

# The Impact of Exerciser Posture and Relationship to Gravity in Elliptical Cross Trainers

*Octane Fitness Delivers Superior Ergonomics*

The incredible popularity of elliptical cross trainers has led to the development of a number of varieties and models, each with a distinctive design and remarkably different motions that foster varying overall “feels,” which collectively impact exerciser comfort and the effectiveness and safety of exercise. Intuitively, if a machine doesn’t feel good, individuals eventually won’t use it and therefore will forfeit the benefits of regular exercise and the valuable results they were seeking.

Two primary determinants of the effectiveness and safety of elliptical training are the user’s posture and relationship to gravity, and these vary widely among different machines. Various designs and ergonomics result in different stresses on the body and exertion required.

## **Importance of upright stance and anti-gravity motion**

User posture and relationship to gravity determine user mechanics, which cause specific muscles to be activated in a specific order at a certain intensity. In turn, this muscle activity determines cardiovascular load and caloric expenditure.

Although exercisers on elliptical trainers follow the machine’s movement pattern, ultimately users have some control over the position of their spine and joints, as well as over the amount of effort they exert. The more the user has to control, such as in standing postures or complex movements, the greater the risk for mechanics errors, poor results and potential injury.

The best solution, then, is a machine that places exercisers in safe position; requires **performing a simple, natural movement; maximizes muscle recruitment and minimizes joint impact**. Research has shown that when compared to other elliptical cross trainers, Octane Fitness models do exactly this—and in a manner that is noticeably superior to competitors.

For instance, in an analysis of the biomechanics of various cross trainers, Octane was found to be the only one to place exercisers in an upright position, versus a slight forward lean. **Leaning forward diminishes the effectiveness of workouts** by enabling users to capitalize on gravity and momentum, in which the energy of the movement itself performs the work rather than the exerciser’s muscles. Essentially, by leaning forward, exercisers can take advantage of the upswing of the ellipse to keep their lower body moving.

Plus, because momentum is affected by mass, the heavier the exerciser, the easier it is for him/her to let momentum to propel the movement, rather than his/her own effort. In essence, **use of gravity and momentum during exercise amounts to “cheating.”**

An upright posture is advantageous for several reasons: clearly, it feels more natural, and it requires users to work against gravity with their own power, which results in greater cardiovascular load and caloric expenditure.

Also, ellipticals that employ a forward lean primarily engage the exerciser's quadriceps, hamstrings and tibialis anterior. **But Octane Fitness was shown to be the only elliptical cross trainer that truly recruits the gluteals along with the quadriceps and hamstrings.** This is a critical distinction, as many exercisers target this area and because the gluteals are the largest muscle group in the body. Emphasizing other muscles at the expense of the gluteals, as seen in many ellipticals, shortchanges users and workout effectiveness.

### **Eliminating excessive force and minimizing risk of injury**

In addition to an upright posture, an ellipse in which the major axes are more horizontal has been shown to be favorable over those utilizing ramps or various inclines. A fluid, relatively oblong ellipse like used in Octane machines more accurately simulates natural motion like walking and running and is thereby inherently more comfortable. Conversely, ramps and inclines demand an excessive amount of repeated hip flexion that can tighten the iliopsoas and pinch the femoral nerve. **Tight hip flexors are extremely common and can contribute to lower back pain.** Ultimately, then, the Octane machines foster better balance between the hip flexors (iliopsoas) and hip extensors (gluteals) and are safer for the femoral nerve tract.

A forward-leaning posture on an elliptical also impacts exercise safety, as it places pressure on the knees, bones of the lower leg (tibia and fibula) and the lower back, which, over time, can cause chronic pain. Octane protects the muscles, joints and nerves in two ways: with its upright posture and by the closest spacing between the pedals among all comparable ellipticals. A narrow stance of two inches better replicates walking, jogging and running and minimizes repetitive hip shifting that can lead to lower back pain. With approximately 80% of Americans suffering from low back pain at some point, obviously fitness equipment should not be contributing to this widespread risk.

### **Building the best biomechanical workout**

Ultimately, then, for optimum biomechanics, effectiveness and safety, elliptical cross trainers should:

- Replicate natural, simple movements such as walking, jogging and running, using flexion and extension in the sagittal plane only
- Facilitate an upright posture *without* placing exercisers into a forward lean
- Require users to work against gravity
- Minimize the use of momentum
- Employ a ellipse with major axes that are horizontal, versus ramps or excessive vertical rise
- Emphasize the gluteals, quadriceps and hamstrings in the lower body over the iliopsoas, tibialis anterior, external hip rotators and iliotibial band

- Preserve the safety of joints, muscles and nerves by eliminating excessive forces

Based on precise biomechanical analysis, Octane Fitness elliptical cross trainers are designed with exacting ergonomics—including all of the factors listed above—as well as a relentless commitment to superiority—to deliver exceptionally effective, safe, comfortable and efficient workouts.

## **REFERENCES**

Ashmore, Amy, *Elliptical Market Analysis*, Independent Research, Amy Ashmore Kinetics, LLC, Las Vegas, NV, June 2006.

Ashmore, Amy, Counteracting the use of momentum during exercise, *IDEA Fitness Journal*, Vol. 1, pages 39-41, 2004.

*For more information, contact Octane Fitness  
at [www.octanefitness.com](http://www.octanefitness.com) or 888-OCTANE-4.*