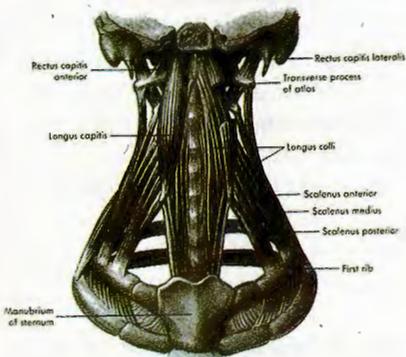
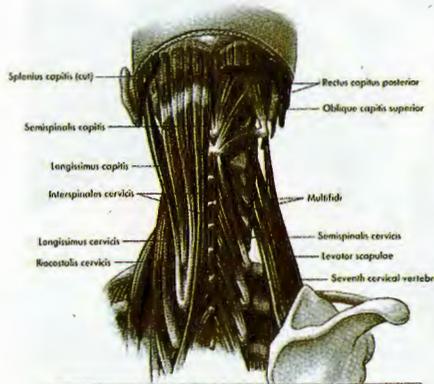


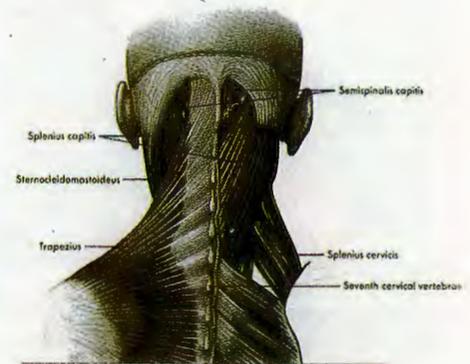
# TARGET TRAINING: **THE NECK**



**Deep Anterior Neck Muscles**



**Deep Posterior Neck Muscles**



**Superficial Posterior Neck Muscles**

**F**OR THOSE OF US WHO were first-hand witnesses, it was a scene that will be forever etched in our memories.

We were playing at The University of Oregon in the second game of the 1998 football season. Amp Campbell, one of our starting cornerbacks, attacked the line of scrimmage on run support. Just before establishing contact he lowered his head ... and took the full brunt of the ball-carrier's mid-stride thigh on top of his helmet.

His entire body seemed to go limp

as he fell to the ground and lay motionless. It took only seconds for the medical staff to reach the inert athlete and begin ministering to him. We don't know how long all of this took, but it seemed like an eternity to those of us who stood helpless on the sideline.

Subsequent X-rays and an MRI of his neck region revealed fractures of the bony structures comprising C-6 and C-7 (cervical vertebrae). Thankfully, there was no major intrusion into the spinal cord. While he would have some bouts of mild numbness and "tingling" in parts of his

upper body, there was no paralysis.

Amp had put himself in harm's way by making contact with the crown of the head. It resulted in severe axial loading and the subsequent compression fractures. He would face nine months of intensive therapy and rehabilitation, spending much of that time in a restrictive "halo" to allow the bones to heal. It was a painful and extremely uncomfortable process, but Amp fought like the true Spartan he had always been.

Remarkably, after being cleared by a medical committee of spinal cord specialists (including several NFL physicians familiar with this type of injury) and consulting with family, coaches, and friends, Amp decided to

**BY KEN MANNIE**

**Strength/Conditioning Coach, Michigan State University**



PHOTOS 1 & 2, FLEXION, START & MID-RANGE



PHOTOS 3 & 4, EXTENSION, START & MID-RANGE



PHOTOS 5 & 6, RT. LATERAL FLEXION, START & MID-RANGE

return for his senior season.

Somebody upstairs must have been watching over Amp. He not only played in our season opener the following year, but he won it with an 85-yard fumble return! He then went on to have an All-Big Ten and All-American season with no residual neck problems.

Most football strength coaches place a high premium on strengthening the neck, and Amp Campbell's

injury was a grim reminder that strength training, while vital, must be combined with proper tackling/blocking mechanics.

Allow us to offer suggestions on both.

### Neck Anatomy

The accompanying diagrams (see page xx) provide anterior and posterior views of much of the superficial and deep musculature of the neck

region. As you can see, this area is comprised of an intricate weave of various sizes and shapes of muscles with functions that include cervical stabilization, support, and protection of vital throat structures.

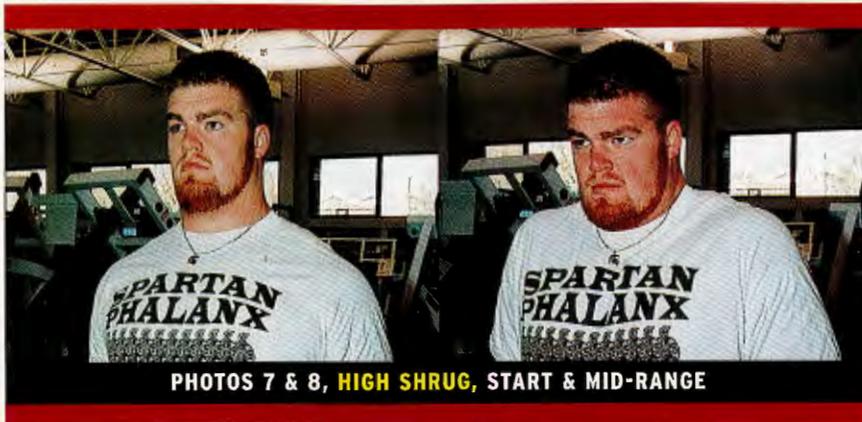
Following is a description of the functions and primary movers of the head:

- Flexion and rotation – Longus Capitus and Rectus Capitus Anterior.
- Rotation – Oblique Capitus Superior.
- Extension and rotation – Sternocleidomastoideus, Rectus Capitus Posterior, Semispinalis Capitus, and Splenius Capitus.
- Extension – Longissimus Capitus.
- Lateral flexion and extension – Trapezius.
- Lateral flexion – Rectus Capitus Lateralis.

