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Global expression profile of microRNA and mRNA in primary peripheral blood mononuclear cells infected with human immunodeficiency virus (HIV-1)

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Host cells respond to exogenous infectious agents such as viruses, including HIV-1. Several studies have shown that HIV-1 infection differentially regulates host cellular genes and pathways, suggesting that differential gene expression in infected individuals either accelerates disease progression or enhances resistance to the development of disease. Recent studies have shown that miRNA have a unique expression profile in cells of the innate and adaptive immune systems, CNS, and cancers, suggesting that pathogens including viruses could potentially modulate host cellular transcription at multiple levels by targeting various factors including miRNAs. In an effort to understand host cellular gene regulation during HIV-1 infection, we performed a comparative global miRNA and mRNA microarray profiling in PBMCs derived from multiple donors upon infection with HIV-1. Results showed that HIV-1 infection led to altered regulation of 21 miRNAs and 444 mRNA more than 2-fold, with a statistical significance of $p < 0.05$. Furthermore, the differentially regulated miRNA and mRNA were shown to be associated with host cellular pathways involved in cell cycle/proliferation, apoptosis, T-cell signaling, and immune activation. We also observed a number of inverse correlations of miRNA and mRNA expression in infected PBMCs, further confirming the interrelationship between miRNA and mRNA regulation during HIV-1 infection. Similar results were observed in PBMCs derived from HIV-1 positive subjects with and without high viral load. These results for the first time provide evidence that the miRNA profile could be an early indicator of host cellular dysfunction induced by HIV-1.

Biography

Dr. Ayyavoo received her PhD from Madurai Kamaraj University and continued her postdoctoral research in Molecular Virology at University of Pennsylvania, Philadelphia. She is an associate professor and the director of the IDM graduate program at the University of Pittsburgh. Dr. Ayyavoo has published more than 50 papers in reputable journals and serves on NIH and Canadian study sections and journal editorial boards.