

Basic Dental Science Education

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It is frequently contended that basic science of the dental course should be taught separately and directed to dentistry and to the special needs of dental student. Credits earned in anatomy, histology, biochemistry, physiology and other basic sciences should be transferable between medical and dental schools. These and other basic courses of the two or four years of the dental curriculum should make it possible for the student at the end of his 4th year, to transfer to medicine or dentistry, if he cared to without the loss to time or credit. In other words, the basic courses of the two or four years of dental and medical education should be almost the same. Some teachers connected with the dental schools observed and remarked on the disposition of students to neglect the sciences in favor of mechanical dentistry. (Fig. 1)

Societal trends, which assist that dental educator in the identification of dental requirement, are making the following demands upon the practitioner : at first the individual must demonstrate in practice a thorough understanding of the structure, functions and disease of the mouth. Second, individual must be able to deliver dental treatment according to published criteria for acceptable dental procedures. And third, the individual must be able to defend the dental treatment. (Fig. 2)

In the dental schools, the fundamental sciences, anatomy, physiology, pathology, biochemistry and others, were given earnest consideration and viewed as essential components of the dental

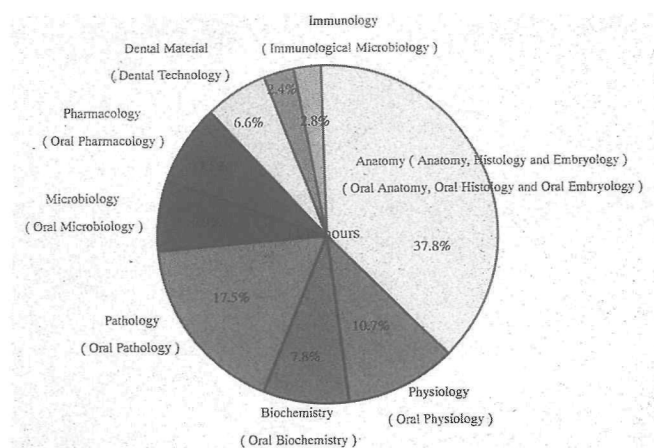


Fig. 1

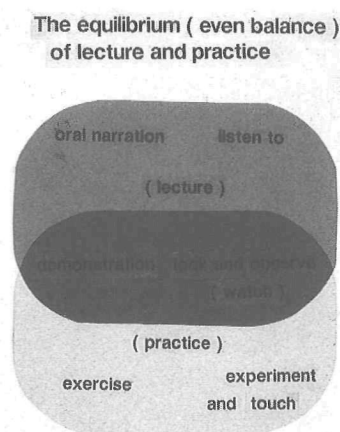


Fig. 2

course and important as the basis for the practice of dentistry. In the curriculum of the first dental school and during the period when the requirement for the degree called for clinical training under proceptors, the medical sciences constituted a large part of the curriculum. But although attempts were made to direct the teaching of these subjects to dentistry.

Anatomy and Oral Anatomy

Human anatomy is the science that considers the various structures making up the human organism. It deals merely with the parts that can be rendered evident to the naked eye by various methods of dissection. Such applied anatomy is usually concerned with human structural observations which are useful in medicine, especially in surgical technique, but also in clinical diagnosis. Descriptive anatomy, however, has a far more extensive application in relation to function. The locomotor system embraces structures directly concerned with movement-skeletal elements, articulations and ligaments and muscle, the study of which may be formalized as osteology, arthrology and myology. Similarly, neurology, which treats of the nervous system, including its sensory organs, and angiology, the study of cardiovascular arrangements of organs and tissues, are correlated as much by function as by structure. It is equally clear that respiratory, alimentary, urogenital and endocrine systems are clearly functional as well as anatomical fields of study.

The masseter-mandibular-temporal region is the pivotal region in which the mandible, the only movable bone of the face is controlled in its relations with superior maxilla at the temporomandibular joint. Within the area are the ramus and body of the mandible, the overlying masseter muscle, its fascia, a portion of the parotid gland and duct, the dense parotid fascia, and vessels and nerve coursing anteriorly over the masseter muscle.

Excepting regions around oropharyngeal isthmus, the oral mucosa receives sensory innervation from the maxillary and mandibular divisions of the trigeminal nerve. The trigeminal nerve also supplies the teeth and their supporting tissues. Both the major and minor salivary glands are supplied by secretomotor parasympathetic fibers from the facial and glossopharyngeal nerve. The motor innervation of the muscles related to the jaws and oral cavity is from the trigeminal, facial, accessory and hypoglossal nerves.

Radiographs must be of good quality. The proper evaluation of radiographic information necessitates an intimate working knowledge of osseous and soft tissue anatomy, radiographic anatomy and the basic nature and varieties of the pathological processes that affect the tissues in areas of concern. The radiograph represents only a portion of the available clinical data relative to a particular pathological process or change.

Dental Anatomy

Dental anatomy is the science that deals with the morphology of the structures and contours of the teeth, their relationships, and their immediately associated parts. The anatomic form is made by applying one's knowledge of the anatomy of the basic tooth form on the practice of tooth carving.

