Title: Circulating miRNAs as early biomarkers for essential hypertension and vascular dysfunction

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Abstract

Circulating microRNAs (miRNAs) are abundant in the bloodstream and hold great potential as diagnostic biomarkers, offering insights into disease mechanisms. With over 2,300 miRNA species, they have shown potential in diagnosing diseases such as essential hypertension and atherosclerosis. However, most research focuses on individuals with fully manifested symptoms. My doctoral research aims to identify miRNA changes that occur before the clinical onset of essential hypertension and atherosclerosis, with the goal of uncovering early biomarker candidates and gaining mechanistic insights.

Using longitudinal data from the Young Finns Study, we have previously analysed whole blood miRNA expression profiles from 838 individuals to evaluate their prospective associations with essential hypertension. Three miRNAs – miR-19a, miR-19b, and miR-329 – were identified as predictive of essential hypertension development within 7 to 9 years offering prognostic value beyond traditional risk factors. These miRNAs, previously linked to vascular dysfunction, might be involved in early vascular changes that may precede the clinical onset of essential hypertension.

Building on these findings, we will further explore the role of circulating miRNAs in vascular dysfunction, particularly their potential to reflect vascular health over time and predict atherosclerosis development. Using serum miRNA data from Young Finns Study, collected at four time point over 35 years (n~145), we will assess how miRNA profiles correlate with key vascular health indicators, such as flow-mediated dilation, carotid intima-media thickness, and pulse pressure, employing mixed-effects modelling for the analysis.