Over the past decades cardiac biomarkers have become a cornerstone in the diagnosis of acute myocardial infarction (AMI) and cardiac injury of other causes, and more recently of heart failure as well. We are beginning an era when it may be possible for biomarkers to direct treatment to optimize patient care, which must be the final goal with all routinely used cardiac biomarkers. A currently very popular research topic is circulating plasma micro ribonucleic acid (miRNA) testing. This book excellently compiles the current knowledge on miRNA testing in patients with AMI and other cardiac diseases. miRNA have been first described in the early 1990s, they are small (typically less than 25 nucleotides), single-stranded, endogenous, non-coding RNAs that post-transcriptionally regulate gene expression by destabilizing messenger RNA (mRNA) or translation repression, thereby preventing proteins synthesis. More than 1,000 miRNAs have been identified in the human genome so far. Eventually miRNAs are also secreted from cells into blood, but the biological function of circulating miRNAs still remains to be established. Nonetheless, circulating miRNAs are interesting and attractive candidates for routine laboratory applications, and panels of miRNAs could provide clinical useful information for AMI diagnosis, risk stratification and treatment monitoring. Thus, miRNAs have already been evaluated as diagnostic and prognostic biomarkers in a variety of human diseases, in particular cancer or cardiovascular disorders, which yielded numerous associations between miRNAs and different types of diseases. Although examples exist where deregulated expression of a single miRNA is indicative for a disorder, the simultaneous analysis of the expression of multiple miRNA usually provides more accurate information. But the interpretation of large panel test results may be challenging requiring expert knowledge in bioinformatics, which clearly is a limitation for routine use.

The next steps for making the way of miRNA testing from research to routine use in cardiovascular diseases will be to replicate and confirm promising available clinical data of the discovery phase in large-scaled, ideally multi-centre clinical trials using a small panel of candidate miRNAs with appropriate pre-analytics and analytics in a clinically relevant patient and control population as validation. Analytical issues still need to be overcome before routine use and explain the poor replicability of circulating miRNA studies. Currently miRNA testing is still tricky, time consuming and purification steps, methods, and normalization remain to be harmonized or standardized and analytical steps automatized. These analytical issues make it very difficult to compare the sample and method dependent published clinical study results. Quantitative reverse transcription PCR (qRT-PCR) still is the most widely used method, which precludes heparin or citrate as an anticoagulants of blood samples as both can inhibit PCR amplification. In addition, although circulating miRNAs are remarkably stable molecules, e.g.hemolysis during blood sampling has to be avoided and whole blood must be processed immediately for platelet free plasma to avoid in-vitro miRNA release from blood cells. Alternatively specific collection tubes in which cells of whole blood samples are directly lysed and miRNA expression is thereby stopped are available. However, a high biological variation between individuals appears to be an issue as well.

Finally, circulating miRNAs have emerged as novel biomarkers in cardiovascular diseases. But, as with other heavily investigated novel biomarkers, the coming years will show whether miRNA testing will make the way from research to routine use. This book is an excellent companion for all interested in the field of miRNA testing in cardiovascular diseases.

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