

Does increased jump height increase energy storage?

Based on these results, we infer that there was additional energy stored within the AT as a consequence of added mass applied to the body and that this additional energy storage did not occur with increasing jump height.

Do jumpers store elastic energy in the Achilles tendon?

Previous studies have demonstrated an important contribution of elastic energy stored within the Achilles tendon (AT) during jumping. This study aimed to alter energy available for storage in the AT to examine changes in how jumpers distribute work among lower limb joints.

Does submaximal jumping reduce dissipation of energy at lower jump heights?

They concluded that during sub-maximal jumping to increasing jump heights, countermovement depth and rotation of large proximal segments were increased while contribution of work at the ankle was decreased. This was considered a strategy that minimized dissipation of energy at lower jump heights.

Does the eccentric phase increase VJ height?

The SSC in general has the storage of elastic energy during the eccentric phase, which will be released as kinetic energy during the concentric phase. However, there are 2 important distinctions with the amount of time during the eccentric phase increasing an athlete's VJ height.

How do we manipulate the mechanical work requirements of jumping?

To examine this we manipulated the mechanical work requirements of jumping in two different ways: (1) Body Mass Paradigm (BMP) - Altering body mass (for a constant jump height) to manipulate the work required for jumping; (2) Jump Height Paradigm (JHP) - Altering jump height to provide a comparable manipulation of total work.

How does tendon compliance affect jump height?

Increasing tendon compliance in the model led to an increase in elastic energy storage and utilization, but it also decreased the amount of energy delivered by the contractile elements to the skeleton. Jump height therefore remained almost the same for both jumps.

It is proposed that a stiffer MTU allows for improved storage and return of elastic energy which may have an impact on vertical jump performance. SSC muscle function has a specific purpose that is to enhance performance during the final phase (concentric action) when compared with isolated concentric actions (McBride et al. 2008).

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Storage and utilization of elastic energy in vertical jump

performance with accentuated eccentric loading during a constrained vertical jump ...

Based upon the optimal control solutions to a maximum-height countermovement jump (CMJ) and a maximum-height squat jump (SJ), this paper provides a quantitative description of how tendons and the elastic elements of muscle store and deliver energy during vertical jumping.

Ito and Saito indicated that gymnasts accustomed to utilizing elastic energy can use a greater amount of elastic energy during a rebound jump than can swimmers. Belli and Bosco (1992) reported that there is a strong positive correlation ($r^2 = 0.92$) between rebound jump performance and amount of elastic energy utilization measured through an ...

This will maximize eccentric strength, elastic energy storage and utilization, and eccentric velocity capacity. This is a feature of the Vertical Jump Protocol. Pair these strength moves (slow or fast) with plyometrics for a synergistic effect [9]. Use band-resistance to force your body into a greater eccentric velocity.

The SSC in general has the storage of elastic energy during the eccentric phase, which will be released as kinetic energy during the concentric phase. However, there are 2 important ...

Here we explore whether isolating additional load during the countermovement is sufficient to increase ground reaction force, and hence elastic energy stored, at the start of the ...

Vertical jump performance (VJP) has been studied by researchers for decades. Early ... There was also some early interest in storage and utilization of elastic energy and its effect on VJP (Ammann & Bondc-Peten, 1974; Komi Bo. co. 1978). These papers Lub 1-. Arng611-Vm-gu, is with lht! facuda Jc Educacion Ff,ica y Deport<";,.

When eliminating the arm mechanics associated with vertical jump testing, the use of flight time or the length of time the athlete spends in the air during a maximal vertical jump may be an effective method of vertical jump testing. ... Athletes generally can jump higher during a CMJ than a squat jump due to the storage of elastic energy and ...

The present study was designed to explore how the interaction between the fascicles and tendinous tissues is involved in storage and utilization of elastic energy during human walking. Eight male subjects walked with a natural cadence (1.4 ± 0.1 m/s) on a 10-m-long force plate system. In vivo techniques were employed to record the Achilles tendon force and to scan real ...

Semantic Scholar extracted view of "STORAGE AND UTILIZATION OF ELASTIC ENERGY IN SKELETAL MUSCLE" by G. Cavagna. ... An overview of muscle and tendon properties and how these interact during vertical hopping is provided and Muscle properties discussed are force-velocity and force-length relationships, electromechanical delay, muscle fiber ...

