. Abstr.)

Effect of Diisopropyl Fluorophosphate on the Energy-rich Phosphates and Ribose of the Brain. Pscheidt, G. R., and Michaelis, M. [*Suomen Kemistilehti*, 28B, No. 1, 72 (1955).]

Diisopropyl fluorophosphate (DFP) poisoning in rabbits increased energy-rich phosphates and ribose in brain. Practically all the energy-rich phosphate except phosphocreatine is present as adenosinetriphosphate. The greatest increase in high-energy phosphate occurred 40 minutes after administration of the drug.

S. P. MARINO (Chem. Abstr.)

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Enzymic Processes in Brain During Tuberculosis. Platonov, E. G. [*Trudy Akad. Med. Nauk S.S.S.R.*, **27**, No. 1, 10 (1953); *Referat. Zhur., Khim., No.* 29111 (1954).]

Tissue respiration, glycolysis, activities of phosphatase and cholinesterase, and the amount of acetylcholine were studied in brains of rabbits with tuberculosis. The animals were injected intravenously with 0·0001 mg. of bovine tubercle bacilli and brains were taken for analysis 2 and 24 hours, 3, 7, 14, and 28 days, and 3 and 5 months afterward. Shortly after injection a retardation of the oxidative processes was evident, especially in the cortex, with a simultaneous increase of glycolysis. The activity of phosphatase in the cortex and in the hypothalamic region was slightly higher in the first 7 days; in the cortex the activity increased further between the 14th and 21st day, and after 36 days the activity decreased rapidly to the normal level. In the hypothalamic region the activity of phosphatase after the 7th day remained slightly below normal. The activity of cholinesterase in the cortex decreased in the period between the 3rd and 21st day after injection; the reverse was true for the hypothalamic region. The amount of acetylcholine 3 days after injection was increased.

E. WIERBICKI (Chem. Abstr.)

Electrolyte Disturbances in Cerebral Lesions. Anthonisen, Poul, et al. [*Acta Med. Scand.*, **150**, 355 (1955).]

Specific cerebral lesions involving the osmoregulatory center will primarily cause the organism to be dehydrated. Even a slight dehydration of this nature with diminution of the extracellular volume will secondarily stimulate the normal volume receptor and thus lead to salt retention.

EDWARD J. VAN LOON (Chem. Abstr.)

The Relation Between Adrenal Cortical Activity and the Convulsive State. Glaser, Gilbert H. [*Epilepsia* (3), **2**, 7 (1953).]

A review. G. concludes that there is confusion about the adrenal cortical hormones and their activity as related to the convulsive state. There is some evidence that heightened susceptibility to seizures may be related to increased 11,17-oxycorticosteroid hormone activity, and that the reverse might be true with the deoxycorticosterone acetate group. The key may be correlated with the extra- and intra-cellular shifts of electrolytes, particularly Na and K. 80 references.

H.W.G. (Chem. Abstr.)

Biochemical Substrate of Nervous Trophism. Bykov, K. M., and Vasyutochkin, V. M. [*Fiziol. Zhur. S.S.S.R.*, **40**, 555 (1954).]

A review, in which it is pointed out that biochemical therapy which acts on the fundamental link of metabolism, cellular respiration, acts therefore on the substrate of nervous trophism. In so doing it normalizes the interoceptive and afferent reactions and thus facilitates the action of the central nervous system in normalizing metabolism of the organism as a whole. Examples of agents include the vitamin group (B_1, B_2, B_6, nicotinic acid, pantothenic acid, etc.).

G. M. KOSOLAPOFF (Chem. Abstr.)

Effect of Stimulation of the Autonomic Nervous Center Upon the Thiamine Metabolism in Rabbit. Satoyoshi, Eijiro. [*Vitamins* (*Japan*), **8**, 68 (1955).].

When the autonomic nervous center in the hypothalamus was stimulated, changes in thiamine concentrations in the liver, kidney, heart, lung, spleen, and adrenal of rabbits were determined. Stimulation of the sympathetic center caused a considerable decrease of total thiamine content in the liver and kidney, a slight decrease in the lung, and little decrease in the heart, spleen, and adrenal. By stimulation of the parasympathetic center, no significant change was recognized in the nonesterified and esterified thiamine of the organs.

HIROYASU FUKUBA (Chem. Abstr.)

Formation of Acetylcholine from S-acetylthiamine. Ito, Shinji. [*Vitamins* (*Japan*), **8**, 31 (1955).]