### Strengthening the Neck

At Michigan State, all participants of collision and/or contact sports (e.g., football, ice hockey, and wrestling) are required to perform a series of neck exercises at the beginning of every lifting session. Neck work is done first to avoid the effects of cumulative fatigue from the main body of the workout. Depending on the exercise, a variety of modes can be used, including machines, manual resistance, and free weights.

1. **Neck flexion:** Start with the head in the extended position, and then gradually flex it forward against the resistance. Pause momentarily at the mid-range position, and then slowly (approximately three seconds) return to the starting position. Photos 1 & 2 show the manual version of the starting and mid-range positions.
2. **Neck extension:** Start with the head in the flexed position, and then gradually extend it back



against the resistance. Pause momentarily at the mid-range position, and then slowly return to the starting position. Photos 3 & 4 depict the machine version of the starting and mid-range positions.

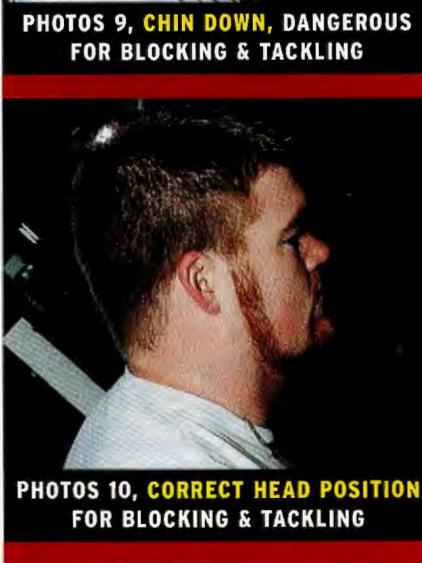
**3. Lateral flexion (right/left):** For the right side of the neck, begin with the head laterally flexed to the left (ear to the shoulder), and then gradually flex it to the right against the resistance. Pause momentarily at the mid-range position, and then slowly return to the starting position. Perform the same techniques for the opposite side. Photos 5 & 6 show the starting and mid-range positions for the right side using manual resistance.

**4. High shrug:** From a standing or seated position, and while holding the resistance with straight arms, lift or "shrug" the shoulders straight up to the ears, pause momentarily, and then slowly return to the starting position. Photos 7 & 8 show the starting and mid-range positions using a machine.

**Sets and Reps:** We recommend one to two sets of 10-12 reps of each exercise at least twice per week during the off-season and at least once per week during the in-season. It is not necessary to perform all of the exercises on the same training day, as long as the goal is met by the end of the week.

### Tackling/Blocking Techniques

Back in 1976, the NCAA and the National Federation adopted rules changes intended to discourage the "head first" tackling and blocking techniques being used by players at



every level:

- 1.** No player shall intentionally strike a runner with the crown (or top) of the helmet.
- 2.** Spearing, or the deliberate use of the helmet in blocking or tackling to punish an opponent, places both players at risk; invokes a major penalty.
- 3.** No player shall deliberately use the helmet as the primary point of contact in blocking or tackling (e.g., head butting").

Since these rulings went into effect, cervical spine injuries producing permanent quadriplegia (paralysis of both arms and both legs) underwent a dramatic decrease through the mid-80's. Then, surprisingly, cervical injuries mysteriously increased from 1988-1990. It may have been the result of lax coaching, disregard of proper technique by the players, and/or laxity by the game officials.

Coaches, players, and officials must understand and adhere to the rules pertaining to the illegal and potentially catastrophic consequences of using the head as a battering ram.

The available scientific data indicate that cervical spine injuries associated with quadriplegia are due to purposeful axial loading of this area. This occurs when the head is slightly flexed (chin down position to approximately 30 degrees), as shown in Photo 9.

When the cervical spine is straightened in this manner, it loses its normal lordosis (curve). Photo 10 illustrates the correct head position for blocking and tackling.

The chin-down position converts the cervical spine into a straight column, which is a dangerous position when making contact with the top of the head. If high velocity contact is made with the crown of the head when it is in this position, the cervical spine is more likely to fail, resulting in fractures, subluxations, or dislocations of the surrounding bony structures.

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## POWERLINE

Essentially, the kinetic energy produced by the contact is transferred to the cervical column, resulting in excessive axial loading and concurrent "buckling" of the system. Buckling is a mechanism of energy release that is produced when slender, segmented structures are subjected to this type of compressive loading. If these bony fragments encroach the spinal cord, the results can be devastating.

### Final Rep

We recommend a four-pronged approach to reducing the probability of a severe cervical spine injury.

1. Coaches must continue to teach and emphasize proper blocking and tackling techniques. Keep the head up – which places it in a more favorable, stabilized position – and make the primary contact points consist of the shoulders, chest area, arms, and hands. Teaching your players to "see" the target all the way to the point of contact also allows the neuromuscular system to prepare for the ensuing collision.
  2. The players must understand and adhere to the techniques and regulations put in place for their protection.
  3. Officials must enforce the rules on spearing and other illegal, unsafe techniques that involve the use of the head as a battering ram.
  4. Football players and athletes in other contact sports must place a high premium on the neck and surrounding musculature in the strength-training program.
- Special thanks to Ted Lambrinides, Ph.D., for his assistance with the information on the mechanisms of serious neck injuries. ■

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