Embryology

Embryology may be defined as the science that deals with the formative history of the individual from the origin of the germ cell to the adult stage, particularly the stage from the time of conception until birth.

Tooth development can be divided into three overlapping phases of initiation, morphogenesis and histogenesis phases. The history of the development of any organ or structure can be revealed only through a sequential observation of its growth and development. Tooth development is characterised by complex interactions between epithelial and mesenchymal tissues.

Histology and Oral Histology

Histology is the science that deals with the four basic tissue of the body, their origins and the relation that exist between histologic component and their functions. Histology is microscopic anatomy, concerned with the structure of the basic tissues, systems, and organs of the body and correlation of their structure with their functional requirements. The advent of the scanning electron-microscope has added an exciting new dimension to the morphologic aspects of histology.

Oral histology is the science that deals with structures in the oral cavity and para-oral regions. The subject matter concerns histological components of the structures, their functions and their relations with systemically related tissues and organs, as well as clinical application.

The advent of modern methods of study has caused the area to be involved in oral biology rather than to be limmited to the former approach, which dealt mainly to the former approach, which dealt mainly with morphological and cytological structure. The dental tissues include the enamel, dentin, cementum, pulp, periodontal ligament and the alveolar bone.

Physiology and Oral Physiology

I have assumed that the student has already taken a course in general physiology. Oral physiology is a most important of knowledge that has only recent been included in the undergraduate curriculum of dental schools. The physiology of the oral cavity is a particularly exciting topic, since sensory and motor systems interact to regulate such highly intricate functions as mastication, swallowing, salivation and speaking. Among the most exciting recent advances in oral physiology are neurophysiologic investigations that explore central nervous system control of orofacial function.

Microbiology and Oral Microbiology

Microbiology may be defined as the science that deals with the study of microscopic, unicellular plant organisms devoid of chlorophyll, homogeneous in structure, and producing by transverse fission. An infectious disease is one that is communicated from person to another, whether by contaminated material or by contact, mediate of intermediate. The sterilization is the process by which all forms of life are completely destroyed in a circumscribed area. The disinfectant is a chemical substance that destroys pathogenic microorganisms.

As the result of much research a greater understanding of the relationship between man and considerable help including in the role of these microorganisms in disease. Many of the mechanisms of bacterial interaction with host tissues such as adherence are often studied using oral organisms.

Clinical dentistry has developed many way, in oral medicine and in this area microbiology, has played a part in the understanding of mucosal infection and of the oral manifestations of systemic disease.

The health of the mouth is dependent on the integrity of the mucosa which does not normally allow microorganisms to penetrate. The mucosa is in continuity with number of anatomical structures and these are particularly vulnerable if the oral defenses are breached. The factors which are responsible for maintaining oral health are the integrity of the mucosa, saliva, gingival cervical fluid and their humoral and cellular immune components.

Biochemistry and Oral Biochemistry

The aims of biochemistry are to describe the nature of living forms and living processes in terms of chemistry and physics.

The aims, attitudes and techniques of biochemistry are as relevant to dentistry as to medicine or any other aspect of biology. Only when the normal structures of the mouth and their development

and reactions are understood it is possible to appreciate the true nature of dental disease. All disease has a biochemical basis regardless of whether its origin is nutritional or genetic or it is caused by an infecting or toxic agent.

The products of bacterial metabolism act by changing the physiochemical factors which influence the solubility of various calcium phosphates at the tooth surface. Increased solubility of the calcium phosphate component of the teeth results in the demineralization characteristic of dental caries.

Decreased solubility of various calcium phosphates deposited from saliva causes calculus formation, which in turn may lead to periodontal disease, the main cause of tooth loss in older subjects.

Pathology and Oral Pathology

The pathology is indeed the scientific study of disease. The pathology describes the cause, course and termination of disease, and the nature of its lesions. The lesions may be morphological, chemical or functional. All good clinician are practising pathologists. The pathology is such an important part of the curriculum for both medical and dental students.

Life is a continuous depletion between an organism and its environment. The function of inflammation is to mobilize all the defenses of the body and bring them to the site of battle with the purpose of overwhelming the source of injury. The source of injury may be physical and chemical or it may constitute an attack by some pathogenic microorganism. The prerequisite for survival are the ability of an organism to destroy and repair itself. The ability of an organism to resist infection is called immunity. The fundamental principles and essentials of immunity and allergy are presented.

The surface lesions of the oral mucosa and tongue are classified according to their clinical appearance. Benign tumors or tumorlike growths that arise in the soft tissues of the oral cavity may be classified into epithelial tumors and mesenchymal tumors.

The jaws, dentition and individual teeth may be involved in a number of disturbances in such a manner that the shape, form or number of these structures is altered. The lesions of hard dental tissues which are dental caries, hypercementosis or root resorption, are discussed in this session. The presence of epithelial tissue within the marrow of maxilla and mandible is one of the numerous dissimilarities between the jaws and other bones of the skeleton. The source of this epithelium is both odontogenic and nonodontogenic.

The developmental abnormalities and the manifestation of generalized and oral diseases are referred to in the special oral pathology.