The addition of O,S-diacetylthiamine (I) to the suspension in which pieces of excised small intestine of the albino rat were soaked, caused contraction of these pieces; this effect did not occur when the pieces were pre-treated with atropine. Contraction was stronger when choline (II) and (I) were simultaneously added to the suspension than when (I) alone was added. Neither glutathione nor cysteine was an activator, but they showed almost the same activating effect when added to the suspension containing (I) and (II). Thiamine had some suppressing effect on the contraction of intestinal loops with acetylcholine (III), but (I) and thiamine alkyl disulfide had no effect. Addition of O,S-dibenzoylthiamine to the suspension resulted in relaxation of the intestine and decrease of response to (III), histamine, or pituitrin.

HIROYASU FUKUBA (Chem. Abstr.)

Effect of High-intensity X-radiation on Velocity of Nerve Conduction. Gerstner, Herbert B., et al. [*Am. J. Physiol.*, **180**, 232 (1955).]

Sciatic nerves of bullfrogs and rabbits were isolated and stored at 24°. Conduction velocity was determined prior to and 1, 2, and 4 hours following exposure to various total doses at dose rates of approximately 9,000 r./minutes of X-radiation. In frog nerves, doses in

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excess of 75 kr. caused a decrease in conduction velocity; doses above 300 kr. produced complete abolishment of conduction within 1 hour. Rabbit nerves were much more radiosensitive than frog nerves. Doses in excess of 45 kr. produced complete block within 1 hour following irradiation.

E. D. WALTER (Chem. Abstr.)

The Quantitative Histochemistry of Brain. IV. Lactic, Malic, and Glutamic Dehydrogenases. Strominger, Jack L., and Lowry, Oliver H. [*J. Biol. Chem.*, **213**, 635 (1955).]

Micromethods were developed for lactic (LDH), malic (MDH), and glutamic dehydrogenases (GDH) in 3 γ or less of brain (dry weight). The assays are based on the measurement of diphospho pyridine nucleotide (DPN) reduction in the presence of appropriate substrate. Quantitative data were obtained for (LDH) and (MDH) in 6 layers of Ammon's horn, 4 layers of cerebellum, 4 layers of striate cortex, supraoptic nucleus, hypothalamus, optic nerve and tract, 4 layers of retina, 4 additional myelinated-fiber tracts, and dorsal-root ganglion cells. (GDH) was determined only in the layers of Ammon's horn. The distribution of (LDH) and (MDH) in Ammon's horn parallels the distribution of aldolase. The non-myelinated fiber and dendrite layers are particularly rich in (LDH) and (MDH); (GDH) occurs principally in the myelinated fibers and molecule layer of Ammon's horn. Three types of fiber tracts were distinguished on the basis of (LDH) and (MDH) activity. Retinal ganglion cells and their axons (optic nerve) are very rich in (LDH) and very poor in (MDH). Some structures deeper in the retina have a high (MDH) activity and a low (LDH) activity. The high glycolytic and respiratory rates in intact retina are, therefore, probably manifestations of different metabolic processes in different cells.

FELIX SAUNDERS (Chem. Abstr.)

Acetylcholine-like Action of Brain Extracts. Schumann, H. J. [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **225**, 110–11 (1955).]

Paper chromatography and evaluation of the frog rectus muscle and guinea-pig intestine tests proved that beef-brain extract contained acetylcholine, propionylcholine, and butryrylcholine.

A. E. MEYER (Chem. Abstr.)

The Metabolism of Normal Brain and Human Gliomas in Relation to cell Type and Density. Heller, Irving H., and Elliott, K. A. C. [*Can. J. Biochem. and Physiol.*, **33**, 395 (1955).]

Per unit weight, cerebral and cerebellar cortex respire much more actively than corpus callosum. The rate per cell nucleus is highest in cerebral cortex, lower in corpus callosum, and still lower in cerebellar cortex. The O-uptake rates of the brain tumors studied, with the exception of an oligodendroglioma, were about the same as that of white matter on the weight basis but lower than that of cerebral cortex or white matter on the cell basis. In agreement with previous work, an oligodendroglioma respired much more actively than the other tumors. The rates of glycolysis of the brain tumors per unit weight were low but, relative to their respiration rate, glycolysis was higher than in normal gray or white matter, Consideration of the figures obtained leads to the following tentative conclusions: Glial cells of corpus callosum respire more actively than the neurons of the cerebellar cortex. Neurons of the cerebral cortex respire on the average much more actively than neurons of the cerebellar cortex or glial cells. Considerably more than 70 per cent. of the O uptake by cerebral cortex is due to neurons.

