DISCRETE VS. FUNCTIONAL BASED DATA TO ANALYZE COUNTERMOVEMENT JUMP PERFORMANCE

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While discrete point analysis (DPA) (e.g. peak power) is by far the most common method of analyzing movement data, it may have significant limitations because it ignores the vast majority of a signal's data. In response, there has been a small but growing use of methods, such as functional data analysis (FDA), which allow an investigation of the underlying structure of the continuous signal and may therefore provide a more powerful analysis. However, a direct comparison between DPA and FDA has not been previously reported. **PURPOSE**: To directly compare DPA and FDA for the identification of performance determining factors for the countermovement jump (CMJ). **METHODS**: Twenty-five male participants performed 15 CMJs, and the highest jump was selected for further analysis. Joint and whole body kinematic and kinetic measures were determined using position data (Vicon, 250 Hz) and force plate data (AMTI, 1000Hz). Participants were divided into good (n=10) and poor (n=10) groups based on jump height. A t-test ($\alpha = 0.05$) was performed on the timing and magnitude of key variables (DPA) and functional derived points (FDA) during the propulsion phase to examine differences between the groups. **RESULTS**: Both techniques found differences ($p<0.05$) in knee angular peak velocity, CoM peak velocity, CoM peak power and CoM work done. However, the FDA alone found significant higher ($p<0.05$) ankle moment (79 - 83%, peak at 67%), ankle power (54 - 67%, peak at 81%), knee angular velocity (28 - 100%), CoM velocity (56 - 100%), CoM power (49 – 91%) and a delay in CoM position (10 – 90%) and CoM velocity (10 - 60%) for the good performance group. Finally, the DPA alone found differences in ankle peak moment, ankle peak power and hip peak angular velocity. **CONCLUSIONS**: In contrast to FDA, DPA found three events which were not detected by FDA. However, only FDA was able to identify important differences in phases of the CMJ and explains differences between good and poor performance better than DPA. Finally, the ability to examine data with continuous techniques appears to provide a deeper insight into human movement than DPA.