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Multi-muscle control of postural muscles-manifolds and frequencies

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The central issue of the studies to be presented is the control of upright human posture. The starting point of my interest on this topic comes from the series of challenges posed by the mechanical design of our body for the execution of the simple task of stand upright and how effortlessly our system of control overcomes these challenges. For example, stabilization and support of the trunk, upper limbs and the head over the lower limbs is required for the execution of most of our daily tasks. Under this requirement, factors such as the vertical orientation of the head-leg-trunk segment, high center of mass, large number of joints, and narrow base of support contribute to make the human body mechanically unstable and difficult to control. Hence, *the postural system must ensure an accurate control of a large set of muscles*. To make the task of standing upright more challenging, the possible solutions to achieve such accomplishment are not unique and can emerge from a large set of possible combination of muscle activations. This problem is often referred as the motor redundancy problem and was first suggested by Nicolai Alexander Bernstein at the early stages of the 20th. My studies are currently oriented to the further development of operational methods for the recognition and quantification of multi-muscle synergies based on the analysis of electromyography signals (EMG). In addition, this presentation explores the possible processes involved on multi-muscle coordination regarding to the stabilization of the human body in space.

Biography

Alessander Danna-dos-Santos is a Brazilian trained physical therapist who has completed his PhD in human motor control at the age of 33 years from The Penn State University and postdoctoral studies from Arizona State University School of Kinesiology. He is the co-director of the Motor Control Laboratory and director of the Anatomy Laboratory of the School of Physical Therapy of the University of Montana. He has published in reputed journals such the Journal of Neurophysiology and Experimental Brain Research and his studies are applicable to both areas of basic and clinical sciences.

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