ENERGY ABSORPTION OF LOWER EXTREMITY JOINTS DURING A DROP VERTICAL JUMP TASK IN HEALTHY INDIVIDUALS

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Purpose: To describe eccentric loading of the ankle, knee, and hip during a double limb landing task in a healthy cohort, including the total energy absorption at each joint and the relative energy absorption contributions between joints.
Methods: 52 healthy subjects (46 female, age = 20.6 ± 2.7 years, mass = 68.6 ± 10.4 kg, height = 171.5 ± 9.2 cm) completed 8 trials of a double limb drop vertical task while 3D marker and force plate data were collected. Energy Absorption (EA) of each joint was calculated by integrating the negative portion of the power curve, indicating eccentric loading, during the first 100 ms of landing and normalized to the product of body weight in Newtons and height in meters. Energy Absorption Contributions (EAC) were calculated as the percent contribution of each joint relative to the total contribution of all 3 joints. Separate paired t-tests were calculated for EA and EAC of each joint between non-dominant and dominant limbs.
Results: There were significant differences between limbs in mean EA at the ankles ($p < .05$) and knees ($p < .05$), with no significant difference in EA between hips ($p = 0.51$). There were no significant differences in the mean EAC values between limbs at any of the 3 joints ($p > .05$).
Conclusion: The non-dominant limb absorbs more total energy in both the ankle and knee. However, EAC strategies between joints are similar in the non-dominant and dominant limbs