THE normal respiratory function of the lung is dependent upon an uninterrupted airway from the larynx to the pulmonary air sac. Interruption of this airway produces abnormal physiologic and pathologic changes in the portion of the lung distal to the interruption, the magnitude of which varies from minor changes to major respiratory dysfunction occasionally resulting in sudden death. In the latter instance where the airway is obstructed above the bifurcation we are in the habit of applying the term asphyxia. However, when the obstruction occurs below the bifurcation of the trachea the term commonly applied to the process distal to the obstruction is atelectasis, obstructive atelectasis or absorption collapse, the latter term being preferred by Robert Coope of the Liverpool Royal Infirmary.

Certain physiologic and pathologic changes occur in the portion of the lung and bronchial tree involved in the atelectatic process. The resulting degree of systemic effect produced is in direct proportion to the area of lung involved, the rate of occurrence and degree of obstruction and the presence of infection in the involved area as well as the effect that the obstructing agent may produce.

Complete obstruction of a bronchus results in a reduction of the vital capacity of that lung immediately. The air in the pulmonary alveoli distal to the obstruction is absorbed by the pulmonary capillaries and the affected segment of the lung becomes atelectatic either rapidly or slowly depending on the presence of collateral aeration through the alvolar pores. The segment of lung becomes very much smaller than normal, reducing the volume of the lung within the unyielding chest wall and creating a potential vacuum. The normal intrapleural negative chest pressure of minus 5 to 8 cm. of water may be increased to as high as minus 40 cm. of water. The movable parts of the chest compensate for this lowered volume, the mediastinum shifting to the affected side, the diaphragm moving upward and the intercostal spaces of the affected
hemithorax becoming narrowed and drawn in. Further compensation is produced by emphysema of the involved portion of both lungs.

Marked changes in the pulmonary circulation accompany the changes associated with absorption collapse. The decreased blood flow through the atelectatic lobe causes capillary engorgement. The increased negative intrapleural pressure tends to suck more blood into the right heart, producing additional strain on this ventricle. The combination of effect, of the above two processes results in the tendency to pulmonary edema and transudation of serum into the atelectatic portion of the lung producing a favorable field for infection. Peripheral circulatory failure may be precipitated through failure of the left heart to receive a proportionally large volume of blood.

Sudden bronchial occlusion may produce cough, dyspnea, cyanosis, rapid respiratory rate, tachycardia and possibly collapse. A slowly developing bronchial occlusion produces cough, usually dry but later becoming productive and the higher up in the bronchial tree, the more bothersome it is likely to be. If the obstruction occurs in the large bronchi, it is frequently accompanied by an asthmatic wheeze, so described by Chevalier Jackson. Dyspnea may onset so gradually that the patient is unaware of its presence except when vigorous exercise is undertaken. Other symptoms produced are usually the results of extrabronchial involvement of structures such as nerves, vessels, glands or the esophagus, producing hoarseness, distended superficial veins, tumor masses or dysphagia.

The physical signs of atelectasis are dependent upon the volume of lung involved. Lobar atelectasis typically produces a silent area of lung with shifting of at least a portion of the mediastinum to the affected side. The individual pulmonary lobes create fairly typical patterns of collapse and these are best delineated by x-ray films of the chest in the postero-anterior and the lateral positions. Small segmental areas of atelectasis become the most difficult to diagnose, some of these appearing as thin plate-like structures and being easily misinterpreted as thickened areas of interlobar pleura or old scarring.

For the sake of specificity, we now turn our attention to those pathological processes which produce the bronchial obstruction which results in atelectasis. In this way we may follow the probable sequelae which may result from the various causative agents. These may be classified according to Rubin as (1) Intrabronchial obstructions which may be (a) endogenous to include tenacious sputum, fibrinous casts, broncholiths, rupture of caseous lymph nodes, postoperative retention of secretion and (b) exogenous to include foreign bodies; (2) Endobronchial obstructions to include congenital abnormalities, nonspecific inflammations of the bronchial mucosa, specific inflammatory processes, bronchogenic neoplasms, benign and malignant or distortions of bronchial lumen by kinking or twisting (3) Extrabronchial obstructions, such as enlarged
lymph nodes, mediastinal suppuration or neoplasms, vertebral abscesses or neoplasms, intrathoracic goiter, neoplasms of lung or esophagus, cardiovascular disease in the thorax or foreign bodies in the esophagus.

Let us pick the first example from the intrabronchial causes of obstruction and recall the little 2-year-old who went to town on Saturday night and Mother bought for him a bag of peanuts. While eating the peanuts big brother decided to pinch him and a sudden cry resulted in aspiration of a piece or pieces of peanut into the bronchial tree. There is a sudden severe choking spell and then things quiet down and Johnny is more comfortable but he is noticed to breathe a bit noisily. Now is usually the critical decision for the parent and sometimes for the doctor. Is Johnny just developing a cold or is there really a peanut down there? This is the question. If the doctor is consulted and he makes a careful examination of the child, in a high percentage of cases it can be determined there and then with the physical examination. Additional information can be had from radiological examination. If the condition can be recognized promptly and the peanut removed, there will be no sequelae in a vast majority of cases because of the immediate relief of the atelectatic process. If it is not recognized and allowed to remain, then atelectasis becomes more complete, secondary infection ensues and bronchiectasis or lung abscess or bronchiolitis may result, causing permanent damage or possibly death.

Every surgeon has experienced the sudden dramatic change which occurs in a postoperative patient when he develops massive atelectasis of the lung. Recognized fairly early by increased respiratory rate, tachycardia, fever and sometimes shock with marked diminution of the breath sounds, immediate action with simple means will frequently suffice to dislodge the large mucous plug which is blocking the bronchus and the patient makes a very rapid recovery from his pulmonary complication which used to be looked upon as a postop-pneumonia or so called ether-pneumonia. In many instances I feel that we doctors are responsible for these conditions by over-sedation with morphine or similar drugs and failing to insist on the patient turning from side to side and deep breathing. Early rising has been a great advance in the prevention of massive postoperative pulmonary collapse.

The methods of treatment which are applicable to this type of pulmonary atelectasis may be listed as follows: (1) turning patient on the good side and encouraging him to cough and even some sharp pressure over the ribs on the affected side frequently help to dislodge the mucus. (2) Failing with this, a small amount of local anesthetic sprayed in the nose (not sufficient to completely abolish the cough reflex) and passing a catheter through the nose and into the trachea to the bifurcation or lower and applying suction will frequently aspirate large quantities of mucus to relieve the respiratory embarrassment very remarkably. A third (3) method is one which you may have thought I would place first and
that is bronchoscopic suction. This is much more unpleasant to the patient than either of the other methods and I fear often not much more effective. But there are occasions on which it is imperative to use it and with success. The fourth procedure that I should like to mention is the use of artificial pneumothorax in selected cases where the atelectasis is complete and a high negative intrapleural pressure exists with marked distortion of the heart and great vessels. Putting in sufficient air to reduce this high negative pressure to nearly a normal level relieves the pressure on the cardiovascular mechanism and I have seen patients cough up tremendously large quantities of sputum following this procedure, with complete relief of the atelectasis.

In considering the various bronchopulmonary infections, we can group the pneumonias, lobar, bronchopneumonia and primary atypical or virus pneumonia, together with such infections as measles and whooping cough. These are productive of thick tenacious sputum, the globules of which undoubtedly produce plugging of bronchi resulting in areas of absorption collapse. Coope has given a very satisfactory explanation of the development of bronchiectasis in association with atelectasis produced under such circumstances. "When the obstruction is due to a plug of mucus, mucopus or a piece of soft blood clot, the increased intrathoracic negative pressure tends to suck the material farther down the bronchial tree towards the periphery, the plug being split into smaller pieces as it meets the spurs of th bronchial bifurcations. The alveoli which were originally collapsed must still remain airless, unless perchance the plug misses one or more bronchial divisions as it moves on and is split up, so that a free airway is re-established to them. When the traction force is exerted mainly on the medium-sized bronchi the dilatations are cylindrical or fusiform; but when the pieces of plug are sucked down as far as the finest bronchioles which contain no cartilage and little muscle the dilatations are likely to be saccular." Reference is then given to complicating infection producing loss of elasticity of the bronchial wall, fibrosis and peribronchial thickening with resultant permanent bronchiectatic change. We are all aware of the frequency with which a past history of measles or whooping cough occurs in the patient with bronchiectasis.

Broncholithiasis, although of rather rare occurrence usually at some stage of the disease, produces bronchial obstruction with resultant atelectasis, bloody sputum, cough and pain in the chest. The chronicity of the disease produces an insidious onset of atelectasis with infection and resultant permanent damage in a very significant proportion of cases. In four cases studied by Fox and Clerf, by means of bronchograms following removal of the broncholith, they found in each of these, cylindrical dilatations in the subdivisions of the bronchi distal to the point of obstruction created by the broncholith.

Of the endobronchial lesions producing atelectasis, bronchogenic carcinoma is by far the first in importance and tuberculosis next. Since
approximately 80% of bronchogenic carcinomas arise in the larger bronchi, atelectasis of major importance is bound to come sooner or later in the development of this malignant tumor. So that it is of the greatest importance to recognize the atelectasis as early as possible and suspect the possibility of carcinoma as the etiological factor with the purpose of establishing a diagnosis and the institution of surgical therapy at a sufficiently early stage to cure the patient.

Bronchial obstruction and atelectasis in tuberculosis may result from hemorrhage and blood clot as an intrabronchial cause, or from ulcerative tuberculous bronchitis as an endobronchial cause or finally as calcified tuberculous lymph glands as an extrabronchial cause. The differential diagnosis of this usually upper lobe type of atelectasis, from that produced by bronchogenic carcinoma may be difficult.

The extra bronchial obstructive diseases are numerous and varied. These are important to recognize because the great majority are not amenable to therapy of any kind although the lymphoma may respond temporarily to x-ray therapy. Of the cardiovascular abnormalities, an enlarged left ventricle or dilated pulmonary artery may compress the left main bronchus. Aneurysms of the arch or descending aorta cause pressure likewise on the left main bronchus while one of the ascending arch may cause compression of the right main bronchus. One of the great fears that has possessed me during the days that I have been associated with a bronchoscope is that sometime I might fail to enquire regarding the serological reaction of the blood and finding a suggestive carcinomatous looking ulcer, take a biopsy only to be met with a sudden gush of blood from a ruptured aneurysm and a dead patient.

The significance of pulmonary atelectasis — what does this really mean to us? (1) It means interruption of the airway by a pathological process. (2) It challenges us to discover the cause of that obstruction. (3) It requires us to remove the obstruction if such removal is possible in the light of present day medical and surgical skill.