Storage and utilization of elastic energy in vertical jump

Therefore the joint moment changes at the turning point of the jump with AEL suggests no change in elastic energy storage at the ankle (a key joint for storing and returning energy from the highly compliant Achilles tendon (22)), a potential small increase in energy storage across the knee, and a reduction in energy storage potential across the ...

The changes in tendon length were estimated assuming a stiffness constant calculated from the tendon architecture. The percentages of elastic energy stored in the Achilles tendon during jumping were 23 %, 17% and 34% of the total calf muscle work in the squat jump, the counter movement jump, and hopping, respectively.

Results: The mean value (\pm SD) of potential elastic energy collected due to lowering of the center of mass during the countermovement phase of a vertical jump was 183 ± 69 J. 24.3% of this value ...

We conducted a trunk-constrained vertical jump test on a custom-built device to isolate the effect of additional load while controlling for effects of squat depth, arm swing, and coordination.

Author: Drake Berberet Social Media Page [HERE](#) Transfer of Energy The ability to maximize transfer of energy in sport is typically what sets the elite athletes apart from the rest. Not only does it allow them to jump higher, run faster, and move more efficiently, it also allows them to save valuable energy so that ... Continue reading ["Assessing Energy Transfer in the Vertical ...](#)

This target article addresses the role of storage and reutilization of elastic energy in stretch-shortening cycles. It is argued that for discrete movements such as the vertical jump, elastic ...

Vertical jump tests are popular assessments of athletic performance for children and adolescents. 1,2 Arguably the most popular vertical jump test is the countermovement jump (CMJ), which ...

This study was done to determine which plyometric training technique is best for improving vertical jumping ability, positive energy production, and elastic energy utilization. Data were collected before and after 12 weeks of jump training and were analyzed by ANOVA. Subjects ($N = 28$) performed jumps under 3 testing conditions--squat jump, countermovement jump, ...

This target article addresses the role of storage and reutilization of elastic energy in stretch-shortening cycles. It is argued that for discrete movements such as the vertical jump, elastic energy does not explain the work enhancement due to the prestretch. This enhancement seems to occur because the prestretch allows muscles to develop a high level of active state ...

Su, Eric Yung Sheng, Carroll, Timothy J., Farris, Dominic J., & Lichtwark, Glen (2024) Increased force and elastic energy storage are not the mechanisms that improve jump performance with accentuated eccentric

loading during a constrained vertical jump. PLoS ONE, 19(8), Article number: e0308226.

The present study indicates that trained jumpers jump higher and have greater ME, possibly as a result of increased force production in the eccentric phase as a reflection of optimal ...

This sequence allows for a greater release of elastic energy, resulting in a higher jump. Exercises such as squat jumps and counter-movement jumps utilize the SSC and improve the storage and utilization of elastic energy. Aside from biomechanical factors, the physiological aspect of vertical jump height should not be overlooked.

The mean value (\pm SD) of potential elastic energy collected due to lowering of the center of mass during the countermovement phase of a vertical jump was 183 ± 69 J. 24.3% of this value can be considered the part of the potential elastic energy (44 ± 21 J) that comes from the transformation of kinetic energy.

Estimation of potential elastic energy stored by lowering the center of mass during the countermovement phase of a vertical jump may offer some insight into the phenomenon ...

The difference in v_4 was greater between SJ and CMJ in SROM (38.6%) than in LROM (9.0%), suggesting that elastic energy storage and re-use can be a dominant factor in the enhancement of vertical ...

tic energy takes place. It is possible that this storage capacity and its utilization depends on the imposed stretch loads in activated muscles, and that sex differences may be present in these phenomena. To investigate these assumed differences, subjects from both sexes and of good physical condition performed vertical jumps on the force-platform from the following ...

There are some deficiencies and limitations in the use of elastic energy storage devices, and the deficiencies and limitations mainly reflect in the following aspects: (1) the mechanical properties and energy storage density of material for elastic energy storage devices are relatively poor; (2) the development of new products and new ...

An alternating cycle of eccentric-concentric contractions in locomotion represents a sequence when storage and utilization of elastic energy takes place. ... sexes and of good physical condition performed vertical jumps on the force-platform from the following experimental conditions: squatting jump (SJ) from a static starting position; counter ...

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