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## PREFACE

Dental care is one of the most common patterns of specialized medical aid. Due to the permanent introduction of technological advances into activity of dental clinics and rooms, the systematic increase of the level of dentist qualification in the course of both higher education and postgraduate study is required.

One of the factors in pedagogical process contributing to adoption of specialty is providing the students with high-quality manuals and textbooks. This is particularly important now, during the period of amplification of training process, due to introduction of new state educational standard of professional higher education; program of study of therapeutic dentistry, which accounts for 906 h that will allow complete adoption of the discipline.

In the last decades, specialization was performed in dentistry that resulted in formation of therapeutic, surgical, prosthetic dentistry, and pediatric dentistry, maxillofacial surgery, and orthodontia. The specialization does not mean complete isolation of these disciplines. Switching to new forms of economy management and wide introduction of market economy into dentistry is associated with necessity of extension of service sector with individual activity. This resulted in significant increase demand for multidisciplinary experts.

Among specified sections, therapeutic dentistry plays the leading role. The training of a dental therapist may be called the main direction of pedagogical work, since most people who seek medical advice are patients with dental, periodontal and oral mucous membrane diseases. The important thing is also that therapeutic dentistry determines the ways of prophylaxis of the most common dental diseases.

The textbook considers the most important problems of therapeutic dentistry. The basics of physiology of oral cavity, therapeutic issues

of dental caries and contemporary methods of its treatment are highlighted. Clinical presentation, diagnostics and treatment of non-caries dental injuries, and also pulpitis and periodontitis were given sufficiently great attention; the grounds of modern endodontics were provided. Periodontal diseases are presented sufficiently completely with consideration of discoveries of modern science and practice. The chapter, dedicated to oral mucosal diseases, underlines the relation of this pathology with body condition, because first signs of some diseases (blood diseases, sexually transmitted diseases, including acquired immune deficiency syndrome) may be observed in oral cavity. The textbook along with methods of diagnostics and treatment of dental diseases and oral mucous membrane presents in detail methods and means of prophylaxis of the main dental diseases. The removal of odontogenic site of infection with focally-mediated diseases gains particularly great significance.

The essential tasks of training process are:

- studying of anatomical-physiological patterns in organs and tissues of oral cavity in the normal condition and pathology;
- learning of methods of prophylaxis of main dental diseases and ability to implement them in routine work;
- learning of methods in diagnostics of main dental diseases;
- adoption of methods in restoration of hard dental tissues with the use of modern dental filling material;
- learning of modern technologies of endodontic treatment;
- learning of modern methods of complex treatment of periodontal diseases and oral mucosa. The authors hope that the textbook will help students to learn the grounds of therapeutic dentistry and arouse interest to deep knowledge of the subject.

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## LIST OF ABBREVIATIONS AND DESIGNATIONS

*	— trade name of the medicinal product
CNS	— central nervous system
CPITN	— community periodontal index of treatment needs
DEF	— aindex of caries experience based upon the number of decayed, extracted, and filled permanent teeth
DNA	— deoxyribonucleic acid
EDTA	— ethylenediaminetetraacetic acid
ESR	— erythrocyte sedimentation rate
HI	— hygiene index
HIV	— human immunodeficiency virus
ICD-10	— International classification of diseases, 10th revision
Ig	— immunoglobulin
LDF	— laser Doppler flowmetry
PMA	— papillary-marginal-alveolar index
RNA	— ribonucleic acid
RPP	— rapidly progressive periodontitis
UHF	— ultrahigh frequency
UV	— ultraviolet
WHO	— World Health Organization

# Chapter 1

## MAIN STAGES OF DEVELOPMENT OF NATIONAL THERAPEUTIC DENTISTRY

The science of dental diseases appeared several hundred years ago. However, in the second half of the 19th century only because of development of disciplines such as anatomy, histology and physiology, dentology was enriched with new reliable findings, which formed the basis of further and faster development of dental specialty.

The following Latin and Greek names entered the Russian dictionary:

- *dentistry* that corresponds to dentology;
- *odontology* is a science of teeth;
- *dentistry* that means literally "science of mouth".

**Stomatology** (Greek *stoma*, *stomatos* — mouth, *logos* — science) is a section of clinical medicine, dedicated to study of etiology, pathogenesis and peculiarities of disease progression and injury of teeth, jaws, oral cavity organs and maxillofacial area and development of methods of their prophylaxis, diagnostics and treatment.

As medical discipline, dentistry formed in the 20s of the previous century as a result of union of dentology and oral surgery.