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McGhie Memorial Lecture, January 30, 1948

THE ANATOMY OF PSYCHIATRY

By ALDWYN STOKES
Professor of Psychiatry, University of Toronto

The continuity of human effort is so fundamental a principle of historical development that its implications are apt to be forgotten. Ideas, for good or evil, are not handed on as material things unchanging save in accordance with the laws of conservation of mass and energy, but are implanted in the minds of others there to burgeon or to rot. Men are remembered not only by their works but by the perpetuation of their works in the activities of others: transmitted evil calls forth damnatory imprecations but a living on, a survival of benefit continuously sustaining others, yields a gracious memory stamped with honorable respect. It is in token of such a regard that we come together tonight.

It was never my fortunate privilege to meet and know the late Dr. Bernard McGhie. But almost immediately on my arrival at Toronto it was apparent that, in the years of his office, he had exerted a great influence in the promotion of mental health and that the force of his efforts for the mentally sick was still operative. Even more was it clear that his thinking had been incorporated into the plans of his colleagues and was still vital in its initiative. Of particular interest to me as a newcomer from Britain was his testimony before the Special Committee on Social Security given at the House of Commons in Ottawa 1943. There on a broad canvas he pictured the field of mental illness from the standpoint of one whose main responsibility was to the public. Supported by psychiatric experts, his brief was penetrating in its discernment of needs that required satisfaction, of deficiencies that must be made good, and of general attitudes and approaches that necessarily had to be changed.

At that time Britain was in a state of ideational flux. The Beveridge Report had been published some six months previously with its attack on want, disease, ignorance, squalor, and idleness. The second of these giant evils, namely disease, had particularly stimulated medical thinking and in that thinking psychiatrists were not laggard. They surveyed the field of mental health and found problems, hitherto unrecognized, to which a full attention was required. Those British problems paralleled the Canadian, where McGhie was actively seeking solutions, and perhaps it is because of this circumstance that I have been given the honour of delivering this address.

The old question “What is psychiatry?” is not so often asked now as formerly. Then the question was posed by the inquisitive to seek a defi-
nition of an area of human knowledge circumscribed by the walls of mental institutions: the question was asked of the unknown and unrevealed. Now, if made at all, the query emphasises an exasperation that this stranger is everywhere, permeating the known with its eccentric influence, demanding novel changes wholesale in the interests of mental health; Cinderella has come out of her kitchen into the throneroom and the staid custom of courtiers disrupts with upheaval.

Upheaval is characteristic of our age. Structured society is rent by social forces the nature of which men guess at; particulate matter has exploded in ferocious cataclism: man himself is dynamic in unstable potential. But in spite of such threats, although the more urgently because of them, it is prudent to examine the scene, not out of fear, but with cool appraisement. The psychiatric corpus is our special concern fixed in a moment of time to view its parts, to see their interplay, and to evaluate their significance.

Psychiatry is concerned with breakdown in the business of living. As the name implies, psychiatry was reckoned a physician's skill with the implication of healing or to make whole. The breakdown to which the special skill has application may be latent, incipient, covert or overt: its manifestations may be apparent to the person or to some other: as a potential breakdown it may be surmised in the light of great experience. "Living" implies a full existence, "the business of living" impact with others in its associative, cooperative, or antagonistic connotations. Man, the object of psychiatry, further complicates the study by a continuous changing: plastic variability in relation to a shifting scene adds a time factor with attributes of past, present, and future.

Here then is a study, continuously uncovering its problems, requiring healing skill and experience, starting from a central point of a human being in distress but ramifying over the whole social scene in time and space.

In England, as elsewhere, the 1914-18 war with its multitude of "shell shock" casualties had shown that ordinary usual people could break down under a sufficient stress, and that folk of weaker dependent kind were earlier susceptible. The "shell shock" was considered within the dual concepts of physical exhaustion and emotional instability with a mutual underlying foundation weakness thought of in terms of deficient stamina, toughness, or moral fibre. Nonetheless, whatever the causative factors, here were ill people not often requiring commitment to a Mental Hospital but needing help. A great impetus was given to the setting up of psychiatric departments in general hospitals and the opening up of out-patient clinics based on the Mental Hospitals.

Between the wars with out-patient facilities available, ordinary citizens, oftentimes at first relations of shell shocked soldiers, sought advice
about their nervous ailments. In them it was clear that the complaints they made were frequently of similar kind to those reported in the war setting. In the absence of physical findings, of exceptional physical stress, and of gross upset of mental state, the psychiatric examination concentrated more and more on a detailed life history. Within the life histories significant difficulties recurred around the themes of emotional development and social adjustment within the family, the vocational group, and the cultural milieu. An impulse was given to the general study of psychopathology and social structure with emphasis on the interplay of personal and social forces. Psychological and social explorations became part of the standard examinations and plans of treatment included psychotherapy and social adjustment.

The Mental Hospitals and the General Hospitals gained in the developing field. Both required beds to support their out-patient services. in the Mental Hospitals voluntary patients were accepted into new hospital reception units. The doctor in the mental hospital revised his approach to the frankly psychotic cases and with a new insight recognised an end section of a continuous series which started in the community. In the General Hospitals the physical symptoms of the nervous patient induced an interest in the pathophysiology of psychiatric disorders: the clearing up of physical symptoms by psychiatric measures offered hope in the field of functional disturbance. Association of the two groups became more intimate and mutual staff appointments cemented a working relationship.

Such changes were of slow and unequal pace with action and reaction much in evidence. But growth was proportionate and each advance was consolidated. Behind each advance the ideal of prevention was gradually building up and slowly information was gathering relevant to that ideal. Children’s clinics had been founded and there were revealed the consequences of poor child-parent relationships, sibling rivalries, broken homes and the like. Delinquency studies seemed to throw light on the origins of criminality. Comparison of industrial plants revealed the influence of human relationships in precipitating or impeding nervous breakdown on the job. Developments in other fields chimed with those in psychiatry. Educationalists were thinking more of character formation and less of learning. The Borstal system was succeeding in reeducating young criminals to citizenship. Vocational groups were interesting themselves in the kinds of human relationships that make for contentment in a work community. Between such groups and psychiatry, there was an increasing interplay and exchange of ideas.

But the constitutional and physical aspects of psychiatry were not behind. Patient work on genetic lines had been carried out and a balanced report on voluntary sterilisation had been put forward. Neuropathology was extending its techniques. Pathophysiology was becoming more and more productive and the electroencephalogram had been devel-
The training of medical graduates to the psychiatric discipline was in the field. The Universities were examining bodies rather than centres of training; clinical experience at recognised hospitals was a prerequisite for examination and this was loosely augmented by lectures and demonstrations at the University centres. The first chair in Psychiatry in England was instituted by the London University in 1936. The main ties fostered within the University were those with the Social Services and with Psychology, while external links with European and American centres were relatively limited.

Such a sketch of the development of English psychiatry up to 1939, indicating as it does only broad general trends, nonetheless allows some pertinent comments. Extension of interest had proceeded outwards from a sick individual to society. At some limit, roughly determined by an immediate possibility of social modification, the psychiatrist handed over the results of his efforts to the sociologist, and there absorbed reciprocal influences. He continued to till his own soil. Further the Mental Hospital and General Hospital were linking in mutual effort and psychiatry despite its particular techniques and approaches was essentially a medical discipline. Essays in prevention were cautiously promulgated following an evaluation of facts found by the field workers.

When the second Great War broke out there were many circumstances connected with a feverish protective activity that forced expedient action in the psychiatric field. Beds were urgently needed to meet the astronomic estimates of casualties: they were made available in the mental hospitals. With the "shell shock" problem of 1914-18 in mind Neurosis Centres were set up over the country: the psychiatric outpatient departments of General and Mental Hospitals were linked and coordinated. Children were evacuated from the cities to the country districts: clinics were organised to meet their health needs, including mental health. Recruitment for the Fighting Forces was in hand and panels of general practitioners were assessing fitness to serve, including mental fitness. In fact at a time of great shifts of population and urgent new purposes, psychiatry in its older medical and younger social aspects had greater responsibilities over the whole community field. Such responsibilities at that stage were sensed rather than accepted.

But slowly the load was taken up. The Navy, Army, Air Forces organised their medical services with psychiatric divisions. The Mental Hospital doctor, together with psychiatrists from general hospitals, worked in close relation to general practitioners and other specialists. Their work certainly was with a selected age and fitness group and to that extent was a more homogeneous sample than their
experience had encountered in civilian life. In the absence of active warfare or military action over the period of the "phony" war, breakdowns were due to constitutional or social causes. Selection in terms of personality stability and inherent capacities, including leadership, and the interplay of human relations in community structure therefore became of ever growing moment. The significance of authoritarianism arose, not in the old tradition of rote discipline but in the newer sense of belonging to a group with its father-like and brother-like figures. Within the social structure of the combatant services the problem of maintaining morale in the face of danger or prolonged inaction, the emotional difficulties attendant on licensed homicide were fields in which the psychiatrist made his contribution alongside others. But the psychiatric contribution was based on insight gained from the individual examinations of patients, men, women and children, who had broken down in the prewar civilian scene or in the new war setting. It was furthered by union with concepts derived from the experiences of sociologists, social anthropologists, psychologists and educationalists. The results of such a federation in terms of prevention of breakdown and promotion of mental health may well be momentous: in the expedient circumstances of war they seemed to be notably worth while. Nonetheless for a more general application to a complicated heterogeneous peacetime society, impression must give way to proof and the specific role of the psychiatrist as a social therapist must be appraised.

While the Services' psychiatrists were adjusting themselves to new problems, significant happenings affected work and outlook in the civilian field.

The Emergency Medical Service had been organised under the Ministry of Health. England and Wales were divided into regions representing compact areas of population. Each region was relatively autonomous in respect to emergency health services including psychiatric services and there occurred a spread of medical strength, hitherto pocketed in the large cities, over each area. But the population too had been spread by reason of large scale evacuations and large scale diffusion of industry. From the psychiatric point of view great groups of ill people for the first time became aware of the possibilities of psychiatric treatment. The awareness was not associated with a rush of pampered weaklings seeking excuse and relief from onerous duties and responsibilities. There were plenty of this kind but, in the main, advice was sought by ordinary decent folk who were impeded in their efforts by functional disabilities. At the treatment centres depressions, anxiety states and hysterias formed the bulk of the population. The frequency of physical symptoms in the psychiatric wards forced the internist to an acceptance of psychosomatic relations with the freer interplay of medical and psychiatric consultations. Effort syndrome, the dyspepsias, asthma, mucous colitis and the like
THE ANATOMY OF PSYCHIATRY

became fields of mutual study. The physical forms of treatment were carried out more critically by the psychiatrist.

