Gene expression analysis of human red blood cells

Sveta Kabanova1 *, Petra Kleinbongard1 *, Jens Volkmer1, Birgit Andrée2, Malte Kelm1, Thomas W. Jax1,3,4
1. Department of Medicine, Division of Cardiology and Angiology, Universitätsklinikum Düsseldorf, Heinrich-Heine-University, 40225 Düsseldorf, Germany 2. Biologisch-Medizinisches Forschungszentrum, Heinrich-Heine-University, 40225 Düsseldorf, Germany 3. Profil Institut für Stoffwechselforschung, Helfersbergstrasse 9, 41461 Neuss, Germany 4. Klinik für Kardiologie, Herzcentrum Wuppertal, Universit?t Witten/Herdecke, Wuppertal, Germany

Abstract:

Understanding of molecular mechanisms governing the enucleating phenomena of human erythrocytes is of major importance in both fundamental and applied studies. Total RNA (n=7) from human RBCs (purity of erythrocyte preparation >99.99%) was tested using 2100 Bioanalyzer (Agilent, USA), and transcribed to cDNA. Microarray analysis was performed with the Human Genome Focus GeneChip (Affymetrix, USA), containing 8500 transcripts corresponding to 8400 human genes. Here we report that human RBCs contain typical eukaryotic RNA with 28S- and 18S-rRNA standard bands. Microarray studies revealed the presence of transcripts of 1019 different genes in erythrocytic RNA. Gene Ontology analysis recognized 859 genes involved in general biological processes: 529 genes for cellular metabolism, 228 genes for signal transduction, 104 genes for development, 107 genes for immune response, 62 genes for protein localization, 53 genes for programmed cell death, and 5 genes for autophagy. A number of genes responsible for transcription, translation, RNA-stabilisation as well as for apoptosis and anti-apoptosis have been identified for the first time in circulating human RBCs. The presented data shed new light on the genetic determination of erythropoiesis, apoptosis and may have implications on the pathophysiology and diagnosis of various diseases involving red blood cells.

Key Word:
red blood cell, gene expression analysis

Volume 6, Number 4, - 2009, ISSN 1449-1907