The O-uptake rates of normal oligodendroglia and astrocytes are probably about the same as the rates found per nucleus in an oligodendroglioma and in astrocytomas; oligodendroglia respire much more actively than astrocytes.

A. E. TEERI (Chem. Abstr.)

Adrenaline Substance of the Brain and Suprarenals Under Increased Oxygen Pressure. Gershenovich, Z. S., et al. [*Ukrain. Biokhim. Zhur.*, **27**, 3 (1955).]

Rabbits 1·5–2·0 kg. were placed into compression chambers filled with pure O under 3·5 and 6 atm. pressure. The CO_2 resulting from respiration was absorbed by soda lime. Animals were observed through a window. The effects of O poisoning at 6 atm. show 3 distinct stages: I—The stimulation period during which the animal manifested restlessness accompanied by motor reactions and jerky motions of the head and appendages. This stage sets in 10–13 minutes after the O-pressure increase. II—The period of convulsions, which appear 20–25 minutes after the beginning of the experiment. III—The terminal period, the duration of which differs with each animal. It is characterized by a state of coma with the animal lying on its side, the respiration is profoundly disturbed, and death soon ensues preceded by specific terminal convulsions. Tests for adrenaline and its conversion products were made during each period. During (I) the adrenaline in the brain is lowered by 62 per cent., which is due to its breakdown, as can be inferred from the increase in the adrenochrome by 14·8 per cent. Dehydroadrenaline is reduced by 20 per cent. Adrenaline is also converted to substances other than adrenochrome, but their identity cannot be established for the lack of specific tests. During (II) adrenaline in the brain increases somewhat, while adrenochrome and dehydroadrenaline are decreased. The sum of the adreno substances is decreased by 40·6 per cent. During (III) adrenaline and dehydroadrenaline are increased only measurably, while adreno-

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chrome is increased by 32·6 per cent. The total of adreno substances in the brain is increased by 14 per cent. as compared with the control and by 92·1 per cent. as compared with (II). In the suprarenals in (I) adrenaline is increased by 234 per cent., dehydroadrenaline by 33·8 per cent. and adrenochrome by 40 per cent. This points to an increased suprarenal functional activity under the influence of the high O pressure toxic condition of the central nervous system. In (II) the synthesizing function of the adrenals is considerably depressed. Adrenaline is reduced by 37·3 per cent as compared with (I) and by 41·7 per cent. as compared with the controls. Dehydroadrenaline and adrenochrome are decreased only slightly. During (III) the function of the suprarenals is completely distorted. No adrenaline can be detected, while dehydroadrenaline and adrenochrome increase. This may be due to the complete oxidation of the adrenaline or to the suprarenals synthesizing no adrenaline. Under pure O pressure of 3·5 atm. the same physiological reactions occur, but they are stretched out and delayed. The biochemical data vary in their percentage values, but the general character and trend of the results are the same.

B. S. Levine (Chem. Abstr.)

The Interrelation Between Functional State of Brain Cortex and Parathyroid Gland. Baranova, N. F. [*Problemy Endokrinol. i Gormonoterap.*, **1**, *No.* 2, 52 (1955).]

Extirpation of parathyroids in dogs lowered the blood Ca to 9–4·5 mg. per cent., and altered the responses of conditional reflexes to light and metronome beats of 120 strokes per minute. Raising the Ca concentration of blood by feeding the hypoparathyroid dogs $CaCO_3$ improved the physical state of the animals as well as the responses of the conditioned reflex. Parathyroid hormones affects the functional state of brain, cortex and the function of parathyroid gland is regulated by the brain cortex.

J. A. Stekol (Chem. Abstr.)

The Biochemical Constitution of Saliva in Unconditioned and Conditioned Reflex Responses. Skesterikova, T. P., and Sokolova, E. A. [*Ukrain. Biokhim. Zhur.*, **26**, 397 (1954).]

