SciMedCentral

JSM Oro Facial Surgeries

Editorial

Challenges in Teaching Genetics for Preclinical Students of Dentistry

Nagle E* and Zarina A

Department of Biology and Microbiology, Riga Stradiņš University, Latvia

***Corresponding author**

Erika Nagle, Department of Biology and Microbiology, Riga Stradiņš University, Dzirciemastreet 16, Riga, LV-1007, Latvia, Tel: 371 67061554; Email: erika.nagle@rsu.lv

Submitted: 18 July 2018

Accepted: 18 July 2018

Published: 24 July 2018

ISSN: 2578-3211

EDITORIAL

To teach genetics in the 21st century firstly and most importantly is to decide what students really need to know not what geneticists value [1]. For "would be dentists" craniofacial genetic pathology is of the greatest importance. Medical genetics with emphasis on genetic pathologies primary expressed in cranium, face, mouth is incorporated in dental curriculum at Riga Stradiņs University in preclinical studies. This fact creates several obstacles due to lack of knowledge in clinical subjects, and in studying genetic pathology good knowledge in basic science subjects is mandatory (see the picture).

As it can be seen in the picture, in preclinical study courses medical genetics is on the top of the pyramid, because this study course accumulates concepts of basic sciences. In clinical study courses, knowledge in medical genetics serves as take-off point for clinical studies, because in aetiology of almost all craniofacial pathologies some genetic elements play a role.

Teaching genetic pathology along with genetic aetiology of the diseases clinical description of the persons with pathology plays crucial role. That is why teaching genetic pathology in preclinical years faces several challenges. Firstly challenges for both students and teachers involves integration of knowledge obtained during basic science subjects into study course Medical genetics and secondly – lack of knowledge in clinical subjects requires collaboration between medical genetics, clinical study courses, and health professionals [2]. Furthermore, knowledge in medical genetics can be useful in solving some clinical questions. For instance, it is well recognized that for individuals with Klinefelter syndrome, taurodontism (large pulp chamber) is characteristic feature in many cases, and endodontic manipulations for these patients could result in severe bleeding. In case of *amelogenesis imperfecta* due to genetic and phenotypic heterogeneity, it is difficult to identify the type of this dental genetic disease. Achievements in molecular diagnosis of genetic diseases can help to overcome this problem, because pathogenic variants of genes are known for many *amelogenesis imperfecta* phenotypes, and genotype phenotype correlation is quite evident. In the field of orthodontics, patients with notable craniofacial features are occasionally identified [3]. For instance, FGFR (fibroblast growth factor receptors) related craniosynostosisis characterized by premature fusion of one or more cranial sutures and is associated with other anomalies, affecting not only cranium but also face, skin, limbs [4]. Consequently, it is apparent that teaching students within independent and isolated study courses contributes to inadequate collaboration among all clinicians in providing effective patient care [5]. How to bring nearer medical genetics to clinics? There are several possibilities, and by the example of Crouzon syndrome described hereafter it could be illustrated. Occurrence of Crouzon syndrome is caused by pathogenic variants of FGFR 2 gene [6]. Dozens of the pathogenic variants in the gene have been described. Link between genomic variants and corresponding phenotypes is demonstrated in study course DNA in vitro. By this study course, translational genetics application in the field of craniofacial disorders is evident [7,8]. Overall information about genetic aetiology of the syndrome is given in medical genetics. Phenotypic features such as abnormal skull shape due to premature fusion of the cranial sutures, large brain, Chiari malformation, exophthalmos, asymmetry between maxilla and mandibula are taught in anatomy and clinical anatomy. Abnormal aspects of bone tissue observed in Crouzon syndrome could be analysed by the help of competences acquired in histology study course. Knowledge about craniofacial abnormalities in persons with Crouzon syndrome is needed also in study subjects such as oral morphology, oral pathology, maxillofacial surgery, and therapeutic dentistry. Although surgical treatment remains critical in the clinical care of Crouzon syndrome there is potential for pharmacological manipulation using FGF signalling pathway as a target. It becomes evident that comprehensive proficiency in molecular biology and biochemistry is necessary [9]. All these basic sciences and clinical branches can be consolidated by clinical cases that should be a part of the study course. Case studies are an important tool to teach genetic pathology for preclinical Dental students. Clinical cases published must be adapted for the competences of preclinical students. Successful use of clinical cases includes also demonstration of a respectful attitude toward the patient and patient's family on the part of the geneticist or clinician [10]. Integration the basic and clinical study courses ensure a clear understanding of how pathology develops. The other approach to bring theory toward clinics is genetic problem solving which give students opportunity to practice in e.g. recurrence risk calculation in families with a history of genetic pathology [11].

