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Individualized Genomic Stress Induction Signature Impacts Reverses Stress on the Genomic Level (2005)

Abstract: Recreational music-making modulates the human stress response: a preliminary individualized gene expression strategy Barry Bittman, Lee Berk, Mark Shannon, Muhammad Sharaf, Jim Westengard, Karl Guegler, David Ruff
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Background: A central component of the complex human biological stress response is the modulation of the neuro-endocrine-immune system with its intricate feedback loops that support homeostatic regulation. Well-documented marked gene expression variability among human and animal subjects coupled with sample collection timing and delayed effects, as well as a host of molecular detection challenges renders the quest for deciphering the human biological stress response challenging from many perspectives.

Material/Methods: A novel Recreational Music-Making (RMM) program was used in combination with a new strategy for peripheral blood gene expression analysis to assess individualized genomic stress induction signatures. The expression of 45 immune response-related genes was determined using a multiplex preamplification step prior to conventional quantitative Real Time Polymerase Chain Reaction (qRT-PCR) mRNA analysis to characterize the multidimensional biological impact of a 2-phase controlled stress induction/amelioration experimental protocol in 32 randomly assigned individuals.

Results: In subjects performing the RMM activity following a 1-hour stress induction protocol, 19 out of 45 markers demonstrated reversal with significant (P=0.05) Pearson correlations in contrast to 6 out of 45 markers in the resting control group and 0 out of 45 in the ongoing stressor group.

Conclusions: The resultant amelioration of stress-induced genomic expression supports the underlying premise that RMM warrants additional consideration as a rational choice within our armamentarium of stress reduction strategies. Modulation of individualized genomic stress induction signatures in peripheral blood presents a new opportunity for elucidating the dynamics of the human stress response.