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THE JOURNAL OF THE NATIONAL ATHLETIC TRAINERS ASSOCIATION, INC. • VOLUME 24 • NUMBER 4 • WINTER 1989



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Meeting	Date & Time
District 1 & 2:	January 8, 1990 2:10-3:10 p.m.
District 4:	March 8, 1990 3:15-4:15 p.m.
District 5:	March 17, 1990 1-2 p.m.
District 7:	March 17, 1990 4:15-5:15 p.m.
District 10:	March 24, 1990 3:50-5 p.m.
District 3:	May 19, 1990 10-11 a.m.
District 8:	June 24, 1990 9:15-10:15 a.m.
District 9:	July 9, 1990 2:30-3:30 p.m.
District 6:	July 27, 1990 2:30-3:30 p.m.

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I trust each of you had a successful and healthy fall season. As we end another decade, we reflect on the great advances in the field of athletic training, knowing the future of our profession is in our hands for the 1990's.

Error

The 1989 NATA Annual Meeting and Symposium was erroneously reported in some places as being the 41st; however it was the 40th meeting. Indianapolis will be our 41st.

Index

I am happy to report that a complete and corrected Index of subject and author is now being finalized for publication in 1990. This undertaking has taken several months of preparation, and I would like to thank Miss Katie Burley, ATC, of Winston Salem, N.C. for her tireless efforts toward the completion of this much needed updating.

Volume 24 Index is published in this issue. Meanwhile, if you need the complete (1956-1989) Cumulative Author/Subject Index, it is available on diskette which may be purchased for \$10.00. Make check payable to ATHLETIC TRAINING, JNATA and send request to Dr. Ken Knight (address at right). Please specify 3½ inch or 5¼ inch format.

Abstractors Needed

If you would be interested in helping out with the abstracts published in the Journal, please contact John Wells.

Closing

The journal staff and I wish the happiest of holiday seasons to each of you. We look forward to the challenges and the advancement of athletic training in the 1990s.

SY(SSSA)

Letters to the Editors

With a membership that is roughly 35% women (and rapidly growing since 40% of graduate students are female) I was disappointed at the offensive exhibits and presentations that we as an organization continue to allow at our conventions. Without naming specific products or companies, I am sure that the majority noted the scantily clad women vying for the attention of the males present. This is insulting to our profession for two reasons:

- 1) It assumes that women have no purchasing power, since the salespitch is definitely not aimed at interesting them in the product.
- 2) It denigrates an entire health care profession, reducing it to a group of males who can be seduced into giving up their purchase order numbers.

The exhibitors do not give us any credit with this type of sales-pitch; it short-changes us on intelligence. If we never protest, they will assume they

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Evaluation and Correction of Common Postural Dysfunctions In the Athlete

Joe H. Gieck, EdD, ATC, PT
Susan A. Foreman, MEd, ATC, MPT
Ethan N. Saliba, MEd, ATC, PT

ABSTRACT: Athletes frequently present postures that are peculiar to their sport. Postures often develop as a result of the specificity that particular sport has on selected muscle groups. Selective development or atrophy may result in a potential for overuse injuries and/or pain syndromes. This vulnerability to pain is also evident after athletes retire from their athletic endeavor and the deconditioning process begins.

Although postures are attained unconsciously and are difficult to correct without deliberate effort on the part of the athlete, they should be considered during evaluation and treatment of athletes. Posture should also be included in pre-season evaluations to allow earlier correction of potential problems.

This article describes the evolution of and the considerations for correct posture. We present examples of postural pain syndromes resulting from athletic activity as well as suggestions for therapeutic exercises and modifications in daily activities to help alleviate deficiencies found with these athletes.

Posture is the arrangement of body parts for a specific activity, or a distinguishing manner of bearing one's body (6). Posture is the state of muscular and skeletal balance which attempts to protect the supporting structures of the body against injury or progressive deformity. The balance between the muscles and skeleton should be maintained even at rest and is independent of the body position assumed (standing, lying, stooping). With good posture, the muscles are placed at an optimal length for strength and the body is maintained in the best position for thoracic and abdominal organ function (4). This position of structural equilibrium requires a minimum of muscular effort and dissipates imposed stresses with the greatest ease. In addition to being in the most efficient

position, persons with good posture display an aesthetically pleasing manner of carrying themselves (Figures 1a, 1b).

Evaluate posture by observing the arrangement of bony structures. Deviations can be the result of inadequate strength and/or flexibility of the soft tissues (4). Reliable methods of evaluation are important to identify the potential pain syndromes that can result from poor posture (Figure 1c). These pain syndromes usually do not limit activity until years after the athlete's retirement, but it is our role to identify future problems and to educate the athletes to accept responsibility for their bodies.

CAUSES OF POSTURAL IMBALANCES

Poor posture can be either positional or structural and results from many causes (7). Postural problems arise most commonly from poor habits and frequently cause an imbalance in strength or flexibility. When a person holds an incorrect posture for a prolonged period, changes occur in the soft tissue surrounding the spine due to increased stresses on those structures. The incorrect position begins to "feel" more comfortable because of altered proprioception, but this position often eventually causes pain. An individual may develop poor postural problems from standing or sitting in one position for a long time such as in a school, athletic or work environment. Tall adolescent basketball players may begin to slouch to avoid seeming different.

Athletes can develop postural problems by overworking certain muscle groups and neglecting others or from lack of tone of postural musculature (4). This etiology is termed positional since it is determined by an imbalance in the soft tissue position rather than a structural deformity. Also included in this category is poor posture that is a result of trauma or of a subsequent muscle contracture. An injury, for example, might induce a change in walking or standing as the person subconsciously adopts a posture or gait that decreases pain. Both upper and lower extremity injuries can result in this compensatory stance, which eventually may become habitual.

Structurally poor posture is the result of skeletal deformity. A significant difference in leg length or abnormalities of the spine may alter posture in this manner (7). Poor posture may be initially positional, but can advance to a structural deformity if a skeletal adaptation to the incorrect posture occurs. In the athlete, an injury such as a disk herniation may induce a functional scoliotic curve. If the compensatory stance, especially a shifting of the pelvis,

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is maintained for prolonged durations, permanent structural changes may result. If the curve does not straighten with forward or lateral flexion, the vertebrae, ribs and other structures have most likely adapted to the position and a structural deformity may exist. This exemplifies the importance of identifying a positional problem early and rectifying the problem through treatment and exercise if the athlete is to perform at his maximum. Many structural defects, however, will not respond to exercise alone and may require bracing to prevent further deformity.

POSTURAL DEVELOPMENT

Humans have adopted both an upright stance and an ability to balance on two extremities, which is uncommon in most mammals. This posture allows two immediate benefits: 1) the hands are free during activities such as standing or walking and 2) standing raises the height of the eyes so that the individual can see farther ahead. An erect posture, however, causes an increased strain on the spine and lower extremities. To avoid injury or pain, especially to the lumbar area, a dynamic equilibrium of the trunk muscles must be present.

Normal development of the spinal curves begins before birth. At this time the entire spine is in a flexed, concave (fetal) position. This curve, which is found at birth is the primary curve. Since the thoracic and sacral sections of the spine maintain their flexed or kyphotic position throughout development, these are also termed primary spinal curves (7). Secondary curves, which are convex anteriorly or lordotic, appear initially in the cervical region as the infant begins to lift his head. A secondary curve in the lumbar spine develops later when the child begins to sit up and walk.

Progressing from a crawler to a toddler requires an upright position of the pelvis and greater degree of balance. The center of gravity in toddlers is at approximately the 12th thoracic vertebra which is higher than in adults, making the toddler's body less stable in the standing position. Initially, lumbar flexion is present when the child begins to stand because hip extension is minimal (11). The pelvis then tilts forward to develop a lumbar lordosis and the abdomen subsequently protrudes. The child walks with a wide base of support to maintain his balance and the knees remain slightly flexed. During the early stages of walking, the legs are bowed (*genu varum*). As more movement is controlled in the hip joint, the legs straighten and the person may become slightly knock-kneed (*genu-valgum*). The legs normally straighten by the third year. A degree of increased lordosis may continue because of the relative weight of the abdomen and weakness of its musculature. Foot posture becomes more important as the child begins walking. When walking begins, the medial longitudinal arch of the foot should become more apparent and stronger.

Although postural changes occur throughout childhood and especially during adolescent growth spurts, early posture training will instill lifetime habits and correct weaknesses (11). It is thought that although the increased lordosis of childhood is the norm, it is not a correct posture and is partially responsible for the prevalence of low back pain in our society (11). Parents and coaches should work with athletes at an early age to encourage abdominal strengthening and general flexibility. The cervical and lumbar lordotic curves are necessary for the normal function and optimal weightbearing in the spine (8). Lordotic curves function like a cantilever bridge to relieve excess stress. Mechanically, the lordoses allow the line of gravity to fall through the skeletal system more optimally than the flattened or exaggerated curves. The lordotic curves aid in reducing the stresses on the soft tissue supports especially in the seated position, which is the most stressful position on

the lumbar spine. Standing is the next most stressful position, lying is the least (1).

Athletes who begin competing at a young age, such as swimmers and gymnasts, have an increased chance of developing postural imbalances. Their bodies are required to sustain stresses uncommon to those children who engage in a variety of activities in play. The competing child may be strong, but there may be an overdevelopment of certain muscle groups, creating a muscular imbalance that may intensify throughout adolescence and into adulthood. The same is true of flexibility with this group.

The psychological and emotional influences on posture are also most easily identified in childhood. Sadness, hostility, shyness or embarrassment are easily demonstrated by mannerisms or stature. A chronically humiliated child hangs his head and slumps his shoulders, thus creating future postural problems (11).

POSTURAL STABILITY

Postural stability is maintained by the strength and balance of both structural and dynamic tissues. Structural tissue, such as bones, joints, intervertebral disks, ligaments, and fascia give structural support to the body. These structures limit motion and by doing so, they provide stability (5). The spinal column can be divided by its structural function into anterior and posterior units. The anterior portion is made of both the vertebral bodies and the intervertebral disks and has a dual responsibility of weight bearing and shock absorption. The posterior unit is composed of the spinous processes and the facet joints which allow the gliding mechanism for movement (5). Muscles attach to this portion and control the motion of the spine.

The bony structures of the spine limit motion in certain directions by the slant of the articulating facets and spinous processes. For example, structural variation among the cervical, thoracic and lumbar vertebrae provide the specific limitations of that region. The ribs restrict motion in the thoracic region.

Several ligaments of the spine are responsible for providing postural support. The anterior and posterior longitudinal ligaments run the length of the spinal column attaching to the vertebral bodies. They restrict hyperextension and hyperflexion of the spine in all regions. The ligamentum flavum, the interspinous and supraspinous ligaments, also contribute to the limitation of flexion. The contralateral intertransverse ligaments restrict lateral flexion. A constant stretch or an injury to the ligaments can decrease their tensile strength and/or cause pain. Irritation to these structures causes an increase in muscle activity in the form of muscle spasms to reduce the stress on these structures. Athletes are susceptible to sprains of these ligaments, especially in gymnastics and in contact sports such as football. Postural pain syndromes result from existing postural deficiencies and contribute to aggravation in this area. Despite the possibility of an acute or chronic sprain, the postural deficiencies in the athlete should be evaluated and treated to prevent a postural pain syndrome resulting from daily activities.

The intervertebral disks are considered to be inert structures, but the ratio of their thickness to the thickness of the vertebral body indicates the mobility in a spinal region. The cervical region has the greatest mobility with a ratio of 2:5. The thoracic region is least mobile and has a ratio of 1:5, while the lumbar region has a ratio of 1:3 (5). Change in these ratios would theoretically affect the normal mobility in these regions, possibly resulting in spinal area pain.

Also providing structural support to the spine are the muscles. They control the body against the force of gravity when a part is moved beyond the base of support (6). Most

importantly, the muscles can move the body from a potentially stressful position to a more correct one. Relatively little muscle activity is required to maintain an upright posture, but with total relaxation, typical of poorly toned musculature, the spinal curves become exaggerated and passive support of the inert structures is needed. Continual exaggeration of the spinal curves leads to faulty posture and a loss of muscle strength and flexibility. Muscles that are habitually kept in a stretched position beyond the physiological resting length weaken as their contractile fibers become stretched. This phenomenon is referred to as stretch weakness (5). For example, the abdominals become stretched and subsequently weakened in a sway back or hyper-lordotic stance and the sternocleidomastoid strength is compromised in a forward head posture as a compensation for the cervical lordosis. Conversely, muscles in a habitually shortened position may also weaken and lose their elasticity. This type of weakness is referred to as tight weakness. An example of this is the lumbar extensors in an aggravated lordosis. The musculature should be examined thoroughly if a weakness is suspected, since the muscles may test weak at various lengths (9).

CORRECT POSTURE AND EVALUATION

The ideal posture describes the position of equilibrium of the body from the midpoint of the sagittal and frontal planes. A reference or gravity line is used to bisect the body in this fashion and corresponds to the midline of the body. This line is used as the reference point when describing the location of relevant structures such as joints and bony prominences. From an anterior or posterior view, this line divides the skeletal structures into right and left halves, which are essentially symmetrical (4). In the lateral view, the halves are not symmetrical and the gravity line divides the body into front and back sections (Figures 1a, 1b).

In addition to the gravity line assessment, other evaluational techniques such as leg length measurement from the anterior superior iliac spine to the medial malleoli can be made (3). The feet and attitude of the lower extremities should be examined as well. The emphasis of the examination is on finding the cause of a postural deficiency if possible, not just on what is wrong. Routine posture checks should be included in pre-season exams for athletes and in physicals for all children. The relationship of various structures in the standard posture will be discussed with respect to the gravity line.

Ankle

In the lateral view, the gravity line should lie anterior to the lateral malleolus. Because the line of gravity lies anterior to the ankle joint, there is a tendency to rotate the tibia forward on the ankle. Stability is provided by the plantarflexor muscles, primarily the soleus. The ankle joint's normal limitation in dorsiflexion further prevents anterior swaying of the body about the ankle. From an anterior-posterior view, the longitudinal arch should support the ankle so that it is neither excessively pronated or supinated. The leg should be perpendicular to the floor so that the weight is evenly divided between the left and right ankles. The feet should face straight ahead or toe up to 45 degrees. Excessive toeing in or out may indicate anteversion or retroversion at the hip respectively.