Two dogs were used. Saliva was obtained from the dissected and cannulated duct of the maxillary salivary gland following nutritional stimulation of dogs with conditioned and unconditioned salivary reflexes. Determinations were made of total N, dry residue, organic and inorganic constituents of Cl and of the n. The development of conditioned salivary reflexes is accompanied by an increase in the salivary exudate upon strong stimulation. In cases with a well established stereotype salivary reflex reaction the values of N, Cl and of the n are of a lesser magnitude in the saliva obtained from the conditioned than the unconditioned dog. Quantitative N and Cl studies indicate that the greater the impact of the conditioned stimulation the greater the percentage of solid substances in the secreted saliva.

B. S. Levine (Chem. Abstr.)

The Cerebrospinal Fluid of the Newborn. Woiski, J. R., et al. [*Arquiv. neuropsiquiat.*, **7**, 264 (1949).]

Physiol., biochem., and other data are given on 82 samples of cerebrospinal fluid from 52 newborn infants. It is generally xanthochromic in the first week of life, but becomes colorless after 20 days. A fibrin web is seen in some cases. The normal protein content on the first day is 0·25–1·58 g./l. After 3–4 weeks, the values approach those of the normal adult. The Cl level (as NaCl) is 7·03–7·49 g./l. The sugar content is 0·42–0·78 g./l. The lower values occur in the first few days.

W. C. Tobie (Chem. Abstr.)

Densities of Cerebrospinal Fluid of Human Beings. Davis, Harold and King, Wilbert. [*Anesthesiology*, **15**, 666 (1954).]

The densities of cerebrospinal fluid in 9 subjects was $1·0040 \pm 0·0004$ g./ml. at 25° and $1·0010 \pm 0·0003$ g./ml. at 37°; densities is most dependent on temperature and Na, Cl, and CO_2 concentrations and depends little on variations in protein concentrations.

Karl F. Urbach (Chem. Abstr.)

Electrophoresis of Proteins in the Cerebrospinal Fluid. Booij, J. [*Ned. Tijdschr. Geneesk.*, **1**, 64 (1950).]

The Tiselius method was modified and used for the small amounts of protein in the cerebrospinal fluid (I). Only albumins could be demonstrated in normal (I). If the total proteins were increased β- and γ-globulins were also demonstrable, α-globulin was not found in (I). Immunologically, an increase in γ-globulin in infectious diseases of the nervous system may be a favorable factor.

W. C. Tobie (Chem. Abstr.)

Concentration of Cerebrospinal Fluid for Preparation of Electropherograms. Pruckner, G., and Schwuttke, G. [*Arch. Psychait. Nervenkrankh.*, 193, 48 (1955).]

A concentration of 100-fold was obtained by pressure filtration through a protein-impervious filter.

Warren M. Sperry (Chem. Abstr.)

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Influence of the Potassium Concentration of the Blood on the Potassium Level of the Cerebrospinal Fluid. Bekaert, J., and Demeester, G. [*Exptl. Med. Surg.*, **12**, 480 (1954).]

In experiments on dogs, the serum K concentration (I) was increased by traumatic shock, while the cerebrospinal fluid K concentration (II) was unchanged. Suboccipital injections of 1 ml. 1 per cent. KCl caused only a transient increase in blood pressure during shock. Intravenously injected insulin (III), with or without glucose (IV), lowered (I) and, to a lesser degree (II). Intraperitoneally injected 10 per cent. (IV) plus (III) lowered (I) without changing (II). Intramuscularly injected (III), did not change (I) or (II). In tuberculous meningitis, (I) lowering caused by intravenously injected (IV), was not accompanied by change in (II), nor was the (I) increase developing in adrenalectomized animals after withdrawal of therapy, the (I) decrease after injections of deoxycorticosterone, the (I) decrease after denervation of the carotid sinuses, and the (I) increase after intravenous infusion of isotonic KCl. Injection of histamine in beeswax-paraffin oil did not influence the K blood-cerebrospinal fluid barrier before and during KCl administration. After death in hyperkalemia, there was a rapid increase in (II). The marked (I) increase caused by injection of dinitro-l-naphthol was not accompanied by definite (II) increase as long as the temperature did not reach very high values. Hyperthermia produced by vaccine did not influence (I) or (II).

MARION HORN PESKIN (Chem. Abstr.)

The Plasmalogen Content of Cerebrospinal Fluid. Stammler, Albrecht. [*Arch. Psychiat. Nervenkrankh.*, **192**, 556 (1954).]

