The Medical Assessment of Injuries

For Legal Purposes

THIRD EDITION

ARNOLD MANN
F.R.C.S., F.R.A.C.S.

Director, The Surgical Unit, Canberra Hospital, ACT
Formerly
Honorary Assistant Surgeon, St Vincent's Hospital, Melbourne
and
Tutor in Clinical Surgery, University of Melbourne
International Visting Professor of Surgery 1978
Cleveland Clinic, Ohio, USA

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Foreword

to the First Edition

BY THE LATE SIR CHARLES J LOWE

During the last two centuries the technological equipment of the civilized world has undergone vast changes which I am not here concerned to particularize. These changes have included at least two major revolutions from previous conditions. The first is generally recognized as the Industrial Revolution. Its effects are almost universally still evident and indeed unexhausted. The second has been the transformation of movement and transport which has increasingly followed the introduction of the internal combustion engine. Each of these revolutions, while on the whole beneficial to the community, has, like a number of beneficial drugs, been accompanied by harmful side-effects.

The Industrial Revolution gradually showed that its methods had created a speed of work and concentration of effort which far exceeded those demanded of craftsmen in the days of previous manufacture, ie, making by hand — a term which the new era quite incongruously continued to use. New dangers for workmen were created and old ones were multiplied. Moreover, industrial diseases were generated or increased. The Parliaments of the English-speaking world by Workers' Compensation Acts made provision for compensating the victims of accidents or industrial disease, and there is such legislation in this country.

The second revolution has not yet attracted the special attention of Parliament, but its results in creating dangers and inflicting injuries beyond those previously encountered may equally call for such attention.

Medical men, employers and their usual representatives, the insurance companies, and lawyers, are all closely concerned with the injuries and diseases which have resulted from both revolutions.

Up to the present there has not, to my knowledge, been available any Australian medico-legal work which dealt with these problems. This lack of authority has now been remedied by the work of Mr Arnold Mann.

In the following pages he has in a comprehensive way dealt with the conditions which arise from accident and disease, with their diagnosis and treatment, and with the probable results of treatment. I find it difficult to imagine any case which can arise in which his book will not prove helpful to medical men, insurance companies and lawyers. Personally, I found the chapters on Toxicology and Miscellaneous Disorders, which include possible harmful effects from the misuse of splints and bandages, of particular interest.

I confidently recommend this book to the special class of readers I have mentioned above.

Melbourne
July 1966

CHARLES J LOWE

Rights must depend upon facts, and facts are extremely difficult things . . .

There is no escape from the general necessity of investigating difficult and complicated sets of facts, and these can never be separated from considerations involving any special branch of knowledge which may affect them. No one who has an intimate knowledge of any ordered set of facts or ideas is ever satisfied with the attempt of another mind to acquire and use any part of the same knowledge. But it is the regular function of the courts to make these attempts, and, after all, there is not much reason for distinguishing medical science from other kinds of special knowledge which are exposed to the mischief of judicial and forensic misuse. Not much serious mischief will arise if judges and counsel are fitted for the work they do. The real service those whose pursuits are scientific can perform for the administration of justice is to lend what aid they can to the lawyers in the not altogether easy task of sustaining, if not raising, the standard of Bar and Bench, whether in respect of capacity, knowledge, learning, intellectual equipment, or the other qualities upon which the proper performance of their respective functions depends.

—*From an address delivered on 30 September 1933, to the Medico-Legal Society of Melbourne by The Rt. Hon. Sir Owen Dixon (a Justice of the High Court of Australia 1929-1952 and Chief Justice 1952-1963).*

Preface

When one considers that only eight years have elapsed since the publication of the second edition, it is astonishing how much of this book has had to be altered, so great have strides in medicine been. Concepts of illness have undergone changes, as have forms of treatment. Some previously incurable conditions have recently been brought under control, and some hazardous forms of treatment have been rendered safer and are therefore more frequently utilised.

Each Chapter has been carefully scrutinised with these developments in mind. At the same time, it has been the generally accepted medical view which has been stated; this textbook is obviously not a suitable place to argue the most recent medical hypotheses.

The basic pattern of the text and Chapters has been retained. However, a medical mini-dictionary has been added between the last chapter and the index. This glossary has been limited, in order to avoid an expensive enlargement of the text, to those obscure technical terms in common use by medical practitioners writing reports concerning their patients.