Knee

Laterally, the gravity line should lie anterior to the knee joint, which tends to keep the knee in extension. Stability is provided by cruciate ligaments and by tension in the muscles posterior to the knee. The soleus aids by pulling

posteriorly on the tibia. With the knees fully extended, little or no muscular support is required at that joint to maintain posture. If the knees flex slightly, the quadriceps must contract to prevent the knee from buckling. Genu recurvatum puts a great deal of stress both on the ligaments and the anterior knee. This stance requires compensation for balance usually in the lumbar region. In an anterior-posterior examination, the entire leg should be straight, exhibiting neither genu varum or valgum. The patellae should face anteriorly. Patellae that turn inward, especially in the presence of genu varus, indicate tibial torsion. The fibular heads and popliteal spaces should both be of the same height.

Hip

The lateral gravity line varies with this joint as a result of swaying of the body. When the reference line passes through the joint axis, there is equilibrium and no muscular support is needed (5). Kendall et al., however, state that when the reference line passes through a joint axis, there is an equal tendency for a displacement either in flexion or extension. Since hip motion is strongly limited anteriorly by the iliofemoral ligament, the body is more stable when the gravity line passes slightly posterior to the hip (4). There is also some posterior rotation of the pelvis when the body shifts anteriorly, but this posterior rotation is controlled by tension in the hip flexor muscles. When the body shifts posteriorly, stability is required by the active support of the hip extensor muscles. In the anterior-posterior examination, the pelvis should be level and the gravity line should bisect the pelvis. The greater trochanters and anterior superior iliac spines should be equal in height bilaterally. To indicate how level the pelvis is, a line between the anterior iliac spines and the pubic symphysis should be perpendicular to the floor.

Trunk

The line of gravity should pass through the bodies of the lumbar and cervical vertebrae so that the curves are balanced. Muscle activity in the erector spinae muscles helps maintain the balance. As the trunk shifts from side to side, contralateral muscles contract, functioning as guy wires (5). Extreme or sustained deviations are supported by inert structures. The shoulders should align with the gravity line and the arms should hang slightly anterior to the line. Forward or rounded shoulders are often accompanied by a certain degree of thoracic kyphosis. The scapulae should be relatively flat against the back. Scapular winging indicates a weakness of the serratus anterior muscle. In a posterior view, the shoulders and scapulae should be level, although a slight depression of the dominant side is considered to be normal. The posterior gravity line should fall exactly along the vertebral column. A straight spine with a lateral deviation may be caused by a leg length discrepancy. A balanced vertebral column with lateral deviations is scoliotic and its cause should be identified by examining the entire body posturally. Have the athlete bend forward at the waist. A functional scoliosis will disappear with trunk flexion whereas a structural one will not. Also, a "humping" of the scapula indicates a structural scoliosis, with the convexity of the curve on the side of the protrusion.

Head

The center of gravity of the head should fall slightly anterior to the atlanto-occipital joint. The cervical muscles contract to keep the head balanced whenever there is deviation from this position. A forward head places abnormal stress on these structures. At extreme flexion, the ligamentum nuchae prevents further motion. The gravity line should trace through the ear in the standard posture

when viewing the athlete laterally. Anteriorly, the head should face forward and should balance on the cervical vertebrae. The face and neck musculature should be symmetrical.

When examining the posture, if a deviation is noticed, that part should be checked for strength and flexibility of relevant musculature. For example, if there is an increased lumbar lordosis, the abdominal strength should be checked while the hip flexors, erector spinae, and hamstrings should be tested for flexibility. The musculature of the body is extensively interrelated and there is usually a compensatory involvement. Identifying these structures upon evaluation makes the design of an exercise program more efficient.

POSTURAL SYNDROMES COMMON TO ATHLETES

Pain results not necessarily from inadequate posture but from the stresses the deficiency places on the compensatory structures. Those structures receptive to nociceptive stimuli include the ligaments, facet capsules, periosteum of the vertebrae, muscles, anterior dura mater, dural sleeves, epidural areolar adipose tissue, and walls of the blood vessels (5). Pain usually results from a mechanical stimuli (stretch, compression, shortening, distension) and can occur in the absence of an inflammatory reaction. A postural fault is defined as one that deviates from the normal alignment but has no structural limitations (5). Postural pain syndrome refers to the pain that occurs from the mechanical stress when a person maintains a faulty posture for an extended period of time. The pain is usually relieved with activity and there may not be permanent adaptive changes in supporting structures.

A postural dysfunction, however, results when the postural pain syndrome progresses to involve adaptive stretching or shortening of soft tissues and muscular weakness. This can be caused by prolonged poor postural habits or from adhesions or contractures that develop after trauma or surgery. A kyphotic posture reduces rotational flexibility of the thoracic spine (10). Loss of rotation is common in postural dysfunction and should be considered in a treatment regimen. Unfortunately, most programs provide only straight-plane exercises. Further stress to the affected structures in a rotational or functional pattern causes pain. Athletes who engage in a specific sport can develop postural pain syndromes or dysfunctions because of the demands of their sport.

Tennis players and baseball pitchers are a classic example of athletes developing postural faults. A normal slight depression of the shoulder of the dominant hand can exist. This depression, or muscle imbalance, becomes intensified when there is a greater stress imposed, as in these sport activities. Throwers tend to develop impingement syndromes and rotator cuff strains or tendinitis by overusing their throwing arm. Tennis players have many of the same shoulder problems because of the same motion of the arm with overhead strokes and serves. Eventually there is a narrowing of the space between the acromion and humeral head, increasing the impingement of the supraspinatus tendon. As the athlete's shoulder becomes more depressed and rounded, a vicious cycle of compromised vascular supply and more pain evolves. The imbalance can be lessened through a regular exercise program to counter restricted motion and weaknesses.

Although any baseball/softball player could develop the described conditions, catchers are also vulnerable to other postural faults because of their stance during play. There is great stress on the knees in the squat position. Perhaps more of a problem, however, is the development of a forward head or cervical lordosis from their crouched stance. This may result in neck pain and spasm, which may even evolve

into or exacerbate shoulder problems.

Swimmers have a distinctive stance. Classically, their shoulders are rounded because the freestyle stroke works the shoulder internal rotators (especially latissimus dorsi) and anterior shoulder muscles. This causes those muscles to be tight, while the posterior muscles are weak and stretched. Shoulder tendinitis and subsequent impingement syndromes often develop in swimmers as a result. Correcting the swimmer's posture by stretching the anterior musculature and strengthening the posterior shoulder and thorax muscles may resolve an impingement or rotator cuff strain. The young swimmer who does these exercises early and regularly may prevent shoulder problems, which seem almost inevitable in the elite college-age swimmer.

Other athletes, such as gymnasts and football players, tend to develop low back pain. Because of the flexibility required of elite gymnasts, the lower spine endures incredible stresses. The inert structures of the spinal column become stretched and are unable to provide support. In female gymnasts, the ligaments can be stretched to the point that there is bone to bone contact of the vertebral spinous processes. In addition to current problems, the gymnast may have osteogenic changes in the spine such as spondylolysis or spondylolisthesis. When gymnasts are undergoing training, their abdominals are kept extremely strong to enable them to control their bodies in flight. Because of the muscular strength, gymnasts usually do not have many postural problems until after retirement, which can be at 14-15 years of age. When muscle tone diminishes, resulting in lumbar lordosis and general laxity, pain syndromes can occur because of the lack of ligamentous support.

Football players, especially linemen, are also prone to low back pain because of improper blocking techniques. They come out of their stance with an upward thrusting motion into their opponent. Most of the stress on contact is on the posterior lumbar area which is now in a hyperlordotic position. Muscle strains or sprains can occur from this technique and can also develop into a pain cycle. Proper technique should be emphasized during practice. The linemen should be taught to take an extra short step to eliminate the necessity of arching the back during blocking. They should be taught to maintain a posterior pelvic tilt as well. Any back injury should be evaluated posturally and should be corrected as part of the rehabilitation of the injury. This may help prevent chronic pain as the athlete ages.

CORRECTION OF POSTURAL DYSFUNCTION

Retraining a person's kinesthetic sense is essential in correcting the body alignment (2). Practice and exercise in front of a full length mirror can help the person realize that the new position is more balanced and more aesthetically pleasing. Until the new position feels more natural, it will not become a habit. Since posture is controlled voluntarily to a large degree, repeated conscious corrections, in addition to strength and flexibility exercises lead to improved habits. Exercise cannot always reverse or correct pathology, but it helps keep musculature and other soft tissue stronger and more flexible (11). Exercises that require little or no equipment should be used to encourage maximal adherence to the program. Functional and rotational planes should also be stressed as opposed to strictly straight-plane exercise.

The problem area should be identified with the evaluation, and each exercise should be explained and/or demonstrated to the patient. Posture exercises should be done often throughout the day to help retrain the kinesiological awareness of correct posture. Various modalities can be used in conjunction with the exercises to decrease pain and increase the effectiveness of

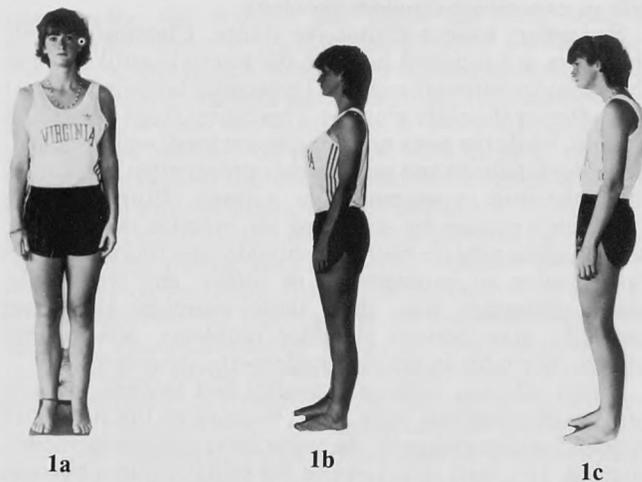


Figure 1. Evaluation of Posture. The athlete should be observed from the front (1a), back and from each side (1b). Alignment of bony landmarks can be assessed relative to the gravity line. 1c demonstrates the classic forward head, kyphosis posture.

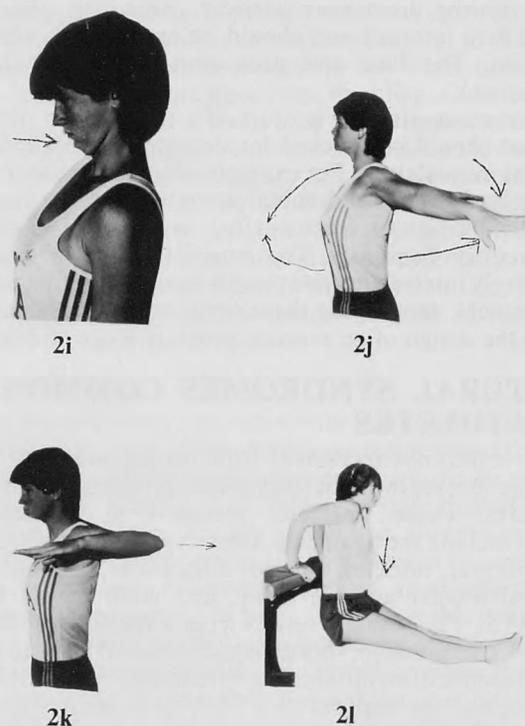
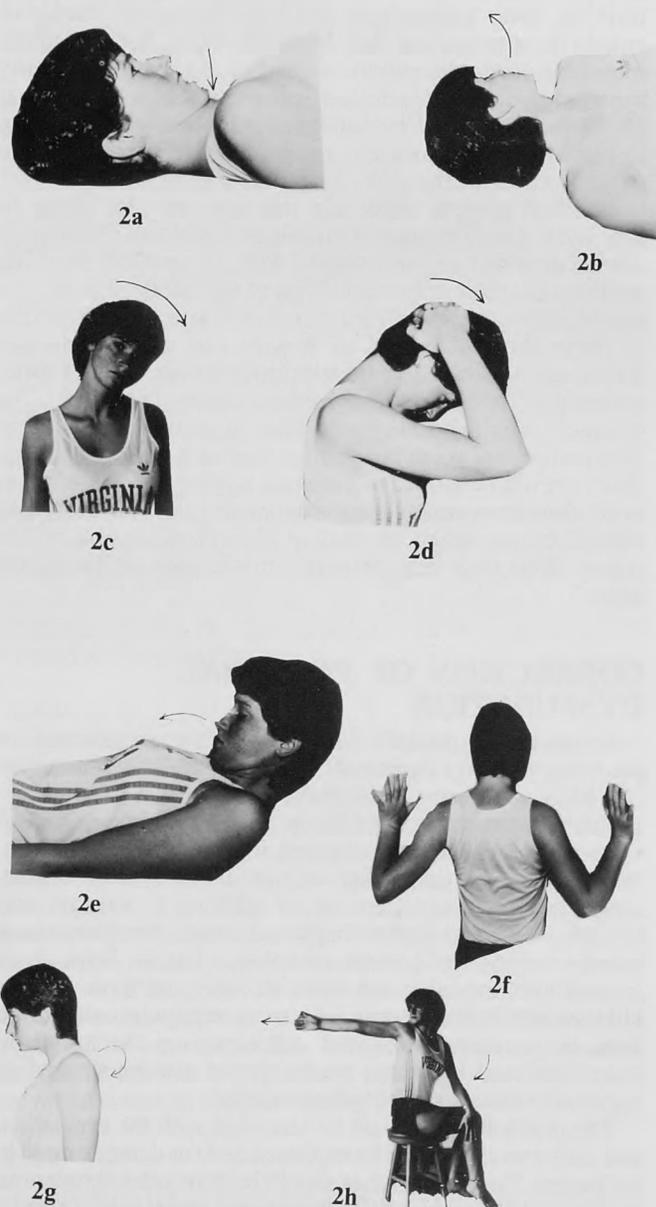


Figure 2. Cervical and Thoracic Exercises. (a) *Neck Press*: Press neck to table for 10 seconds. (b) Rotate head as far to the left as possible and hold for 10 seconds; Rotate as far to the right as possible and hold for 10 seconds. (c) *Active Motions*: Actively move head and neck into flexion, extension, lateral flexions, rotation, and at a 45 degree angle between the sagittal and frontal planes in the flexion and extension directions (both right and left). (d) *Passive Motion*: Passively pull head and neck opposing areas of tightness and discomfort and return to normal with manual resistance. (e) *Chin Tucks*: Bring chin to chest from the supine position holding for six seconds. Emphasize long axial extension with neck flexion. Scapulae should be adducted during this exercise. (f) *Corner Stretch*: With the hands placed against walls, lean into a corner attempting to touch nose to the corner to stretch anterior shoulders. Hold 20 seconds. (g) *Shoulder Rolls*: Actively roll shoulders forward and back, clockwise then counter-clockwise. (h) *Shoulder Twists*: Twist to the right with right arm back as far as possible, with left hand, as a fulcrum on the thigh, assisting in the twist. Hold for 20 seconds and repeat to the left. (i) *Head Tucks*: Tuck chin, glide head back to flatten the cervical spine while distracting head from shoulders and adducting scapulae. Do not flex the cervical spine. Maintain a posterior pelvic tilt while performing. Hold 6 seconds. (j) *Arm Circles*: Rotate arms in tight circles clockwise then counter-clockwise for 30 seconds. (k) *Elbows Up/Back*: Bring elbows up and back as far as possible for 6 seconds then return. (l) *Bench Dips*: With the hands on a bench and the body extended in front, the athlete lowers herself, holds for four seconds then returns to original position.

stretching. Moist heat, ultrasound or whirlpool treatments may be used in this manner. The athlete may be advised to do the exercises after showering in the morning to benefit from the heat. The following exercises are recommended for the athlete or a person with moderate strength. To make these exercises more applicable to other populations, they can be modified by performing them without weights or by repositioning to reduce the force of gravity.