The dried residue from extraction of 2 ml. cerebrospinal fluid (CSF) with EtOH–Et_2O (2:1) was heated 5 minutes at 55° with 0·1 ml. AcOH and 0·1 ml. 2NHCl. After neutralization, color was developed by addition of 1 ml. fuchsin-H_2SO_3 solution, extracted after 15 minutes with amyl alcohol, with centrifuging, and read with Pulfrich filter 553. The average concentrations of plasmalogen (I) in (CSF) from 26 normal men and 26 normal women were 0·272 (0·075–0·475) and 0·342 (0·169–0·600) mg./100 ml. respectively. In 12 persons there was no correlation between blood serum and (CSF) (I) concentrations. The average concentration in serum was about 22 times that of (CSF). In most of 35 patients with organic diseases of the central nervous system and abnormalities in the (CSF) the (I) concentrations in (CSF) were normal.

WARREN M. SPERRY (Chem. Abstr.)

The Effect of Age on the Protein Concentration of Cerebrospinal Fluid of Normal Individuals and Patients with Poliomyelitis and Other Diseases. Muller, Otto, et al. [*Am. J. Med. Sci.*, **228**, 510 (1954).]

An increase in protein (I) concentration of the cerebrospinal fluid with age occurred to a slight extent in normal individuals, to a marked extent in patients with poliomyelitis. In normal persons, 40–45 mg. 1/100 cc. was generally found in adults up to age 60, somewhat lower values in infants and children, and up to 60 mg./100 cc. in adults above age 60.

MARION HORN PESKIN (Chem. Abstr.)

Mucoproteins in Normal and Pathological Cerebrospinal Fluid. Ferrante, Luigi and Cantarutti, Felice. [*Minerva pediat.*, **6**, 430 (1954).]

By the technique of Winzler applied to cerebrospinal fluid, mucoprotein values (in mg. tyrosine/100 cc.) were 0·4–0·5 in normal children, 0·8–0·9 in children with various diseases without meningeal irritation, and 2·0 in cases of acute meningitis. The ratio tyrosine/galactose-mannose in the cerebrospinal fluid was nearly the same as in blood mucoproteins.

C. SCANDURA (Chem. Abstr.)

2. Pharmacology and Treatment

The Effects of Xylocaine on the Central Nervous System with Special Reference to its Influence on Epileptic Phenomena. Berhard, C. G., and Bohm, E. [*Experientia*, **10**, 474 (1954).]

In cats intravenous injections of 2 mg./kg. body weight xylocaine were effective in abolition of epileptiform cortical after-discharges and ventral root outbursts after electrical stimulation of the cortex. The tonic asynchronous discharge in the radial nerve during cortical stimulation disappeared in treated animals.

D. S. FARNER (Chem. Abstr.)

Mysoline—a New Anticonvulsant. Lamobros, Vasilios S. [*Epilepsia* (3), **3**, 118 (1954).]

Mysoline (5-ethyldihydro-5-phenyl-4,6(1H,5H)-pyrimidinedione) was used in treatment of 494 new epileptic patients. The dosage started at 125 mg. daily and was increased until control was reached. Major convulsions, psychomotor seizures, myoclonic, traumatic, and minor seizures all responded in varying degrees to the drug. Mysoline was considered a satisfactory anticonvulsant, especially for major seizures, and produced only a minimum of toxic signs.

H. W. GILLEN (Chem. Abstr.)

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The Intracellular Distribution of a Fluorescent Convulsant. Mayer, Steven E., and Bain, James A. [*Epilepsia* (3), **3**, 120 (1954).]

Fluorescence microscopy was used to determine the distribution of 10-(2-diethylaminoethyl)-9-acridone after a 12 mg./kg. dose in cats. Small tissue samples were fixed by freeze-drying and imbedded in paraffin. The convulsant was found to localize in the neuronal and glial nuclei. A characteristic blue fluorescence was predominantly in the nucleolus and along the surface of the nucleus. The staining seemed to be specific for the cells of the nervous system.

H. W. GILLEN (Chem Abstr.)

Hydrazides as Metabolic Convulsants. Pfeiffer, C. C., et al. [*Epilepsia* (3), **3**, 121 (1954).]

