

Music and Cognition

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Listening as well as performing classical music modulates genes that are responsible for brain functions

Research on Music Listening : *Although listening to music is common in all societies, the biological determinants of listening to music are largely unknown. According to a new study, listening to classical music enhanced the activity of genes involved in dopamine secretion and transport, synaptic neurotransmission, learning and memory, and down-regulated the genes mediating neurodegeneration. Several of the up-regulated genes were known to be responsible for song learning and singing in songbirds, suggesting a common evolutionary background of sound perception across species. A Finnish study group has investigated how listening to classical music affected the gene expression profiles of both musically experienced and inexperienced participants. (All the participants listened to W.A. Mozart's violin concerto No 3, G-major, K.216 that lasts 20 minutes.) Listening to music represents a complex cognitive function of the human brain, which is known to induce several neuronal and physiological changes. However, the molecular background underlying the effects of listening to music is largely unknown. A Finnish study group has investigated how listening to classical music affected the gene expression profiles of both musically experienced and inexperienced participants. Listening to music enhanced the activity of genes involved in dopamine secretion and transport, synaptic function, learning and memory. One of the most up-regulated genes, synuclein-alpha (SNCA) is a known risk gene for Parkinson's disease that is located in the strongest linkage region of musical aptitude. SNCA is also known to contribute to song learning in songbirds. Although music perception and practice are well preserved in human evolution, the biological determinants of music practice are largely unknown.*

I. Research on Music Performance :

Although music perception and practice are well preserved in human evolution, the biological determinants of music practice are largely unknown. According to a latest study, music performance by professional musicians enhanced the activity of genes involved in dopaminergic neurotransmission, motor behavior, learning and memory. According to a latest study, music performance by professional musicians enhanced the activity of genes involved in dopaminergic neurotransmission, motor behavior, learning and memory. Playing music enhanced the activity of genes involved in dopaminergic neurotransmission, motor function, learning and memory. Some of the up-regulated genes like SNCA, FOS and DUSP1 are known to contribute to song perception and production in songbirds suggesting a potential evolutionary conservation in molecular mechanisms related to sound production across species.

Playing music enhanced the activity of genes involved in dopaminergic neurotransmission, motor function, learning and memory. Some of the up-regulated genes like SNCA, FOS and DUSP1 are known to contribute to song perception and production in songbirds suggesting a potential evolutionary conservation in molecular mechanisms related to sound production across species. In addition, several of the up-regulated genes are known to be involved in biological pathways like calcium ion homeostasis and iron ion homeostasis that are essential for neuronal function, survival and neuroprotection. In addition, several of the up-regulated genes are known to be involved in biological pathways like calcium ion homeostasis and iron ion homeostasis that are essential for neuronal function, survival and neuroprotection.

"The up-regulation of several genes that are known to be responsible for song learning and singing in songbirds suggest a shared evolutionary background of sound perception between vocalizing birds and humans," says Dr. Irma Järvelä, the leader of the study. In contrast, listening to music down-regulated genes that are associated with neurodegeneration, referring to a neuroprotective role of music. "The effect was only detectable in musically experienced participants, suggesting the importance of familiarity and experience in mediating music-induced effects," researchers remark. The findings give new information about the molecular genetic background of music perception and evolution, and may give further insights about the molecular mechanisms underlying music therapy.

References :

Sciencedaily.com

Source: Helsingin yliopisto (University of Helsinki)

Journal Reference:

Chakravarthi Kanduri, Pirre Raijas, Minna Ahvenainen, Anju K. Philips, Liisa Ukkola-Vuoti, Harri Lähdesmäki, Irma Järvelä. **The effect of listening to music on human transcriptome.** PeerJ, 2015; 3: e830 DOI: 10.7717/peerj.830

Journal Reference: Chakravarthi Kanduri, Tuire Kuusi, Minna Ahvenainen, Anju K. Philips, Harri Lähdesmäki, Irma Järvelä. **The effect of music performance on the transcriptome of professional musicians.** Scientific Reports, 2015; 5: 9506 DOI: 10.1038/step 09506