Postural problems of the neck and trunk are usually the result of fatigue from overuse. In the athlete, one most commonly observes a forward head with accentuated kyphotic and lordotic curves. The resultant pain and dysfunction is exaggerated by athletic stresses or trauma. Other causes may be poor

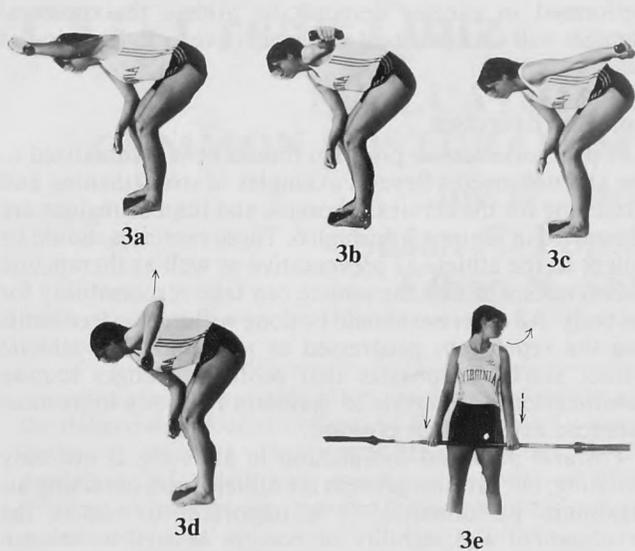


Figure 3: Thoracic Strengthening Exercises. Strengthening exercises should be performed when pain free range of motion is tolerated. *Arms Up/back:* Repeat elbows up/back exercise (Fig. 2k) but with the elbows extended at shoulder height. *Flys/Elbow lift:* With the back parallel to the floor and using weight, bring arm into maximum forward flexion (a), horizontal extension (b), then backward extension (c), and then lift elbow (d). These should be performed unilaterally. These four motions constitute one repetition. Do 3 sets of 10. Increase the weight when this is completed comfortably. (e) *Shoulder Shrugs with Bar:* Shrug shoulders up, back, down; rotate the head/neck to each side as far as possible in a stretching motion, hold 6 seconds in each direction.

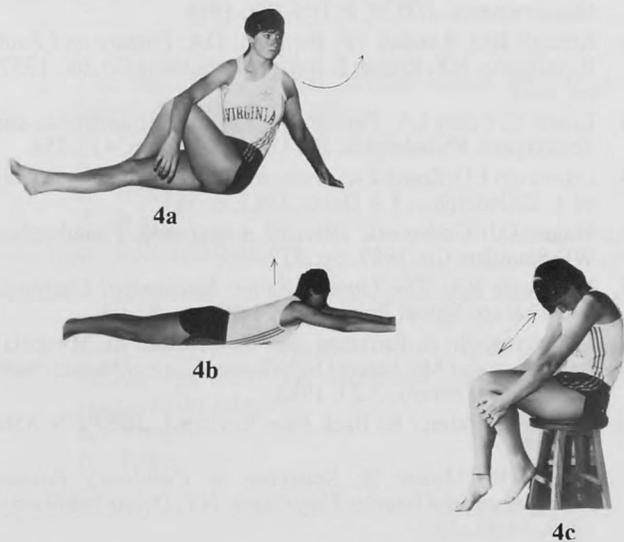


Figure 4. Thoracic/Lumbar Postural Exercises. (a) *Long Sitting Rotation:* From a long sitting position, cross right leg and put that foot lateral to left knee. Rotate to the right using left elbow as a fulcrum. Repeat with the left. Hold 20 seconds. (b) *Chest Raise:* Raise chest up from a mat and hold 6 seconds. (c) *Rhomboid Stretch:* Relax, tuck chin, grasp knee with hands and push forward passively abducting scapulae. Hold 20 seconds.

driving or study postures. Morning pain is usually related to improper sleeping habits or poor mattress support.

Prevention of these posture-related problems is achieved through a maintenance of strength, flexibility and synergistic usage of the muscles required in keeping a correct posture. Posture evaluation in a pre-season screening can identify postural abnormalities that may become problems later in a

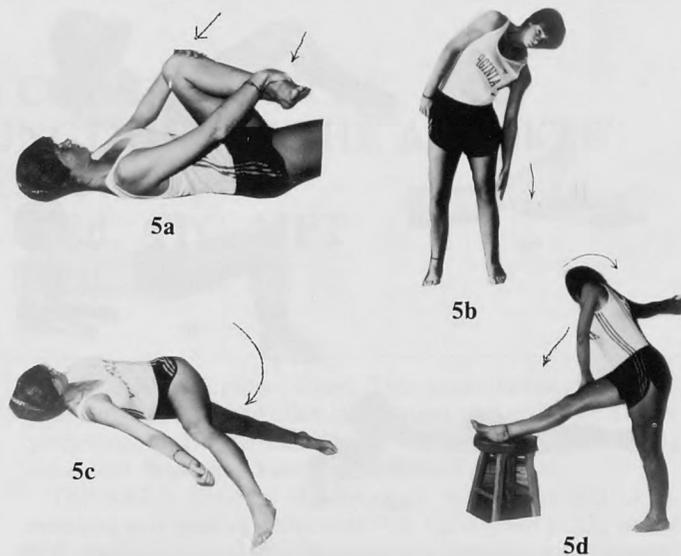


Figure 5. Lumbar/Sacral Postural Exercises. (a) *Lumbar/Sacral Stretch:* Bring left knee to chest pulling the left ankle toward the right anterior superior iliac spine. Hold 20 seconds. Repeat with right leg. (b) *Lateral Stretch:* Lean to the right as far as possible keeping both feet flat on the floor, hold 20 seconds and return to the upright position. Repeat to the left. (c) *Cross Stretch:* Rotate hips to the left attempting to bring left foot to right hand while keeping the shoulders flat. Hold for 20 seconds then repeat to the right. (d) *Hamstring Stretch with Rotation:* Place foot on low bench, bend forward at the hips while simultaneously rotating the trunk to the right with the right arm reaching as far to back as possible using the wall or a pole for added stretch. The left hand/arm acts as a fulcrum on the thigh to aid rotation. Hold 20 seconds. Repeat to the left.

season or after retirement. Once a correct posture has been demonstrated, the athlete must endeavor to maintain it. Failure to hold a correct posture indicates a potential for future pain and dysfunction. Postural conditions characteristically require either strengthening or stretching to maintain or correct posture for the athlete. Identification of the causes allows the individual prescription of reconditioning exercises.

Activities of Daily Living

Before beginning an exercise program, activities of daily living should be evaluated in athletes with postural pain and dysfunction. Normally, the athletes should be told to begin each night's sleep on the back because gravity will foster the return of muscles and soft tissue to their correct postural position. This position may be uncomfortable initially, especially for the athlete with a long-standing kyphotic/forward head problem. They should also be encouraged to assume a posterior pelvic tilt which may be more comfortably maintained with a pillow under the knees. The mattress should be firm and/or a board may be utilized between the mattress and box springs for better support.

When normal cervical/thoracic function is present, the athlete can comfortably sleep prone without a pillow and with the head fully turned to the right or left. Sleeping prone with the affected arm extended and under the head will continue to exaggerate symptoms in the athlete with rotator cuff or impingement syndromes. This will be noticed especially with night pain or in the morning as a result of prolonged narrowing of the joint space.

To orient the athlete to proper posture, he should stand with the heels approximately two inches from a wall. The buttocks should touch the wall and there should be enough lordosis to barely allow the hand to slide between the wall and the low back. Some posterior pelvic tilt may be required to reduce the

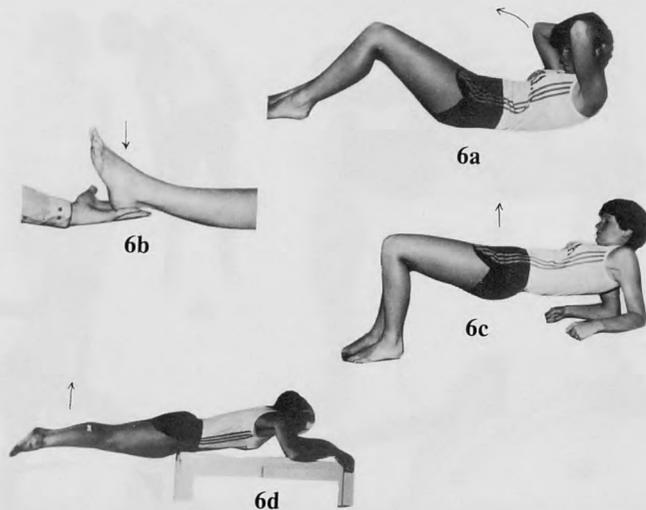


Figure 6. Low Back Strengthening Exercise. (a) *Curl-ups*: With the knees bent to maintain posterior pelvic tilt, roll head and shoulders up off the mat and return. The next curl up should be done rotating the body to the right. The third curl up rotates the body to the left. The athlete should not lift her waist off the floor. Hands should be behind neck for resistance or crossed on the chest. Repeat as many as comfortable. (b) *Heel Press*: Press left heel into the surface while supine to strengthen the back extensors, holding for 6 seconds. Repeat with right heel. (c) *Hip Raise*: Knees flexed and feet flat on the surface, raise hips with the pelvis tilted posteriorly until the body is in a straight line from the shoulders to the knees. Hold 10 seconds. (d) *Reverse Leg Lift*: Lift one leg off the table, hold for 2-6 seconds and return. Repeat with the opposite leg. Progress until both legs may be lifted simultaneously.

amount of lordosis. The scapulae and back of the head should both touch the wall. While standing, the athlete should be encouraged to stand tall with the eyes forward and knees extended but in a relaxed position. The athlete should attempt to maintain self-distraction of his head and neck from his shoulders, as if a string on top of the head is pulling it up. This technique is attained by tucking the chin. With this posture, the head and center of gravity should be over the pelvis and feet.

For posture correction while sitting, the athlete should have the head and neck supported whenever possible. When choosing an automobile, one should select a seat with a tilt of approximately 15 degrees. Many vehicles have bench-type seats that slant back 25 degrees or more, thus encouraging the kyphotic-forward head posture. The seat should provide good support in the lumbar and thoracic spine. Ideally, the car seat should have bilateral armrests and multiple electrical adjustments for individual comfort. The seat adjustment should be changed every 20-30 minutes on long drives. The headrest should be elevated for head and neck support as tolerated.

A chair with a high back and armrests of appropriate height is recommended for support to reduce cervical and thoracic stress. Frequent position changes will also aid in the prevention of resultant pain and dysfunction. A lumbar roll placed between the lumbar spine and the chair back may help maintain a normal lumbar lordosis and aid in preventing stress and pain from maintaining sustained static positioning. The feet should rest comfortably on the floor with the thighs comfortably supported by the chair seat.

All posture exercises should be incorporated into functional activity. The athlete should practice correct posture, such as standing with the back against the wall while observing the posture in a full length mirror for self analysis. (Figures 1a, 1b) Progress will be slow because exercises to these areas may result in pain and soreness if

performed in excess. Remind the athlete that postural changes will take constant awareness over a long period of time.

Postural Exercises

A postural exercise program should be individualized to the athlete's needs. Several examples of strengthening and stretching for the cervical, thoracic and lumbar regions are illustrated in Figures 2 through 6. These exercises should be taught to the athlete as preventative as well as therapeutic interventions so that the athlete can take responsibility for his body. All exercises should be done within pain free limits and the repetitions progressed as tolerated. The athletic trainer should emphasize that postural changes require modifications in lifestyle to maintain the body in its most balanced and efficient position.

Postural pain and dysfunction in athletics, is not only irritating, but can also prevent the athlete from obtaining his maximum performance. It is important to realize the development and stability of posture as well as to gain evaluative skills necessary to recognize athletic postural syndromes. Through a pre-season screening, postural problems can be identified. A program can then be implemented for the prevention of injury and the maintenance of correct postural alignment to better enable the athlete to achieve his maximum potential.

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ANSWERS TO PREVIOUS CEU CREDIT QUIZ

"On The Field Management of the Potentially Cervical Spine Injured Football Player"

- | | |
|------|-------|
| 1. a | 6. e |
| 2. a | 7. b |
| 3. d | 8. e |
| 4. b | 9. a |
| 5. c | 10. c |

CEU Credit Quiz

EVALUATION AND CORRECTION OF COMMON POSTURAL DYSFUNCTIONS IN THE ATHLETE

Joe H. Gieck, EdD, ATC, PT

Susan A. Foreman, MEd, ATC, MPT

Ethan N. Saliba, MEd, ATC, PT

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Questions	a	b	c	d	e
1. Athletes may develop postural problems from 1. overworked muscle groups. 2. underworked muscle groups. 3. trauma. 4. difference in leg length. <p style="margin-left: 100px;"> a. 1,2,3 b. 1,3 c. 2,4 d. 4 e. 1,2,3,4 </p>					
2. The secondary spinal curves which appear during a baby's development are a. kyphotic. b. cervical. c. lumbar. d. b and c e. a, b and c					
3. Swimmers and gymnasts who begin competing at a young age have an increased chance of developing postural imbalances. a. True b. False					
4. Lateral flexion of the spine is limited by the 1. interspinous ligaments. 2. supraspinous ligaments. 3. ligamentum flavum. 4. intertransverse ligaments. <p style="margin-left: 100px;"> a. 1,2,3 b. 1,3 c. 2,4 d. 4 e. 1,2,3,4 </p>					
5. In evaluating correct posture, the gravity line should lie posterior to the lateral malleolus. a. True b. False					

Questions	a	b	c	d	e
6. When an athlete bends forward at the waist, indications of a structural scoliosis include a. scoliosis disappears. b. "humping" of the scapula. c. both of these d. neither of these					
7. Athletes with a tendency to develop shoulder tendinitis and impingement syndromes include 1. tennis players. a. 1,2,3 2. baseball pitchers. b. 1,3 3. swimmers. c. 2,4 4. gymnasts. d. 4 e. 1,2,3,4					
8. Exercises to correct postural dysfunction should be performed 1. in front of a full length mirror. a. 1,2,3 2. after showering in the morning. b. 1,3 3. with little or no equipment. c. 2,4 4. to increase strength and flexibility. d. 4 e. 1,2,3,4					
9. Athletes with postural dysfunction should be instructed that the best position to begin each night's sleep is a. on the back. b. on the side. c. prone. d. none of these.					
10. For posture correction while sitting in a car, the athlete should choose a seat with a tilt of approximately a. 0 degrees. b. 5 degrees. c. 15 degrees. d. 25 degrees.					