Comments from readers have proved invaluable in the past and it is to be hoped that this easy flow of communication will continue in the future.

I wish to express my appreciation to Drs G Danta, C J Eastman, H Lopert, H J Peak and R G Pembrey (Staff Specialists at Canberra and Woden Hospitals) for their generous assistance with revision of the text.

ARNOLD MANN

Canberra
March 1979

Contents

Chapter		*Page*
	Foreword to the First Edition	v
	Preface	vii
1	Introduction	1
2	Injuries — General Considerations	11
3	Neoplasia	17
4	Psychological Disorders	29
5	The Nervous System	38
6	The Heart	56
7	Blood Vessels	74
8	The Haemopoietic System	85
9	Diseases of the Chest	91
10	The Abdomen	102
11	The Genito-Urinary System	115
12	The Eye	123
13	Ear, Nose and Throat, Face and Neck	136
14	Fractures	146
15	Joints	160
16	The Spinal Column	172
17	Muscles, Tendons, Fasciae and Bursae	181
18	Hand Injuries	188
19	The Skin	195
20	Metabolic Disorders	209
21	Toxicology	213
22	Amputations	221
23	Anaesthesia	227
	Index	235
	Medical Mini Dictionary	247

1

Introduction

[101] Medicine has an ancient history and originated as an adjunct to magical rites and primitive religions, as well as from folk medicine. The physicians who practised in the oldest known civilizations in Sumeria, Babylonia and Egypt, were probably all members of the priest class. The subsequent divorce of medicine from primitive magical and religious rites and much later its separation from monotheistic religions played an important part in its history.

The primitive idea of disease and injury was that they were punishments for sin or the work of evil spirits. Hence, relief from them could be obtained only by exorcism or divine intervention. These beliefs were to prove a serious impediment to the progress of scientific medicine.

It was Hippocrates (5th century B.C.) who was probably the first of the physicians of antiquity who insisted that observation of patients and their diseases was necessary, and that causes of illnesses were determinable. He was strongly opposed to the idea that disease was a punishment sent by the gods. In *The Sacred Disease* (probably a treatise on epilepsy), he stated: "It is not, in my opinion, any more divine or more sacred than other diseases, but has a natural cause and its supposed divine origin is due to man's inexperience". Although Hippocrates' ideas held sway in many quarters of the ancient world until the Roman Empire was destroyed, they suffered that decline to which all learning which had accumulated in the slave states of Greece and Rome was subject during the Middle Ages. At this time, no deviations from the rigid views of Galen (A.D. 131–200) were permitted; indeed, departures from his teachings were often treated with great ruthlessness by ecclesiastical authorities. All scientific investigation of disease was discouraged and numerous scientists suffered in their attempts to evade this edict. The destruction in A.D. 640 of the library at Alexandria and the religious persecution of Galileo are probably the best known events of that time.

In medicine, dissection of the human body was forbidden as sinful, and the primitive idea that disease was a punishment for sin was revived.

It was not until the Renaissance that the foundations for a scientific approach to medicine could be laid afresh. Painstakingly, over the course of four centuries, the scientific pre-requisites for rational medical treatment were gathered. Thus in the 15th and 16th centuries Leonardo da Vinci, Vesalius, Fallopius and Eustachius laid the foundations for a knowledge of human anatomy. Later, Servetus and Harvey discovered the circulation of the blood. In the 18th century Morgagni attempted the first correlation between post-mortem findings and clinical symptoms suffered by patients; and after his death, Bichat examined human tissues microscopically. The great scientific discoveries of cellular pathology (Virchow) and bacteriology (Pasteur and Koch) were products of the 19th century. Even simple clinical methods such as the discovery of the stethoscope, Laennec (1816), were late

arrivals. X-ray diagnosis was not used until the end of the 19th century and did not gain an important place in medicine until the 20th century.

Although important observations concerning the human body and its diseases had been made over two thousand years ago, it was not until the fundamental studies in anatomy, physiology, pathology, bacteriology and methods of diagnosis had been made, that the benefits of these discoveries were reaped. Prior to this time, scientific discoveries had little influence on the practice of medicine which was extremely crude and often harmful. Thus, blood letting was carried out for no good reason, purges were administered indiscriminantly, and medicines and ointments were given despite the absence of proven efficacy. Treatment often made the patient worse, and of these one of the most barbarous and harmful was the immersion of wounded areas in boiling oil, a practice which continued until the 18th century, despite the writings of Paré (1510–1590).