Nonetheless despite an invigorating impetus to the study of the individual as a physical reacting system it was clear that in most instances the immediate precipitant was in the social sphere. The home and the job come in for closer scrutiny as causative factors in mental ill health. Here again two organisation features were helpful to psychiatric development.

In 1939 the Feversham report had been followed by the co-ordination of almost all the voluntary agencies concerned with psychiatric social work: the Provisional National Council for Mental Welfare had been set up as a National organisation with its field workers spread, although as yet thinly, over all the country in relation to psychiatric centres. Disrupted homes in both material and emotional sense raised psychiatric problems of the first magnitude. Children, evacuated from their homes for safety reasons, suffered negligibly from the bombings compared to parental separation. Behaviour disorders and delinquency increased in association with new family structures and personal relationships within the new setting. The schools became increasingly aware of the problem of the maladjusted child and educational authorities had to organise residential homes with an attendant psychological and psychiatric service. At the other end of the life scale the aged were frequently adrift in the unfamiliar scene. To the psychiatrist the mental disabilities of old people presented oftentimes as a symptom complex of social disruption. More attention was paid to the prerequisites for suitable care of the aged offsetting commitment to a mental hospital or institution. In the working adult population open to the exigencies of total war the problems were legion. Insofar as the psychiatrist was concerned he was forced to consider what in the community were stabilising centres of integration—the home, the vocational group, the church, the recreational group, and the effect of newspapers, films, radio and the like as incorporated in the information services. In his efforts to manipulate the social milieu to the advantage of his ill patient he became aware of social forces outside the immediate field of his clinical experience. His increasing awareness forged closer links with educationalists, sociologists, industrialists, etc., to whose problems he made contributions from his particular viewpoint.

In respect to Industry the Ministry of Labour, at a time of diminished man power, had been concerned with making the fullest use of the capacities of people previously labelled as disabled and to that extent considered economic liabilities. An initial emphasis on rehabilitation (in the physical sense) was followed by an emphasis on vocational rehabilitation (in the sense of a stable adjustment in a job). This carried implications of selection for and appraisement of fields of work in Industry. In turn there arose the beginnings of an interest in the structure of Industry with its physical and human relationships. Although such developments in Industry were outside the psychiatrist's immediate scope he was vitally
interested in their effects on his programmes both for treatment and prevention. At the Hospital centres treatment was aligned to an ultimate job placement. Evidence of personality make up, capacity in terms of intelligence or special attributes, performance as seen at an occupation within the hospital or in an adjacent community setting, preference in terms of ambition or need for security, were all weighed in an effort to determine success in a particular work placement. Particularly notable in this regard was the work done with Repatriated Prisoners of War: but at the other end of the psychiatric scale patients from Mental Hospitals and high grade Mental Defectives were successfully mobilised for Industry to their own betterment. The work milieu was subject to examination and the first large scale assessment of the incidence of Neurosis in Industry was undertaken by the Industrial Health Research Board. From the aspect of prevention it was clear that there are slums in industry as in housing and that even in industrial mansions human relations can be distressingly imperfect.

Thus while new physical and social alignments were made, the war time scene in England did not preclude psychiatric interest in personality studies. On the whole the personality disorders were easier to understand in the light of greater stresses. Patterns of personality structure, defective in one or other quality, recurred repeatedly in the large clinical material. The personal histories emphasised the importance of early life experiences and family relationships in promoting invalid attitudes, or dependency on others, or arrogant assertion or like dominant characteristics. Psychotherapy, of necessity short term and expedient in most instances and sometimes associated with "short cut" techniques such as hypnosis or narcoanalysis, attempted to give insight into the nature of the illness and promote active effort in self reeducation. As clinical aids psychological projective techniques, such as the Rorschach or Thermatic Apperception Tests, were employed but only rarely did they transcend the carefully conducted clinical exploration.

Of necessity, in the war setting, group methods of personality study were developed. Psychologist colleagues devised group techniques which, on the one hand were used for screening purposes in selection, and on the other were submitted to statistical analysis. The former use was of practical value, the latter of immense theoretical importance in the developing idea of functional unities. It seems clear that such mental functions as "intelligence" or "primary suggestibility" are part functions embodied in a particular framework of reference within which each individual can be given a place rating.

Treatment of personality disorders also progressed along group lines. Methods ranged from the psychotherapeutic manipulation of personal interplay in small groups to a more didactic explanation and re-education of large groups. Occasional experiments were carried out using projection techniques of film or drama.
But throughout the group studies the old problem of constitutional predisposition recurred. Interest was focussed on it not as an easy explanation overriding the complication of many interlocked causative factors but as a practical issue. "What can be done for the enablement of this man with relatively unmodifiable defects of this degree?" Closer enquiry was prompted into the physiological mechanisms associated with life long neurotic symptoms of physical kind: the general relation of bodily habitus to kinds of functional syndromes, e.g. 'effort syndrome'; was investigated with painstaking care: patterns of brain potentials were critically evaluated in respect to clinical state. These investigations had little if any immediate value in relation to individual cases but were important as correctives to disproportion in a whole approach.

Such a sketch of the war time development of psychiatry in England is vastly different from that of the era before 1939. Exuberant growth of interest had replaced a slowly progressing study. Psychiatric notions ranged far beyond the constitutional and physical, past the personality of the individual, further than the immediate family environment, right into the greater social field of human relations, there to expand in ever increasing scope, limited only by the resistances they induced. A new enthusiasm had sometimes outstripped an older discipline: time and place had been auspicious, but a major impediment had been the dearth of trained personnel. With the new vistas there were grave dangers that the source of vision would be discounted, that the patient struggling with his local difficulties would no longer be the first concern of new comers to the psychiatric field: and that such new comers, because of personal shortage, would be placed too soon in the social field equipped neither as psychiatrists nor sociologists. In such circumstances gains were tenuous awaiting consolidation by richer experience and criteria of proof. Indeed a few dispassionate follow-up studies undertaken at the end of the war cast doubt on the efficacy of some of the new procedures.

Now in the post-war era consolidation has begun. Significantly the process has started with promulgations by authoritative professional bodies on the scope and kind of training required of workers in the psychiatric field. The Goodenough report, which is concerned with post graduate medical training in general, pays particular attention to would-be-psychiatrists. A Psychiatric Institute of the Post Graduate Medical Federation has been established in London and other Universities will actively concern themselves in psychiatric education. Such an education is regarded not so much as an assemblage of specific courses but as an issuing forth from a general medical background into a field of special interest, due attention being paid to auxiliary social sciences. The emphasis on experience with the patient himself has been reasserted.

The medical examining bodies too are beginning to reframe their requirements. Short courses of the six months to a year variety are on
the way out as evidence of psychiatric clinical experience. Two to three years full time post graduate study, after a basic experience in general medicine, is the new standard. The training is concerned in overall terms with a proper balance of mental hospital work and extramural activities in Psychiatric Departments and Out-Patient Clinics. The supporting sciences have particular representation in the curricula: a renewed emphasis is laid on personality development and the application of psychotherapeutic techniques.

The implications of these declarations are plain. A liberal psychiatric experience, while fostering enthusiasm, will sharpen the critical faculty and seek substance in the new ideas. The broad overall training, while preserving special interests, will offset warring sectarianism. The dangers of split between mental hospital and community psychiatry, of opposing clinical treatment service to social service, of sounding the clarion of prevention too positively and too early, will be lessened.

In the professions auxiliary to the doctor, similar thought has been given to standards of training and integration of practice. The psychiatric social worker particularly has new opportunities and responsibilities not only by a skillful betterment of the social setting which was contributory to the patient's illness, but also by adjusting the attitudes of spouses, parents and others in a more healthy framework of human relations. The double task must preserve an appropriate balance. Imbalance on the one hand will deny the human element in the social setting, on the other will obscure the very present load of a harsh social structure. Psychological insight and practical efficiency are the ideal objectives of sound training.

While the training of psychiatric personnel is being strengthened, broadened, and at the same time disciplined, changes, important to psychiatry, promulgated or proposed, are changing the social scene and, for better or worse, new commissions will be laid on mental health workers. Perhaps the most momentous is the National Health Service Bill.

The integration of the country's health services after the war was already under consideration during hostilities. Insofar as psychiatric resources were concerned they were surveyed in 1944 and published in 1946: the factual results were officially sponsored by the Ministry of Health, the proposals arising out of them were regarded as the personal views of the author. Nonetheless these latter views indicate a relative consonance of opinion with regard to the general magnitude of requirements: they attempt to embody in quantitative terms the generalised propositions of the planning committees and are put forward on the basis of a million unit of population. It is recommended that 100 beds as a start should be provided outside of Mental Hospitals for psychiatric cases with additions when appropriate. Out-patient clinics should be doubled in five years. 200,000 children are to be expected in a million
unit and will require 10 Child Guidance Centres under the Education Authority with 3 or 4 Child Psychiatric Clinics each as part of a central psychiatric organisation. In addition hostels for 50 unstable or difficult children and a reception centre for the sorting and appropriate disposal of homeless or destitute children, or for children needing immediate care should be established.

Whether or not these or similar recommendations are accepted, it is clear that under the National Health Service each region will seek to achieve a coordination of Mental Health Services. A Medical Officer of Mental Health will bring into unified relationship psychiatric out-patient services whether attached to general or mental hospital, psychiatric beds outside Mental Hospitals, Mental Hospitals, the ascertainment of mental defectives and their community care, problems of industry, problems of criminal psychiatry and delinquency, cooperation with education authorities in dealing with the maladjusted child, the education of the public in mental health and the carrying out of surveys and follow-up enquiries.

The emphasis on the child is worthy of note. The Care of Children Committee has published its report (Curtis report) with widespread implications for the welfare of the child, and the Education Act (1944) has placed a statutory obligation on the Education authority to ascertain and treat the maladjusted child. Since maladjustment in the school is oftentimes a symptom of difficulties in the home a huge field of prevention is opened up.

Next to the school, Industry in the broadest vocational sense, offers perhaps the most compact field of health study. With the old Workmen's Compensation provisions replaced by a new form of accident insurance, the Industrial Medical Officer will work in a better doctor-patient relationship: his discovery and anticipation of neurotic illness may well have incalculable results in terms of prevention, particularly if a full coordination with the Mental Health Services is achieved. A coordination of this sort will be strengthened by the operation of the Disabled Persons Employment Act.

The Disabled Persons Employment Act arose in the war setting in an effort to utilise the capacities of disabled people for production purposes. The gain in terms of personal welfare and family stability were great added advantages. In the Act it is provided that persons handicapped in gaining or maintaining employment by reason of a disability may register with the Disablement Rsettlement Officer of the Ministry of Labour. Under medical advice he may be placed in open employment but under a quota arrangement (now 3 per cent) obligatory on all employers: or if so judged by the doctor he may be placed in sheltered employment in a factory or workshop or at home. Psychiatric disorders are included within the provisions of the Act and an obligation is placed on the psychiatrist to assess, in a practical way, what job his patient is suited for
and under what conditions. The opportunity of a firm tie between the Psychiatric Clinic, Industry and the Industrial Officer is thus created. Already an impetus has been given to a careful study of the best work milieu for neurotic patients.

