# Preface

Nearly 20 years ago the concept of molecular diagnostics moved into the focus of academic and industrial research. This shift was mainly driven by new techniques like DNA Microarrays which often result in miniaturization of assays and the automatization of processes. Since, then the field of molecular diagnostics has been expanded and clinical diagnostic laboratories function as a playing field for this expansion. Vast and dynamic changes in the test menus, instrumentation and clinical applications have been some of the impacts molecular diagnostics has had. Nevertheless, so far only a few promising techniques have become standard routine.

Human beings differ in their level of health. Even individuals with the same disease can have specific differences in their clinical picture. Therefore it is important to adjust therapy and medicaments individually. Today this approach is known as "personalized medicine". Molecular Diagnostics covers current molecular biological techniques used not only to identify the underlying molecular defects in inherited disease, but also to monitor therapies. Multiple studies in modern science have shown that changes on a molecular level are often directly linked to the origin of diseases. Consequently, new targets have been recognized and often used as potential biomarkers for intervention. These targets are able to act on different levels, like proteomics, genomics, or metabolomics.

The aim is to develop disease-specific biomarkers, which can be applied *in vivo* in the patient or *in vitro* by analyzing human samples like blood, tissues, or urine. Ideally, these markers allow not only a distinction between healthy and diseased people, but also, e.g., the classification of different types of cancer. Moreover, multiplexing multiparameter analyses often have a higher sensitivity, wide dynamic range, and need shorter incubation time. So the quite new field of "Molecular Diagnostics" is able to open new ways for detecting diseases, even at an early stage. This prevents severe harm for a patient, reduces costs and the effort of medical examinations, gives access to new methods in modern medicine, and is well-suited for point-of-care diagnostics.

Newly developed assays, devices for *in vitro* diagnostics and the corresponding imaging technologies should not only be available in specialized institutes or laboratories. Even common hospitals and surgeries, as well as general medicine, should gain access to these techniques.

The development of molecular diagnostic tools is an interdisciplinary task of clinicians, experimental and theoretical groups in universities, research institutes and industrial facilities. This multidisciplinarity gives the opportunity to use knowledge and resources of diverse institutes and researchers in an ideal way. Contributors of the chapters are well-known experts in their field, and come from a variety of disciplines, to ensure breadth and depth of coverage.

Therefore this volume contains contributions from scientists working in different fields and institutes.

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We also want to acknowledge the authors for distributing their chapters and spending their time preparing interesting articles.

Finally, we want to thank all colleagues who made this volume possible.

In conclusion, we hope that in this volume you will find inspiring literature and useful information about molecular diagnostics.

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