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***Comparative impact on Hip Flexion, Knee Rotation, and Hip Abduction-  
Adduction  
using Lateral Cardio Trainers  
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**Abstract**

The purpose of this study was to examine the relative impact on hip flexion, hip abduction/adduction and knee rotation using three commercially available lateral cardio trainers. The trainers used were the Octane Lateral X Elliptical, the Helix 3500 Lateral Trainer and the Helix Lateral Trainer 3-D.

**Key Findings:**

*Calorie Expenditure:* For a given perceived intensity, test subjects using the Helix Lateral Trainers burned 50-60 more calories per hour on average than test subjects using the Octane Lateral X Elliptical. This is notable given that heart rates and perceived intensity rates were the same.

*Knee Flexion Range of Motion:* The Knee flexion range of motion differed slightly on each machine, with the greatest range of motion seen on the Helix 3500, and the least on the Helix Lateral Trainer 3-D. Vertical range of motion tested similarly on all three machines.

*Ankle Motion:* Ankle dorsiflexion range of motion was greater on both the Helix 3500 Lateral Trainer and the Helix Lateral Trainer 3-D. The least amount of ankle dorsiflexion was observed on the Octane Lateral X Elliptical. Ankle eversion-inversion and rotation range of motion was greatest on the Helix Lateral Trainer 3-D.

*Trunk Flexion:* Test subjects using the Octane Lateral X Elliptical demonstrated the most trunk flexion/extension. The least amount of trunk bending was observed in the Helix Lateral Trainer 3-D.

*Knee and Hip Abduction-Adduction:* The Helix 3500 Lateral Trainer and the Octane Lateral X Elliptical demonstrated similar levels of knee and hip abduction/adduction. The Helix Lateral Trainer 3-D showed the least knee and hip abduction/adduction of the three pieces of equipment tested

*Hip Flexion/Extension:* Hip flexion measurements were similar on all three machines evaluated.

*Knee Rotation:* The Helix 3500 Lateral Trainer produced the greatest knee rotation of the three machines, followed by the Octane Lateral X Elliptical and the Helix Lateral Trainer 3-D.

## **Conclusions:**

*Ease of use:* Test subjects uniformly reported finding the motion of the Octane Lateral X Elliptical awkward in comparison to the motion of the Helix Lateral Trainers. Researchers posit that while the pelvis can be stabilized while using the Helix machines, it cannot with the Octane; instead, the Octane's extremely wide foot platforms creates a large deviation from the center of the unit which discourages centering and forces side-to-side travel of the pelvis. Researchers further conjecture that this could be the reason that test subjects burned more calories using the Helix machines and fewer calories using the Octane machine despite working at the same perceived rate of exertion on each machine.

*Bi-directionality:* Researchers observed a great variety in degree of muscle activation and joint motion dependent upon which direction the machines were used by test subjects, noting that this was a significant benefit to all three of the machines with respect to versatility for the exerciser.

*Joint function:* Knee rotation is a key component to normal healthy joint function, but most rhythmic forms of cardio training (cycling, biking, rowing, etc.) do not provide much rotation. Each of the three machines in this study allowed for good knee rotation, with the Helix Lateral Trainer 3-D providing the best benefit.

*Knee and hip abduction/adduction:* The Helix Lateral Trainer 3-D demonstrated the least amount of abduction/adduction because its motion incorporates a forward and backward component that the other machines do not, thereby causing some of the 'lateral load' to be

dissipated to the front. The feet are still travelling cyclically, but the path is more three dimensional. As such, the knees are not bent to the side as much, and the hips are not forced apart to as a great a degree. Researchers believe that many users would find this motion more comfortable.

## Author Information

James Smoliga, DMV, Ph.D.

## Education:

2003 Cornell University, Doctor of Veterinary Medicine

2007 University of Pittsburgh, Ph.D., Sports Medicine

## Career specialties:

James Smogliam DVM, Ph.D. is the Associate Director of the High Point University Human Biomechanics and Physiology Laboratory. Prior to teaching in the DPT program, Dr. Smoglio taught undergraduate and graduate courses in human anatomy, physiology, animal physiology, exercise physiology and chronic disease. Additionally, he previously taught exercise physiology for primary care sports medicine fellows at Geisinger Medical Center in Danvil, PA. He is a peer reviewer for over 40 scientific journals.

## Selected Publications :

Smoliga J.M., Weiss P., Rundell K.W. Exercise induced bronchoconstriction in adults: evidence-based diagnosis and management. *BMJ (British Medical Journal)*. 352:h6951. PMID: [26762594](#).

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trials – revisiting body surface area scaling. *FASEB Journal*. 29(5): 1629-1634, 2015. PMID: [25657112](#)

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Smoliga J.M., Colombo E.S., Campen M.J. A healthier approach to clinical trials evaluating resveratrol for primary prevention of age-related diseases in healthy populations. *Aging*. 5(7): 495-506, 2013. PMID: [24073437](#)

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