If oral surgery originated and developed as part of surgery, dentology was not related to general medicine until the 17th century. Earlier to this period, dentology was a way of helping with pain and was limited mainly to removal of an affected tooth. Dental care was delivered by barbers, bathhouse attendants, craftsmen, etc.

Dental care as medical specialty appeared at the turn of 17th–18th centuries. This was firstly related to works of a prominent French

physician Pierre Fauchard. The emergence of technologies of manufacturing of artificial gold crowns and silver amalgam dental filling and later the employment of arsenous acid in pulp necrotization (1836) and invention of dental drilling machine had approved this specialty conclusively.

The beginning of development of dental treatment in Russia refers to the 18th century, when private dentist rooms were opened in Saint Petersburg and Moscow for the first time. In order to receive the right to practice, Russian physicians had to pass the Medical Board (special medical surveillance authority) examination. Subsequently, in 1810 the law on introduction of the title "Dental Healer" was passed; in 1838 this title was replaced by the "Dentist". In 1900, however, this form of training of dentists was officially prohibited. In 1829 women received the right to pass exams for the title of dental healer equally to men.

During this period, some remarks appear that dental treatment should be transformed into specialty, which might be learned after having received higher education. The opening of the first Russian position of privatdozent of odontology in departmental surgical clinic of Moscow University (1885) became a significant landmark in this direction. The senior lecture's course on dental diseases was headed by N.N. Znamensky.

The oversize role in organization of odontology course belongs to prof. N.V. Sklifosovsky; he understood the need for teaching of dental diseases in medical departments,

displayed interest in dental treatment and was engaged with scientific studies in this problem. He is a founder of dental caries study in Russia in terms of epidemiological aspect; he was the first who established higher prevalence of dental caries in city inhabitants. N.V. Sklifosovsky suggested the need for full mouth debridement and prophylactic measures.

In 1892, positions of privatdozent of odontology were opened in Military Medical Academy (headed by P.F. Fedorov) and in Women's higher courses in Saint Petersburg (headed by prof. A.K. Limberg).

One may rightfully consider that the first scientists-dentists were educated in prof. N.V. Sklifosovsky Moscow Departmental Surgical Clinic, Military Medical Academy and in Women's higher courses Saint-Petersburg: M.M. Chemodanov, N.N. Znamensky, N.N. Nesmeyanov, A.K. Limberg.

A.K. Limberg was the first in Russia (1891) to defend a thesis on odontology "Contemporary prophylaxis and therapy of dental caries". A.K. Limberg is a founder of planned sanitation of oral cavity in pupils.

The major events in development of dental treatment in Russia became a foundation of Russian First Society of Dentists (1883), and issue of the first press organ "Zubovrachebny Vestnik" (Dental Treatment News) in 1884, calling of All-Russian Odontological Conference in Nizhny Novgorod in 1896 and organization of the department of dental diseases in Saint Petersburg Clinical Institute. During the conference, apart from scientific reports, matters of dental treatment staff were also discussed, a question on prohibition of preparation of specialists by means of noviciate was posted, and an idea of sanitation of oral cavity in pupils was proposed.

In 1899, Moscow Odontological Society established a journal "Odontologicheskoye Obozreniye" (Odontological Review). These initial landmarks in development of dental treatment were the first precursors of therapeutic dentistry.

While odontology was establishing, a number of questions were increasingly raised as preparation of specialists in this field should be performed in universities. For example, in 1910, the 11th Pirogov conference concluded to establish independent departments of odontology with independent hospitals and technical laboratories in all medical faculties.

In November 1918, a resolution on rendering of dental treatment education to medical faculties of universities was issued.

In 1918 with creation of People's Commissariat of Healthcare of the RSFSR, a dental treatment subsection was formed in its structure, which was headed by P.G. Dauge (1869–1946).

In March 1920, in accordance with resolution of People's Commissariat of Healthcare and People's Commissariat of Education, departments of dentistry were arranged in medical faculties of state universities. This measure was an important landmark in the development of specialty. In accordance with this resolution, in April 1920, the course of dentistry of medical faculty of Moscow University was rearranged into department of dentistry, which was headed by prof. G.I. Wilga. From 1924 to 1926 it was headed by prof. L.A. Govseev. At the time the future outstanding personalities of dentistry worked at the department. Among them were V.A. Dubrovin, I.G. Lukomsky, I.A. Begelman, A.E. Verlotsky.