Proposals, affecting psychiatric work, concern another group of socially disabled, namely the Delinquent and Criminal. The Criminal Justice Bill may require the services of psychiatrists in connection with Remand Centres, Prison Remand Homes, Compulsory Attendance Centres and Howard Houses. Probation or Remand arrangements may include a requirement for mental examination or treatment.

The questions of criminal responsibility and selection of prisoners for psychotherapy are under serious review. The psychiatrist on the whole, for practical purposes, assumes a deterministic frame of reference to the criminal: the law by its very development and nature assumes the principle of personal responsibility. In the face of this dilemma the publication of a series of essays by psychiatrists on "Mental Abnormality and Crime" from the Department of Criminal Science, Faculty of Law, University of Cambridge is especially significant.

Lastly, with the vast alteration in the poor laws, the reform of education, and the provision of a complete medical and rehabilitation service, free for everyone, it is certain that radical changes will at some future time be introduced into the Lunacy, Mental Deficiency and Mental Treatment Acts. While adequate safeguards will be maintained, it is certain that the psychiatrist will be freed from those restrictive procedures which at the moment most surely emphasise custodial care as opposed to a wider therapy.

In England, it is apparent that development in the quality of the psychiatrist and the creation of new community conditions momentous for his work are proceeding by a process of evolution rather than revolution. The elasticity of the training and the plasticity of the social organisation are vital factors in any ultimate contribution which the psychiatrists may make of human well being. Elasticity and plasticity are qualities which are manifest only in the face of counter forces but it matters greatly whether the forces are antagonistic in the unyielding opposing sense or synergic in a balanced cooperation. In psychiatry both varieties of opposition exist: the inimical opponent is reset into a friendly line of force, not so much by the devices of propaganda, but by a revealed integrity based on demonstration and proof. In the new developments the psychiatrist cannot offer too much of proof, and cannot in its absence be too ready at reconsidering. Working hypotheses must not be pushed too far forward, and must be consolidated in the rear. To this end the strengthening of psychiatric research is not being neglected, although the crucial importance of its need is not appreciated to the full. The Universities, with their newly created chairs of psychiatry, will require time
to develop adequate research programmes. Funds will come chiefly from Government sources implemented by privately endowed foundations. The Postgraduate Psychiatric Institute in London is committed to research investigations in all the sectors of psychiatric interest from the physical to the social. The Tavistock Institute of Human Relations, the National Institute of Industrial Psychology, the Burden Neurological Institute and other organisations are exploring new concepts from many differing angles of approach. Importantly, too, various community authorities are instituting pilot projects and inviting the cooperation of psychiatrists, on a research basis, in small areas of social experimentation.

A dissection of the English psychiatric corpus shows a specimen related to his habitat. Even north of the border, as our Scotch colleagues are quick to show, there is a different though related species. With such an example of difference it would be presumptuous for me, on such a short acquaintance, to deny or assert a very close kinship to the Ontario, much less the Canadian kind. But the recommendations put forward in May 1943 at Ottawa by Dr. McGhie and his associates make me think that the body image and the meaning of psychiatry are very similar in Canada and in England. The translation of that imagery and meaning into action embodies to my mind three important principles:

(1) the individual patient as the source of all psychiatric inspiration.
(2) psychiatric integration, not schism.
(3) Discipline in the sense of action through knowledge.

The last might well be linked to the text "Prove all things; hold fast that which is good."

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SICK CHILDREN

Sick children present a two-fold problem in respect to growth and maintenance of body tissue: (1) repairs of the damage wrought by disease, and (2) provision of the nitrogen needed for the growth processes, which persist in their demands during periods of illness. Hence, the physician may wish to prescribe large amounts of protein. Protenum is a highly palatable high protein — low in fat. In the form of a beverage or in various recipes, Protenum will increase the protein intake without adding appreciable bulk to the diet.

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BLOOD LOSS AND ITS REPLACEMENT

By W. J. Warren Gamble '49

Since blood loss is the most serious immediate consequence of injuries whether accidental or operative, wounds of blood vessels and methods of controlling bleeding have from the earliest times roused the interest of surgeons. Ligation was practiced by the Greeks but during the dark ages was replaced by cauterization and remained neglected until Ambrose Pare revived and popularized the ligature.

Long before the circulation of the blood was understood venesection was practiced. Something poisonous was to be let out—a logical thought, but the procedure was so mechanical that it fell into the hands of the humblest sort of surgical workman, the barber surgeon. Routine bleeding was not given up until the early part of the 19th century, by which time it had become a fad so badly abused that Benjamin Travers complained that lancet was sometimes responsible for what was soon to be called shock.

Unlike blood-letting, transfusion began badly and only in the past few years has it come into its own. Obviously it tempted enterprising surgeons, for why not refresh with new blood the blood of the sick or the old? It is known that an attempt was made to save the life of the dying Pope Innocent VIII in 1492—at the suggestion of a Hebrew doctor—by withdrawing some of the sick man’s blood and exchanging it for the blood of boys. Three boys are said to have lost their lives in this ambitious but unsuccessful experiment. In the 17th century, when Harvey had revealed the circulation of the blood, successful transfusions began to seem possible. Indeed an Englishman, Richard Lower, in 1665 successfully joined the carotid artery of one dog to the jugular vein of another dog by means of a goose quill, and only a year later Deny’s, a physician of Louis XIV, by making use of this method, passed into the veins of a sick man the blood of another. Later this same Leny’s, as an experiment, transfused the blood of a lamb into a well man who experienced “an agreeable sense of warmth”.

Transfusion of whole blood is actually a transplant of a living tissue, the red cells being the essential element. Under ideal circumstances the cells survive for at least 30 days, perhaps for three months. It is said 500 cc. of donor’s blood should add 350,000 cells to the recipient’s red cell count.

Transfusion from animals to man is impossible and from man to man is allowable only when the bloods of donor and recipient are compatible; that is, when the serum of one neither hemolyses or agglutinates the red corpuscles of the other. Transfusion of whole blood is especially indicated to combat acute haemorrhage, secondary anemia (after haemor-
rhage has ceased) and states of chronic blood loss and red cell destruction, notably haemorrhagic disease of the new born. Its value is rather empirical in the treatment of severe and prolonged infections and since the advent of sulfas and penicillin is less likely than formerly to be used to carry immune bodies against streptococcal septicemia, in other words to be used as immuno-transfusions.

First let us review quickly the functions of the blood and the body fluids. They are summarized as follows:

1. Respiratory: The transport of O2 of the air from the lungs to the tissues, and of CO2 from the tissues to the lungs.
2. Nutritive: The conveyance of food materials such as glucose, amino-acids and fats from the alimentary canal to the tissues.
3. Excretory: The removal of waste products of metabolism, e.g. urea, uric acid, creatine, etc.
4. The maintenance of water content of the tissues.
5. The regulation of the body temperature.
6. Protective and regulative: The blood, tissue fluids and lymph contain certain chemical substances of a complex nature, antitoxins, lysins and other antibodies which are the basis of the body’s defense against bacteria and injurious agents of various kinds. The blood is also the vehicle by which the hormones of the various ductless glands are carried to and enabled to exert their effects upon the cells of the tissues.

Thus, when blood is lost all of these functions are affected to a major or minor degree.

The blood volume can be altered in many ways; for example, by the loss of whole blood, the loss of plasma in burns, or dehydration (loss of water). In this review I shall limit my discussion to the loss of whole blood commonly known as haemorrhage, and oligaemic shock resulting from a sufficient loss of blood. Haemorrhage can occur as a result of many causes, e.g. destructive diseases which erode arteries, such as gastric or duodenal ulcers or pulmonary T.B., trauma to large blood vessels by stab wounds or flying glass. The haemorrhage may be external—where blood escapes onto the surface, or internal, where blood escapes into the tissues or into a body cavity. Haemorrhage from our clinical classification we remember can be arterial, venous, or capillary according to the nature of the vessel from which it takes place.

The Effects of Haemorrhage

Immediate or Early Effects — When more than 30% of the blood volume is lost rapidly the body is usually unable to repair the loss unaided and unless transfusion is resorted to, death results. In a healthy
man the loss of 30% or less of his blood calls readjusting mechanism into play which may bring the blood volume back to the normal level within a remarkably short length of time. When 500 cc. of blood are withdrawn for transfusion purposes the volume is said to be replaced within an hour. The restoration of the blood to its previous concentration in erythrocytes, however, takes about seven weeks on the average.

This time may be shortened considerably by the administration of iron and a diet containing a liberal quantity of high quality protein. Fowler and Barer found in a study of two hundred blood donors that after the removal of 550 cc. of blood the average fall in Hb. was 2.3 grams per 100 cc. Regeneration of Hb. occurred at the rate of 0.049 grams per cent for males and 0.040 grams for females per day. If the loss of blood is large, especially if it is of sudden occurrence and from an artery, there is a prompt fall in B.P. as a result simply of the reduction in circulating fluid. In moderate loss of blood, 10% of the total amount or less produces little or no drop in pressure. This is especially true if the blood is lost gradually and if it comes from a vein beyond the vessels responsible for peripheral resistance.

Clotting of the blood which occurs within a few minutes serves to close the opening in a blood vessel. The initial drop in pressure when such occurs, aids the formation of the clot and the effectual sealing of the vascular wound. This is also furthered in the case of an artery by the retraction of the middle fibro-muscular coat of the vessel, as well as by the curling up of its endothelial lining. These factors alone may be sufficient to staunch the flow of blood from an artery as large even as the popliteal. The blood also clots more rapidly than usual after a severe haemorrhage.

*Increase in heart rate:* This is almost invariably an accompaniment of a severe haemorrhage and is one of the most valuable signs of concealed or internal haemorrhage. It is brought about through the carotid sinus reflex and the aortic reflex initiated by the fall in blood pressure. However, it seems clear from the work of several investigators that simple increase in the cardiac rate does not increase the output of the heart. The pulse commonly rises to 100-120 per minute but rates over 160 are not commonly seen.

*Contraction of the spleen* occurs with the discharge into the circulation of a large quantity of blood rich in red cells.