Modern medicine, then, is very little more than 150 years old, and modern methods of diagnosis and treatment are largely products of the last 80 years. Although much of medicine is now based on rational foundations, the degree of accuracy obtainable in the physical sciences is of a much higher order, for the scientific study of living things and their diseases has only begun. For this reason, medical opinions can rarely be given with a high degree of certainty, and often the physician or surgeon whose opinion is requested must choose that explanation for a set of symptoms which he considers to be the most probable. Then again, many diseases remain as yet undiscovered and the dogmatic assertion that there is nothing physically wrong with a patient can be very dangerous. From the limited knowledge which has accumulated, it is evident that in many fields, medical opinions will differ widely, less commonly about diagnosis than about aetiology and treatment, and this undoubtedly produces many complexities in the administration of justice; however, these differences of opinion are completely unavoidable.

Until the 15th century witnesses were practically unknown in British jury trials and the small number called to give evidence were treated with great suspicion, as they were felt to be biased. Although surgeons were at times asked to assist courts, not until 1782 in the leading case (*Folkes v Chadd*) was it established that an expert could give an opinion on a set of facts which he had not witnessed. Medical expert witnesses could now be asked, both in court and in their reports, their opinion about the inter-relationship of events which they had not witnessed.

Before the 19th century the value of medical testimony was dubious. Even as late as the 18th century learned treatises existed which accepted among other things, that a woman was capable of producing 150 live births, that grossly deformed infants had a bestial parentage, and that in the presence of a murderer, his victim's wounds would open and bleed afresh*. Dr. Friedrick Hoffmann (1660–1742), Professor of Medicine at Halle, was considered in his day a man of kindly and urbane temperament. Despite this, he stated that those "who vomited nails, hair, wax, glass or leather were indisputable witches". When it is remembered that conviction for

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* If thou delight to view thy heinous deeds,
Behold this pattern of thy butcheries,
O! Gentlemen: see, see! dead Henry's wounds
Open their congeal'd mouths and bleed afresh.
Shakespeare *Richard III*

witchcraft often ended in grotesquely brutal executions, the erroneous views held in past ages lose some of their humorous qualities.

Scientific Medical Testimony

[102] Medical opinions, reports and evidence of scientific merit first began to appear in legal history at the time one would expect it, namely, when medicine itself had become based on rational observation. For reasons mentioned earlier, the degree of accuracy in diagnosis, even with the highest degree of competence and with use of modern aids to diagnosis, is still far from perfect. It is the purpose of the remainder of this chapter to describe the sources of medical facts and opinions and to discuss briefly their merit in general terms.

Sources of Medical Evidence

THE HISTORY OF PATIENT'S INJURY OR ILLNESS

[103] As a rule, the history is obtained from the patient. Supplementary evidence, particularly in accident cases, may be obtained from witnesses. Additional information may also be obtained from people who have an intimate knowledge of the patient, having lived or worked with him for many years. This is particularly important, of course, where the accident or illness has resulted in the death of the patient.

[104] **Accident cases.** The health prior to the accident is important. The patient may have been suffering from a physical illness which made him prone to being involved in an accident; on occasion, an acute medical illness, such as a myocardial infarction, may be the sole cause of an accident. Similarly, alcoholism plays a very important part in many accidents. If the patient had been involved in numerous accidents in the past it may be alleged that he was "accident prone". Of especial importance is the degree of function existing in the parts injured. Thus, in the case of injuries to limbs, there may already have been a state of dysfunction owing to previous accidents, or the existence of osteoarthritic changes in the joints and so on.

The history of the accident itself must then be considered, and the aspects of particular importance depend on the kind of accident involved. To quote a few examples:

[105] *Falls.* The distance fallen; the surface on which the victim landed; whether it was soft or hard and whether it was smooth and clear, or littered with protruding objects; the parts of the body which struck the surface.

[106] *Collisions.* Speed of objects colliding; movements of the body after the time of impact; which parts struck where. In motor car accidents, was the person thrown from the car?