Unsubstituted hydrazides (thiosemicarbazide, carbohydrazide, thiocarbohydrazide, semicarbazide, isonicotinoyl hydrazide) are all carbonyl trapping agents, diamine oxidase inhibitors, inhibitors of enzyme systems catalyzed by pyridoxal phosphate, and all produce convulsions after a latent period of 1 hour. Repeated maximal seizures occur for 4 to 5 hours. When topically applied to the cerebral cortex, the hydrazides produce fast, high-voltage spiking activity, recorded on the electroencephalogram. The hydrazides lower the threshold to photic stimulation-induced seizures in most species. Semicarbazide increases sensitivity to metrazole, but not to strychnine, electroshock or NH_4^+. Acetone, phenurone, trimethadione, phenobarbital, α-ketoglutarate, pyruvate, and glucose are effective antidotes. The B_6 group of vitamins are also antidotal to hydrazide convulsions.

H. W. GILLEN (Chem. Abstr.)

A Study of the Anticonvulsant Properties of Phenobarbital and Dilantin. Chen, Graham and Ensor, Charles R. [*Arch. intern. pharmacodynamic*, **100**, 234 (1954).]

In mice, the antielectric shock effect of pentobarbital and barbital is an abrupt increase of the threshold, probably caused by paralysis of the spinal cord, while the effect of phenobarbital and dilantin is slow to reach a maximum, and is shown in nonhypnotic doses. The difference in action is seen when these drugs are given in combination, and the last 2 drugs given together show a potentiation of antielectric shock effect, but no increase in toxicity. This is a possible mechanism for their therapeutic efficiency in epilepsy.

M. L. C. BERNHEIM (Chem. Abstr.)

Effect of Metrazol and Nembutal on Motor Activity in the Spinal Cat. Jones, David P., and Lombroso, Cesare T. [*Am. J. Physiol.*, **180**, 209–14 (1955).]

The effect of metrazole and nembutal upon spontaneous and evoked motor activity was studied in 12 cats after high spinal section. After injection of metrazol, 11 cats had spontaneous seizure discharges and 8 had bilateral muscular responses to electric stimulation of a cutaneous nerve. Nembutal, even in very small doses, exerted a markedly depressant action in the spinal animals.

E. D. WALTER (Chem. Abstr.)

Mutual Action of Carbon Dioxide and Convulsants. Langnickel, D., et al. [*Naunyn-Schmiedebergs Arch. exptl. Pathol. Pharmakol.*, **224**, 434 (1955).]

Carbon dioxide causes a reduction of the convulsive action of metrazole, Azoman, picrotoxin, and coramine, but augments the convulsions produced by strychnine, brucine, and nicotine. This enhancing effect is localized, in the case of strychnine, in the spinal cord. The experiments were performed on cats.

A. E. MEYER (Chem. Abstr.)

Reserpine Effects in Epileptic Monkeys. Chusid, Joseph G., et al. [*Proc. Soc. Exptl. Biol. Med.*, **88**, 276 (1955).]

Intravenous reserpine treatment produced behavioral changes in epileptic monkeys resembling those described for similarly treated normals. Electroencephalograms are shown and discussed.

L. E. GILSON (Chem. Abstr.)

Cortical (Brain) Bioelectric Changes in Human Beings Produced by Hexamethonium Chloride. Imbriano, Aldo E., et al. [*Semana méd.* (*Buenos Aires*), **1**, 325 (1955).]

The modifications observed with increasing dose given intravenously were: Increase and well synchronized α-rhythm; bursts of irregular slow rhythms with tendency to become generalized; bursts of rapid spikes.

A. E. MEYER (Chem. Abstr.)

Drug Therapy of Parkinson's Syndrome: a Review. Drake, Frank R. [*Am. J. Med. Sci.*, **228**, 97 (1954).]

79 references. MARION HORN PESKIN (Chem. Abstr.)

Experimental Study on the Physiological Distribution and Metabolism of Phenacemide (Phenurone). Richards, R. K., et al. [*Epilepsia* (3), **3**, 120 (1954).]

Carbon-14-labelled Phenurone was used and recovered from the intestinal tract and the

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brain. Only small amounts (no figures) were found in the brain. The anticonvulsant protection of phenacemide seemed to correlate with the quantity in the brain.

H. W. GILLEN (Chem. Abstr.)

Pharmacological Studies on the Phosphorus Metabolism of the Brain with Radioactive Phosphorus-32. Takenaka, Fumio, et al. [*Folia Pharmacol. Japan*, **50**, *No.* 2, 161 (1954).]

