

## Evaluation of the Effectiveness of SmartCells® Surface Technology on Vertical Jumping Forces

KAITLYN R. CORBETT, SCOTT P. MCLEAN, and JIMMY C. SMITH

Department of Kinesiology; Southwestern University; Georgetown, TX

---

*Category: Undergraduate*

*Advisor / Mentor: McLean, Scott (mcleans@southwestern.edu)*

### ABSTRACT

It is thought that a majority of lower extremity injuries in volleyball can be related to overuse or overtraining due to the high frequency of jumping and landing during practices and games. Further, it has been suggested that playing surfaces could contribute to these injuries. Purpose: To examine the effectiveness of SmartCells® Cushioning Technology in reducing impact forces experienced while playing volleyball. Methods: Twelve collegiate women's volleyball players (age:  $20.01 \pm 1.29$  yr, height:  $172.85 \pm 6.26$  cm, mass:  $73.45 \pm 13.02$  kg) performed two separate jumping tests. For the first test, each participant completed a series of drop-jumps, where they stepped off a platform onto a force plate and immediately performed a maximal effort vertical jump. Drop jumps were performed from two heights (30 or 60 cm) and onto two different surface conditions (with or without a SmartCells® mat). For the second test, each participant performed maximal effort 45 s repetitive jumping tests, once on the SmartCells® mat and once without the mat. Jump height, calculated using flight time determined from the force plate, peak propulsive force, and peak landing force were compared across the mat and no mat conditions of each test. Results: In the drop-jump test, the forces experienced while landing were greater dropping from the 60 cm box for both mat ( $5.2 \pm 0.9$  BW) and no mat ( $5.3 \pm 1.1$  BW) conditions versus the mat ( $2.7 \pm 0.5$  BW) and no mat ( $2.9 \pm 0.6$  BW) conditions dropping off of the 30 cm box ( $F_{(1,11)} = 356.02$ ,  $p < 0.001$ ). Further, in the repetitive jump test peak propulsive force decreased at a 31.6% greater rate on the mat ( $-.0077 \pm .0042$  BW/jumps) versus no mat ( $-.0056 \pm .003$  BW/jumps) ( $t_7 = -3.235$ ,  $p = 0.013$ ,  $d = 1.14$ ). Conclusion: Use of the SmartCells® mat had no effect on jumping performance or landing characteristics. The more rapid drop off in peak propulsive forces in the repetitive jump test suggests that the participants became fatigued more rapidly while jumping on the mat.