[107] *Blows.* The object responsible—its shape, weight, density and surface. The velocity of the object at the time of impact. The parts of the body struck.

[108] *Crushing and tearing injuries.* The nature of the implement, equipment or machinery which inflicted the injury. In the case of power presses and rollers, it is important to determine what the jaws or rollers were made of, whether they were hot or cold and whether a gap existed normally between them. Sometimes a hand is caught between the jaws of

a power press but the blow is softened by a piece of metal being "worked" in the press.

[109] *Cuts.* The nature of the implement or object producing the wounding and its depth of penetration.

[110] *Thermal injuries.* The temperature of the object or flame; the duration of contact; whether clothing caught fire; the existence of protective clothing.

[111] **The nature of injuries.** The patient is then asked to describe the nature of the injury he sustained, the presence of any bruises, lacerations, division of muscles, tendons, nerves or blood vessels, joint injuries, fractures and injuries to important organs. The patient's description of these is often quite inaccurate, even when there is no attempt on his part to mislead the physician or surgeon. Common errors are confusion of tendons with nerves and the belief that there were fractures when in fact there were none. Remarkably few patients know that fracture and break in a bone are synonymous.

Medical reports from treating doctors and from hospitals are of much greater value in this regard but it must be remembered that accidental omissions of injuries or incorrect labelling of the side of the body on which the injury was sustained, due to typographical errors, are not rare. For this reason a patient's statement which does not match up to the injuries mentioned in a hospital report, should not necessarily be dismissed.

[112] **The nature of treatment.** The patient will have a rough idea of the treatment undertaken and approximately how long he was kept in bed or how long plasters and splints were applied.

Having determined from the patient the nature of his injuries and the treatment undertaken for them at least in rough outline, he is questioned about his period of convalescence; when he was able to resume light duties, and when he was able to resume his normal work. If he has been unable to resume his previous employment, it must be determined whether this was due to the injuries received or owing to the personal inclination of the patient or his employer.

RESIDUAL DISABILITY

The next step is to determine from the patient what his complaints are and in what way his health differs from that which existed prior to the accident. Thus, in the case of injuries to the hand, important questions are —whether there is full movement of all joints, whether the hand is powerful or weak, whether there has been loss of any portions of the hand or fingers, where the sensation is normal, and so on.

Where the possibility of an action for negligence is involved the precise details of the circumstances of the accident, whether there were hidden hazards, and whether regulations had been obeyed are necessary. These are more properly within the province of the law and engineering, and they will therefore be discussed no further.

[113] **Occupational diseases.** Wherever relevant, a detailed picture must be built up of the precise conditions of work and the following are the most relevant: (1) Details concerning the work site—the nature of buildings, state of repair, adequacy of work space (particularly relevant in such occupations as mining). (2) Atmospheric conditions (*a*) Temperature (*b*) Humidity (*c*) Pollution of the air with dust particles or infectious agents,

eg anthrax in wool sorters. (3) Lighting. (4) The nature of any hazards —whether easily seen and recognized, or hidden. (5) The nature of machinery and implements used, and whether there are adequate safeguards. Has there been a period of training in the use of this machinery? (6) The precise nature of work undertaken. (*a*) The nature of physical work undertaken. Is the work heavy or light; if it is heavy, is it imposing undue strain? Is the work repetitive, and if so, how many times per day is the same movement carried out? Are any undue postures required of the patient for prolonged periods of time? Does the worker come into contact with poisonous or irritating materials? (*b*) Mental work. Mental work is involved in every occupation, but not all can be considered to produce mental stresses. The ones most likely to do so are those in which the job specifications are very precise, and the standards demanded high; where there is a high degree of responsibility; where the pressure of work is great and the necessity for completion of tasks within a certain time is important. Mental strains may also be imposed by personality clashes, some of which are inevitable in almost any occupation. In some occupations, notably where there is a direct service to the public, clashes of personality may be quite distressing, eg tram conductors, journalists.

INFORMATION FROM TREATING DOCTOR AND HOSPITAL

[114] Information from these sources is invaluable particularly with regard to obtaining an accurate description of injuries, special investigations including X-ray examinations undertaken, and treatment received. However, as mentioned earlier, reports, more particularly from hospitals, often contain minor inaccuracies some of which are typographical.