*Increased respiration:* The anoxia of the chemo-receptors of the carotid and aortic bodies caused by the reduced flow of blood is probably responsible for the increased rate and depth of breathing. When the blood loss is more profound, and consequently the O2 want more urgent, long drawn inspirations and expirations of a sighing character occur. This is known clinically as air-hunger.
Reduction in Capacity of the Vascular Bed and Redistribution of the Blood

This is effected by the reflex narrowing of innumerable small vessels in regions such as the skin, mucous membranes, intestines and other parts not immediately essential to life. This allows the essential centers in the medulla to be supplied by blood under adequate pressure to sustain their vitality. Also a greater quantity of blood is brought to the heart to supply its muscles, fill its cavities and maintain the circulation. The withdrawal of blood from the parts of the body which are responsible portrays some of the characteristic manifestations of haemorrhage, notably the pallor of the skin and mucous membranes, and the coldness of the body surface. The cerebral anemia causes sensations of giddiness or faintness, flashes of light or tinnitus. The rise in B.P. at this stage may cause fresh bleeding in that the clot formed may be dislodged.

Delayed Effects of Haemorrhage

Replacement of the lost fluid: This begins almost immediately blood is lost but takes a variable length of time depending upon the extent of the blood loss. Fluid is drawn from the tissues into the vessels diluting the blood. The corpuscular concentration is therefore decreased. The protein concentration is also reduced. The protein concentration is at first relatively low so that for a short time after haemorrhage the protein content of the plasma is markedly depressed. This is relieved by the mobilization of protein stores. The extreme thirst which the subject of acute haemorrhage suffers is the call of the tissues for fluid and indicates that the stores are being drawn into the underfilled vessels. The administration of water will therefore aid the body in recovering its water balance and replenishing the blood volume.

Replacement of R.B.C. and W.B.C.: This finally occurs through the increased activity of the blood-forming organs, and takes several days or weeks. The rapidity of the process depends to a large extent upon the nutrition and recuperative power of the individual and upon the diet.

The thing that interests us clinically is the condition known as shock, which has been defined as a state of collapse of the circulation. Primary shock occurs immediately after the injury whereas secondary shock develops within two to a few hours after injury. Shock, we all realize, is no single entity—however, it is generally agreed that a major feature of "shock" is an acute reduction of blood volume or oligemia and this is due to the loss of blood and plasma from the circulation, whether externally or internally. According to Harkin in the Lancet, 1942, to have the state of shock ensue there must be a sufficient loss of blood. It has been demonstrated that apart from vasovagal collapse the withdrawal of up to two pints of blood may well be tolerated in a normal person and lead to no more than a slight fall in arterial pressure. Blood losses beyond this amount are apparently necessary before the full classical picture of oligaemic shock is seen. Death usually follows unless speedy measures
are undertaken. When the systolic pressure falls to 60 mm. Hg it has been shown that 50% of the normal blood volume has to be lost to bring the systolic pressure down to this level.

Clinical Features of Oligaeemic Shock

While established shock is easy to recognize, it must be appreciated that in the early stages the clinical appearance of the patient may be deceptive and the blood pressure may even be high. As will be emphasized later, in such patients the severity and the nature of the injury are the best guides in judging the need for transfusion. In established shock, then, the patient is pallid with a cold skin which may be moist with sweat. Temperature may be subnormal. Mentally he is clear, but he may be either talkative and euphoric or apprehensive and restless. In spite of severe wounds he usually does not complain of much pain. Vomiting may occur particularly with extensive injuries. Rapid pulse of poor volume precedes any profound fall in arterial pressure, but as the condition progresses the blood pressure falls considerably and the pulse may become imperceptible. The venous pressure is low. Although the skin is generally intensely pale, cyanosis in the nails and lips may indicate the sluggish state of the circulation. Air-hunger is sometimes seen and invariably the subject complains of intense thirst and the fluids taken by mouth may be immediately vomited. The urinary flow is scanty until recovery occurs.

Just a word about vasovagal collapse. It frequently complicates the picture of haemorrhage and occurs in about 5% of ordinary blood donors losing 400 cc. or more. It can occur late as well as early after haemorrhage. The blood pressure at first maintained falls profoundly with a systolic pressure of 50-80 mm. of Hg. and the pulse becomes slow down to 40 per minute. The patient feels faint and may lose consciousness. The fall of arterial pressure is not due to cardiac slowing, but is due to vasodilation, especially in the muscles. This has also been called the carotid sinus syndrome or vasovagal syncope after Lewis.

Treatment

Before discussing replacement therapy I should like to discuss briefly some general measures that should be employed in the case of severe haemorrhage.

1. Arrest of Haemorrhage

The site of a wound should be examined to confirm the arrest of haemorrhage and if a tourniquet has been used, to decide as to its removal. If removal of the tourniquet is unavoidable, arrangements for a transfusion should be made. Even after a tourniquet has been released, it is necessary to keep a look-out for renewed bleeding when the blood pressure is raised by transfusions.

2. Rest

Rest in bed is an obvious essential, except in cases of head and chest
injuries. The foot of the bed should be elevated 9" as this measure will often raise the blood pressure by 5-15 mm. Hg.

3. **Warmth**

Warmth has an important place in the treatment of patients who are chilled by exposure to wet and cold. The general principles are to get them in a bed warmed with hot-water bottles and administration of hot drinks. Enough cover and warmth for comfort are now thought to be the best. Vigorous heating beyond this point is harmful, probably because the vasodilation in the skin accentuates the blood lack in other tissues due to the existing oligemia. If a tourniquet must be kept in place or if the blood supply to a limb is seriously diminished by pressure bandages, the part should be kept cool. Cooling decreases the rate of metabolism of the tissues and reduces both the nutritional needs and the production of metabolites that may be injurious. Cooling however must not be so severe as to risk frost bite. The appropriate environmental temperature is not below 50 °F. If the atmospheric temperature is at this level, simple exposure of the limb will suffice; if the air is colder, the limb must be protected once it has cooled to the desired degree.

4. **Relief of Pain, Restlessness and Apprehension**

Morphine is often necessary for the relief of pain. 1/6 gr. given intravenously when possible is most satisfactory, for when the condition of the circulation is poor, absorption from the subcutaneous tissues is slow and unreliable. It will often be found that pain is not complained of until the blood pressure is recovering with transfusion and the injection may then be made conveniently into the rubber tubing of the transfusion set and thereby washed into the circulation.

As far as possible, morphine should be reserved for pain and apprehension. Its routine use is undesirable and there have undoubtedly been many cases of morphine poisoning from its too liberal use in the past. Slow absorption from the cold skin may lead the unwary into further subcutaneous administration, the large total dose being subsequently carried into the circulation, as the latter improves. After resuscitation, however, morphine may of course be given subcutaneously.

5. **Dehydration**

Dehydration may on occasion contribute to "shock". Wounded patients can be assumed to be suffering from some degree of depletion of extravascular reserves. All patients except those who are unconscious or who are suffering from abdominal wounds should be given copious and repeated drinks; generally they are thirsty. If vomiting is troublesome sips of water are better. Warm sweetened tea or coffee should be given whenever possible. If necessary the rectal route may be used to supplement oral administration; warm half isotonic (0.45%) Na Cl. solution (approximately a half teaspoonful per pint) is the most suitable fluid for rectal injection.
Intravenous saline and glucose-saline infusions are not now regarded as an adequate method of making up the blood volume, as their effect is only transitory. Where dehydration complicates the picture, intravenous saline may be used in quantities not exceeding three litres per day to supplement previous transfusing.

An important fact is that plasma loss in injured tissue has been noted to be greatly increased by movement. Immobilization is therefore of very great importance to reduce plasma loss in traumatized tissue.

6. O2 Administration

On the hypothesis that the slow circulation in shock led to tissue anoxia, it was hoped that giving pure O2 would lead to improvement. These expectations have not been borne out either in experiment or in practice. Thus in the absence of good evidence of its efficacy, it seems unwise to recommend this measure in addition to transfusion. Oxygen therapy should therefore be relegated to its appropriate place—e.g. where injury to the chest has led to interference with the respiratory O2 uptake or where there is pulmonary oedema.

Restoration of Blood Volume by Transfusion

Where oligaemic shock is profound, there is no known measure other than transfusion which will save life. However, when the oligaemia is associated with pulmonary oedema (transudated fluid leaves circulation immediately through the damaged capillaries). There is experimental evidence that transfusion is not only useless in these cases but indeed may be harmful.

When to Transfuse

When as a result of injury the systolic pressure is below 90 mm. of Hg. and the pulse is rapid, transfusion should not be delayed. In intermediate cases skilled judgment may be required, and if early spontaneous recovery does not occur, transfusion should be begun. If there is any doubt, it is better to give rather than to withhold transfusion. From what has already been said, it is obvious that some patients may lose considerable amounts of blood (up to 30% of the blood volume) and show little reduction of the systolic pressure. If operation has to be undertaken in such patients a profound fall in pressure may ensue (due to anaesthetic). If therefore there is (a) evidence of severe blood loss, (b) severe injury with traumatized tissue in situ, exceeding two fists in volume, transfusion should proceed and accompany operation, even if the pre-operative blood pressure level is apparently satisfactory. In such cases operation must not be delayed. Conversely, transfusion should not be withheld no matter how near to death the patient may appear to be. The apparently moribund and pulseless patient may sometimes be successfully resuscitated by massive transfusions.

Choice of Transfusion Fluid

Where blood loss is the major factor in the production of shock,
Blood Loss and Its Replacement

Blood is naturally the fluid choice for replacement. Where plasma loss is indicated by haemoconcentration, plasma or serum should be used. Other factors, however, have to be considered. Firstly, plasma or serum, either natural or dried, may be more accessible and can be given to a patient without fear of haemolytic reactions. For this reason, plasma or serum is particularly suitable for beginning transfusion. Where the volume of transfusion required is moderate (up to two bottles of 500 cc. each) plasma or serum alone can be given with safety. When larger transfusions are required, blood should be used or a change-over to blood made after one or two bottles of plasma or serum.

Amount and Rate of Administration

The volume of blood (or other fluid) transfused should be determined by the response of the patient. The aim is to restore the blood volume to normal as soon as possible. The sooner the blood pressure is restored to normal the better for the patient. The fluid used may be given as rapidly as it will run under gravity through the largest infusion needle or cannula. As much as 100 cc. per minute may be given in this manner. If the veins are in spasm a hot water bottle laid over the arm is often all that is required to relax them or blood can be forced in by a positive air pressure in the transfusion bottle created by a Higginson syringe. The rapid transfusion flow should be maintained until the blood pressure has risen to over 100 mm. Hg., when it may be reduced to a drip.