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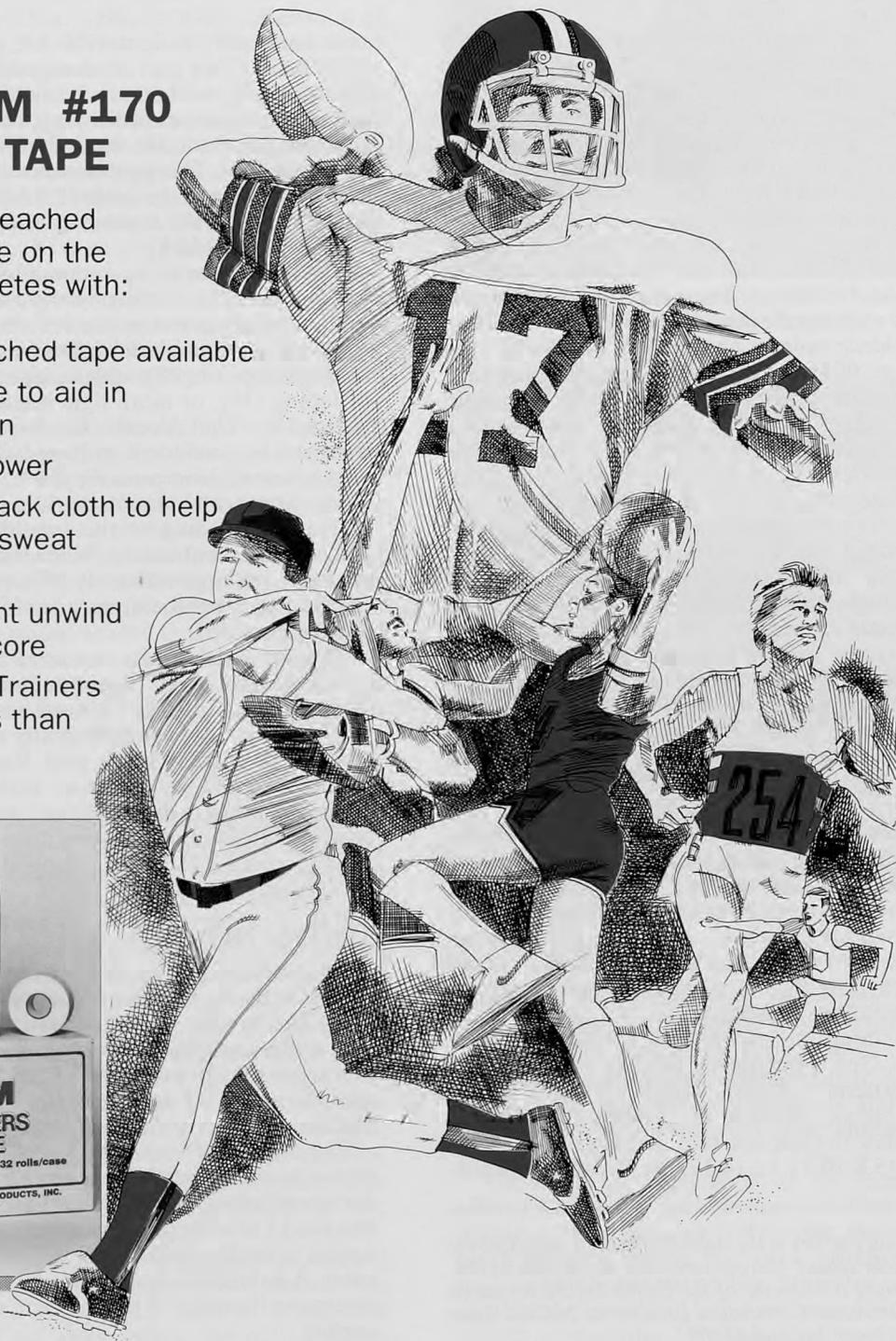
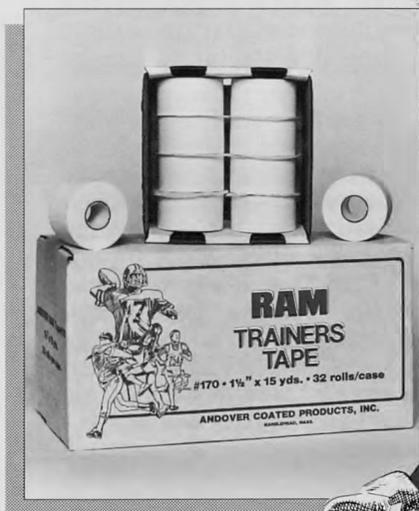
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Ankle Compression Variability Using the Elastic Wrap, Elastic Wrap with a Horseshoe, Edema II Boot, and Air-Stirrup Brace

Heather MacLeod Duffley, MA, ATC, CAT(C)
Kenneth L. Knight, PhD, ATC

ABSTRACT: Compression is universally used as part of immediate care of athletic injuries, but the pressure exerted has not been quantified. We used a closed system air cell attached to a pressure gauge to measure pressure exerted over the anterior talo-fibular ligament by an elastic wrap, elastic wrap over a horseshoe, Aircast Air-Stirrup Ankle Brace, and Camp Edema II Boot. They were applied by each of four athletic trainers to ankles of four different sizes four times each. There was a significant difference between the pressure exerted by the four devices ($F(3,189)=48.0$, $p=.001$), with the Air-Stirrup Brace exerting the least and the Edema Boot exerting the most (SNK Post Hoc Analysis, $p<.05$). Two athletic trainers applied both the elastic wrap ($F(3,60)=30.3$, $p=.001$) and horseshoe wrap ($F(3,60)=32.5$, $p=.001$) with greater pressure (SNK Post Hoc Analysis, $p<.05$) than the other two athletic trainers. There was also a significant difference among pressure applications to the different sized ankles ($F(3,189)=5.8$, $p=.0008$). Variability in application of the four trials by each athletic trainer for each device was evident by the large standard deviations when the trials were averaged, but no consistent pattern was evident. Pressures exerted in this study were great enough to decrease or occlude venous blood flow, raising concern regarding adequate circulation. They were similar to the intermittent pressures, exerted by pneumatic devices, which are believed to decrease edema. Application variability, due to different sized ankles, different devices, and differences within and between athletic trainers, is indicative of a haphazard and potentially harmful approach to compression application.

Compression is one of several commonly used methods for treating acute ankle sprains. The purpose of compression application is to prevent and/or reduce edema by restoring the pressure gradient (18), forcing fluid back into the venous capillaries and lymphatic system (7,18,20), increasing venous blood flow (4,13,16,21), and increasing lymph flow (8,17), all without compromising circulation or neurological function.

Treatments for injury induced swelling utilize two general types of devices. One is pneumatic devices, such as an air splint, Jobst Extremity Pump, Thera-Nu rapid pulsed pneumatic compression device, or Lympha-Press. These devices can regulate the amount, rate, and interval capacity of compression (5,8,10,11,12,14,17,20). Treatment proto-

cols using pneumatic devices are designed specifically to meet the primary goal of edema reduction. The second and most common method uses a device such as an elastic wrap, horseshoe under an elastic wrap, Aircast Air-Stirrup Brace, or Edema II Boot, for up to 24 hours per day for several days or weeks. This provides mostly unmeasured amounts of compression to the ankle (1,3,6,9,15,18,19). In addition to compression, the device may also support the limb during activity (1,2,6,15,19).

The elastic wrap is commonly used in treatment of injuries (4,9,19), although some researchers discourage its use as a compression device due to inconsistency in application (4) and lack of effectiveness (19). Others prefer an elastic stocking (8), athletic tape (19), pads under a wrap or taping (19), or more rigid semimolded ankle supports (1,3,6,15). The Aircast Air-Stirrup Ankle Brace was designed to produce a milking effect by using air-filled plastic liners to compress the ankle (6,15). The brace, when worn during ambulation, produces varying amounts of pressure, depending on the amount of talo-crural flexion and muscular contraction. When tested, pressure applied by the brace was approximately 25 mm Hg during rest, 50 mm Hg during weightbearing, and 75 mm Hg with forced dorsiflexion (15).

The beneficial effects on edema of compression applied by these devices are unsubstantiated, despite claims of success (9,14,15,18,19). Compression exerted by the devices available has not been sufficiently quantified to know the amounts of pressure being used. Research on variations in pressure caused by different athletic trainers applying different devices to different sized ankles is unavailable. The possible variability of pressure due to these factors needs to be addressed before protocols for treatment can be established.

METHODOLOGY

Four athletic trainers applied four different compression devices to the right ankles of four subjects, each day for four days. The devices were the elastic wrap, the elastic wrap over a plastazote horseshoe, the Aircast Air-Stirrup Ankle Brace, and the Camp Edema II Boot. Pressure was measured over the anterior talo-fibular ligament by a closed air cell bladder attached to a pressure gauge.

The design used was a 4x4x4 factorial with repeated measures on one factor. The design for the application of the devices was four 4x4 Balanced Latin Squares within a 4x4 Balanced Latin Square. Each athletic trainer applied each device, according to the order assigned to the design, to each ankle. A Balanced Latin Square design was also followed to determine the order of the ankles to which the devices were applied.

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The athletic trainers were four graduate students, two females and two males (age=24 ± 3.4 yr). They had completed 3.5 ± 2.0 undergraduate athletic training courses and all athletic trainers had completed five graduate level athletic training classes. They had accumulated 1750 ± 472 CATA and/or NATA approved clinical and field hours. One subject was NATA certified; the other three were eligible for NATA certification.

The measuring device, a closed air system, consisted of a gauge which read up to 100 inches of water, attached by 1 mm tubing to a 3 cm air cell containing a small compressible piece of foam (Figure 1). The air cell was placed over the anterior talo-fibular ligament area on the lateral side of the ankle and held in place with tape. The position of the air cell was marked on the ankle and the same placement was used on each trial. The gauge was placed so that neither the subject nor the athletic trainer could see the pressure readings.

The right ankles of four subjects with different foot lengths were used: 8.5, 9.5, 10.5, and 11". Each ankle was placed at a 90° angle as measured by a goniometer before the application. The distance from a mark on the base of the first metatarsal to a mark on the tibia was used to check proper foot position. The individual held the ankle in this position while the device was applied, foot position was rechecked and corrected if necessary, and then a recording was taken from the pressure gauge. Measurements were converted to millimeters of mercury prior to analysis.

A 4" x 5' elastic wrap was applied in figure-of-eights, starting distally and continuing until all the wrap was used.

The elastic wrap over a horseshoe was applied by placing a plastazote horseshoe on the lateral side of the ankle, covering the air cell and then applying the wrap in figure-of-eights over the horseshoe.

The Aircast Air-Stirrups Ankle Brace (Figure 2) consisted of one component which was applied in accordance to the instruction manual (1), using the brace with the air supplied by the manufacturer. For the purpose of this study, athletic trainers added no additional air to the air cells.

The Camp Edema II Boot consisted of a compression pad and a boot (Figure 2). The lateral compression pad was placed on the lateral side of the ankle, covering the air cell, and then the boot was placed around the lower leg and foot according to the instruction manual (3).

Prior to testing, each athletic trainer was given an opportunity to become familiar with the devices and to practice applying each device once.

RESULTS

There was a difference among the pressures applied by the four devices ($F(3,189)=48.05, p=.001$). (See Table 1 for means and standard deviations.) The Air-Stirrups Brace exerted significantly lower pressure than the other devices (SNK Post Hoc Analysis, $p<.05$), and the Edema II Boot exerted significantly greater pressure than the others (SNK Post Hoc Analysis, $p<.05$). There was no significant difference between the elastic wrap and the horseshoe wrap.

The athletic trainers applied the devices with different pressures ($F(3,189)=37.66, p=.001$). Athletic trainers 2 and 4 exerted more pressure than athletic trainers 1 and 3 with both the elastic wrap ($F(3,60)=30.3, p=.001$; SNK Post Hoc Analysis, $p<.05$) and the horseshoe wrap ($F(3,60)=32.5, p=.001$; SNK Post Hoc Analysis, $p<.05$). With the Air-Stirrups, athletic trainer 2 exerted greater pressure than athletic trainer 3 ($F(3,60)=2.63, p=.058$; SNK Post Hoc Analysis, $p<.05$).

The least amount of pressure was applied to Ankle 3 (large) (49.2 ± 22.2) and the greatest amount of pressure was applied to Ankle 4 (x-large) (59.7 ± 25.6). When each device was analyzed for ankle effect, the only pressure

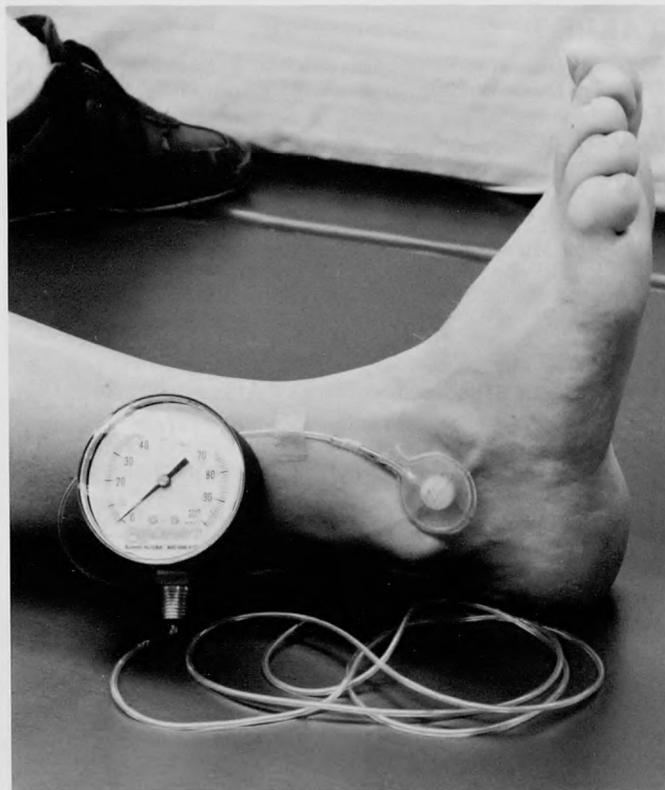


Figure 1. Manometer attached to ankle for measuring compression applied over the anterior talofibular ligament.