The treating doctor is often in an excellent position to make an assessment of the patient's character and keenness or otherwise to resume work. After the conclusion of treatment and rehabilitation, the treating doctor may also be in a position to make some statements concerning residual disability. However, it is to be noted that where the results of medical or surgical treatment are poor, even where such results were inevitable, the efforts of the treating doctor to encourage his patient to make the most of his life despite his problems would tend to lead him to underestimate the extent of the disability unless he is constantly aware of this pitfall and avoids it.

[115] X-ray examination. X-rays are the single most useful aid to diagnosis available in current medical practice. Their usefulness has been so great that the impression has been created that X-ray examinations are diagnostic methods which can discover any disease and are infallible. Nothing could be further from the truth. It must be remembered that X-ray plates are merely records of the varying radiodensity of various parts of the body and they are of use diagnostically only when there is a contrast between parts of different radiodensity. Thus an X-ray shows bones clearly demarcated from the soft tissues; the muscles, nerves, tendons, etc., which the latter contain are seen merely as shadows of much lighter intensity producing vague lines here and there. In other words, X-ray examination may show irregularities and deficiencies in bone structure, including fractures to a very high degree of accuracy, but disease of soft tissues of limbs cannot usually be demonstrated in this way. Then again, minor irregularities of bone structure may not be revealed and in some cases even fractures may not be detected radiologically.

Severe joint disease can exist without X-ray evidence—a common example is a torn meniscus of the knee joint, and another chondromalacia. In order to improve the usefulness of X-ray examinations for soft tissues various methods have been evolved which create contrasts where none normally exist. Thus, air may be injected into the ventricles of the brain, and dye may be injected into arteries, thereby outlining them; a barium meal will reveal the configuration of the lining of the oesophagus, stomach and duodenum; dyes ingested by mouth or injected intravenously may be excreted by the biliary and renal systems respectively, thereby revealing the configuration of these systems and the presence of any irregularities such as stones within them. As previously stated, X-ray examinations may indicate no abnormality, even in the presence of significant disease. A positive result is therefore more significant than one where no abnormality is detected.

[116] **Other special investigations.** Each specialty has its own method of investigation of disease. Thus, an ophthalmologist will use an ophthalmoscope, the slit lamp microscope and other pieces of equipment. In neurology, in addition to highly specialized methods of contrast X-ray techniques, use is made of electroencephalography (EEG) electromyography (EMG) and computer-assisted tomography. In diseases affecting the ear, nose and throat, and the chest, special illuminated instruments (eg laryngoscopes, bronchoscopes) may be employed for the further investigation of the inner passages. In heart disease, electrocardiography occupies such an important place, that no assessment of heart function is complete without it. So, in each particular specialty, special methods of investigation are available.

In addition to instrumental investigations, valuable additional information is frequently obtained from examinations of samples of body fluids including blood, or microscopic examination of body tissues. Each method of investigation has its pitfalls. For example, many blood examinations have attained a high level of accuracy, but they must be interpreted in conjunction with the clinical findings. Thus, a patient who has recently lost one litre of blood may, when a blood sample is taken, show a normal level of haemoglobin, or even a level in excess of normal as it takes time for the components of the blood stream to be diluted by absorption of fluid. Then again, blood alcohol levels can be estimated with great accuracy, but blood taken from the heart during post-mortem examination may contain a very high level of alcohol simply by virtue of diffusion from the stomach if this latter organ contained alcohol at the time of death. It would be completely erroneous to conclude that the level of alcohol in the blood inside the heart was representative of the level of blood alcohol at the time of death. There are many similar examples, and they all point to the necessity for co-ordinating the results of special investigations with the facts of the case, with the clinical features, and with the results of other special investigations.

[117] **Certificates.** Owing to their cryptic nature, the amount of information obtainable from certificates is limited. Nonetheless, they may be of value in indicating the diagnosis and period of incapacity. Death certificates are very important and wherever possible it should be ascertained whether the diagnosis was made as the result of clinical examination or whether this was reinforced by post-mortem examination. Despite their importance, death certificates are frequently incorrectly completed. This occurs because the

ultimate cause of death is written on the last and not the first line of Part I of the death certificate. For example below is a correctly completed Part I.