Along with arrangement of departments in medical faculties, the institutes were established as follows: in 1919 in Petrograd the Institute of Public Dental Treatment, in Kyiv Odontological Institute. In 1922 the State Institute of Dental Treatment was established in Moscow, which in 1927 was renamed first into the State Institute of Dentistry and Odontology, afterwards into the Moscow Medical Dentistry Institute, and in 1998 it had come to be called as the Moscow State University of Medicine and Dentistry (MSUMD). In 1928, the Odessa Research Institute of Dentistry, first research institution in this field in the country, was opened.

In the pre-war period, a significant material basis on preparation of dentists was created, 11 dental institutes were opened. However, the war did not allow finishing the started reforms.

In 1949, the term of education in dentistry institutes was increased up to 5 years. A number of higher educational institutions, in which the preparation of dentists was carried out, increased. A distinctive feature was that not dental institutes but dental departments of medical institutes were opened.

During development of specialty, already in pre-war years three fields were determined: therapeutic, surgical and prosthetic dentistry. In 1963, the department of pediatric dentistry was opened. Currently, a number of dental faculties have a course of physiotherapy, and the Moscow Medical Dental Institute has a department of physiotherapy. In accordance with study plan in the specialty "dentistry", approved in 1983, a primary prophylaxis course was introduced at the department of pediatric dentistry. The department of dental diseases prophylactic was established in the MSUMD.

In order to improve the quality of training of young specialists, the introduction of post-graduate specialization (internship) is of great importance.

The internship involves continuing medical education of young specialists for a year on the basis of institutes. The management of interns is carried out by teachers of dental departments. This measure allows significant increase in quality of preparation of young professionals.

The Decree of the Council of Ministers of the USSR from November 5, 1976 "On measures in further improvement of dentistry aid for population" played an important role in development of dentistry in our county. Order of Healthcare Ministry of the USSR from December 10, 1976 No. 1166, issued based on this Decision (having the same name), involved a number of measures in extension of dentistry institution net and increase of

dental physicians issue. With this object in mind, a number of new dentistry faculties were opened, and admission to those previously existing was increased.

Currently, 46 dentistry faculties are functioning in our country.

In 2015, 68000 professionals in dentistry fieldwork in municipal dentistry organizations, among them 54000 (79.4%) dentists and 14000 (20.6%) dental practitioners. As before, there is an increase in the proportion of stomatologists and a decrease in dentists.

There are more than 35,569 (52.4%) dental therapists and pedodontists among all dental professionals, and dental orthopedists and orthodontists hold second place with 12,036 (17.7%). Dental surgeons and maxillofacial surgeons totaled 6528 (9.6%), and dental general practitioners 13,777 (16.7%).

The MSUMD, the head university on higher dentistry education in Moscow, developed the Concept of improvement of dental education in Russia (1999), which was presented and approved at panel of Ministry of Healthcare of the Russian Federation. This document is extremely significant for development of specialty. It is based on preparation of general dental practitioner, who nowadays is absolutely necessary for the dental net. Thus, as a result of implementation of this concept, a specialist of only one type, a dental physician, is to be prepared by higher educational institutions. The offer from the MSUMD should be acknowledged as essential and progressive. It reflects the requirements of dental practice and brings our education nearer to standards accepted by global community.

The therapeutic (conservative) dentistry is engaged with studying etiology and pathogenesis of dental and alveolar tissue diseases, oral mucosal diseases, their diagnostics, development of method of their treatment and prophylaxis.

The level of development in therapeutic dentistry significantly determines the state of dental health service to population. The par-

ticularly great significance belongs to development and introduction of prophylactic measures of the main dental diseases. Currently, the level of knowledge in problem of tooth caries and periodontal diseases is such that one may successfully be engaged in prevention of those diseases.

The differentiation and definite specialization appeared in therapeutic dentistry. It includes radiology, endodontology, periodontology, and oral mucosal diseases, although they should not be divided into individual sections.

The scientific directions comply with the main problems of this section of dentistry. Multiple studies, which continue to this day, are dedicated to the problem of caries.

It is known that the level of investigations depends on scientific evidences and applied techniques. For example, in the 20–30s years of the 20<sup>th</sup> century clinical trials of methods and determination of chemical composition of dental tissue with the use of analytical methods were conducted. In the 1940–1960, with the emergence of the option of using radioactive isotopes and more advanced biochemical methods, biochemical composition of organic substances of hard tissues and metabolic processes in the norm and pathology were studied. The studying of ultrastructural dental tissue including enamel became possible with the use in dentistry of electronic microscope, electronic probe, and scanning microscope.

