

# OPTIMAL HEALTH UNIVERSITY™

Presented by Katie Gravesen, DC

## Ergonomics for Tablet Computers

*Tablet computers, such as iPads, are now commonplace. However, what many tablet users don't realize is that these devices come with a unique set of ergonomic challenges, which are creating an onslaught of overuse injuries.*

*Doctors of chiropractic, like Dr. Gravesen, are seeing a growing number of patients with tablet-computer related pain, particularly neck and shoulder pain. The good news is that researchers are beginning to look into how to prevent these disorders. Read on to learn the latest.*

### Prolonged Neck Flexion

Dr. Gravesen finds that prolonged neck flexion is the crux of most iPad and other tablet computer-related injuries.

Essentially, neck flexion is bending the neck so that the chin is toward the

chest. From an anatomical standpoint, this is an abnormal, unnatural position.

Prolonged neck flexion may lead to a straightening — or even a reversal — of the normal curvature of the neck. This triggers a condition known as **vertebral subluxation**, where spinal bones (vertebrae) become slightly



misaligned. Vertebral subluxations of the neck are linked with a myriad of health problems ranging from headaches, neck pain and shoulder pain to ear infections, fatigue and depression.

Fortunately, chiropractic care is the perfect antidote for vertebral subluxations. Dr. Gravesen uses gentle and safe maneuvers called **chiropractic adjustments** to correct and prevent vertebral subluxations. A wealth of scientific research has deemed this approach as highly effective.

### Gaze Angle

When it comes to tablet computers, the largest determinate of neck flexion is what ergonomic researchers term “gaze angle.”

Gaze angle simply means the angle at which the tablet user's eyes view the screen. A low gaze angle occurs when the tablet is placed on the user's lap. A high gaze angle occurs when the tablet is placed on a table.

### The Latest Research

One study published in *Work: A Journal of Prevention, Assessment, and Rehabilitation*, researchers from Harvard School of Public Health, Microsoft Corporation, and Brigham and Women's Hospital investigated how to reduce the risk of neck and shoulder pain brought about from use of tablet computers (*Work* 2012;41:81-91).

“Compared to typical desktop computing scenarios, the use of media tablet computers is associated with high head and neck flexion postures, and there may be more of a concern for the development of neck and shoulder discomfort,” notes lead investigator Jack T. Dennerlein, PhD.

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As part of the study, 15 experienced tablet users completed a set of simulated tasks with two media tablets, an Apple iPad2 and a Motorola Xoom. Each tablet had a proprietary case that could be adjusted to prop up or tilt the tablet computer. The Apple Smart Cover allows for tilt angles of 15° and 73°. The Motorola Portfolio Case allows for tilt angles of 45° and 63°.

Four user configurations were tested: Lap-Hand, where the tablet was placed on the lap; Lap-Case, with the tablet placed on the lap in its case set at the lower angle setting; Table-Case, with the tablet placed on a table with its case at the lower angle; and Table-Movie, with the tablet placed on a table with its case at the higher angle. Head and neck postures and gaze angle and distance were measured using an infrared three-dimensional motion analysis system.

Head and neck flexion angles were greater, in general, than reported for desktop or notebook computing.

Only when the tablets were used in the Table-Movie configuration, where the devices were set at their steepest case angle setting and at the greatest horizontal and vertical position, did posture approach neutral. This suggests that tablet users should place the tablet higher, on a table rather than a lap, to avoid low gaze angles, and use a case that provides steeper viewing angles.

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