Preface

It is generally recognized that the knowledge and research base that underpins dentistry lies in the biological and physical sciences. In this context, the major advances in these sciences over the past two decades have come through the application of molecular biology and nanotechnology. These advances are currently impacting on the diagnosis and treatment of a wide range of human diseases and it is essential that dental research, education, and practice keep pace with this rapidly advancing field. As pointed out by Ford et al. (1):

The definition of disease is also changing. Previously, disease was understood to be the presence of symptoms or of a particular phenotype. With increasing knowledge of the genetic basis of many diseases, this definition is changing to become the presence of a genotype conferring a pre-disposition to clinical symptoms or phenotype (Ford et al. (1)).

This changing definition of disease means that today’s undergraduate or graduate student in dentistry (and its related fields) must be in a position not only to acquire new knowledge in the future but also to be able to evaluate the information and apply it in a clinically relevant setting. This naturally positions oral biology as an integral part of any dentally related professional’s repertoire of knowledge.

There are as many topics in oral biology as there are the number of sites and microenvironments within the oral cavity. Therefore, it is impossible to cover all aspects in a single volume. Nevertheless, we believe we have compiled a selection of molecular methods and techniques, albeit optimized for particular applications, which can be adapted to a particular organism or area of interest. For ease of presentation, we have divided the volume into three parts. Section I describes techniques applicable to the study of saliva, the fluid that is exquisitely unique to the oral cavity. Saliva is not only one of the first lines of defense against microbial invaders but also a rich source of biomolecules for study at the molecular level, which may lead to the identification of susceptibility to particular diseases. Among the techniques presented are those pertaining to the preparation of salivary samples for proteomic and genetic purposes. Section II is devoted to the study of the microbial inhabitants that share the oral cavity with us, and the methods provided will allow the study of the oral microbiota as a whole (microbial diversity and biofilms) or only of select members (microbial physiology or natural genetic transformation). Furthermore, techniques to identify putative immunogenic proteins from microbial pathogens as well as ways of producing such proteins in heterologous hosts allow the reader to examine the influence of single biomolecules on the host response. Lastly, Section III provides a range of protocols that facilitate assessment of the molecular behavior of oral cells and tissues in health and during disease progression. The present age that we live in is full of nanotechnological advances, and sophisticated instruments capable of high-throughput sample processing, especially for DNA sequencing and microarray applications, are available and increasing in popularity. Hence, some of the techniques presented in this volume potentially generate an enormous quantity of data. As we feel that it is just as important to be able to analyze and interpret these data as it is in obtaining them in the first place, certain chapters include sections on bioinformatic analyses.
This volume will be a useful resource not only to the new researcher but also to the seasoned laboratory veteran including cell biologists, microbiologists, and any researcher intent on delving into the exciting world of oral biology.

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Reference

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