The content of P in the blood plasma of rat 3, 5, and 24 hours after intra-abdominal injection of inorganic P after fasting was 8·26, 8·36, and 7·84 mg. per cent. respectively; anesthetizing with urethan decreased the contents to 5·54, 5·03, and 5·21 mg. per cent. respectively. After administration of P^{32}, no difference was observed in the content in plasma at varied intervals. The specific activity of P^{32} (P^{32} c.p.m./mg. P^{31}) in brain tissues was 1 per cent. of the content in blood plasma 3 hours after intra-abdominal injection and 5 per cent. after 24 hours. The P was mainly obtained in an acid-solution fraction of brain tissues. The pathway of the P administered to brain tissues was discussed. The ratio of organic P^{32} to inorganic P^{32} in the acid-solution fraction from brain tissues was 0·28 at 5 hours and 0·37 at 24 hours after administration of P^{32}; this small difference may indicate that synthesis of organic P from inorganic P compounds is rapid before 5 hours after administration and slow later. The P^{32} content in other fractions was 12 and 24 per cent. of the content in the acid-solution fraction 5 and 24 hours after administration, respectively. Anesthetizing with urethan did not change the amount of P^{32} moved to brain after intra-abdominal injection. Administration of urethan increased the acid-solution P fraction in the brain. Urethan decreased the P^{32} content in other fractions, particularly at 5 hours after the administration of P^{32}. The ratio of inorganic to organic P^{32} in the acid-solution fraction was not affected by urethan.

SCHOZABURO KITAOKA (Chem. Abstr.)

The Use of a New Preparation for Cure of Insomnia. Gibellini, Fausto. [*Policlinico* (*Rome*), *Sez. prat.*, **62**, 350 (1955).]

The carbamate of phenylethynylcarbinolat 0·15–0·30 g. produced sleep for 5–8 hours in psychoneurotic patients. The incubation period was 0·5–1 hour. The drug was not habit-forming and was well tolerated, and no alteration of normal function of liver and kidney was noted after administration. LD_{50} in white mice was 275 mg./kg., and hypnosis for 1 hour was obtained with 150 mg./kg. The point of attack seems to be on the cortical and subcortical centers.

M. ELLIOTT (Chem. Abstr.)

Influence of Small Doses of Thyroidin on the Higher Nervous System Activity in Dogs. Baranov, V. G., et al. [*Problemy Endokrinol. i Gormonoterap.*, **1**, *No.* 1, 28 (1955).]

An alteration in the conditioned reflex activity of dogs was obtained by the administration of small doses of thyroidin which did not affect the O consumption, indicating the influence of small doses of thyroidin on the nerve cells. Oxygen-consumption measurements are not always reliable criteria of excess of thyroxine in the organism, as they do not detect the early effects of thyroxine on the nerve cells. This may have a bearing on various diseases, such as neurosis, in which no visible or measurable changes in the thyroid gland or its activity can be detected.

J. A. STEKOL (Chem. Abstr.)

Pharmacological Studies on the Function of the Extra-pyramidal System. I. Significance of Corpus Striatum in the Presence of Extrapyramidal Poisons. Kawamori, Kazuhiko. [*Folia Pharmacol., Japan*, **50**, 17 (1954).]

The corpus striatum of mouse was submitted to high frequency electrocautery and the significance of the striatum for the development of action of extrapyramidal poisons was examined. The action of harmine was decreased when the anterior portion of the striatum was injured, while the injury of the posterior portion exerted a reduction of action of bulbocapnine.

Pharmacological Studies on the Function of the Extra-pyramidal System. II. Significance of Hypothalamus, Mid-brain, and Cerebellum in the Presence of Extrapyramidal Poisons. [*Ibid.*, **50**, 27 (1954).]

Hypothalamus, mid-brain, and vermis of the cerebellum were treated by high frequency electrocautery. Injury in hypothalamus and mid-brain, particularly in the ventral portion of both sides of each, inhibited the action of extrapyramidal poisons, whereas partial injury in mid-brain and cerebellum appeared to have no direct effect on either harmine or bulbocapnine.

SHOZABURO KITAOKA (Chem. Abstr.)

Drug-produced Experimental Psychoses. Fischer, Roland and Agnew, Neil. [*Naturwissenschaften*, **41**, 431 (1954).]