The outstanding scientists were engaged with the problem of caries: I.A. Begelman, I.G. Lukomsky, D.A. Entin, P.F. Belikov, E.E. Platonov, A.E. Sharpenak, A.I. Rybakov, E.V. Borovsky, Yu.M. Maximovskiy, G.M. Barer. N.A. Fedorov significantly contributed to study of dental caries; he created a whole direction in studying metabolic processes in hard dental tissues in the normal condition and pathological processes. His followers N.V. Lisenko, A.A. Prokhonchukov, N.A. Zhizhina, L.A. Dagaeva, E.V. Borovsky, M.S. Bubyakina and oth-

ers received a number of significant data, which dramatically changed a previously existing concept on hard dental tissues, most notably, on the enamel. Those findings were employed as basis for development of the contemporary approach to caries problem.

The scientific and practical developments regarding non-caries lesions of hard tooth tissues were worked out due to studies of V.K. Patrikeev, M.I. Groshikov, Yu.A. Fedorov, Yu.M. Maximovskiy and others.

Periodontal diseases are the equally important problem. The tremendous contribution in its study was made by A.I. Evdokimov. Apart from him, D.A. Entin, E.E. Platonov, L.M. Lindenbaum, I.O. Novik, B.Yu. Kuryandsky, N.F. Danilevsky, V.S. Ivanov, T.I. Lemetskaya and others studied periodontal diseases.

Currently, some former views in etiology and pathogenesis of periodontal diseases were reconsidered that allowed marking effective ways of their prophylaxis.

The studies in endodontology take the important place. Those questions were developed by I.G. Lukomsky, S.M. Gofung, T.G. Shkolyar, Ya.S. Pekker, E.E. Platonov, A.E. Anishenko, A.I. Evdokimov, V.M. Uvarov, M.I. Groshikov, E.V. Borovsky, Yu.M. Maximovskiy and others significantly contributed to the development of this section.

L.R. Rubin created the direction of the use of physical methods in diagnostics and treatment of pulpitis and periodontitis.

The oral mucosal diseases were less attractive for investigators; however there are some achievements in this direction too. I.T. Lukomsky, Ya.S. Pekker, E.E. Platonov, I.O. Novik, G.V. Banchenko, L.N. Maximovskaya and other prominent specialists were concerned with this problem. B.M. Pashkov and A.L. Mashkilleison, who were in charge of faculty of skin and venereal diseases of Moscow Medical Dentistry Institute, made a great contribution to the study of oral mucosal diseases.



Currently, a great work on wide use of measures for prophylaxis of dental diseases is performed that was reflected in the works of G.N. Pahomov, T.F. Vinogradova, P.A. Leus, E.M. Kuzmina and others.

The scientific research is conducted in all departments of 46 Russian faculties. The Central Scientific and Research Institute of Dentistry (CSRID), which was established in 1962, in conjunction with Academic Council for Dentistry affiliated with RAMS coordinates scientific studies.

The history of dentistry is closely related to the activity of dental societies. In 1883, the first Russian society of dentists was established in Petrograd. In 1891, the society of dentists was founded in Moscow. In 1899, the Russian odontological society was established.

After the revolution, with the normalization of political and economic situation of the country, the independent odontological societies begin to work already at the end of 1921. In 1921, the Tatar odontological society was founded, and in 1926 Novosibirsk odontological society.

In the pre-war period, Saratov (1933), Stavropol (1937), Perm (1939), and Omsk (1940) dental societies began their activity.

The new stage in history of activity of scientific dental societies is the creation of All-Union Medical Dental Society, which was established in May 1958, at the scientific conference in Leningrad. The final formation of All-Union and Republic Scientific Medical Dental Societies ended by 1962. All-Union Scientific Medical Dental Society totaled more than 60,000 members.

The activity of dental societies was multifaceted. The great work was performed in improvement of dental care to the population, introduction of new methods of prophylaxis and treatment of the main dental diseases.

The results of dental care in pre-revolutionary Russia brought up the 5th All-Russian Congress of Professional Union of Dental Physicians, which took place in April 1917.

The questions raised by the Congress about the need for a radical dentistry reform through the training of specialists at medical faculties and the organization of public dentistry were resolved only after the revolution.

In November 1923, the 1st All-Union Odontological Conference took place in Moscow. The points pertaining to problems of tooth caries and periodontal diseases were decided in this and further conferences of the first years of Soviet power were held (the 2nd All-Union Conference of Odontologists took place in Moscow in 1924; the 3rd conference went in Leningrad in 1928).

