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MicroRNA-211 regulates oxidative phosphorylation and energy metabolism in human vitiligo

Vitiligo is a common, chronic skin disorder characterized by loss of epidermal melanocytes and progressive depigmentation. Vitiligo has complex immune, genetic, environmental and biochemical etiology, but the exact molecular mechanisms of vitiligo development and progression, particularly those related to metabolic control, are poorly understood. Here we characterized the human vitiligo cell line PIG3V and the normal human melanocytes, HEM-l by RNA-sequencing (RNA-seq), targeted metabolomics and shotgun lipidomics. Melanocyte-enriched miR-211, a known metabolic switch in non-pigmented melanoma cells, was severely down-regulated in vitiligo cell line PIG3V and skin biopsies from vitiligo patients, while it is predicted targets transcriptional co-activator PGC1-α (PPARGC1A), ribonucleotide reductase regulatory subunit M2 (RRM2) and serine-threonine protein kinase TAO1 (TAOK1) were reciprocally up-regulated. miR-211 binds to PGC1-α 3'UTR locus and represses it. Although mitochondrial numbers were constant, mitochondrial complexes I, II, and IV and respiratory responses were defective in vitiligo cells. Nanoparticle-coated miR-211 partially augmented the oxygen consumption rate in PIG3V cells. The lower oxygen consumption rate, changes in lipid and metabolite profiles and increased reactive oxygen species production observed in vitiligo cells appear to be partly due to abnormal regulation of miR-211 and its target genes. These genes represent potential biomarkers and therapeutic targets in human vitiligo.

Biography

Ranjan J Perera is an Associate Professor and Scientific Director, Analytical Genomics Core for Sanford Burnham Prebys Medical Discovery Institute at Lake Nona. His research focuses on the molecular mechanisms by which non-coding RNA might affect melanoma and prostate cancer development in humans. He has received his PhD in Molecular Genetics from Moscow State University Russia and University of Gent, Belgium. He has completed his Postdoctoral studies in gene targeting and DNA recombination at Massachusetts Institute of Technology (MIT).

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