

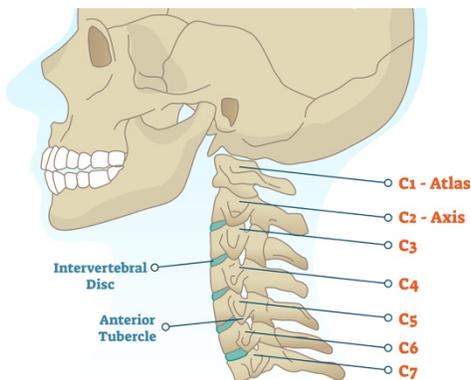
ERGONOMICS FOR THE SAFETY PROFESSIONAL

Mechanics of the Head and Neck (Part 5 of 6)

Dr. Patrick Carley, Professor, Doctor of Physical Therapy

While the ergonomic importance of the head and neck seems apparent to everyone, the coordination of the two are sometimes not obvious. For example, everyone can move their eyes up and down, side to side, but it is the job of the neck to position the head in three different planes of motion to maximize one's vision and hearing.

The role of the neck not only repositions the head to maximize our sense and interaction with work, but also will dictate what the back will do. You can confirm that by flexing your neck. As you maximize that flexion motion, you can feel your thorax and lumbar vertebrae all following the direction of the neck. From an ergonomic standpoint, if you wanted more extension of the low back when lifting or material handling, it would be wise to extend the neck first. If you ever watch powerlifters, before they lift heavy weights, they will always maximally extend the neck.



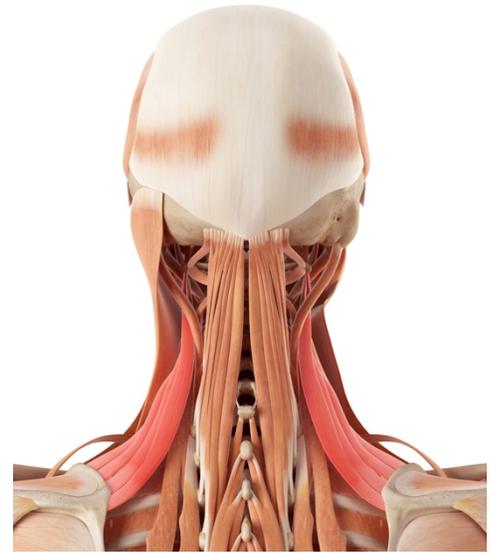
It is important to note that even though there are seven cervical vertebrae that make up the neck, the joints and the prominence of the cervical spines progressively change to increase motion. The upper cervical vertebrae are good at allowing rotation for the head. As a result, the name of the first two are called, the *Atlas (C1)* and *Axis (C2)*, mainly responsible for turning your head left and right.

The story goes that C1 holds up the skull (from Greek mythology describing the “globe of the head” being that Atlas was given the task of holding up the heavens [earth] as punishment from Zeus). The Axis (C2) was given its name for two reasons, one because of its structure that has a section of bone (odontoid process) that protrudes upward inside the ring of C1. The result is rotation around a pivot point or around the axis of rotation. C2 also has the greatest motion of all the cervical vertebrae.

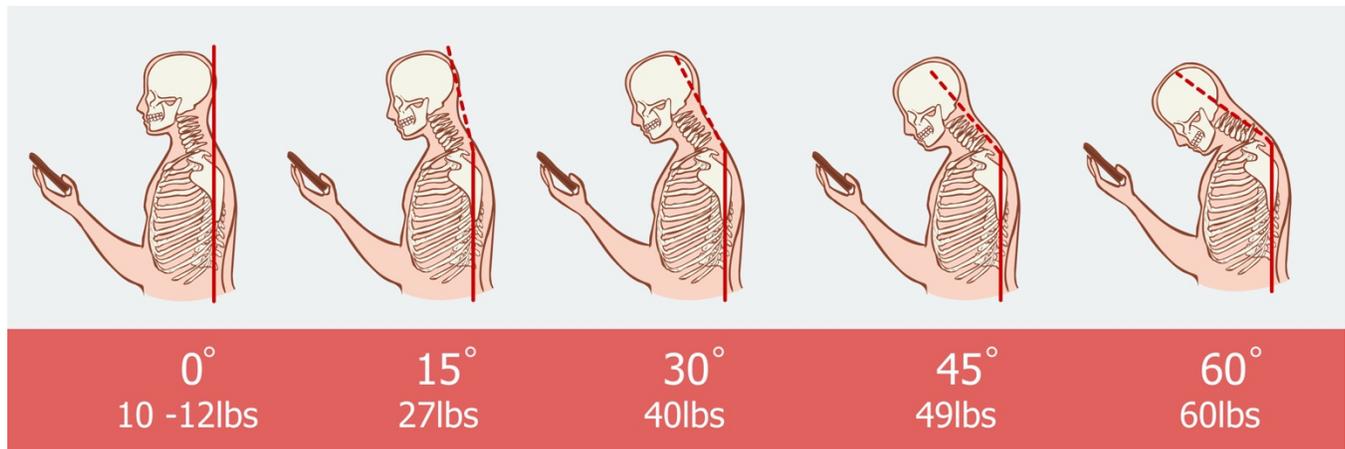


Once the understanding of the cervical structure is known, the synchronized interaction of how we move our head and neck becomes relevant to how we engage various tasks of work and the potential for discomfort can result. Remember, the prominent spinous processes of the neck, those are for anchoring the muscles of the neck controlling the head movements. The neck muscles have a unique design that permit well harmonized and controlled movement of the head.

The weaving strap-like design of the neck muscles are effective to achieving the head positions. However, the muscles on the opposite side of the neck need to stretch. When those muscles become excessively tight, it becomes “a pain in the neck” to simply look over your shoulder, especially when driving. So, from an ergonomic perspective, it is vital to encourage people to include stretching of the neck throughout the day.



Taste, smell, hearing, and sight are the four senses contain in the head with the neck merely being the articulating intermediary between the head and the rest of the body to maximize our use of those senses. From a work design point of view, if the objects are too high or too far to our right or left, the head will force the neck to make accommodations for our senses to get the right information and interaction. For example, if a smart phone is placed too far away and the eyes have a hard time capturing the information, it will force the neck to compensate to position the head forward to better view the work task or the distant screen of the phone.



From an ergonomic standpoint, this simple event increases the potential for discomfort and awkward chronic postures neck and back spinal segments. Normally, the neck precisely balances head over the rest of the body. The head weighing about 8% of body weight so the head of a 150-pound individual weighs 12 pounds, as shown above. However, when the head is forward, the muscles of the neck are effectively trying to control 42-pounds like extending a jug of water or milk away from your body.



Out of balance positions for the head is an important issue to address at the worksite can occur in both the sitting and standing positions. The right insole can help cushion and support the feet helping with standing balance throughout the day. Work tasks in sitting or standing that maintain good posture avoid potential neck strain while also improving productivity, thus bringing work ergonomically back our senses.

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