Risks of Over-Transfusion

Danger of pulmonary oedema—a previously normal subject in a state of oligaeic shock, cannot be overloaded by reasonable transfusion volumes (e.g. 2 to 3 pints) so long as the infusion rate is slowed after a normal blood pressure level is reached. The normal cardiac output of about 5 litres per minute will have been considerably reduced in oligaeic shock and the heart can easily cope with blood transfusions at the rate of 100 cc. per minute, up to a quantity restoring the normal blood volume. Certain circumstances should be remembered in which excessive transfusion may be a real danger. Firstly, intravenous saline and glucose—saline administration may be retained in the circulation, and with excessive infusion of these fluids, pulmonary oedema may ensue. This type of infusion, however, is seldom needed in shock. If for any reason the patient is dehydrated, e.g. from excessive vomiting after an abdominal injury, it is useful to remember that a drip infusion of saline at the rate of 40 drops per minute supplies a pint of fluid in 4 hours, which is quite a suitable rate in the average case. Secondly, in the stage of post-haemorrhagic anemia which may be reached a day or two after acute blood loss, the circulation is not normal. It has already been mentioned that in such cases the pulse is full and bounding, often 90-100 per minute and with a high pulse pressure, e.g. (120-150 mm. Hg.). In such anaemic subjects, the cardiac output is often doubled. Large rapid transfusions may precipitate pulmonary oedema from heart failure in these cases.
Preparation of such patients for operation is best carried out by small transfusions (one bottle) of concentrated blood corpuscles, or one or two bottles of whole blood in either case given slowly by a drip method. Thirdly, severe burns may be complicated by thermal trauma of the lungs and air passages. Pulmonary oedema is liable to complicate transfusion in such cases, and also in patients who have suffered blast injury of the lungs or have pulmonary fat embolism. Also a similar risk is present in certain types of gas poisoning. One danger in transfusing with serum that may be forgotten is that where excessive amounts of serum are used, the blood may be diluted to such an extent that the person becomes anaemic.

Practical Points in the Intravenous Administration of Blood or Blood-Products — Choice of Vein

1. A vein in the antecubital fossa is usually the most prominent and therefore if the arm is undamaged may be used with advantage. A cannula should not be used in the antecubital fossa since the vein may be needed for further transfusions. If the patient is restless, the arm must be splinted.

2. If a long transfusion is to be given, a vein in the forearm is often more satisfactory than one in the antecubital fossa since the patient has greater freedom of movement.

3. If the arms have been injured, it may be necessary to use the internal saphenous vein. In this case, it is wise to cut down and insert a cannula. This vein is to be found in a constant position just anterior to the internal malleolus. When a cut-down has been done it is important to fix the limb either by a splint or by tying the foot to the bottom of the bed.

In certain cases the intravenous route may be impracticable, owing to the severity of the injuries or because of venous spasm. This is especially true in cases of burns. Fluids then can be administered into the marrow cavity. In adults and in children over two years the sternum is the most convenient site and in infants the tibia may be used.

Summary

In the recent literature it seems that many authors do not differentiate between shock due to haemorrhage and shock from other causes. Harkins, however, maintains that the primary factor in shock is oligaemia, whether due to frank haemorrhage or loss of plasma by exudation to a traumatized area. If about 1000-1200 cc. of blood be removed from a patient replacement is slow, and compensatory replacement of plasma amounts to only about 200 cc.

Thus, in shock due to haemorrhage, treatment with whole blood is necessary since compensation is slow in that it takes two to three days.
However, in other forms of shock, just restoring the fluid content will be efficacious. The object in an obviously shocked patient should be to raise the systolic pressure to 100-110 mm. Hg. and to maintain it there. Of course good nursing care and close supervision by the attending surgical staff are essential if the patient is to attain the optimum care required.

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THE ROLE OF DIET IN TREATMENT OF NEPHRITIS

By W. Goldberg '49

In considering the role of diet in the treatment of any condition, one must take into account not only the specific approach of the diet but also a consideration of the general nutritional state of the patient, which should be recognized as important in all dietary therapy but often is not. This twofold dietetic approach in regards to therapy is probably better illustrated in the proper treatment of nephritis than in any other condition.

Nephritis may be thought of as an impairment of the function of the kidney affecting its ability to excrete waste products in the normal manner. This disease is progressive, probably of an inflammatory or degenerative nature, either directly, or as a result of an allergic state, or both; its exact etiology has not as yet been determined. The object of the diet in the treatment of this condition is to adjust the proteins, salts and fluids to meet the various types of impairment in the various stages of the disease. The diet must vary not only with different stages but with different individuals of the same clinical variety.

Dietetic treatment has the following aims:

1) Spare the impaired kidney to allow recovery.
2) Prevent uraemia, the result of accumulation of waste products.
3) Prevent edema, that is, the retention of salt and water.
4) Maintain nutrition generally, as nephritis is essentially a wasting disease.

In order to accomplish these aims the following general considerations must be constantly kept in mind.

A.—Protein. The amount of protein in the diet must at all times be adequate in order that the process of assimilation may be carried on in a normal manner so as to attempt to overcome the wasting and further impairment of renal tissue. At the same time the protein intake must be varied in the different stages of the disease so as to specifically attack and try to remedy the problem being confronted at that stage.

B.—Salt content of the diet. This is usually low in all types of nephritis on the assumption that salt retention is present in all forms of the disease to a greater or lesser degree. Salt, though, is sometimes indiscriminately restricted whenever albumen is found in the urine. Though there is no experimental proof that a diet low in salt is indicated in nephritis without edema, it is well to caution the patient against excessive use of salt as this will spare the kidney extra effort evoked in the output of added mineral elements.
C.—*Water intake*. Fluid intake is said to usually be that of fluid output without the use of diuretics, but even though this is a general rule it will be seen later in considering the various stages of nephritis that this is not an invariable rule.

D.—*Calories*. These must be adequate at all times to maintain the general nutrition of the patient, again bearing in mind that nephritis is a wasting disease.

E.—*Carbohydrates*. A diet relatively high in carbohydrates is usually employed due to the fact that protein is spared and more economically utilized in the presence of a diet high in carbohydrates and low in fat. Also a higher carbohydrate diet is better tolerated than a high fat one in the presence of nausea and vomiting. Added carbohydrate has also been found of help with impending acidosis.

F.—*Fat*. As intimated above, a diet low in fat allows for a more economic use of protein. Also in the stage of chronic nephritis with edema an increased plasma lipoid content is present and so indicates a diet low in fat.

These general considerations are presented so that they may make clearer the more specific consideration of the dietetic treatment of the various stages of nephritis which follows.

At this point in the discussion a classification of nephritis is necessary and since this is a much debated affair the following classification is presented for use in the following considerations. This one is used by Barborka in his text, and by others.

1. *Acute nephritis*.
2. *Chronic nephritis without complications*: considered latent nephritis by some.
3. *Chronic nephritis with edema*: considered, nephrotic nephritis, nephrotic syndrome, and sub-acute nephritis by others.
4. *Chronic nephritis with uremia*.
5. *Terminal chronic nephritis*.

These considered just chronic nephritis according to other classifications.

The dietary treatment will be considered in respect to these five forms in the following paragraphs.

1. *Acute Nephritis*

Acute nephritis is a disease of comparatively short duration and most commonly follows an upper respiratory infection or an acute contagious disease such as scarlet fever, typhoid, diphtheria, pneumonia. It may occur at any age but is much more common in children and young adults than at a later age. Because of its short duration the patient’s nutritional requirements are of less importance than in chronic nephritis. In the acute form in which nausea and vomiting are so often present as a predominant symptom, it is often well to withhold food for a few days; starvation for such a short period does no harm. Edema is another fre-
quent symptom and it varies in extent from the more common simple transient edema to the rarer generalized anasarca. Oliguria is often present and the urine contains red blood cells, casts, albumen and few leukocytes in most instances. Headache and fever may also be present.

The general regimen carried out in regards to dietary treatment is to start the patient with 600-700 cc. of fruit juice which has been sweetened; the Karrel milk diet has been used here instead by some clinicians. The fluid is restricted due to the presence of oliguria and retention of fluids by the patient. If anuria be present, then a further restriction of fluid must be carried out, giving only pieces of crushed ice. As this stage of reduced urinary output is overcome, then the fluids may be increased to 1000 cc. per day and if vomiting and edema do not occur or do not become worse this may be increased to 1500 cc. per day. For the first few days a diet with about 25 gms. of protein and the total calories at a minimum is suggested, but if the plasma proteins are too low then the protein intake should not be limited for too long a period. Murphy and Peters found in their work that the same effects occurred with a high protein diet as with a low one but that a diet with enough protein as above and increasing it was better tolerated by the patient. The starvation diet of Volhard, with complete fasting, is thought to be of no advantage except in the presence of extreme nausea and vomiting. If nausea and vomiting are not too severe the 25 gm. protein and sweetened fruit juice diet is kept on until this period is passed. The caloric intake at this time should be in the neighborhood of 1800. The diet for the first four weeks in any case should be primarily carbohydrate with a small amount of fat, but in ten days to two weeks, if all goes well, the protein intake may be increased to 30-40 gms. per day with the addition of some starchy foods. After the first month, if the patient continues to improve, the protein quota may be raised to 50 gms. per day with a caloric intake of 2000 or more if necessary. In the later stages of recovery the diet suggested for chronic nephritis without complications may be used. In regards to salt intake, it has been found best to add no salt to meals after they have been prepared; this gives a diet with 2-4 gms. of sodium chloride per day. In brief, the dietary recommendations for the acute stage are:

1) Proteins—Marked restriction at first and then increasing.
2) Fluids—Sufficient for proper drainage, but not forced.
3) Calories—Restricted to a minimum.
4) Carbohydrates—High.
5) Fat—Low.

After the acute stage is over there is a transitional phase in which the kidney may completely heal or progress into the chronic stage with or without complications. If the diet is to be dismissed one must be positive that the former is the case and that the patient is not in the latent or, as Barborka calls it, chronic stage without complications. This is a very hard
differentiation to make; therefore, it is best to keep on with the diet of
the last stage, and if after a reasonable length of time no albuminuria
or other symptoms arise, one can consider it a cured acute stage and dis­
continue the special diet.

2. Chronic Nephritis Without Complications

In this stage of the disease there are no marked symptoms and it is
usually of a long duration; the patient must therefore live on a nephritic
diet for a long period of time. Often the only evidence of a renal lesion
is the finding of albumen in the urine, often quite accidentally,
during a routine physical examination, and the patient not aware
that he ever had acute nephritis. In fact the absence of symptoms is so
regular an occurrence that the condition is often not diagnosed until
uraemia develops. Increased blood pressure is the symptom most com­
monly associated with the albuminuria. Formerly protein was restricted
considerably because of the possible damaging effects of the end products
of protein catabolism. This dietetic treatment was all focused on the
kidney, but more recently the patient as a whole is being considered and
due to the upbuilding effect of protein a more liberal allowance of it is
made in the diet. Experiments show both the beneficial effects of protein
restriction as well as the fact that this restriction is conducive to prema­
ture renal deterioration. This latter evidence leads to the diet with a more
liberal allowance of protein. This, though, is modified in each case,
depending upon the symptoms present, and when the blood non-protein
nitrogen is elevated less protein is administered. Generally a normal diet
is given but an excess of salt is avoided and the use of alcohol forbidden.
Fried foods, rich protein foods and heavy desserts should definitely be
limited, also tea and coffee are best omitted but may occasionally be
allowed. An obese patient should be encouraged to reduce to his or her
ideal weight, gradually.