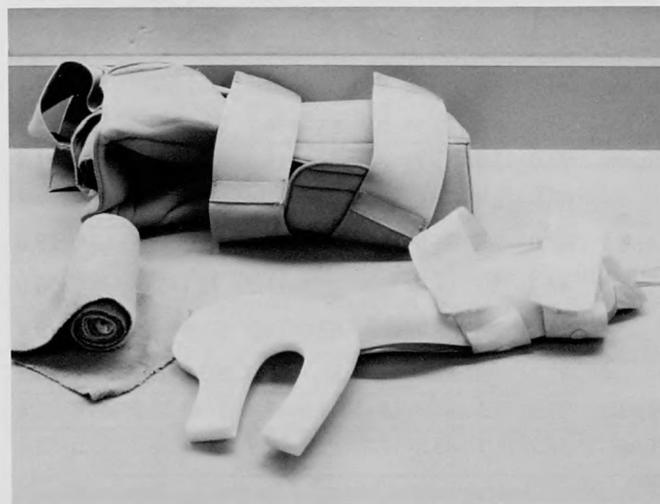


Figure 2. Four compressive devices used in this study. Proceeding clockwise from the elastic wrap are the Camp Edema II Boot, Aircast Air-Stirrups, and plastizote stirrup.

difference among the ankles was evident with the Edema II Boot ($F(3,60)=5.3, p=.003$), which when applied to the x-large ankle resulted in significantly (SNK Post Hoc Analysis, $p<.05$) greater pressures than application to the other ankles. Pressure applied by the athletic trainers was not affected by the different sized ankles ($F(9,189)=.86, p=.57$).

Variability in application of the four trials by each athletic trainer for each device is evident by the standard deviations seen in Table 1. However, there was no effect of the four trials on the pressures exerted ($F(3,189)=1.93, p=.13$) despite the variability. Standard deviations for the combined means of all four devices and four ankles for each subject were similar. Of the devices, the Air-Stirrups had the

TABLE 1

Pressure (mm Hg) Exerted on Each of Four Ankles by Four Different Devices After Application by Four Different Athletic Trainers (Means + Standard)

	Device				Total
	Air-Stirrup	Horseshoe Wrap	Elastic Wrap	Edema Boot	
Athletic Trainer 1					
Ank 1	39.7+ 6.0	32.5+13.1	39.5+ 7.3	63.8+28.9	43.9+19.0
2	35.8+16.2	39.3+ 1.7	36.7+ 9.8	57.7+16.7	42.4+14.2
3	34.8+10.0	37.4+ 9.6	26.6+ 1.8	65.0+32.3	41.0+21.7
4	38.6+18.4	39.7+ 8.4	36.9+ 5.8	91.2+36.4	51.6+30.2
Subtot	37.2+12.3	37.2+ 8.7	35.0+ 7.9	69.4+29.2	44.7+21.0
Athletic Trainer 2					
Ank 1	39.0+ 4.3	50.3+16.1	79.0+10.3	72.2+14.4	60.1+19.9
2	48.4+4.2	67.7+ 9.8	82.5+12.7	68.5+14.5	66.7+15.9
3	39.0+ 8.0	64.0+21.3	52.1+17.2	86.0+19.1	60.3+23.5
4	50.5+10.8	59.1+ 6.5	61.5+10.0	93.7+11.2	66.2+19.1
Subtot	44.2+ 8.5	60.2+14.7	68.8+17.3	80.1+17.1	63.4+19.6
Athletic Trainer 3					
Ank 1	28.8+16.0	31.1+ 5.6	36.9+10.6	47.0+32.1	35.9+18.4
2	31.8+ 7.1	32.7+ 3.9	33.9+ 6.8	51.2+32.7	37.4+17.5
3	31.8+17.6	28.3+ 8.4	28.8+ 3.1	63.1+23.7	38.0+20.4
4	43.5+ 6.5	43.5+ 5.2	51.4+36.2	74.8+32.0	53.3+25.6
Subtot	34.0+12.9	33.9+ 8.0	37.8+19.3	59.0+29.4	41.2+21.4
Athletic Trainer 4					
Ank 1	29.0+ 9.8	65.9+14.9	93.3+ 5.6	59.8+35.5	62.0+29.6
2	42.3+ 5.7	66.6+ 5.9	93.7+11.1	70.1+7.0	68.2+20.0
3	40.7+ 3.5	58.7+17.3	63.8+14.2	67.0+10.8	57.6+15.4
4	37.2+ 6.5	67.6+ 6.7	65.7+ 6.9	100.8+10.2	67.8+24.3
Subtot	37.3+ 8.1	64.7+11.4	79.1+ 7.4	74.4+23.8	63.9+22.8
Total	38.2+11.1	49.0+17.4	55.2+24.9	70.8+26.0	53.3+23.8

*Column subtotals include 16 measurements, totals include 64 measurements.

smallest standard deviation, indicating that it was applied with the greatest consistency.

There was no interaction ($F(27,189)=.68, p=.08$) between athletic trainers, ankles, and treatment.

DISCUSSION

The insignificant variance found among trials is misleading. On examination of the standard deviations seen in Table 1, inconsistency of application is evident. There is so much variation between trials of each of the athletic trainers for each device and ankle that it does not follow any consistent pattern, making the variation completely random and about equal for all athletic trainers. Some devices exerted greater pressures, or were more affected by subject applications or by ankle sizes, than others. This information

is valuable for deciding what the most appropriate ankle compression device is, depending on the treatment goal. If consistency of compression is a concern, either in teaching compression techniques or in clinical use of compression, emphasis needs to be placed on using a consistent form of compression, such as the Air-Stirrup used in this study.

The fact that neither ankles, athletic trainers, nor trials significantly affected the Aircast is not surprising, since the device did not require much adjustment during application. The brace was one standard size with adjustments made to the width of the heel stirrup and then to the tension applied to the two non-elastic straps which held the device in place. For this study, no air was added to the cells, since amounts of air could not be measured. Fitting and pressure may have varied more had athletic trainers been allowed to add air.

The pressure exerted by the Air-Stirrup in this study was considerably greater than the pressure reported (25 mm Hg) by Stover (15). The difference may be accounted for by difference in measuring device, technique and foot position. Stover (15) measured pressure by a pressure manometer attached to the air-cell valve of the Air-Stirrup. Pressure readings represented pressure caused by the leg and foot against the whole air cell. We measured the pressure exerted by the device to a small area of the ankle. In both studies, the foot position was non weight bearing but Stover did not report the degree of dorsiflexion of the ankle, which in our case was 90°.

The Edema II Boot was similar to the Air-Stirrup Ankle Brace in that both devices were pre-fitted, pre-constructed braces. The Edema II Boot exerted greater pressure, possibly due to the construction and placement of the closing straps. The straps were made of elastic, so more tension was exerted by stretching the straps than was possible with the Air-Stirrup closing straps. The velcro attachments were small which allowed little variability in the placement of the straps. Also, the velcro attachments were placed on the boot so that the straps had to be stretched to reach the attachments. This could explain why application to the x-large ankle produced greater pressure than application to the other ankles.

The Edema II Boot was the only device that was not significantly affected by different athletic trainers when applied to ankles of the same size, since the straps causing the pressure were basically designed to be attached to the same spot on the boot.

The pressure exerted by an elastic wrap depended on the athletic trainer who applied it, which was not true with the Air-Stirrup and the Edema II Boot. The tension on the elastic wrap during application and the resulting pressure caused by the tension was controlled by the athletic trainer. The characteristics of the wrap, such as the tensile strength, durability, stretch ability, and width, may have had some effect on how much tension the athletic trainer put on the wrap and the resulting pressure. Since no significant difference was found among the trials, little change in elasticity and tensile strength seems to have occurred, even after repeated use. It would be beneficial to study application of various styles of elastic wraps to see how construction of the wrap affected the pressure exerted.

The pressure exerted by the elastic wraps was greater than that reported by Linde et al. (9, $M=11.6$ mm Hg). They did not describe their subjects, whereas ours were moderately experienced athletic trainers with some background in compression techniques. Also, Linde et al. (9) measured pressure with a slightly distended blood pressure cuff.

Yamaguchi and others (21) reported pressure means of 36.6 ± 15.6 mm Hg for unskilled application of elastic wraps and 34.1 ± 4.7 mm Hg for skilled application of elastic wraps. While the difference between the means was small, the standard deviations indicated that skilled application

was more consistent. In our study, pressure was greater than either group and the standard deviation was higher, suggesting a greater amount of individual variability, despite the high level of skill of our athletic trainers.

Pressure exerted by the wrap over a horseshoe was no different from pressure exerted by the elastic wrap alone. As with the elastic wrap, the horseshoe wrap pressure was dependent on the athletic trainer. Note that the horseshoe underneath the wrap did not change the average amount of pressure. This contradicts the theory that a horseshoe increases the pressure under it when used with a wrap (17). The material of the horseshoe, plastazote, is a rigid foam which is not easily compressed. A softer material may allow more of the pressure to be transmitted through to the skin surface. Since the plastazote is so stiff, it does not immediately form to the shape of the surface to which it is being applied. Had this study incorporated a molding phase in the horseshoe application, pressure may have been different.

We did not intend to examine the difference between application of the devices by males and females, but a trend became apparent with the elastic wrap and horseshoe wrap. With both devices, the males applied significantly greater pressure than the females. More subjects of both genders need to be studied to determine if this is a common occurrence.

The pressure exerted in this study may have been great enough to diminish or occlude venous blood flow (4,13,16,21). The pressures found to increase venous flow are lower (4,13,16,21). The pressures in our study were also greater than the pressures Matsen and Krugmire (10) used continuously for 65 and 90 hours, to significantly decrease post-fracture swelling. Some of the pressures were similar to the intermittent pressures exerted by pneumatic devices, which were believed to decrease lymphedema and acute edema from injury (8,11,14,17). It may not be necessary to use the amounts of pressure we applied to achieve edema reduction. In any case, we should be cautious about the amount of compression we apply, in order to ensure adequate circulation.

The four devices studied here are just a few of the wraps, boots, braces, and materials commonly used to compress the ankle. It is probable that the variability found in pressures exerted by these four devices also occurs with other devices. Difference in pressure exerted among athletic trainers depends on the device as well as the application. This should be considered when teaching methods to compress the swollen ankle, since some apparatuses can be applied more consistently than others and some athletic trainers can apply devices more consistently than others.

While this study quantified the amount of pressure applied, nothing suggested the optimal pressure, if indeed there is one. This still needs to be explored.

It is apparent from this study that more research is needed to understand and quantify the response of the body to external compression. The use of ice, compression, and elevation are standard procedures for treating acute sports injuries. If the variability of application between and within our subjects is true for all athletic trainers, then either we often apply compressive devices with less or more than optimal pressure or the amount of pressure exerted by the device does not matter. Our clinical impression is that compression is vital to immediate care. Is the range of pressure also vital?

Acknowledgement

We gratefully acknowledge the manufacturers of each of the devices for donating the devices in this study. In addition, Walter Johnson of the Aircast Corporation supplied the manometer.

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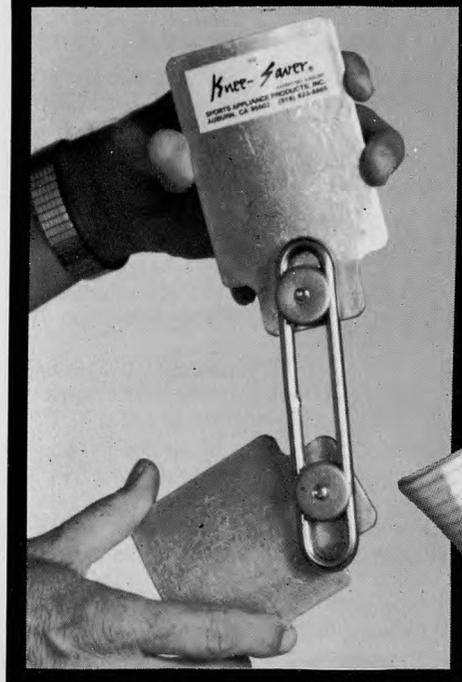
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Role of the Athletic Trainer in the Use of Inhaled Bronchodilators

Eva J. Clifton, MA, ATC
G. Dennis Clifton, Pharm D

ABSTRACT: *A large number of asthmatic individuals currently participate in sports events. Recent advances in the pharmacologic treatment of asthma are key factors allowing athletic participation of asthmatic individuals interested in sport and exercise. Of the many therapeutic agents available, the beta₂ agonists are the drugs of choice for acute exacerbations of chronic asthma, for intermittent symptoms, and for protection from exercised-induced asthma. Inhalation of beta₂ agonists is preferred for the treatment or prevention of bronchospasm. Beta₂ agonist aerosols are generally administered by metered dose inhaler (MDI). Many asthmatics utilize MDIs improperly. This is a significant problem, since technique is the major determinant of the dose delivered to the lung. Proper use of these aerosols may increase the likelihood that the asthmatic athlete can participate safely and competitively. Athletic trainers can play a key role in assuring that asthmatic athletes are knowledgeable about their medications and their proper use. This paper briefly reviews the pharmacology, adverse effects, proper use, and banned drug status of the beta₂ agonist aerosols.*

The increased involvement of asthmatics in a wide range of sports has been largely the result of advances in the pharmacologic treatment of asthma and exercise-induced asthma. Particularly important for the asthmatic athlete has been the development and availability of potent beta₂ agonist bronchodilator aerosols. Aerosol therapy with beta₂ agonist drugs currently constitutes the most widely used approach to the management of asthma and other diseases associated with bronchospasm (1).

Athletic trainers may regularly encounter athletes with asthma since the overall prevalence of asthma is estimated to be approximately 6.5% (3). In male and female children aged 10-14 years, the prevalence is slightly higher at approximately 8.5% (3). The exact incidence of athletes suffering from exercise-induced asthma is difficult to estimate. In the 1984 summer Olympic games 67 out of 597 (11.2%) American athletes were reported as having exercise-induced asthma (4). The number of individuals with asthma participating in athletic competition should compel athletic trainers to be knowledgeable about medications used by these athletes. Because of their widespread use and potential for incorrect use, athletic trainers should be particularly familiar with beta₂ agonists that are administered by inhalation. The purpose of this article is to enhance the athletic trainer's awareness of the pharmacologic properties and proper use of aerosolized beta₂ agonist bronchodilators.

