The Biomechanical Relevance of the Mathematical Models of Torque-Angle and Torque-Velocity Relationships

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Mathematical models of torque-velocity and torque-angle relationships on different muscle groups and joints allow at least two things: (1) to generate and analyze characteristic curves based on experimental data and to assess their dynamics during neurogenic or myogenic dysfunctions, or to use them as a criterion for the changes in the level of training; and (2) to generate the predictive torque equations for various joints. Based on our previous studies [1-2] and on the classical force-velocity relationship of Hill [3], in this report we discuss the biomechanical relevance of mathematical models of torque-velocity and torque-angle relationships with polynomials, cubic splines and exponential functions. The cases concern different muscle groups and joints, as well as a comparative analysis of data between trained and untrained subjects, demonstrating the possibilities of mathematical modelling to differentiate the changes in the force profile of skeletal muscles as a response to long-term adaptation to training.

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