In 1962, the 4th All-Union Dentist Congress took place in Moscow, dedicated to discussion of the condition and perspectives in development of dental care to the population. The problem of dental caries and its complications was widely discussed.

In the 5th All-Union Dentist Congress, taking place in Kyiv in 1968, the main attention was paid to the pediatric dental care.

The program of the 6th All-Union Dentist Congress taking place in Leningrad in 1975 included the points of enhancement of dental care to the population. This congress also discussed the points of contemporary state of the problem of periodontal diseases.

In 1981 in Tashkent, the 7th All-Union Dentist Congress was held, where the points of organization of dental care, problems in prophylaxis and treatment of inflammatory diseases and injuries of maxillofacial area were discussed.

In 1987 in Volgograd, the 8th All-Union Dental Congress was held, where the points of prosthetic dentistry were subjected to comprehensive discussion.

It should be noted that scientific medical dentist societies worked in all union republics. In accordance with peculiarities of local conditions, republican scientific medical societies performed great work in development of new means and methods for diagnostics, treatment and prophylaxis of dental diseases, in intro-

duction of scientific advances, searching for optimal organizational forms for provision of dental care to the population.

Apart from All-Union Scientific Medical Dentist Society, the All-Russian Scientific Medical Dental Society was arranged in 1965, which was headed by the associate of AMS of the USSR, Honored Science Worker prof. A.I. Evdokimov. Afterwards V.F. Rudko, Honored Science Worker prof. E.I. Gavrilov were elected as chairmen. From 1970 to 1993, the chairman of the board was prof. E.V. Borovsky.

Up to the present day, 14 All-Russian Dentist Congresses were held: The 1st one in 1965 in Kalinin, the 2nd one in 1970 in Smolensk, the 3rd one in 1976 in Volgograd, the 4th one 1982 in Ulyanovsk, the 5th one in 1988 in Novosibirsk, the 6th one in 1996 in Moscow and the 14th one in 2015 in Moscow. The last conference paid great attention to organization of dental care to the population in new economic conditions.

In 1992 in Voronezh, the founding congress of Dental Association took place, and in February 1993, Ministry of Justice of the Russian Federation registered Dental Association (All-Russian).

In April 1993, the 1st Conference of Dental Association took place, in which the management bodies were elected. Honored Science Worker of the Russian Federation, professor E.V. Borovsky was elected as first president of Dental Association.

The Dental Association (All-Russian), created on the basis of Scientific Medical Dentist Society and with support of local dental associations, is an independent public organization as a juridical person that provides opportunity of interaction with Ministry of Healthcare of the Russian Federation and other organizations under any contract. In 1997, the Dental Association (All-Russian) was renamed to the Dental Association of the Russian Federation.

Most regions of the Russian Federation have local dental associations.

The main purposes of creation and activity of the Dental Association include assistance in professional and scientific activity of dental specialists, decrease of morbidity and health promotion, development of medical science and adjacent disciplines, protection of social and professional rights and interests of its members.

The association also pays great attention to preparation of dental staff. The 7th All-Russian Scientific and Research Conference conducted by the Russian Dental Association with the MSUMD addressed this point.

In 2002, upon an initiative of the MSUMD, the constitutional convention of the National Association of Educational Dental Institutions was held, and the "Kafedra" (Department) journal began to be published.

Currently, there are fundamental changes both in medicine as a whole and in dentistry, in particular, that are associated with new economic conditions. Many dentistry institutions work in accordance with mandatory health insurance system. The system of voluntary health insurance gets widespread use. The significant position in the system of dental care begins to take an individual sector.

Since 1922, the journal "Dentistry" is published. In the recent years, new journals began to appear: "Novoe v Stomatologii" (New in Dentistry) (Moscow) "Parodontologiya" (Periodontology) (St. Petersburg), "Chelyustno-Litsevaya Khirurgiya" (Maxillofacial Surgery) (Novosibirsk), "Klinicheskaya Stomatologiya" (Clinical Dentistry) (Moscow), "Stomatologiya dlya Vsekh" (Dentistry for All) (Moscow), "Maestro" (Maestro) (Moscow), "Ekonomika i Menedzhment v Stomatologii" (Economy and management in dentistry) (Moscow), "Institut Stomatologii" (Dentistry Institute) (St. Petersburg), "Rossiyskaya Stomatologiya" (Russian Stomatology) (Moscow). The newspapers "Vestnik Stomatologii" (Dental News) (Moscow), "Dantist" (Dentist) (St. Petersburg), "Stomatologiya Moskv" (Moscow Dentistry) and a number of regional newspapers are also published.