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ASTHMA AND EXERCISE-INDUCED ASTHMA

The American Thoracic Society defines asthma as a disease characterized by increased responsiveness of the tracheobronchial tree (1). The major symptoms of asthma include a sudden onset of difficult breathing, wheezing, and coughing, which may vary from mild and almost undetectable to severe and unremitting (status asthmaticus). Although the etiology of asthma is not completely understood, the pathophysiologic features include smooth muscle spasm, mucosal inflammation and edema, and mucus hypersecretion (17). The increased responsiveness results from a variety of stimuli, including drugs and chemicals, cold air, viral respiratory tract infections, psychological factors, atmospheric irritants, and exercise (1). Of these stimuli, exercise and atmospheric irritants are particularly relevant to the athlete.

Seventy to 90 percent of all asthmatics experience exercise-induced asthma (5). Although many mechanisms for exercise-induced asthma have been proposed, current theories suggest that hyperventilation and exercise liberate bronchoconstricting mediators by cooling the mast cells in large and small airways (6). In a person with asthma, 6 to 8 minutes of submaximal exercise induces bronchoconstriction, which peaks 5 to 10 minutes after exercise and spontaneously resolves over the next 45 to 60 minutes (11,15). For a short period (1-3 hours) following exercise, the individual may be relatively refractory to further attack. The exact mechanism responsible for occurrence of the refractory period remains obscure (6). Exercise-induced changes of lung function may also occur in subjects with allergic diseases other than asthma, such as hay fever (6).

MANAGEMENT OF ASTHMA

Because of the intermittence of asthma, the increased responsiveness, inflammation, edema, and hypersecretion of the airways can vary greatly from one person to another as well as within the same person (17). As a result, the decision to treat asthma, the selection of the drug, and its route of administration depend on the frequency and severity of symptoms experienced by the individual.

The agents currently available for the management of asthma include beta₂ agonists, theophylline products, anticholinergic agents, corticosteroids, and cromolyn sodium. Beta₂ agonists have become the drugs of choice for acute exacerbations of chronic asthma, for intermittent symptoms, and for protection from exercised-induced asthma (1,5). Beta₂ agonists used for treatment of asthma along with their possible routes of administration are shown in Table 1.

Although a complete review of the sympathetic nervous system and the pharmacology of beta₂ agonist bronchodilators is beyond the scope of this article, a brief summary is appropriate. Receptors of the sympathetic nervous system are divided into two major subgroups — beta and alpha. Stimulation of alpha receptors results in vasoconstriction,

urinary retention, and pupil dilation. Beta receptors include beta₁ and beta₂ receptors. Beta₁ receptors are primarily located in the heart and result in increased heart rate and increased myocardial contractility when stimulated. Beta₂ receptors are found in a variety of organs including the lung. Stimulation of beta₂ receptors in the lung result in bronchodilation. Stimulation of these same receptors in other organs result in vasodilation, insulin secretion, and uterine relaxation, to name a few (19). All beta₂ agonist bronchodilators commercially available are chemically related to the endogenous circulating hormone, epinephrine (adrenaline). Various modifications in the chemical structure of the compounds have been made to improve their specificity for the beta₂ subtype of adrenergic receptor, improve their potency, and prolong their duration of action (12). Beta agonists work presumably by attaching to and stimulating beta₂ receptors located in the smooth muscles of the airway. Stimulation of these receptors results in a cascade of events eventually leading to relaxation of the bronchial smooth muscle (2).

Adverse effects of beta₂ agonists result primarily from stimulation of sympathetic receptors in other areas of the body. The most common adverse effects include rapid heart rate, skeletal muscle tremor (usually noted as hand tremor), and nervousness. Other more serious side effects, such as cardiac arrhythmia, myocardial ischemia, and infarction, have been reported only rarely (12).

The incidence and severity of toxicity are directly related to the amount of drug present in the systemic circulation. The concentration of drug in the bloodstream is, in turn, directly related to the method of its administration. Side

TABLE 1

Beta₂ Agonists Available for Asthma Treatment

Beta ₂ Agonist Bronchodilators Generic name (Brand name)	Available Routes of Administration
Albuterol (Ventolin, Proventil)	O,A
Bitolterol (Tornalate)	A
Isoproterenol (Isuprel, others)	O,A,I
Isoetharine (Bronkometer)	A
Metaproterenol (Alupent, Metaprel)	O,A
Pirbuterol (Maxair)	A
Terbutaline (Brethine, Bricanyl)	O,A,I
Epinephrine* (Primatene Mist)	A,I

O = oral, A = aerosol, I = injectable

*aerosol form available over-the-counter

TABLE 2

Steps For Correct Use of Metered Dose Inhalers

1. Shake the canister thoroughly.
2. Breath out slowly and steadily.
3. Place the mouthpiece between lips; make sure teeth and tongue are out of the way.
4. Just after beginning a slow, deep breath, activate the canister.
5. At the end of the complete inspiration, hold breath for approximately 10 seconds.
6. If a second inhalation is called for, wait at least 2 minutes.



Figure 1. A metered-dose inhaler (MDI) as used by an asthmatic individual.

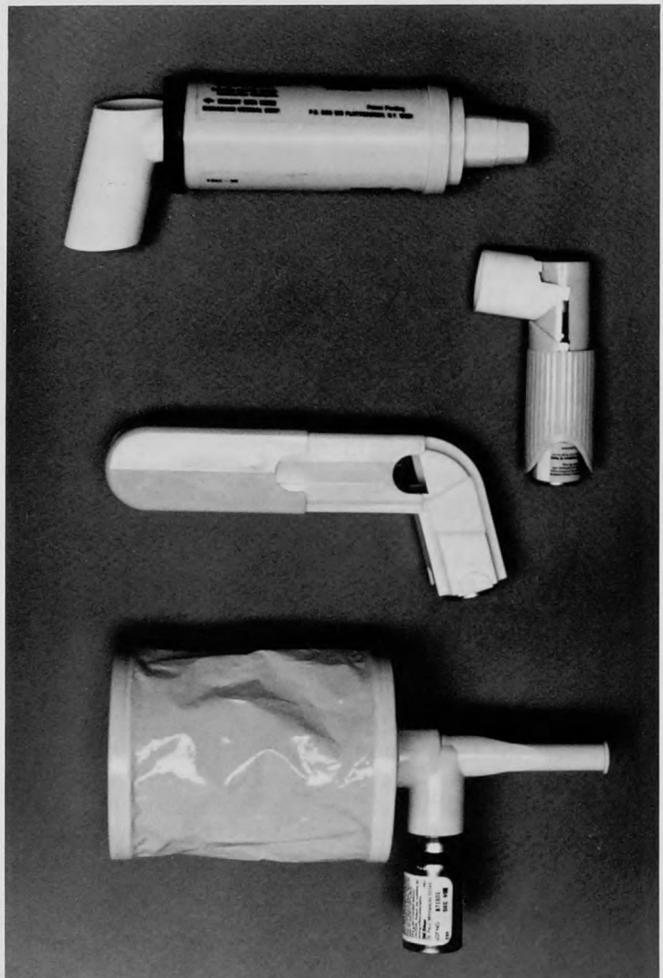


Figure 2. Examples of tube spacer devices used with metered-dose inhalers.

effects are common following injection or oral administration of beta₂ agonists (7). Conversely, after inhalation of normal doses of these agents, side effects are negligible. A high degree of efficacy and low incidence of side effects following inhalation is the result of the drug being delivered directly to the site of action, with only small amounts reaching the systemic circulation (10). Adverse effects are also related to the specificity of the drug for the beta₂

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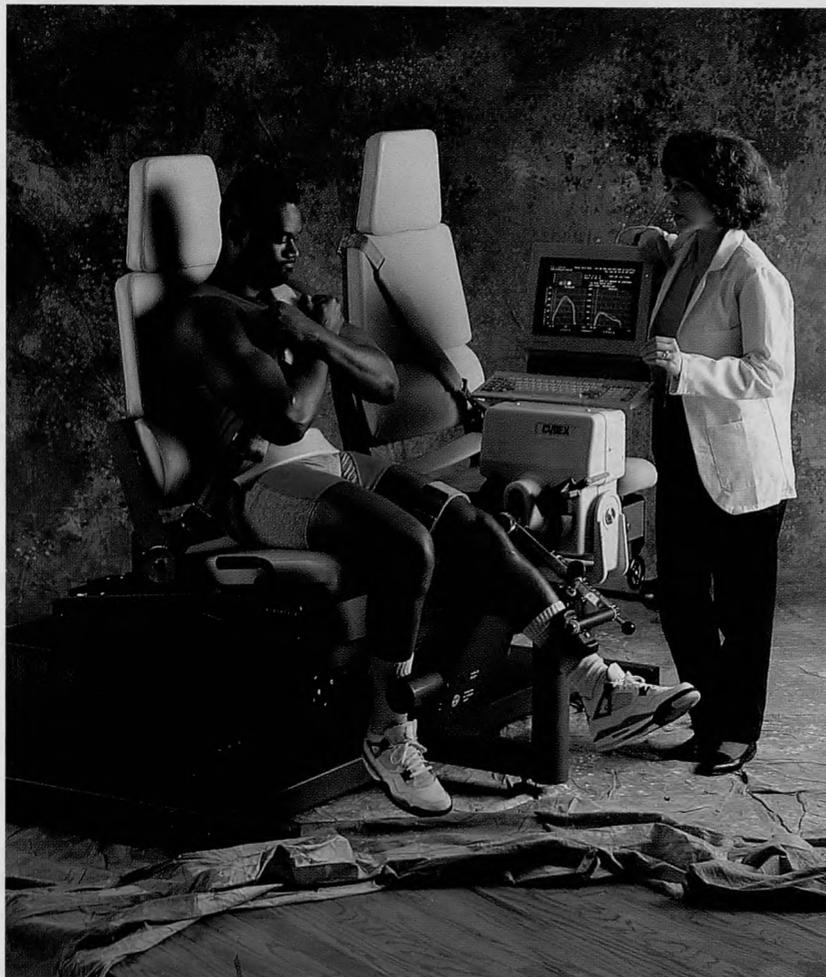
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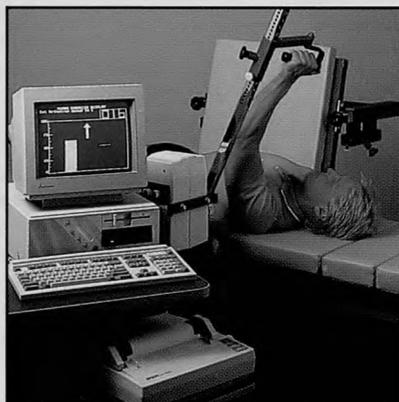
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receptor. Agents that stimulate beta₁ and/or alpha receptors are associated with a greater incidence of undesired effects. Isoproterenol and metaproterenol are the least selective of the currently marketed prescription beta₂ agonists administered by MDI (19).

Due to the efficacy, convenience, and low incidence of side effects, inhalation of beta₂ agonists is preferred for treatment of acute and intermittent asthma, and for protection against exercise induced asthma (1,5). Although inhalation may be performed by a variety of techniques, the most convenient and least expensive method is by MDI.

An MDI (Figure 1) consists of a small pressurized canister containing a fluorocarbon propellant, a vehicle (solvent), and active drug. Activation of the MDI results in the formation of tiny droplets (atomization) of the pressurized liquid. The droplets, containing active drug, are inhaled by the patient and deposited in the airways. Proper technique when using MDIs is of critical importance since it is the major determinant of the dose delivered to the lungs (12). Table 2 outlines the proper technique for use of MDIs.

Incorrect use of MDIs can decrease and even negate drug efficacy. Unfortunately, 14-45% of patients have been shown to have major errors in technique (12). Inadequate instruction by physicians and pharmacists is an important reason for inappropriate technique. Additionally, most patients lose proper technique over time if not reminded or retrained (9). The major problem in technique, however, is the inability to adequately coordinate activation of the MDI and inspiration (14). A common error is to stop breathing entirely or breath through the nose when the aerosol is released into the mouth.

A tube spacer, which attaches to the mouthpiece of an MDI (Figure 2) can be utilized in patients unable to develop proper technique. The device acts as a holding chamber in which the medication is sprayed before inhalation by the patient. In individuals with poor technique, tube spacers improve lung deposition of the drug by decreasing the need for accurate synchronization (9). In general, however, a tube spacer provides no additional benefit over a properly used MDI without a tube spacer (9). One exception may be the treatment of an acute asthmatic attack where tube spacers may be superior to the MDI alone.

Two other problems with MDIs are overuse and improper timing of use. A potential consequence of beta₂ agonist bronchodilator overuse is that the drug's effectiveness may decline over time (8). The timing and frequency of MDI use depends on the frequency and severity of symptoms. Individuals with intermittent symptoms may only need their aerosol from time to time, while those with chronic asthma may need to use their inhaler on a regular schedule to control symptoms. For exercise-induced asthma, prophylactic use of the MDI 15 minutes prior to exercise is effective in preventing symptoms for 2 to 4 hours (5). Understanding the proper timing of MDI use by the asthmatic athlete is important in preventing overuse or underuse of the medication.

BANNED DRUG STATUS OF BETA₂ AGONISTS

The NCAA currently allows the use of bitolterol, metaproterenol (orciprenoline), albuterol (salbutamol) and terbutaline for the treatment of asthma (16). Interestingly, the NCAA makes no mention of which, if any, routes of beta₂ agonist administration are not allowed. Conversely, the United States Olympic Committee (USOC) permits only the aerosol forms of albuterol, terbutaline and rimiterol (not available in USA) to be used in asthmatics (18). Both the NCAA and USOC allow the use of theophylline and cromolyn sodium for asthma. The NCAA also allows the use of inhaled beclomethasone (a corticosteroid) and

atropine (an anticholinergic agent).

There is little evidence to suggest an ergogenic effect of sympathetic agonists that are specific for beta₂ receptors. These agents, particularly when inhaled in normal doses, stimulate the heart or central nervous system (CNS) minimally, and thus are not classified as doping agents (3). If an ergogenic potential does exist for beta₂ agonists, it would be expected from those administered orally or by injection since the higher systemic concentrations of these drugs could result in stimulation of cardiac and CNS adrenergic receptors.

OVER THE COUNTER BETA₂ AGONIST BRONCHODILATORS

Currently, the only beta₂ bronchodilator available over-the-counter in the United States is epinephrine (i.e., Primatene Mist®, Bronkaid®). These products are effective bronchodilators if used properly. The disadvantages of epinephrine compared to the other bronchodilators, however, are its lack of specificity for the beta₂ receptor and its shorter duration of action (1,13). Epinephrines lack of specificity results in a greater incidence of side effects such as rapid heart rate, increased blood pressure, and CNS stimulation. Additionally, the drug is banned from use in competition by both the USOC and NCAA owing to its potential ergogenic effects. Epinephrine's rapid metabolism necessitates more frequent dosing to maintain the desired effect.

