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Breathing biomechanics: optical measurement systems for thoracoabdominal analysis

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Abstract:

Respiratory assessment can be carried out using different approaches. Most findings related to respiratory volume changes and adaptations were obtained using spirometry, that is the most common pulmonary function test. This technique measures inhaled and exhaled exchanged volumes and/or airflow. However, this method does not allow to study thoraco-abdominal contributions and biomechanics associated with breathing. Optical measurement systems may overcome these limitations, thus allowing investigating some aspects of ventilatory biomechanics. A model for positioning photo-reflective markers on specific chest landmarks and a computational method are required to compute breathing volume as a function of time from the marker trajectories. Moreover, using compartmental breathing volumes, the thoracoabdominal patterns, percentage contribution of each compartment and the coordination between compartments can be evaluated. Different models allowing to perform breathing assessment have been described and applied on healthy and pathological subjects in different body positions.

In this talk, the advantages and disadvantages of the spirometry method and optical measurement systems for thoracoabdominal analysis will be presented. Then the results of the Silvatti's Lab studies related to breathing mechanics as the effects of the sport modality practice, the aging, the breathing maneuver and gender will be also discussed.

Biography

Prof. Amanda Piaia Silvatti received her Bachelor's in Physical Education from Universidade Estadual de Campinas, Brasil in 2005. She received her Master's, and Ph.D. in Physical Education also from Universidade Estadual de Campinas, Brasil in 2009 and 2013, respectively. Since 2013, Prof. Amanda is Assistant Professor at the Universidade Federal de Viçosa. She has experience in physical education, and her research focus is related to breathing biomechanics, biomechanical evaluations in sports (swimming, combat sports, basketball, ballet) and gait (human and animal), and biomechanical methodologies developments. She is member of the International Society of the Biomechanics in Sport, European College of Sport Science, and European Society of Biomechanics.

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