In general the important features of the diet are as follows:

1) Protein—Essentially a normal amount, 60-70 gms. per day; this, though, is varied if the N.P.N. is elevated.
2) Salt—Somewhat restricted in that none is added to food after preparation.
3) Carbohydrates—High.
4) Fluids—Essentially normal; usually as the patient desires.
5) Fat—Avoid excess.
6) Calories—Best to be in the vicinity of 2000 calories.

This diet is continued on until all symptoms disappear, and as there
are often so few, it would be safer to continue it long after their dis­
appearance. If this does not occur and the condition enters another stage
of the disease, as it so often does, then the diet of that stage is, of course,
to be used.
3. **Chronic Nephritis With Edema**

As the title implies, the most predominant symptom is edema. This stage of nephritis is identical in respect to symptomatology with nephrosis and is thought by some to be the same thing. However, a discussion of this much debated issue will be avoided here. The blood pressure is quite constantly increased in this stage. The urine is decreased in amount as well as the sodium chloride output; thus water and salt are retained. The urine contains great quantities of albumen and many casts of different types; this, as Peters found, produces the serum protein deficiency. The albumen in the plasma is decreased and globulin is relatively increased. There is no increase in the non-protein nitrogen in the earlier stages but there is a moderate increase through the general course of the disease, and of course marked uraemia in the terminal stages. The concentration of the plasma proteins should be more carefully studied than they have been in the past. The reduction in plasma proteins seems to be an index of the protein starvation and although it can occur without albuminuria, this latter more commonly is present. A general consideration of the proteins in the body is a helpful guide to the treatment by diet of this condition. The proteins of the body are more or less inter-dependent, comprising a single "pool," the components of which are in equilibrium. Withdrawal of protein from one region (the blood in this case) therefore results in a change in the protein concentration in all areas due to the fact that there is a shift to re-establish the equilibrium. Thus the low protein picture of this stage is not a phenomenon limited to the blood but must be considered part and parcel of the derangement affecting protein stores all over the body. So in giving protein, not only does it fill the depleted blood but must add to the total protein pool. Sachar states that twenty-five to one is the ratio of extravascular to intra-vascular protein. Thus he found twenty-five gms. of protein had to be given to his starving dogs in order to replace one gram of plasma protein. In the human with chronic nephritis with edema this ratio is in the vicinity of ten to one. The increased plasma protein not only replaces the depleted stores but the protein acts as a diuretic by producing an increase in osmotic pressure, so drawing fluids into the blood vessels from the tissues. Thus, more fluid reaches the kidneys and more is excreted in the urine. There is considerable controversy concerning the reason for the passage of the albumen through the kidney filter. It is attributed by some to an increase in the permeability of the glomerular epithelium and others claim an extra-renal cause. An interesting theory is mentioned by Thomas which states that the normal blood albumen is altered in this condition in some way, so as to be treated by the kidney as foreign protein and therefore excreted in the urine. This paper will not attempt to settle this problem or even present its many other sides. The important work of Monk, Volhard, Farr and Epstein and others has been to emphasize the need for liberalizing the diet in renal cases. The diet should be liberal in protein to replace its loss as stated above but only providing the renal function is such as will
permit of its utilization without the retention of non-protein nitrogen. Loeb reports that the results of forced protein feeding, beyond giving the patient enough protein to maintain his nitrogen balance and replace body protein lost have been disappointing and in his opinion there is little to be said in favor of excess protein feeding, that is, more than 3 gms. per kilo of body weight per day. More might even increase renal damage. Fluid intake and salt content of the diet are very important factors and due to their retention in the body there is a necessity for restricting them. A fluid intake of 700-1000 cc. per day is usually found to be within the proper limits unless there is an anuria or the blood N.P.N. is increased, when edema is risked to lower the N.P.N. Fluids are then increased in an effort to wash out these nitrogenous end products of metabolism. The salt is eliminated completely sometimes, that is, none is added at the table or in the preparation of the food; this gives 0.5 gms. per day in the diet. It has been found that up to 2 gms. per day would be safe. The reasons which are given against an absolute salt free diet are:

a) Such a diet is woefully unpalatable.

b) It often causes nausea, vomiting, headache and leg ache.

c) Moderate reduction is better in the long run as it is easier and more effective because it can be continued for a longer period.

With a moderate salt restriction it has been found a strict fluid restriction is not necessary as salt is chiefly responsible for the fluid retention in the tissues. The reason for salt retention is not clear as yet, but it is probably either: (1) An inability of the damaged kidney to excrete chlorides, or (2) They are not excreted because they are held in the extra renal tissues.

Use in the diet of salts other than sodium chloride has been suggested, and ammonium chloride (5-15 gms. per day), calcium chloride (10-20 gms. per day) have been suggested and used. Barker states that good results have been obtained with a liberal normal diet, with the addition of extra vitamin-D and the replacement of sodium with potassium chloride to be used as follows: the patient is given 5 gms. of potassium chloride in a salt shaker at the beginning of the day and he uses this on his food all day and if there is any left over at the end of the day he dissolves this in water and drinks it. Kieth states that a patient with blood urea over 100 mgm % has a lessened tolerance to potassium, so Barker’s therapy should not be used above this limit. Kieth and his co-workers at the Mayo clinic report good results with the use of low ionic diets. They stress that the water and salt content of the diet should be under strict, exact control. The diet is to be kept the same from day to day as this allows for a better study of these dietary constituents, but the disadvantage is that due to the monotony of this diet few patients will accept it. Barborka in his text states that he finds little difference between the low ionic diets of Kieth which necessitate the use of identical foods every day,
and the salt free diets that he uses himself which allow a more liberal choice of food, especially fruit and vegetables. Also the water content of a salt free diet is greater than that of the low ionic diet. Thus Barborka advises to start with a 40 gm. protein diet per day which should contain 1500 calories. As soon as the patient's metabolic needs and the ability to take care of protein are determined the protein and caloric intake may be increased, the former to usually between 70-100 gms. per day.

Burger et al found that alcohol in moderate amounts rarely augments proteinuria and sometimes induces a moderate diuresis even in the presence of considerable impairment of renal function; but in spite of this observation most men will feel greatly justified in restricting if not forbidding the use of alcohol by their nephritic patients. In regards to fat, Fishberg has found that there is a lipaemia in this stage of the disease manifested by an increased blood cholesterol. This is said to be a compensatory mechanism affecting the osmotic pressure of the blood, the increased blood lipids attempting to make up for the hypoproteinemia.

In general the dietary factors in the treatment of chronic nephritis with edema are:

1) Protein—This depends on the case as stated before, but generally is a high protein diet.
2) Fluid—This is restricted to a certain degree.
3) Salt—This is restricted down to 2 gms. per day.
4) Carbohydrate—High, due to fact it facilitates better utilization of protein.
5) Fat—No excess; it is better if it is on the low side.

4. Chronic Nephritis With Uraemia

There is at this stage a retention of urinary products, so giving on examination an increased blood N.P.N. due to the progressive kidney damage. Even though polyuria often exists, there is a retention of the nitrogenous end products as this urine is of low specific gravity, being only a renal filtrate, as the kidney has lost its ability of concentration. Other symptoms are headache, dyspnoea, visual disturbances, muscular twitchings, convulsions, coma, and eventually death. Uraemia in this stage is often transient and after its termination the patient returns to the stage of chronic nephritis without complications. These uraemic episodes may occur a few times at reasonable intervals, but eventually a state of permanent uraemia occurs, called the terminal stage of chronic nephritis.

The question of pushing fluids as a means of increasing elimination and diluting the toxic substances in the tissues, though contrary to the advice given in the general management of nephritis, is probably the best procedure and even if no diuresis takes place the fluid stored temporarily as edema fluid dilutes the toxic substances and later, if the uraemic episode passes, not much residual damage is left and the edema so produced will pass off.
In general the dietary factors in the treatment of this stage are:

1) Protein—This should be low.
2) Salt—Low.
3) Water intake—High.
4) Carbohydrates—High.
5) Fat—Low.

A low protein diet is necessary in order not to add to the already excessive retained nitrogenous products. The diet for uraemia is either limited to milk, Karrel diet, or that mentioned before for acute nephritis, with the exception that there is an increased fluid intake to be desired. A rigid salt restriction is not necessary, due to a hypochloraemia present at this stage. If NaCl and sufficient fluids can not be taken by mouth, then the intravenous route must be used.

The discussion of this stage overlaps with that on terminal chronic nephritis due to the fact that they are different stages of the same thing. In chronic nephritis with uraemia there is an attempt made to tide the patient over the uraemic episode, while there is no such hope with terminal chronic nephritis.

5. Terminal Stage of Chronic Nephritis

This stage, as said before, is similar to that of chronic nephritis with uraemia but the uraemia is constant, the acidosis more severe, and the termination fatal. It has the same symptoms as uraemia under any condition but ends in coma and death in all cases.

In this stage there is nothing gained by special dietary restrictions, so it is well to let the patient choose just about what he wishes. In theory a diet low in protein is advocated to keep down nitrogen retention but as a matter of fact if insufficient protein is given in the diet for satisfactory tissue nutrition the balance is obtained from endogenous sources and the end result is the same in regards to nitrogen retention. The problem is usually to get the patient to eat enough of anything due to the severe anorexia at this stage, and sometimes a small amount of wine or cordial is justified in an attempt to promote the taking of food. Often, towards the end the kidney has completely lost its ability to concentrate and large quantities of chloride are washed out; it is wise, therefore, to study the plasma chlorides if possible, and to administer sodium chloride up to 3-4 gms. per day with a considerable amount of fluid to try and wash out the retained nitrogenous end products of metabolism as well as replace the lost chlorides. If heart failure is present the excess fluid and chlorides will have to be given judiciously in order not to overload an already overstrained heart. An alkaline ash diet will often help to overcome the acidosis; this is done by a reduction in the diet, of meat, bread, cereals, fruit, and vegetables, and the addition of figs, molasses and raisins. If
the acidosis can be fairly well combatted this will help diminish the convulsions and the nausea and vomiting so often associated with this condition. All in all the dietary treatment is of no avail at this stage and should only aim at keeping the patient as comfortable and content as possible for his last days.