ROLE OF THE ATHLETIC TRAINER

The potentially high number of athletes that experience bronchospasm with exercise demands that athletic trainers be knowledgeable of medications used by these athletes. The athletic trainer, through daily contact with the athlete, can check for proper inhaler technique on a regular basis and ensure that the athlete understands the proper frequency and timing for aerosol administration. Athletes with exercise-induced asthma, for example, should be instructed to use the inhaler 15 minutes prior to performance. Athletic trainers should also be familiar enough with MDIs to assist an athlete suffering from an acute asthmatic attack. Knowledge of correct use of beta₂ agonist bronchodilators by the athletic trainer and athlete may minimize the risk of serious asthmatic symptoms.

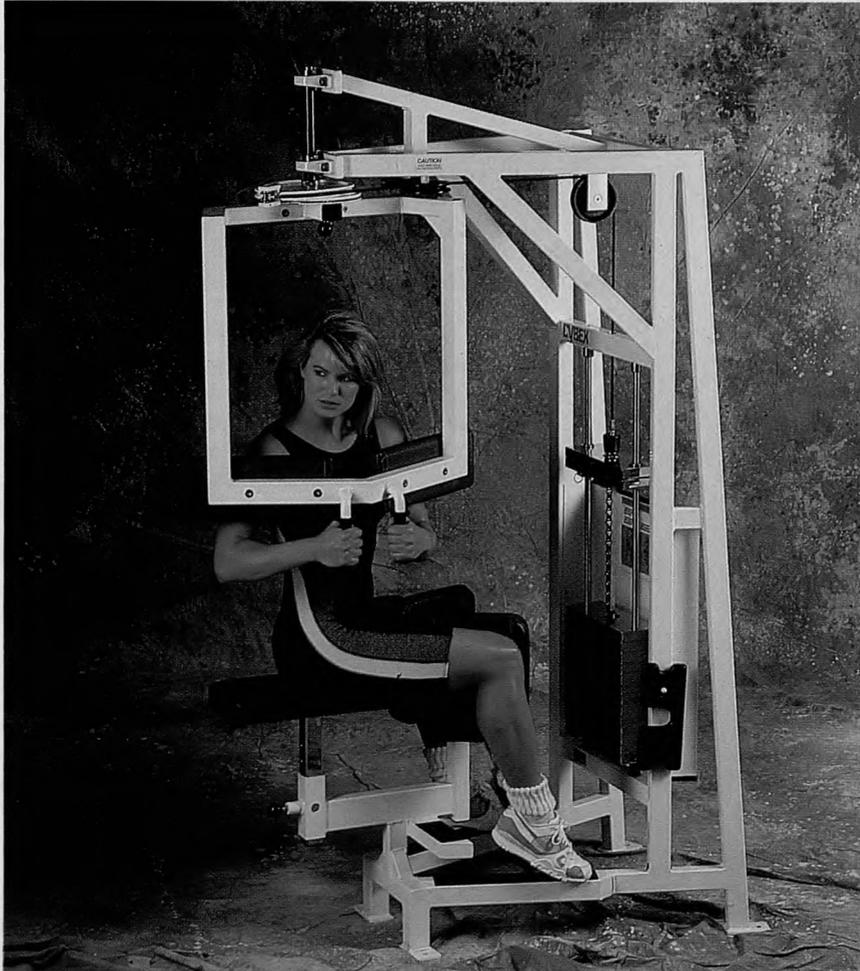
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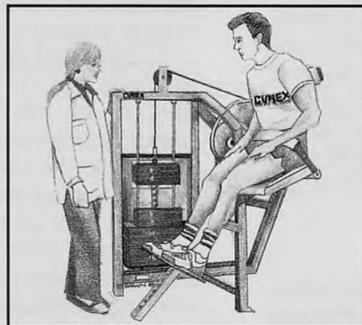


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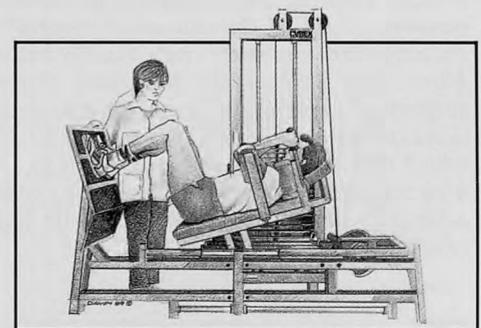
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STRENGTH SYSTEMS

Undergraduate Athletic Training Education Programs: Aspects of Their Operation, Administration, and Structure

Thomas G. Weidner, PhD, ATC

ABSTRACT: *The purpose of this study was to examine selected aspects of the operation, administration, and structure of NATA-approved undergraduate education programs. Data were gathered through a self-reporting questionnaire designed specifically for the study. A total of 51 (93.0%) NATA program directors responded to the survey. For recording practical experience, 35.3% of all student athletic trainers used individual, weekly clinical hour log sheets. Student progress was formally evaluated in 74.5% of the programs with 96.1% of these evaluations reviewed in individual student conferences. The responsibility for scheduling student athletic trainer clinical hours was divided about equally between the head athletic trainer, the assistant athletic trainer, and the program director. Students were required to work with both men's (51.0%) and women's (49.0%) sports. In 56.9% of the programs, students were required to wear a uniform or adhere to a dress code. A majority (82.4%) of the programs conducted pre-season in-service sessions to review various procedures. About half (54.9%) of the program directors indicated that their programs engaged in fund-raising activities. Regarding program administration, 29.4% of the programs had a constitution. Student athletic trainer manuals were used in 78.4% of the programs and usually contained similar information. The position of Head Student Athletic Trainer existed at 35.3% of the schools. Many of the program directors (37.3%) indicated that they met weekly with the athletic training staff. Regarding various program components, 51.0% of the education programs had an athletic training club, and these clubs usually had similar functions. More than half of the programs organized orthopedic surgery, physical therapy, and/or orthopedic clinic observation experiences for their students. Of 45.1% of the programs which reported using affiliated settings, 31.4% were at the high school level. Further research is needed in the area of athletic training education, and it is imperative that the results be shared.*

This study examined selected aspects of the operation, administration and structure of NATA-approved undergraduate athletic training education programs. Its intention was to apprise both program directors (curriculum and internship) and NATA Professional Education Committee evaluation team members of the

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approaches other athletic training education programs are taking in the professional preparation of their students.

SURVEY INSTRUMENT

Data were gathered through a self-reporting questionnaire designed specifically for the purpose of the study. With input from selected Professional Education Committee members, I developed the general items listed on the questionnaire as well as the areas to be investigated (see Table 1). After testing the survey instrument on nine NATA-approved undergraduate athletic training education programs, I further refined the questionnaire, then mailed the completed instrument to the remaining 55 program directors of NATA-approved undergraduate athletic training education programs.

RESULTS

A total of 51 (93.0%) of the 55 program directors surveyed responded to the questionnaire (results in Table 1). The internal consistency of these results is summarized in Table 2.

DISCUSSION

The study contributes to our general understanding of the operation, administration, and structure of NATA-approved undergraduate athletic training programs. It has revealed some helpful alternate approaches, and has reaffirmed those approaches already in use. Certain elements could be incorporated into the Program Self-Evaluation material for review purposes, both by program directors and by on-site evaluation teams. Responses provided by the program directors indicate that NATA-approved education programs tend to be similarly arranged, although guidelines for program structure, components, and operation are not as specific as they are for curriculum and skill competencies.

Two questions arise from this research: What is the effectiveness of such program components in the overall educational process? How do we ascertain and measure the impact of these components on the development of athletic training professionals?

It seems that some differences between programs could create differences in the preparedness of an entry-level professional. For instance, the reported variation in the frequency of staff meetings seems to suggest that communication among clinical supervisors may not be at an optimum level for providing adequate discussion and coordination of clinical experiences for student trainers. Further, the use of allied medical settings in NATA-approved education programs suggests that such experiences are not given to enough program graduates (assuming that these experiences are beneficial).

A possibility for revealing the influences of such program differences may come through a post hoc analysis of students' perceived benefits of selected program components on their job readiness during their first year of athletic training employment. This may also be expanded to include their perceived benefits of curricular offerings and skill competencies. These recommendations for improvements in program administration, operation, and structure could prove to be valuable.

As NATA-approved education programs grow and develop, a current status report regarding various program components could be used as a baseline for determining progress. Unique approaches should also be shared in an effort to improve athletic training education.

Acknowledgement

I would like to thank Peter Howell for his assistance in both developing the survey instrument and conducting its mailing.

TABLE 1
Survey Instrument and Responses

Instructions: Please respond to the three sections of this questionnaire as accurately and completely as possible. Checkmark all applicable responses.

Part I: Program Procedures and Operations

1. How do students in your program record their clinical hours?
 - (2) 3.9% a. community weekly hour sheet
 - (6) 11.8 b. community monthly hour sheet
 - (18) 35.3 c. individual weekly hour sheet
 - (2) 3.9 d. community semester log book
 - (11) 21.6 e. individual log book (for entire length of time in program)
 - (22) 43.1 f. clinical hours recorded in student's file at regular intervals
 - (19) 37.3 g. time sheets maintained in each clinical setting in the program (e.g., training rooms, physical therapy, etc.)
 - (11) 21.6 h. other responses: individual monthly, yearly, semester, bi-weekly, or daily time sheets were indicated as being used

2. How often is student progress formally evaluated by the program director and/or clinical instructors in your program?
 - 0.0% a. never
 - (38) 74.5 b. one or more times per semester or quarter
 - (11) 21.6 c. once annually
 - (4) 7.8 d. other responses: twice annually prior to registration; monthly; 4 times/semester as juniors, 1 time/semester as seniors, informal check at mid-semester

- 2a. How are these evaluations reviewed by your students?
 - 0.0% a. students never review written evaluation
 - (49) 96.1 b. individual conferences with students
 - (5) 9.8 c. student independently reviews written evaluation
 - (4) 7.8 d. other responses: during registration advisement with program director; committee evaluation; monthly feedback

3. How often do the athletic training students formally evaluate your athletic training education program?
 - (9) 17.6% a. seldom or never
 - (17) 33.3 b. once per semester or quarter
 - (20) 39.2 c. once annually
 - (7) 13.7 d. other responses: informal individual discussion; in the junior and senior years; at program completion; 4 times/semester as juniors, 1 time/semester as seniors; students encouraged to present concerns at any time

- 3a. How frequently are the clinical instructors in the Athletic Training Program evaluated by your students?
 - (9) 17.6% a. seldom or never
 - (26) 51.0 b. once per semester or quarter
 - (12) 23.5 c. once annually
 - (4) 7.8 d. other responses: according to faculty contract; junior and senior years; 4 times/semester as juniors, 1 time/semester as seniors

4. Who schedules your student athletic trainers' clinical hours?
 - (21) 41.2% a. head athletic trainer
 - (19) 37.3 b. assistant athletic trainer
 - (19) 37.3 c. program director
 - (8) 15.7 d. student athletic trainer (with supervision)
 - (2) 3.9 e. students work without schedules
 - (8) 15.7 f. other responses: twice/semester; athletic training committee; student secretary with head athletic trainer supervision; each clinical instructor to whom student is assigned

- 4a. With which sports are your student athletic trainers required to work?
 - (14) 27.5% a. all men's sports
 - (16) 31.4 b. all women's sports
 - (26) 51.0 c. some men's sports
 - (25) 49.0 d. some women's sports
 - (20) 39.2 e. other responses: all students work football; club sports, cheerleaders, band members; as many as possible; football and basketball; all three clinical settings; high school sports

5. Are your student athletic trainers required to wear uniforms or to adhere to a dress code?
 - (29) 56.9% a. daily
 - (11) 21.6 b. events only
 - (8) 15.7 c. variable times during the year and during events
 - (2) 3.9 d. individual student preference
 - (3) 5.9 e. other responses: neat dress

6. Does your Athletic Training Education Program provide an orientation session for its new students?
 - (1) 2.0% a. no
 - (50) 98.0 b. yes

7. What is included in this orientation session?
 - (43) 84.3% a. program requirements
 - (40) 78.4 b. program regulations
 - (46) 90.2 c. training room procedures
 - (11) 21.6 d. other responses: CPR; introduction to levels of profession; code of conduct; personal and program expectations; history taking, notations, technical application of modalities, wound care, work expectations of each clinical supervisor, tours

- 7a. When is the orientation session conducted?
 - (27) 52.9% a. before selection process
 - (26) 51.0 b. after selection process
 - (5) 9.8 c. weekly
 - (1) 2.0 d. monthly
 - (10) 19.6 e. other responses: entire first semester, during observation practicum twice each semester; when freshmen arrive on campus; in introductory course; before football camp; each semester; beginning of each rotation

8. Do you hold a pre-season in-service for your athletic training students to review emergency procedures, training room operations, and the like?
 (9) 18.0% a. no
 (42) 82.4 b. yes
9. Does your program have a designed laboratory/study area (excluding campus library) for your students?
 (33) 64.7% a. no
 (18) 35.3 b. yes
- 9a. What type of area is available?
 (13) 72.2% a. department library
 (14) 77.7 b. office space
 (12) 66.6 c. special study area
 (12) 66.6 d. other responses: physical therapy room for modality application practice; student lounge; training room offices; college library
10. Does your program engage in fundraising activities to raise money for its own intent and purposes?
 (23) 45.1% a. no
 (28) 54.9 b. yes
- 10a. How is the money used?
 (12) 42.9% a. purchase of uniforms
 (15) 53.6 b. tuition scholarships for conventions, clinical symposia, etc.
 (6) 21.4 c. books or journal subscriptions
 (7) 25.0 d. teaching aids (slides, models, etc.)
 (18) 64.3 e. social activities
 (7) 25.0 f. other responses: scholarship fund, banquet/awards dinner; room and board expenses at NATA meetings; travel with athletic teams

Part II: Program Administration

1. Do you have a program "constitution?"
 (34) 66.7% a. no
 (15) 29.4 b. yes
2. Are your student athletic trainers given program/curriculum handbooks (student trainer manuals) of standard operating procedures?
 (11) 21.6% a. no
 (40) 78.4 b. yes
- 2a. What type of information is included within the manual?
 (35) 87.5% a. emergency procedures (e.g., road trips, local health facilities)
 (38) 95.0 b. training room protocol and procedures (e.g., record keeping, dress code)
 (37) 92.5 c. curriculum guidelines and description (e.g., coursework, retention policies)
 (32) 80.0 d. competencies (e.g., skill, knowledge, attitude)
 (5) 12.5 e. other responses: all course handouts; philosophy of athletic training; glossary of medical terms; symptoms of common athletic injuries
3. Do you have the position of Head Student Athletic Trainer within your program?
 (33) 64.7% a. no
 (18) 35.3 b. yes
- 3a. How is this person selected?
 (1) 5.6% a. elected by fellow students
 (17) 94.4 b. assigned by curriculum director and/or head athletic trainer
 (1) 5.6 c. academic standing in comparison to other students
 (2) 11.1 d. other responses: students in final practicum

