



Biochemistry. The importance of basic sciences in dentistry

Bioquímica. La importancia de las áreas básicas en la odontología

Silvia Maldonado-Frías*

Living beings are a complex set of chemical elements joined together. Structures constituting them are in harmonious disposition which enables them to work in a concerted manner to give way to numberless cellular events, which preserve internal communication among molecules which require and bear energy. In the same manner, living beings receive messages from the environment. They then translate them in a coordinate and specific manner, and thus elicit responses which allow the development and reproduction of different forms of life.

Biochemistry is a scientific discipline which explains how carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur, besides being essential to life, are components of structures such as carbohydrates, lipids, proteins and nucleic acids, which are all involved in cell metabolism. Biochemistry also provides valuable knowledge with respect to the complex molecular relationship which allows to sustain life. It also allows the understanding of processes involved in cell aging and death; it confers knowledge on the process of energy transformation in living beings and signaling mechanisms, as well as providing necessary knowledge to be able to understand scientific and technological research.

The fact of being acquainted and understanding each of the events which allow proper functioning, sets the bases to understand the fact that any alteration of these processes result in the different disorders which afflict living things. From the aforementioned we can gather that biochemistry is not isolated and is part of a distinguished group of disciplines which interact to achieve a comprehensive understanding of the wonderful human body.

It must be well understood that biochemistry has been the springboard of numberless Nobel laureates, like Fisher in 1902, who concluded that the action of an enzyme was specific with respect to a substratum. Biochemistry is doubtlessly a discipline which provides significant tools in the development

of medical research, and this fact supports its importance within the Study Plan of the Dental Curriculum.

Bruce J. Baum mentions that biomedical sciences are overwhelmingly relevant and bear impact in the practice of dentistry, he highlights the fact that there would appear to be certain resistance to consider their importance in dental education. He also points out the fact that to appreciate and understand science and to think scientifically is not disparaging to technical knowledge required in the practice of dentistry. On the contrary, the understanding of disease and tissue biology using rigorous logical thought when treating patients and the valuing how biomedical sciences lead to therapeutic advances, are desirable conditions under different circumstances in any clinical discipline, including all facets of dentistry.¹ Scientific advances occur exponentially, they created a variety of available knowledge which help to understand phenomena taking place in the human body. In our days, powerful tools are being developed and they can be applied to the treatment of many diseases. Such is the case of the nano-particles in dental implants. Nevertheless the ability to bring this knowledge into the classroom so as to create an impact in dental teaching is still an uncertain task.

Iacopino points out the lack of personnel with proper training and experience in clinical and basic sciences who could enable proper integration and use of emergent knowledge provided by science.² These deficiencies could be addressed if there were to be acknowledgement of the role of basic areas in the realm of dentistry education.

Other authors point out that vocational training (professional) of health providers contemplates basic skills for promoting health and preventing disease. This

* National School of Dentistry, National University of Mexico (UNAM).

is the aim in Canadian and US schools. A converging point in these study plans would be to include basic areas. They indicate there are basic disciplines which are shared in the academic study plans (curricula) of many health professionals. Therefore, communication bridges must be built among health providers in order to offer quality care.³⁻⁶

Dr. Zoller proposes the de-construction of dental teaching curriculum highlighting the fact that there are some contents which do not concern the dentists. Dr. Zallen responded to this noting that trimming (cutting) study plans of basic disciplines could elicit the formation of a dentist unable to understand the complexities inherent to diseases and surgical processes his patient might exhibit and thus endanger their patients when they arrive seeking dental treatment.^{7,8}

In a session held in the USA on dental education renovation, contributions and knowledge generated there were compiled. Dr Tabek presented an outstanding presentation, wherein he posed the following questions: should dentists be educated at the highest levels, like ophthalmologists or at a technical level, like optometrists? How are dentists educated in the realms of experience and knowledge? Are they going to be able to fully understand the biology of oral health and disease and be then able to deal with most complex situations? He concluded saying that schools must build upon a scientific knowledge basis as well as promote among dental students dedication to scientific research and knowledge. Turnes, meanwhile, mentioned, at the same session the fact that dentistry is properly focused on the need to transform teaching contents and methodology so as to improve critical thought.⁹

De Paola, aptly writes on the importance of a approach change in the focus of dental education. He mentions the fact that students, as well as teachers, must be able to be at the vanguard of technological and scientific advantages bearing on dental practice. He pointed out the fact that development of oral bacteria species microarrays can contribute as diagnostic tools, that the study of inflammation biomarkers can elicit proper treatment, and that development of mother cell biology and regenerative medicine require the revitalization of dental teaching.¹⁰

A good platform with solid knowledge in basic disciplines such as biochemistry is required to continue with scientific and technological advances. This platform would generate strength in those involved in the study of dentistry and would allow them to successfully use this knowledge in their professional endeavors.

Understanding the use and application of basic areas in dental education will increase with an impact on dentistry students, and will as well give evidence on the fact that social, demographic, scientific and technological changes require the application of this knowledge in dental treatment. This implies that the future dentist must possess solid background in these disciplines. Therefore it can be stated that biochemistry has a vital role in dentistry.

REFERENCES

1. Baum BJ. Can biomedical science be made relevant in dental education? A North American perspective. *Eur J Dent Educ* 2003; 7 (2): 49-55.
2. Iacopino AM. The influence of «new science» on dental education: current concepts, trends, and models for the future *J Dent Educ* 2007; 71 (4): 450-62.
3. Brown JP. A new curriculum framework for clinical prevention and population health, with a review of clinical caries prevention teaching in U.S. and Canadian dental schools. *J Dent Educ* 2007; 71 (5): 572-578.
4. Haden NK, Hendricson WD, Kassebaum DK, Ranney RR, Weinstein G, Anderson EL, et al. Curriculum change in dental education, 2003-09. *J Dent Educ* 2010; 74 (5): 539-57.
5. Spielman AI, Fulmer T, Eisenberg ES, Alfano MC. Dentistry, nursing, and medicine: a comparison of core competencies. *J Dent Educ* 2005; 69 (11): 1257-1271.
6. Cohen MM Jr. Major long-term factors influencing dental education in the twenty-first century. *J Dent Educ* 2002; 66 (3): 360-373.
7. Zoller LC. Deconstruction of the curriculum: a modest proposal. *J Dent Educ* 2005; 69 (12): 1305-1306.
8. Zallen RD. How much basic science should be taught? The discussion continues. *J Dent Educ* 2006; 70 (4): 353-354.
9. De Paola's D. The importance of scientific research and teaching critical thinking in academic dental institutions: reactions to "The Revitalization of U.S. Dental Education". *J Dent Educ* 2008 Feb; 72(2 Suppl): 43-5.
10. DePaola DP. The revitalization of U.S. dental education. *J Dent Educ* 2008; 72 (2 Suppl): 28-42.

Mailing address:

Silvia Maldonado-Frías

E-mail: biominer2007@gmail.com