

DNA and RNA Profiling in Human Blood

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METHODS IN MOLECULAR BIOLOGY™

DNA and RNA Profiling in Human Blood

Methods and Protocols

Edited by

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 **Humana Press**

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Preface

Blood samples are widely used as biological specimens for diagnostic or research purposes. There are many examples of important disease markers which can be investigated using peripheral blood. In the context of blood transfusion and immunohematology, blood itself is the target of investigation with regard to the determination of blood groups and the screening for antibodies. Furthermore, blood samples represent the main source of genetic material, i.e., DNA and RNA, for analyzing gene mutations, polymorphisms, and expression at the molecular level.

The development of novel bioanalytical technologies for complex and quantitative molecular analysis of DNA, RNA, proteins, and cell functions led to the introduction of ‘-omics’ terms such as genomics, transcriptomics or proteomics. These molecular profiling approaches have opened up a broad field of research and may help to identify further disease markers in blood. Recently developed techniques, such as microarrays or bead arrays, represent the basis of high-throughput multiplex DNA typing and RNA profiling. Such methods have been applied already to blood cells or plasma and many of them were adapted to the special characteristics of blood cells. Thus, protocols have been developed to achieve diagnostic systems in the fields of genotyping for blood cell antigens including Human Leukocyte Antigens (HLA) and blood groups. The diagnostic systems are of great importance in blood transfusion and organ transplantation. Furthermore, special protocols were adapted to particularities of certain blood cell types such as platelets or reticulocytes in order to address questions in the field of gene expression analysis.

The aim of DNA AND RNA PROFILING IN HUMAN BLOOD is to bring together established, standardized, and recently developed protocols for complex and/or high-throughput DNA and RNA profiling. This book consists of two sections, Part I: *DNA Profiling for Blood Cell Antigens*, and Part II: *RNA Profiling in Blood Cells*. In Part I, a number of methods and protocols describe high-throughput multiplex approaches for genotyping of various blood cell antigens (*see Chapters 1–5, 8, and 9*). Blood grouping by DNA typing also includes a step-by-step protocol for prenatal RhD determination using of maternal plasma (*see Chapter 11*). Other DNA protocols describe modern techniques for SNP typing other than blood cell antigen SNPs (*see Chapters 6, 7, 10 and 12*) that may serve as examples to establish protocols for the own purposes.

Part II is focused on RNA profiling methods and protocols that have been adapted to the special characteristics of certain blood cell types such as platelets (*see Chapters 16–18*), reticulocytes (*see Chapter 20*) or megakaryocytes (*see Chapter 19*). Furthermore, methods and protocols are included to describe recently developed techniques which have been applied to blood samples (*see Chapters 13, 14, 21, and 22*) or which may be applied to RNA samples of any type of biological source (*see Chapters 12 and 15*).

This book summarizes contributions from leading international experts in the fields of DNA and RNA profiling. As editor of this volume, I am very grateful indeed to themfor

their willingness to provide an insight into their knowledge and to provide the detailed step-by-step protocols. I also wish to thank Steffanie Bickelhaupt and Daniela Griffiths for considerable editorial and secretarial assistance.

Peter Bugert

Contents

Preface	<i>v</i>
Contributors	<i>ix</i>
 PART I DNA PROFILING FOR BLOOD CELL ANTIGENS	
1 PCR–ELISA for High-Throughput Blood Group Genotyping <i>Maryse St-Louis</i>	<i>3</i>
2 Single Base Extension in Multiplex Blood Group Genotyping <i>Gregory A. Denomme</i>	<i>15</i>
3 Real-Time PCR Assays for High-Throughput Blood Group Genotyping <i>Fernando Araujo</i>	<i>25</i>
4 Real-Time PCR Assays for High-Throughput Human Platelet Antigen Typing <i>Simon E. McBride</i>	<i>39</i>
5 Multiplex ABO Genotyping by Minisequencing <i>Gianmarco Ferri and Susi Pelotti</i>	<i>51</i>
6 Multiplex Genotyping for Thrombophilia-Associated SNPs by Universal Bead Arrays <i>Susan Bortolin</i>	<i>59</i>
7 Pyrosequencing of Toll-Like Receptor Polymorphisms of Functional Relevance <i>Parviz Ahmad-Nejad</i>	<i>73</i>
8 Multiplex <i>HLA</i> -Typing by Pyrosequencing <i>Ying Lu, Julian Boehm, Lynn Nichol, Massimo Trucco, and Steven Ringquist</i>	<i>89</i>
9 High-Throughput Multiplex <i>HLA</i> -Typing by Ligase Detection Reaction (LDR) and Universal Array (UA) Approach <i>Clarissa Consolandi</i>	<i>115</i>
10 Medium- to High-Throughput SNP Genotyping Using VeraCode Microbeads <i>Charles H. Lin, Joanne M. Yeakley, Timothy K. McDaniel, and Richard Shen</i>	<i>129</i>
11 The Use of Maternal Plasma for Prenatal RhD Blood Group Genotyping <i>Kirstin Finning, Pete Martin, and Geoff Daniels</i>	<i>143</i>
 PART II RNA PROFILING IN BLOOD CELLS	
12 Nanoliter High-Throughput PCR for DNA and RNA Profiling <i>Colin J. H. Brennan, Douglas Roberts, and James Hurley</i>	<i>161</i>

13	RNA Stabilization of Peripheral Blood and Profiling by Bead Chip Analysis <i>Svenja Debey-Pascher, Daniela Eggle, and Joachim L. Schultze</i>	175
14	RNA Profiling in Peripheral Blood Cells by Fluorescent Differential Display PCR <i>Martin Steinau and Mangalathu S. Rajeevan</i>	211
15	cDNA Amplification by SMART-PCR and Suppression Subtractive Hybridization (SSH)-PCR <i>Andrew Hillmann, Eimear Dunne, and Dermot Kenny</i>	223
16	Transcript Profiling of Human Platelets Using Microarray and Serial Analysis of Gene Expression (SAGE) <i>Dmitri V. Gnatenko, John J. Dunn, John Schwedes, and Wadie F. Bahou</i>	245
17	Genome-Wide Platelet RNA Profiling in Clinical Samples <i>Angelika Schedel and Nina Rolf</i>	273
18	PCR-Based Amplification of Platelet mRNA Sequences Obtained From Small-Scale Platelet Samples <i>Jutta M. Rox, Jens Müller, and Bernd Pötzsch</i>	285
19	MicroRNA Profiling of Megakaryocytes <i>Ramiro Garzon</i>	293
20	Serial Analysis of Gene Expression Adapted for Downsized Extracts (SAGE/SADE) Analysis in Reticulocytes <i>Béatrice Bonafoux and Thérèse Commes</i>	299
21	Real-Time PCR Analysis for Blood Cell Lineage Specific Markers <i>Louise Edvardsson and Tor Olofsson</i>	313
22	Monitoring the Immune Response Using Real-Time PCR <i>Patrick Stordeur</i>	323
	Index.....	339

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