Despite several hardships, Medical genetics should be as a

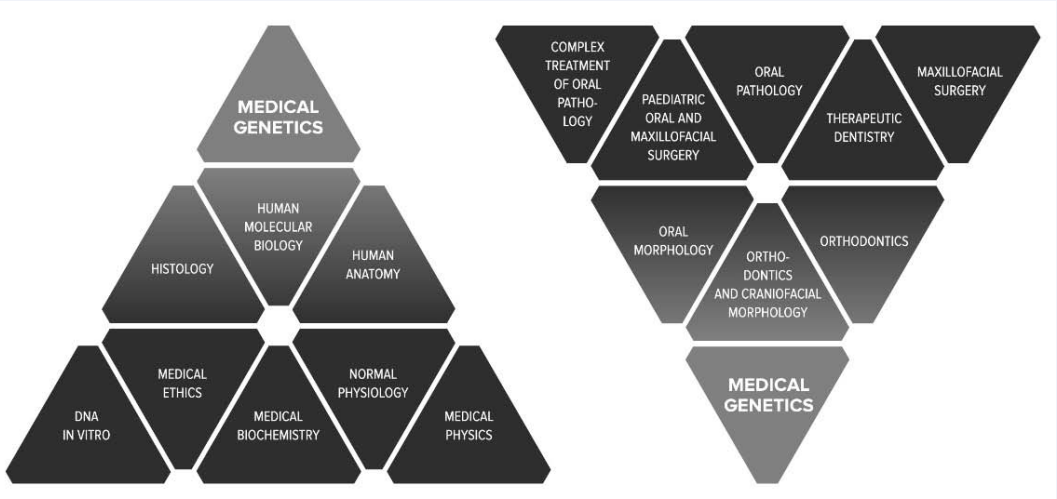

Figure 1 The place of Medical genetics in preclinical studies (on the left hand) and in clinical studies (on the right hand).

core study course in the curriculum of Dentistry. The road from basic studies to clinic can lead to novel treatment, and preventive strategies in patients with craniofacial genetic pathology. The border that separate various study courses in the dentistry curriculum should become less clear.

ACKNOWLEDGEMENTS

The authors wish to thank students of Riga Stradiņš University for their involvement in the study subject that fostered the development of the article and teaching stuff of the Faculty of Dentistry.

REFERENCES

1. Redfield RJ. Why Do We Have to Learn This Stuff? A New Genetics for 21st Century Students. PLoS Biol. 2012; 10: 1001356.
2. Alfano MC. Connecting Dental Education to Other Health Professions. J Dental Edu. 2012; 76: 46-50.
3. Hartsfield JK. The Benefits of Obtaining the Opinion of a Clinical Geneticist Regarding Orthodontic Patients. Integrated Clinical Orthodontics. 2012 (uploaded by J.K. Hartsfield in 2018); 7: 109-131.
4. Hall BK. Summarizing craniofacial genetics and developmental biology (SCGDB). Am J Med Genet Part A. 2014; 164A: 884-891.
5. Debra S. Regier DS, Hart TC. The Future Is Now with Inter professional Collaboration. Dent Clin N Am. 2016; 60: 943-949.
6. Bugeaci C, Burlui V, Baranov N, Vizitiu A. Stomatology in the era of genomics. International Journal of Medical Dentistry. 2016; 6: 135-140.
7. D'Souza RN, Dunnvald M, S. Frazier-Bowers, Polverini PJ, Wright JT, de Rouen T,Vieira AR. J Dent Res. 2013; 92:1058-1064.
8. Schully SD, Khoury MJ. What is translational genomics? An expanded research agenda for improving individual and population health. Appl Transl Genom. 2014; 3: 82-83.
9. Kosty J, Vogel TW. Insights into the development of molecular therapies for craniosynostosis. Neurosurg Focus. 2015; 38; 1-7.
10. Nagle E, Kažoka Dz. Ethical chalenges in teaching Genetics for Medical Students. Journal of Microbiol Biol Educ. 2014; 15:181-185.
11. Smith MK, Wood WB. Teaching Genetics: Past, Present, and Future. Genetics. 2016; 204: 5-10.

Cite this article

Nagle E, Zarina A (2018) Challenges in Teaching Genetics for Preclinical Students of Dentistry. JSM Oro Facial Surg 3(1): 1011.