*Anaemia in Chronic Nephritis*

Anaemia associated with chronic nephritis is often overlooked. In every case of chronic nephritis a secondary anaemia is likely to develop. The toxic influences which produce this anaemia are not known, but animal experiments have shown that when as much as three-quarters of the kidneys is removed, death from anaemia develops in from one to six months. If a low protein diet is used over a long period the anaemia develops much earlier in the disease than if adequate protein is administered. This therefore is another reason for the careful administration of a sufficient amount of protein to an individual suffering from chronic nephritis, but so many variables enter into the calculation of this protein quantity, it proves to be a formidable task.

This paper has attempted to present the cardinal features in the role of diet in the treatment of nephritis as well as some of the rational reasons involved. It indicates the importance of diet, not only as it affects the general nutrition of the nephritic patient but as a specific therapeutic factor.

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This book was intended by the author, not as a text book, but rather a practical hand book for the busy general practitioner. It is concise, beautifully written and basically sound.

The mysteries of endocrinological nomenclature are explained from a practical viewpoint. The role of the hormones in the normal sex cycle and pregnancy are discussed. These chapters are followed by a series of self-contained accounts of the more common clinical syndromes. There is finally an appendix, which lists most of the commercial endocrine products, complete with proper name, manufacturer and price.

This is one book which actually accomplishes the author's original purpose. —E. PLUNKETT, M.D.

AMERICAN MEDICAL RESEARCH

By Richard H. Shryock, Ph.D.

THE COMMONWEALTH FUND, NEW YORK, 1947, pp. 325. Price $2.50

Dr. Shryock, a distinguished historian, has written a short and interesting appraisal of the development of medical research in the U.S.A. He correlates this development with the economic, social and political changes of the past two centuries.

The first part of the book is largely historical, and describes the formative influences of other countries on the growth of American science. The early period can be divided into a British era, 1750-182; French, 1820-1860; and German, 1860-1895.

After 1895 original work was given private support by Foundations like that of Rockerfeller. Success of this venture was so rapid and remarkable that endowed institutes and "funds" sprang up all over the country.
Universities remained the chief centres of medical research, and these, too, were largely privately endowed. American industry, though expanding rapidly, was slow to take an interest in research until the pioneering General Electric set up industrial laboratories. Drug corporations followed suit, but it was not until World War I that industry really became alive to research.

The second half of the book discusses trends of research from 1895 on, and its public relations. After 1895 there was a trend toward a rational rather than an empirical approach to problems. Research was enthusiastic in the study of infectious diseases, but much slower to take up the unrewarding task of chronic and degenerative disease. Then came the doldrum years after the influenza pandemic of 1918, when all research lagged, as trial after trial failed to produce magic cure-all pills.

Interest revived with the virus diseases and wonder drugs; psychiatry emerged from myth and led to Psychosomatic Medicine; Endocrinology introduced thyroxine and insulin. The people themselves became interested in research through movies, Paul De Kruif, the Science Service, and a deluge of science magazines. Then came the impact of World War II and the wholehearted support of the Government at last, and research unified with military problems—and the Atom Bomb.

In conclusion, Dr. Shryock looks into the future. World War II is over, with its dramatization of research; still public enthusiasm must be maintained for research because no official program will be able to operate long in a democracy unless sanctioned by the people. This is a book to be recommended to all those interested in scientific research, for, as Shryock says, research without historical perspective becomes mere technology.

—E. SLOMAN, '51

OCCUPATIONAL MEDICINE AND INDUSTRIAL HYGIENE
By RUTHERFORD I. JOHNSTONE, A.B., M.D.
The C. V. Mosby Company, St. Louis, 1948, pp. 604. Price $10.00

Industrial medicine has emerged from a lifeless past to become a vital force in the health of the country. With each advance in industry there arises a new danger to man and it is in the prevention, detection and treating of the factory diseases that the industrial physician finds his work.

Dr. Johnstone points out that industrial medicine is not just a sideline but a specialty in itself, and as such he feels it should be given more emphasis in undergraduate education. Dr. Johnstone introduces an elementary survey of the organic chemistry of the solvents which proves
an aid to better understanding of the physiological reactions which they induce. He discusses the properties, pathology caused, diagnosis, tests and treatment for the damage done by industrial solvents, metals and dusts. He further enables the physician to understand the hazards of various occupations, by describing the common industrial processes and the precautions necessary for the safety of the worker.

This book is of interest to the undergraduate as it presents a relatively new field of medicine where more specialists are needed; it is of interest to the graduate as a reference for industrial diseases.

— Betty Andrewes, Meds ’51

THE INTEGRATIVE ACTION OF THE NERVOUS SYSTEM

By Sir Charles S. Sherrington


Sir Charles Sherrington first wrote the book which bears this name in 1906. It was an outstanding success at the time but became neglected during the last quarter century. However, in 1947, the American Physiological Society was responsible for the publishing of a completely revised edition under the guidance of the original author.

This work is a remarkably coherent and modern study of the physiology of the nervous system. Basically, it deals with reflexes, since these form the basis for almost all nervous activity. Roughly, one-half the book is devoted to the simple reflex arc, its properties being dealt with in great detail. This discussion leads in a perfectly logical manner to the study of the interaction of reflexes and of compound reflexes. Similarly, this leads on to a discussion of the motor cortex, sensory fusion and emotion—the highest activities of the human nervous system.

One has no hesitation in recommending this book to all students of physiology, including, by all means, the undergraduate. Perhaps it has a fault in being slightly under-illustrated, but this is atoned for by the quality of the text.

— D. L. Fletcher, Meds. ’49
To Study the Phenomena of Disease without Books

Is to Sail an Uncharted Sea.

—Osler.

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September 22, 1948.
STREPTOMYCIN IN THE TREATMENT OF TUBERCULOSIS
J. Burns Amerson, F.A.C.P., and William H. Stearns
Annals of Internal Medicine, Vol. 29, No. 2, 1948, p. 221

The authors found the effects of streptomycin administered to tuberculous patients to be "strikingly beneficial" in some but insignificant in others.

**Symptomatic Response**

When the drug exerts its maximum effect patients suffering from acute febrile tuberculosis often experienced a decided subjective change within three or four days. The fever may subside abruptly within a week, or more gradually. However, the sedimentation rate may remain accelerated for several months.

The effect on local symptoms, e.g. in tuberculosis laryngitis or genito-urinary tuberculosis, is also sometimes quite pronounced and usually before any changes in local lesions can be demonstrated. Improvement in the lesions is often definitely more rapid than that which would be expected with rest treatment alone. The factor responsible seems to be the suppressive effect of the antibiotic on bacterial growth before caseous necrosis has occurred.

**Lesions Not Affected by Streptomycin**

The extent of caseous necrosis limits to a degree the response to streptomycin and even small foci of caseous necrosis are very apt to give rise to a relapse following temporary symptomatic response unless held in abeyance by prolonged rest treatment. Severe tuberculous pneumonia of two or three months duration, nodular lesions of the prostate and epididymis, tuberculous abscesses in soft tissues are examples of lesions which usually show no striking change.

**Disadvantages**

1. Toxic damage—minimized by limiting the dose and duration of treatment. Two grams daily has caused complete loss of vestibular functions in 12 or 18 cases, while 1 gram daily does not, although there may be partial impairment.

2. Development of bacterial resistance to streptomycin—Resistant variants of the bacillus may be recognized in cultures of sputum or other exudate within four weeks of the start of treatment with streptomycin.

3. Certain limitations of its effectiveness—The authors stress the importance of vital resistance of the patient in the final issue of the case. The total time required for complete recovery has not necessarily been shortened and the drug should be supplemented by rest treatment and perhaps collapse therapy.

**Schedule of Treatment**

It is suggested that in mild cases treatment with streptomycin should be withheld for more critical episodes which might arise in the future—in mild cases of acute tuberculous pneumonia. If used at all, treatment should not exceed 1 gram of streptomycin daily for six weeks. In desperate cases of tuberculosis the disadvantages of the drug should be ignored and streptomycin administered intramuscularly in daily doses totaling 40 mgs. per kg. body weight for 90 days and in addition, in meningitis 50 mgs. should be given intrathecally at 24 to 72 hour intervals during that period.

—P. Gaskell, Meds '50.

**TREATMENT OF MIGRAINE HEADACHE**

Taken from "Modern Medicine of Canada" by H. G. Wolff, Vol. 3, No. 7, July 1948

This article defines migraine and describes the more common symptoms which precede and accompany the headache. The probable
mechanisms by which these preceding symptoms and the actual headache are produced are briefly stated.

The most valuable drug in the treatment of an attack is ergotamine tartrate, which is effective in 90% of cases. It is generally given intramuscularly in 0.25 to 0.5 mg. doses followed by a period of rest in a quiet, dark room without food or drink. A list of the contra-indications for the use of ergotamine is given. A considerable number of therapeutic measures with less constant beneficial effect are also discussed.

Included in this article is a description of the migrainous type of individual and of the nature of the forces that operate to bring about headache attacks. The important factors in therapy aimed at preventing attacks include reassurance, suggestion, psychic catharsis and especially re-education.

— D. MARSHALL, Meds '49.

DRASTIC FOOD RESTRICTIONS
Effect on Cardiovascular Dynamics in Normotensive and Hypertensive Conditions

JOSEF BROZEK, ET AL
J.A.M.A. 137: 18, Aug. 28, 1948

Experimental data was obtained in the controlled Minnesota experiment on thirty-four young men previously normal in all respects. Corresponding observations were carried out at Leningrad, Holland and Germany during war-time periods of severe dietary restrictions. Unlike the Minnesota experiment, it encompassed both sexes and all adult age groups.

Results in both studies tend to show that drastic dietary restriction causes a fall in blood pressure in most normal persons and those with hypertensive disease. Neither group of observations can be regarded as settling the controversy over the relative importance of caloric and sodium restriction in reducing blood pressure. They do however suggest that caloric intake may be of greater importance.

However, the process would seem to be a reversible one, since the increase in incidence and severity of hypertension during recovery from starvation that figures so prominently in the report from Leningrad seems too impressive to be ignored. In fact, all observations supply information indicating that the cardiovascular dynamic state during recovery from semistarvation may be extremely precarious, even in the absence of hypertension. If hypertension is superimposed, severe cardiac failure may result.

The authors therefore suggest that uncritical application of regimens, such as the Kempner diet may be of some danger to the patient in that the patient may be worse off when he modifies his dietary restrictions, than he was before the treatment was instituted. They further suggest that hypertensive patients treated by severe dietary restrictions should be carefully selected. Furthermore, patients so selected should be warned beforehand that once instituted, the regimen must be followed carefully and that modifications, particularly if sudden, may be dangerous. There can, however, be no objection to a severe dietary regimen in cases of severe and especially malignant hypertension.

— H. B. HAY, Meds '49.
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