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Reading Hexametric Rhyme Supports Cardiac Synchronization, Especially After A Heart Attack

(July 14, 2004) - Bethesda, MD – According to new findings from a team of European physiologists, you might receive greater health benefits (and probably a deeper appreciation of the classics) by forgoing the movie “Troy,” and instead, reading *The Iliad* out loud. The gist of this new research focuses on the hexameter, the poetic format unique to classical Greek and Roman epic poems like those found in the works of Homer and Virgil.

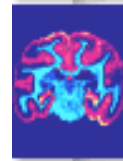
Background

The effects of different breathing frequencies and patterns found in poetry readings on cardiovascular regulation have been investigated extensively in recent years. Poetry recitation has been known to cause a frequency adjustment of breathing oscillations with endogenous blood pressure fluctuations (Mayer waves) and even cerebral blood flow oscillations during the saying of the Catholic Rosary and the ‘OM’ mantra. This effect is attributed to the breathing frequency of approximately six breaths per minute induced by the metric of both religious verses. Researchers have also observed increased arterial baroreflex sensitivity, which is a favorable long term prognostic factor in cardiac patients. Thus, some have endorsed recitation of specific poetry as a means to control breathing patterns.

Many features of the cardiorespiratory control during recitation of poetry are still unknown. Recently, with simultaneous recordings of an electrocardiogram and a respiratory trace, new techniques for the analysis of cardiorespiratory interaction were developed. They unambiguously revealed that heart rate and respiration may intermittently synchronize. The application of these techniques promises new information about the cardiorespiratory interaction, specifically after a heart attack.

What is the Hexameter?

The ideal dactylic hexameter consists of six (*hexa*) metrons or



feet called dactyls (*fingers*). Each dactyl consists of three syllables, the first long, the other two short. Note that the last foot is not a real dactyl, as it only consists of two syllables. The following represents a hexameter:

Down in a | deep dark | hole sat an | old pig | munching a |
bean stalk |

A New Study

Now, European physiologists have investigated the cardiorespiratory synchronization in healthy subjects using a cross sectional study design: recitation of hexameter verse, controlled breathing and spontaneous breathing. They hoped to improve the understanding, through poetry, of regulatory processes that maintain stability and coherence between different physiological functions since cardiorespiratory interaction seems to play a crucial role in this context.

The authors of "Oscillations of Heart Rate and Respiration Synchronize During Poetry Recitation," are Henrik Bettermann, from the Department of Clinical Research, Gemeinschaftskrankenhaus Herdecke and Dirk Cysarz, at the Institute of Mathematics, University of Witten/Herdecke, both in Germany; Dietrich von Bonin and Peter Heusser at the Institute for Complementary Medicine KIKOM, University of Berne, Switzerland; Helmut Lackner at the Institute for Noninvasive Diagnostics, Joanneum Research, Weiz, Austria; and Maximilian Moser with the Physiological Institute, University of Graz, Graz, Austria. Their findings appear in the Articles in Press section of the *American Journal of Physiology – Heart and Circulatory Physiology*. The journal is one of 14 published each month by the American Physiological Society (APS) (www.the-aps.org).

Methodology

The researchers investigated the cardiorespiratory synchronization in healthy subjects during recitation of hexameter verse. Three different exercises were compared using a cross sectional study design: recitation of hexameter verse, controlled breathing, and spontaneous breathing.

Some 20 healthy subjects without prior knowledge of the hexameter text used for the recitation were enrolled in the study. After an initial check 3 subjects had to be excluded due to frequent ectopic heartbeats. The 20 subjects (10 female; age: 43 ± 6.6 years, average \pm SD; 3 smokers) had no history of cardiovascular diseases, especially no hypo- or hypertension or anti-arrhythmical therapy.

All subjects were invited individually three times to the therapy center at the same time of day. In each of the three sessions the subjects performed a different exercise (in random order): hexameter recitation (H), controlled breathing (C) and spontaneous breathing (S). The researchers used a piece from Homers Odyssey in a German translation, which did not alter the rhythmic scheme of the verse.



During each session an electrocardiogram and the nasal/oral airflow were recorded simultaneously. The overall duration of each session was 50-60 minutes, divided into three successive measurements: 15 minutes quiet rest in a resting chair, 20 minutes of exercise measurement, and 15 minutes quiet rest in a resting chair. During S1 and S2 the subjects were allowed to breathe spontaneously. This procedure resulted in nine different measurements of each subject. To ensure comparable levels of physical activity during the three types of exercises, the subjects walked through the room at a pace of 50 steps per minute (given by an electric metronome). The three experiments had to be at least 24 hours apart but within 14 days.

Results

With respect to cardiorespiratory interaction the results of the analysis of the phase difference and the coherence analysis revealed: (1) during recitation of hexameter verse the low frequency oscillations of the breathing pattern were synchronized to a large extent with the heart rate oscillations; (2) the cardiorespiratory interaction was also synchronized during the controlled breathing exercise, but to a slightly lesser extent; (3) the resting periods before and after the exercises showed a further reduction of cardiorespiratory synchronization; and (4) during the spontaneous breathing exercise, the cardiorespiratory interaction was almost completely desynchronized. Rhythmic speech thus has the strongest impact on synchronization of low-frequency breathing oscillations and heart rate fluctuations, whereas cardiorespiratory interaction during everyday activities is rarely synchronized.

Conclusion

The special breathing pattern used for the recitation of hexameter verse produced a strong cardiorespiratory synchronization with respect to low-frequency breathing oscillations and heart rate variations. Controlled breathing showed cardiorespiratory synchronization to a lesser extent. The results of this study may improve our understanding of regulatory processes that maintain stability and coherence between different physiological functions since cardiorespiratory interaction seems to play a crucial role in this context.

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Source: Articles in Press section of the *American Journal of Physiology – Heart and Circulatory Physiology*. The journal is one of 14 published each month by the American Physiological Society (www.the-aps.org).

The American Physiological Society (APS) was founded in 1887 to foster basic and applied science, much of it relating to human health. The Bethesda, MD-based Society has more than 10,000 members and publishes 3,800 articles in its 14 peer-reviewed journals every year.



Editor's Note: A copy of the research article is available in pdf format to the press. Members of the press are invited to obtain a pdf copy of the study and to interview members of the research team. To do so, please contact Mayer Resnick at 301-634-7209 (direct dial), 301-332-4402 (cell) or mresnick@the-aps.org.