Pharmacology and Dental Pharmacology

Pharmacology is the science that deals with all facets of drugs, especially the action of drugs on living tissue. Since a drug is usually defined as any chemical substance that affects living tissue, pharmacology is a broad discipline.

The dentist must be concerned with two areas of drug use. First, the dentist should be able to obtain the maximum advantage from available drugs while inducing minimal disadvantage. The second aspect of drug information that is essential in dental practice concerns medically prescribed drugs. The dentist should never use a drug that he does not know well. The dentist should never begin treatment of a patient that is taking a drug whose nature is not known to him. This requires more than a basic knowledge of pharmacology.

Although a course in oral pharmacology is included in most dental and dental hygiene educa-

tional programs, it has been difficult to find what the role of pharmacology is or should be. Pharmacology is important enough to be included in the dental and dental hygiene curricula, there should be some attempt to agree upon what it is doing there and to orient it strongly toward that pharmacology necessary for the competent practice of dentistry or dental hygiene.

Pharmacology is the study of drugs. The extensive scope of this discipline is obvious when one considers that a drug may be broadly defined as any chemical substance that affect biologic systems.

Dental Technology

The dental material and technology deals specifically with the restorative and accessory materials as amalgam, gold alloys, denture base resins, cements, investments and impression materials. Metallurgy in science of economically extracting metals from their ores and applying them to useful purpose.

The organic materials are included impression materials, waxes, organic denture base material. Much has been claimed for the different type of dentifrice, but the chief service rendered by a dentifrice is as a mechanical or chemical cleansing agent. The question whether tooth paste is to be regarded as a medicine or as a cosmetic can be disposed of without extended discussion. It must be admitted that in certain instances, a medicated preparation is necessary in treating a definite oral pathologic condition.

The dental investments are composed essentially of stone or plaster and silica, and they are used in making dental castings and in soldering operation. Other ingredients may include salt, boric acid, and reducing agents. Dental cements are classified into the zinc oxychloride cements, zinc oxid-eugenol cements, copper phosphate cements, zinc phosphate cements, silicate cements, and silicate-zinc phosphate combination cements.

Summary

For convenience in comparative rating the basic science subjects were considered separately general and oral anatomy, general and oral histology, embryology, general and oral physiology, biochemistry, and oral biochemistry, microbiology, and oral microbiology, dental pharmacology, general and oral pathology, dental material, and general and oral hygiene, oral pathology, dental materials, dental pharmacology, and hygiene while better classified as the clinical science, was committed to clinical visitors. Including dental materials, oral pathology. But dental pharmacology and oral hygiene as basic science, that an average of 17.5 percent of the entire curriculum in four years course was devoted to the teaching of the basic science.

Basic science, intermediate science and clinical science share an interdependent relationship. The intermediate sciences include oral pathology, dental material science, dental pharmacology and oral hygiene. (Fig. 3)

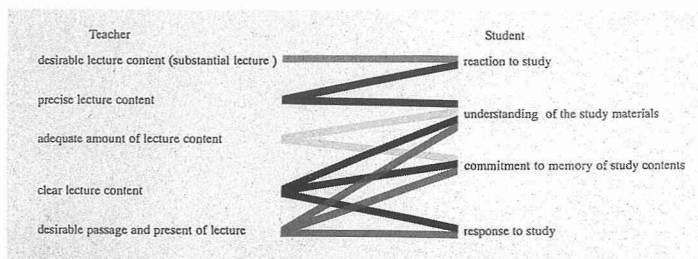


Fig. 3

抄録：歯科基礎医学の教育について

鈴木和夫（松本歯科大学・口腔解剖学第2講座）

歯科医学を学ぶ学生に対し、歯科医学に必要な基礎医学をどの程度、どの様に教育すべきか、しばしば論議されている。歯科大学での専門教育カリキュラムでは、歯科臨床医学（臨床科目）の講義や実習を受ける前に歯科基礎医学として基礎医学の数多くの科目を受けるように構成されている。歯科大学で学ぶ解剖学、生理学、細菌学、生化学および病理学などの基礎科目は、後に学ぶ臨床科目に重大な基礎的思慮と知識を与えるために、歯科医学を学ぶには不可欠な内容となっている。

歯科医学教育では、まず口腔領域の構造、機能と疾患について教授しなければならない。次には歯科医療にそった専門知識と技術を習得し、最後には歯科治療を学ぶとともに手順を十分に習得する必要がある。

各学年での単位履修の課程として、歯科基礎医学は、解剖学・口腔解剖学、組織学・口腔組織学、発生学、生理学・口腔生理学、細菌学・口腔細菌学、生化学・口腔生化学、病理学・口腔病理学、歯科薬理学、歯科理工学、衛生学・口腔衛生学に区分されている。しかし衛生学・口腔衛生学は歯科医療に密接な関係をもっているために歯科臨床医学の中に入れた方がよいとされている。口腔病理学、歯科薬理学、歯科理工学と口腔衛生学は歯科基礎医学から歯科臨床医学への橋渡しの科目と考えられている。このため、第4学年において歯科医学教育としての全体の17.5%程度が口腔病理学、歯科薬理学、歯科理工学と口腔衛生学に振り分けられている。