Music may have a future role in heart and stroke patient rehab

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Blood flow and respiratory rates can synch with music, indicating that music could one day be a therapeutic tool for blood pressure control and rehabilitation, according to a study by Italian researchers published in *Circulation: Journal of the American Heart Association*.

The researchers found in an earlier study (*Heart*. 2006 Apr;92(4):445-52) that music with faster tempos resulted in increased breathing, heart rate and blood pressure. When the music was paused, breathing, heart rate and blood pressure decreased, sometimes below the beginning rate. Slower music caused declines in heart rates.

In an extension of those findings, researchers recently discovered swelling crescendos appear to induce moderate arousal while decrescendos induce relaxation. In music, a crescendo is a gradual volume increase, and a decrescendo is a gradual volume decrease.

"Music induces a continuous, dynamic — and to some extent predictable — change in the cardiovascular system," said Luciano Bernardi, M.D., lead researcher of the study and professor of Internal Medicine at Pavia University in Pavia, Italy. "It is not only the emotion that creates the cardiovascular changes, but this study suggests that also the opposite might be possible, that cardiovascular changes may be the substrate for emotions, likely in a bi-directional way."

Researchers studied 24 healthy Caucasians matched for age and sex — 24 to 26 years old with 12 experienced singers (nine women) and 12

participants (seven women) who had no previous musical training. Study participants were fitted with headphones and were attached to electrocardiogram (ECG) and monitors to measure blood pressure, cerebral artery flow, respiration and narrowing of blood vessels on the skin.

Five random tracks of classical music were played — including selections from Beethoven's Ninth Symphony; an aria from Puccini's Turandot; a Bach cantata (BMW 169); Va Pensiero from Nabucco; Libiam Nei Lieti Calici from La Traviata — as well as two minutes of silence.

Researchers found:

- Every crescendo led to increased narrowing of blood vessels under the skin, increased blood pressure and heart rate and increased respiration amplitude. In each music track the extent of the effect was proportional to the change in music profile.

- During the silent pause, changes decreased, with blood vessels under the skin dilating and marked reductions in heart rate and blood pressure. Unlike with music, silence reduced heart rate and other variables, indicating relaxation.

- Music phrases around 10 seconds long, like those used in "Va Pensiero" and "Libiam Nei Lieti Calici," synchronized inherent cardiovascular rhythm, thus modulating cardiovascular control.

"The profile of music (crescendo or decrescendo) is continuously tracked by the cardiovascular and respiratory systems," Bernardi said. "This is particularly evident when music is rich in emphasis, like in operatic music. These findings increase our understanding of how music

could be used in rehabilitative medicine."

Previous studies have shown that music reduces stress, boosts athletic performance and enhances motor skills of people with neurological impairments. Bernardi noted that music more frequently is being used as a therapeutic tool for different diseases. In addition, the distracting effect of music can also prolong exercise by increasing the threshold for pain or labored breathing.

"What we are learning from the present and previous study is that alternating between fast and slow music (crescendo and decrescendo within the same music track) may be potentially more effective," Bernardi said.

Music can induce physiologic changes that may precede the psychological appreciation. Such autonomic modulations could be of practical use to induce body sensation which might reach the level of consciousness, or at least create a continuous stimulus to the upper brain; moreover, the inter-individual synchronization of body physiology mediated by music could aid in strengthening the sense of sharing within the human relationship.

All this may better explain the efficacy of music therapy in pathologic conditions like stroke, and open new areas for music therapy in rehabilitative medicine.

Among the study's limitations, there were only 24 subjects, all of whom were similar in age, education and ethnicity. Different responses might have come from older subjects, or subjects accustomed to different styles of music, said researchers, who used only few well-known tracks by a small number of classical composers.

Source: American Heart Association (news : web)