# Developing Diagnostic Tools for Vascular Disease Using RNA Markers

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Cardiovascular diseases are the leading cause of death in the world. Atherosclerosis, the buildup of plaque on artery walls, is the precursor to many cardiovascular diseases. Unfortunately, this disease is difficult to diagnose in its early stages and its symptoms usually only show when there is serious damage. Current methods to diagnose atherosclerosis are mainly used in later stages of the disease, when the patient is already at risk. Therefore, the purpose of this study was to develop a diagnostic tool that could detect atherosclerosis in its early stages, using RNA biomarkers. Seven genes known to be involved in atherosclerosis (F11R, ICAM1, ITGA6, NFKB1, CLEC4E, CXCR2, and TNFAIP6) were identified based on their functions. Expression of these genes, along with one housekeeping gene, were quantified in normal human leukocyte RNA and three RNA samples from subjects with atherosclerosis. QRTPCR, used with SYBR Green, detected the expressions of the housekeeping gene and the seven target genes. Their relative expression levels, calculated using CT values, showed that transcripts of F11R and NFKB1 were significantly greater in all three RNA of diseased subjects compared to the healthy subject RNA, while ICAM1, ITGA6, and TNFAIP6 transcripts were significantly lower. CLEC4E and CXCR2 were expressed variably in the RNA samples. The differential expressions of five of the target genes are promising biomarkers that could become part of a comprehensive blood test to diagnose cardiovascular disease. Such a test, using the method developed in this project, would be simple, noninvasive, relatively low-cost, and rapid.

**Awards Won:**