PULMONARY EMBOLISM

due to or as a consequence of

DEEP VEIN THROMBOSIS

due to or as a consequence of

OPERATION FOR CARCINOMA OF THE COLON

It is easy to understand that a busy medical practitioner could reverse the order of the diagnoses through inattention to detail.

Subsidiary diagnoses are often inadvertently made to appear as the main cause of death. All causes listed on the certificate should be carefully assessed and if revision seems necessary, the practitioner issuing the certificate should be asked for further information.

[118] Reports from specialists. The treating doctor may himself be a specialist. Where additional reports are required from doctors other than the one undertaking treatment, the opinions of specialists in particular fields is of much greater value, as a rule, than opinions obtained from general practitioners. In addition some familiarity by the specialist of the legal problems involved is an advantage, as otherwise the legal adviser may find his most important questions remain unanswered.

It is the opinion of some specialist physicians and surgeons, that the only report which ought to be utilized is that of the treating doctor. Whilst no-one can deny the importance of obtaining such a report, it need not be assumed that these reports invariably produce a complete picture. The reasons for this are as follows: (*a*) The treating doctor is "involved" with his patient and may be unable to take a detached view. (*b*) It is his duty to encourage the patient as much as possible, and, where residual disability remains, to encourage the patient to make the best he can of his life. His natural tendency, unless he is very careful, is to underestimate the extent of residual disability. (*c*) Sometimes a fresh opinion will uncover new aspects of the case not previously suspected. (*d*) The opinion of a specialist with an interest in medico-legal problems often proves of considerable value to the legal attendant.

COLLATION OF INFORMATION

[119] Having obtained all the information from the various sources set out above, it should be possible for the legal adviser to have clear answers to the following matters: (1) What was the nature of injuries sustained, or, alternatively, from what diseased state is the patient suffering, and what is their cause? (2) What was the nature of treatment required, and is further treatment still needed? It may be necessary to obtain estimates concerning the cost of medical treatment, and what might be considered a reasonable period of convalescence. (3) If no further treatment is likely to be of any value, is the patient's rehabilitation complete—in other words, has "stabilization" occurred. If stabilization has occurred, what was its approximate date? (4) The nature of residual disabilities: (*a*) Are these consistent with the causes stated by the applicant, and are they consistent with the findings?

(*b*) Is the applicant able to resume his former type of employment? If this is possible, will he be in any way curtailed as regards efficiency and earning capacity? If he is unable to resume his former employment, what kinds of jobs are now open to him? (*c*) Is the length of his life or working life likely to be affected? (*d*) Are there any unsatisfactory cosmetic results? (*e*) Are there any unsatisfactory influences on his social adjustment, marital opportunities and so forth?

Where required, an assessment of percentage loss of a part may be given. This generally applies only to limbs, hearing and vision. Assessments of disability as percentages of the whole body may also be required.

Medical Terminology

[120] English medical terminology is derived from Latin and Greek roots and from English. The reader may encounter difficulty in comprehending medical terms and will frequently need to have recourse to a medical dictionary or to the mini-dictionary in this book. It may be of some assistance to him to read the following pages.

In the pre-scientific phase of medicine, diseases were named either by their supposed cause or by one or more predominating symptoms. This phase of medical history has given us names like "St. Anthony's Fire" (now called erisypelas) and "malaria" (bad air), which are unscientific and misleading. On the other hand, it has given us terms like "diabetes" (a running through) and "pellagra" (rough skin), which are descriptive terms referring to main symptoms. As knowledge increased these methods of naming diseases have gradually been discarded and terms indicating the nature of the pathological process involved, often giving some reference to cause, became employed. The colourful terms used in the past have, in many instances, lingered on even though they may have long outlived their usefulness, an unfortunate feature which has given rise to a multiplicity of names. To use an example from occupational disease, silicosis of the lungs has been known as dust consumption, ganister disease, grinders' asthma, grinders' rot, miner's phthisis, rock tuberculosis and by many other names. Its modern scientific name is, however, silicosis.

