Through The Looking Glass: Uncovering the Molecular Mechanisms of Phytochemical Treatment for the Prevention of Age-Related Macular Degeneration

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Title: Through the Looking Glass: Uncovering the Molecular Mechanisms of Phytochemical Treatment for the Prevention Age-Related Macular Degeneration Name: Rishab Samant School: Vestavia Hills High School, Vestavia Hills, AL, USA Purpose: Age-Related Macular Degeneration (AMD), the primary cause for blindness in people over 65, has no cure. Stopping angiogenesis prevents AMD. Ethnodyne Visio™ (a mixture of phytochemicals: Withaferin A, Gallic Acid, and Bacopaside I) is emerging as a promising preventive for AMD. However, its mechanism of action is unknown. Hypothesis: Studying the gene network regulated by constituents of Ethnodyne Visio™ will reveal its mechanism of action. Procedure: Data sets from a systems-level analysis of AMD (GEO2R-GSE85871) was compared with data sets for constituents of Ethnodyne Visio™ to obtain significant ($p< 0.05$) changes in gene expression and to reveal common impacts of each phytochemical in Ethnodyne Visio™. G: Profiler and STRING were used to reveal the interaction network and molecular functions. A list of transcriptomic (mRNA) variations caused by constituents of Ethnodyne Visio™ was cross-compared with a systems-level analysis of AMD. Altered signaling changes in AP-1 and SMAD transcription factors and epigenetic regulatory miRNAs and histone acetyl-transferase were discovered. Conclusion: The phytochemical components of Ethnodyne Visio™ may affect the epigenetic miRNA and SWI/SNF complexes, as well as transcriptomic gene regulatory mechanisms.
References: https://string-db.org/cgi/network?taskId=bULCvurJZ0r0&sessionId=bFF8Nkf1k6AD – https://biit.cs.ut.ee/gprofiler/gost https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3746283/ https://pubmed.ncbi.nlm.nih.gov/12037009/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4899165/

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