Wool protein was used as model surface simulating the neuroreceptors involved in drug-induced psychoses. The millimoles $\times 10^{-3}$ of such drugs adsorbed by 1 g. wool was for mescaline 0, methedrine 0·6, lysergic acid monoethylamide 1·1, lysergic acid diethylamide 2·6; the corresponding doses required by humans are 0·5, 0·1, 0·001, and 0·0001 g. The

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adsorption of a number of phenothiazines on wool was estimated to determine the possible inhibitory effects relative to the psychotic effect. Methylene blue, parsitan, largactil, and diparcol have increasing affinity to wool: 3·3, 4·8, 5·3, and 5·5 millimoles $\times 10^{-2}$ per g. wool. Affinity for wool of the 7 compounds tested and relative toxicity on tadpoles are in the same order. Preliminary experiments show that higher affinity for wool may be associated with more complete inhibition of experimental psychosis.

B. J. C. VAN DER HOEVEN (Chem. Abstr.)

Effect of Chlorpromazine on Phosphorylation of Brain Mitochondria. Abood, L. G. [*Proc. Soc. Exptl. Biol. Med.*, **88**, 688 (1955).]

Chlorpromazine uncoupled the oxidative phosphorylation of rat brain mitochondria and inhibited cytochrome oxidase in concentrations not affecting over-all oxidation. Since the drug inhibits the adenosinetriphosphatase activity of mitochondria, it presumably does not uncouple by accelerating high-energy phosphate breakdown. It is suggested that it acts by reversibly altering intramitochondrial relations.

L. E. GILSON (Chem. Abstr.)

2-Amino-5-chlorobenzoxazole (McN-485, Flexin), a longacting Spinal Cord Depressant. Kamino, Kazuya and Koell, George B. [*Proc. Soc. Exptl. Biol. Med.*, **88**, 565 (1955).]

The drug produces selective depression of polysynaptic spinal reflexes in cats at lower doses than those required to block monosynaptic reflexes. In much higher doses it inhibits the response of indirectly stimulated skeletal muscle. Its duration of action is extremely long and its toxicity is low.

L. E. GILSON (Chem. Abstr.)

Acute and Chronic Barbiturate Poisoning. Malmros, H., et al. [*Nord. Med.*, **41**, 305 (1949) (in Swedish); *Excerpta Med., Sect. VIII*, **3**, 395).]

Chemical antidotes and physical countermeasures are considered.

W. C. TOBIE (Chem. Abstr.)

The Value of Barbiturate Estimation in the Diagnosis and Treatment of Barbiturate Intoxication. Wright, J. T. (*London Hosp.*). [*Quart. J. Med.*, **24**, 95 (1955).]

There is a quantitative relationship between the blood concentration of barbiturate derivatives and the degree of depression of the nervous system. Comparatively low levels may be associated with profound depression when the picture is complicated by shock, anoxia, the addition of other poisons, senility, and possibly parkinsonism. Relatively high values may be tolerated after continued usage of barbiturates. Barbiturates are more or less uniformly distributed throughout the body water; hence it is possible to calculate the approximate dose ingested from the patient's weight and the maximum concentration of barbiturate in the blood. Soon after ingestion of barbiturates, large concentrations appear in the liver, but subsequently diminish to the same order as in the blood; hence in fatal cases some estimate can be made of the time between ingestion and death. Barbiturates always remain low in the spinal fluid. Renal clearance of barbital is greater than that of phenobarbital, and the clearance in both cases is slightly increased at higher rates of urine flow, but is not significantly influenced by agents designed to alter the pH of the urine. The practice of forced diuresis is not justified. Gastric lavage is of little value 4 hours after ingestion.

JOHN T. MYERS (Chem. Abstr.)

Sodium Succinate in Pentobarbital Depression of the Cerebral Cortex and Medulla Oblongata. Larson, Edward, et al. [*Anesthesiology*, **16**, 239 (1955).]

In vitro, slices of rat cortex and medulla oblongata show decreased O consumption after addition of pentobarbital. Na succinate prevented or overcame this decreased O consumption.

KARL F. URBACH (Chem. Abstr.)

Bromide Intoxication. Campbell, J. D. [*Southern Med. J.*, **42**, 967 (1949); *Excerpta Med., Sect. VIII*, **3**, 394 (1950).]

Bromide intoxication (I) is almost always associated with a more serious mental disorder. In normal individuals, a level of 150 mg. per cent. blood bromide may be necessary to produce (I), but in chronic alcoholics or persons on a salt-free diet much lower levels will produce (I). NaCl is a specific antidote, but must not be given in excessive amounts.

W. C. TOBIE (Chem. Abstr.)

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