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Vascular alterations regulated by impaired level of microRNAs after coronary stenting

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MiRNAs play a prominent role in the regulation of vasculature in coronary artery disease via controlling critical signaling pathways. Previous studies described that miR-223 suppressed ICAM-1 in endothelial cells (EC), while vascular inflammation via NF-κB was regulated by miR-181b. Non-coding small RNAs promoted vascular inflammation and remodeling after stent injury, as in-stent restenosis (ISR) was prevented by genetic ablation of miR-21 attenuating neointimal formation after stenting in pigs. Few data are available, which miRNAs are involved in EC activation after stent implantation. Our group recently published higher levels of soluble E-selectin and VCAM-1 after bare-metal (BMS) versus drug-eluting stenting (DES) in stable angina patients. One fifth of BMS subjects displayed ISR, while no DES individuals had complication. We compared plasma miRNAs in patients with or without ISR, and miRNA alterations were analyzed in cultured human coronary artery and umbilical vein endothelial cells challenged with recombinant TNF-α in the presence or absence of externally added everolimus. We found that there were 36 significantly decreased and 21 upregulated circulating miRNAs in BMS with ISR vs. those BMS without complication and all DES patients. Among *in vitro* conditions, TNF-α enhanced miR-146a, miR-155 and miR-185 expression in both EC cultures indicating cellular inflammatory response and dysfunction. Decreased miR-424, miR-223 and miR-181b were found with elevated E-selectin, ICAM-1 and VCAM-1 mRNA levels. In contrast, everolimus raised these miRNAs causing significantly depressed mRNAs and protein concentration of these adhesion proteins. In conclusion, everolimus suppressed EC activation in case of DES via modulating circulating and cellular miRNAs.

Biography

Béla Nagy Jr completed his MD at University of Debrecen in 2004 and PhD from the same university in 2010. He worked as a Postdoctoral fellow at Temple University School of Medicine in Philadelphia, USA for two years. Currently, he is working as an Assistant Professor in Department of Laboratory Medicine, University of Debrecen. He has published more than 30 peer-reviewed international papers, especially in platelet physiology in metabolic and cardiovascular diseases. He is the advisor of two full-time PhD students focusing on the analysis of platelet and plasma microRNAs in diabetes mellitus and septic conditions.

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