In addition to the development of medical knowledge, terminology has been further complicated by the evolution of language. In the first place, as mentioned, English medical terminology has a very strong admixture of Latin and Greek. Hence, very frequently there will be three or more sets of terms meaning the same thing. For example, for the English word "gallstones" we have "*biliary calculi*" (L.) and "*cholelithiasis*" (G.). Similarly, for the English word "stomach" (which, incidentally is derived from Greek) we also have "*gaster*" (G.) and "*ventriculus*" (L.). In the second place, there is the process of what one might call "linguistic extrapolation", namely, the use of words for meanings which were not their original ones. The Latin word "*porta*" means a gate, but as a gate is an entrance it has been used to indicate "the entrance" to an organ, for example, the *porta hepatis* (the entrance to the liver). If we now examine a term like "portal vein hypertension" which is usually rendered more concisely as "portal hypertension", it certainly does not mean "excessive tension in a gate"; it means an abnormal amount of pressure in the main vein entering the liver.

Modern disease nomenclature attempts to inform the reader about the following matters: (1) the anatomical site of the disease process; (2) the

causal agent, when known; and (3) the kind of pathological process which the agent has produced in a particular structure.

EXAMPLES

[121] Inflammatory processes. The clue is generally given by the ending "-itis": appendicitis, gastritis, carditis mean respectively inflammation of the appendix, the stomach and the heart. If an inflammatory disease is of rapid onset (hours or days) it is called acute: thus, acute appendicitis, acute meningitis. If the inflammatory process is not quite so rapid in onset (up to a few weeks) it is called sub-acute. The term is also misused in place of "incomplete" (for example, sub-acute bowel obstruction is more correctly rendered "incomplete bowel obstruction" or "intermittent bowel obstruction"). If the disease process develops very slowly it is called chronic. Thus, in most cases, tuberculosis and rheumatoid arthritis are chronic diseases as they develop over a period of months or years and frequently progress for similar periods before becoming arrested either by natural processes or through the intervention of surgical or drug therapy, or death.

Not all inflammatory processes enjoy the ending "itis" and it must be remembered that not all inflammatory processes are caused by infections. Other endings which are not as specific are "-osis" and "-pathy" which indicate "condition" and "pathological state" respectively. Examples of inflammations in this category are nephrosis, tuberculosis, sarcoidosis and silicosis. Infections may be described in a similar way but, included in the title there may be reference to the organism responsible, for example, amoebic colitis. Frequently the organism names the disease and the type of inflammatory response which it excites is not described. Common examples are tuberculosis and brucellosis.

[122] Degenerative disorders. The end of the word is frequently "-itis", "-osis" and "-pathy". Common examples are arteriosclerosis and osteoarthritis. Purists would prefer us to use the ending "-itis" exclusively for inflammatory processes and they prefer to use the term osteoarthrosis. Although differentiation of this kind would be very desirable, changes in terminology are difficult to effect.

[123] Tumours. If a medical term indicates a tumour, the ending is "-oma". Unfortunately, the ending is not entirely restricted to neo-plastic conditions and it sneaks its way into words like haematoma and hamartoma. Nonetheless, in most instances the ending "-oma" indicates either a benign or malignant tumour. Common examples of the former are fibroma, lipoma and adenoma indicating respectively benign tumours arising from fibrous tissue, fatty tissue and glandular tissue. If the tumour is malignant it may be simply described as a malignant . . . -oma; for example, malignant adenoma and malignant melanoma. This terminology is utilized particularly in cases where there has been a malignant transformation or alternatively, where it is not clear whether the malignant tumour has arisen from epithelial cells or from connective tissues. Malignant tumours arising from epithelial cells are called carcinomata and those arising from connective tissues are called sarcomata. Thus, examples in the former category are carcinoma of the stomach, carcinoma of the lung and squamous cell carcinoma of the skin. Examples in the latter category are fibrosarcoma, liposarcoma and osteosarcoma indicating malignant tumours arising from fibrous tissue, fatty tissue and bone respectively.

Additional descriptive terms may be employed to describe the macroscopic as well as microscopic characteristics. Thus, scirrhous means hard, encephaloid (brain-like) means soft, *adeno*carcinoma is a tumour that arises from glands, and a mucoid carcinoma is one producing much mucus. If the tumour resembles the tissue from which it arose it is described as "well differentiated" and if it does not it may be called "undifferentiated" or "anaplastic".

There are many other aids to the understanding of medical terminology but they pre-suppose some knowledge of anatomical terminology and pathology, and as many readers of this book do not possess such knowledge, little would be served by going further. For the interested reader, references are available below.

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