- 3b. What are the responsibilities of the head student athletic trainer?
0.0% a. title only
 (10) 55.6 b. liaison between staff and students
 (13) 72.2 c. supervision of other students
 (14) 77.8 d. key responsibilities in training room operations
 (2) 11.1 e. athletic training club president
 (6) 33.3 f. other responses: assist with budget and in-services; in charge of a particular team
4. How often do you meet with the athletic training staff and others to discuss matters of the Athletic Training Education Program?
 (19) 37.3% a. weekly or more often
 (4) 7.8 b. bi-monthly
 (11) 21.6 c. monthly
 (8) 15.7 d. rarely (e.g., once each semester)
 (11) 21.6 e. other responses: correspondence/memoranda; as needed; almost daily on an informal basis

Part III: Program Components

1. Is there an organized athletic training club for students in your program?
 (25) 49.0% a. no
 (26) 51.0 b. yes
- 1a. What functions does the athletic training club perform?
 (21) 80.8% a. fundraising
 (22) 84.6 b. social events
 (20) 76.9 c. seminars
 (12) 46.2 d. guidance of new students
 (21) 80.8 e. general communication
 (1) 3.8 f. other responses: NATA meeting trips
2. Which of the following allied clinical setting(s) or experiences does your program offer?
 (29) 56.9% a. physical therapy
 (27) 52.9 b. orthopedic clinic
 (34) 66.7 c. orthopedic surgeries
 (4) 7.8 d. nurse practitioner observation (general illness evaluation and care)
 (22) 43.1 e. physician observation—non-orthopedic (general illness and injury evaluation and care)
 (5) 9.8 f. health educator/wellness counselor observation (clinical setting)
 (1) 2.0 g. nutritionist observation (clinical setting)
 (17) 33.3 h. emergency room
 (23) 45.1 i. sports medicine center
 (9) 17.6 j. podiatric clinic
 (8) 15.7 k. other responses: high school setting; optometrist, sites as arranged by student; cadaver labs; dentistry, gynecology, allergy specialist
3. What affiliated settings do you have in your program?
 (28) 54.9% a. none
 (16) 31.4 b. high school
 (3) 5.9 c. community college
 (12) 23.5 d. college/university
 (2) 3.9 e. professional sport(s)
0.0 f. other
- 3a. Is this setting approved by the NATA for use in your program?
 (3) 13.0% a. no
 (20) 87.0 b. yes

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Is Critical Analysis of Sports Medicine Research Necessary?

Marilyn A. Looney, PED
Bruce P. McAllister, MS, ATC/R

ABSTRACT: Today's athletic trainers look for the most effective method to treat the athletes under their care. They stay current by reading professional journals and attending conferences and workshops. The dilemma for the athletic trainer is that the information presented is often contradictory. The purpose of this article is to present selected research principles that will help athletic trainers identify flawed conclusions. To illustrate the need for critical analysis of the literature, examples of anecdotal accounts and research results are presented regarding football injury rates associated with different playing surfaces and ankle supports. In an age of constant change, athletic trainers must arm themselves with the knowledge to identify flawed conclusions based on anecdotal accounts and/or misleading facts in order to best serve their athletes.

Professionals whose task it is to prepare athletes for competition and to rehabilitate them from injury constantly make decisions that affect their athletes' welfare. To enhance the decision making process, athletic trainers stay current by reading professional journals and attending conferences and workshops. The dilemma for the athletic trainer is that the information that is published is often contradictory (1). To be able to explain why the contradictions occurred requires an understanding of basic research principles. This understanding allows the reader to identify conclusions that are based on anecdotal accounts (informal observations) or poorly designed studies.

This article presents selected research principles to consider when reading professional literature, both advertisements and research articles. The importance of these principles will be illustrated by presenting examples from literature concerning the injury rates associated with playing on grass vs. artificial turf, and injury rates associated with preventative ankle taping vs. lace-on braces.

SELECTED RESEARCH PRINCIPLES

True experimental design is characterized by the researcher manipulating one variable to observe the effect on another variable. The goal is to determine if a cause and effect relationship exists by testing the null hypothesis. The degree to which the investigators can say variable X caused Y depends on how well the influence of other variables (called extraneous variables) that could have caused Y were controlled, and if subjects were randomly assigned to groups. In many sports medicine studies it is not possible to randomly assign subjects to groups because of the nature of the study. When this occurs it is imperative that the influence of extraneous factors be minimized. Other designs are used to determine if a strong relationship exists between two variables when true experimental designs cannot be

employed in sports medicine research. A strong association that exists consistently over time and in more than one setting is evidence that a cause and effect relationship may exist (3).

Drawing an association between number of injuries and wearing a certain piece of equipment must first be tempered by the definition of injury used (5,8,12). Definitions of injury vary from requiring emergency hospital care (13) to cessation of normal activity for two days following onset (9).

It is meaningless to compare the number of injuries between groups if one group may have had more exposure to injury. The group with more exposures will have a greater chance for injury and thus a greater frequency of injury. A comparison of injury rates per exposure is more meaningful (7,11).

Exposure must also be defined (5,12). An exposure could be defined as miles, hours, games, or participants. For example, there could be 3.5 foot injuries per 1000 training miles for long distance runners. Knowledge of injury and exposure definitions allow for better comparison of results across studies and populations. Obviously, direct comparisons cannot be made if different definitions are used, but generalizability of findings may be enhanced.

RELATIONSHIP BETWEEN FOOTBALL INJURIES AND PLAYING SURFACE

There are many factors that contribute to injury in football. These may be categorized into three major areas: characteristics of the player (age, experience and skill, past injuries, structural abnormalities, susceptibility to injury, etc.); characteristics of the game (position, conditioning program, etc.); and characteristics of the playing environment (type of surface, type of shoe, game vs. practice, prophylactic taping or braces, etc.). Individual characteristics of the playing environment have been the focus of several research efforts (2,6,9,10). In most cases, however, the influence of extraneous factors has not been controlled.

In 1986, Duda (4) presented the perceptions (anecdotal account) of an athletic trainer at a Big 8 university concerning the number of injuries that occurred playing on grass vs. Omniturf. The team suffered 182 injuries during home and away games and practices during 1984 when its home field was grass. In 1985 the number of injuries decreased to 129. Because of this comparison, the athletic trainer concluded that the fewer number of injuries was a result of playing on Omniturf at home. There are several ways in which the data may be misleading. No information was provided to indicate that the following influences were constant over the two years: 1) the number or proportion of away games played on grass and artificial surface; 2) conditioning techniques; 3) coaching philosophy; 4) preventative taping and bracing techniques for knees and ankles; and 5) type of shoe worn. If these factors were not constant, their interaction with playing surface may have contributed to the number of injuries. For example, player conditioning may have been worse the year the team played

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on the grass field. If so, the level of conditioning and not the playing surface may have been the leading contributor to injury.

Also, the total number of games and practices may have varied across years because of postseason play. A team participating in more games and practices will usually have more chance for injuries than a team that participates in a fewer number. Therefore, it is not acceptable to compare frequency of injury. In order to make a more valid comparison, the number of injuries per unit of exposure (however defined) should have been reported. The presence of these confounding factors preclude drawing any valid conclusion.

Investigators at a Big 10 university employed both retrospective and prospective methods to determine whether more injuries occurred when playing on grass vs. Tartan Turf (6). For the retrospective part of the study, 450 varsity athletes who played football between 1960 and 1973 were sent a questionnaire regarding injuries they sustained while playing football. The athlete was responsible for categorizing the type and severity of the injury he had sustained. This reporting technique is fraught with memory recall errors because of the time between the event and recall (5). A second major problem is that only 52% of the athletes returned the questionnaire. No meaningful injury rates could be determined because all injured athletes did not respond, and a measurable definition of exposure to injury could not be determined. Also, changes in equipment, rules, conditioning programs, and coaching philosophies occurred over the time surveyed. The authors compared a meaningless statistic (frequency of injury) and concluded that fewer injuries occurred as a result of playing on Tartan Turf than on grass.

One of the best studies conducted to date concerning the issue of playing surface monitored the incidence of injury in the National Football League (NFL) from 1980-1985 (9). Exposure to injury was defined as a team game in order to control for the variation in practices across teams. The influence of player, game, and playing environment characteristics on injury rates was not controlled. Across six years and all of the NFL teams, player susceptibility to injury, conditioning levels, rules, equipment, and prophylactic practices varied. The authors realized that the impact of this variability on the findings could be minimized if the incidence of injury associated with the different playing surfaces was *significant* and *consistent* over six years. The results of this study met the criteria, so the authors concluded that a team would have one or two more significant or major knee or ankle/foot injuries if it played its preseason and regular season games on Astro Turf rather than grass.

Three published accounts concerning the association of injury with playing surface have been presented. Two support the use of artificial turf, while one supports the use of grass. If readers do not critically analyze what they read, they may become confused and frustrated when contradictions occur in the literature. The selection of a playing surface may then be based on some other aspect, such as cost to maintain surface, instead of its association with injury.

THE EFFECTIVENESS OF PROPHYLACTIC ANKLE TAPING AND BRACING

Before a study is designed to compare the incidence of injury between athletes wearing tape and athletes wearing lace-on ankle braces, factors which determine the effectiveness of these prophylactic measures must be identified (7,11). Some unique factors which influence taping include:

- Preparation of skin surface (shaving, adherent, etc.)

- Application to skin or underwrap
- Mobility of skin over the joint
- Amount of tape applied
- Type of tape job (number of stirrups, and number of heel-locks or figure-eights applied, etc.)
- Length of time tape is worn
- Experience of applicator

Unique influences which affect lace-on braces include:

- Determination of proper fit for foot form
- Application to skin or sock
- Proper lacing
- Frequency of retightening laces

The factors presented are not common to both prophylactic measures. For example, mobility of the skin over the joint is a problem for tape support but not for a lace-on brace.

Other factors common to both methods of support are:

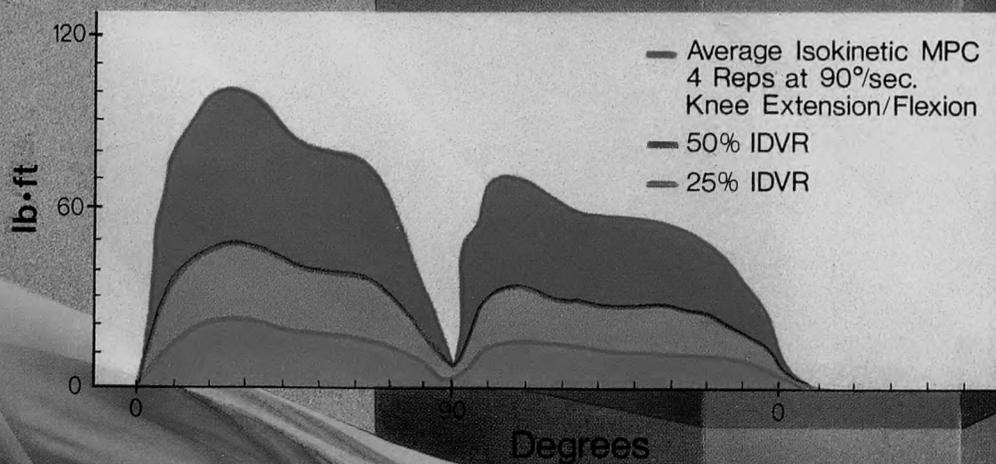
- Proper application
- Tensile strength of material
- Presence of moisture
- Psychological factors

Although proper application is required for both taping and bracing, more skill is required to apply tape. There is greater variability in positioning the foot and method of taping. With ankle braces, the tension placed on the laces is the source of greatest variability. Moisture reduces tape adherence to the skin or, in reference to bracing, may cause the brace material to shrink or "give" disproportionately. The presence of moisture as a result of sweating will vary greatly among individuals. Psychological factors can operate in one of two ways. First, some athletes think they are invincible because they are wearing special equipment. As a result they become more reckless in their play, making moves they would not ordinarily attempt. On the other hand, some athletes are distracted from play because of the additional material restricting range of motion. Distraction from play, particularly in a contact sport, could lead to injury.

When designing a study, it is important to standardize treatment and testing protocols as much as possible. Factors that cannot be standardized are mobility of skin over the joint and length of time the tape is worn. Other factors with which the researcher must also be concerned include a history of past injuries, susceptibility to injury, conditioning level, playing surface, and type of shoes worn, since they all interact with the type of ankle support used to predispose an athlete to injury.

The six year study conducted by Rovere et al. (10) is a significant contribution to the literature because the investigators standardized the application of tape and the stabilizer, and controlled the influence of several game and playing environment characteristics (player position, conditioning methods, playing surface, and high-top vs. low-top shoes). To get an overall summary value, the data were collapsed across player position and type of shoe worn. Athletes wearing tape experienced 4.9 ankle injuries per 1,000 exposures, as compared to 2.6 per 1,000 exposures for the athletes wearing the Cramer Ankle Stabilizer. It should be noted, however, that the difference in injury rates was not always this large when the comparison was made for each position. Since exposure was defined as a practice or a game, it was assumed that the risk for injury was directly related to the quantity vs. the quality of the exposure. For example, the starting quarterback and the third string place kicker were considered to have the same exposure to injury per game. This assumption was not considered as a serious limitation to the study because the injury rates were consistent over the six years studied. If this study's results could be replicated in a prospective cohort study at another university, there would be even stronger evidence to support

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the use of lace-on braces (3,11).

Readers may be puzzled when comparing the results of Rovere et al. (10) to those of Bunch et al. (2) who found that the Cramer Ankle Stabilizer provided less support than tape. However, a plausible explanation is possible. In the Bunch et al. study the focus was on the amount of torque required to bring a polyurethane foot form to 30 degrees inversion. On five different occasions tape was applied to the ankle by the same athletic trainer using the same technique. Each of five stabilizers was also applied on five different occasions using a standardized protocol. The average of the five respective measures was used to control for the variability in fitting and lacing the stabilizer, or taping from one time to the next. After application and 25 inversions, tape provided more support against inversion than any of the five stabilizers. Of these stabilizers, the Cramer stabilizer provided the least support. To simulate a post exercise condition, measurements were taken again after about 350 inversions (20 minutes). Tape did not provide as much support as it had initially. In fact, there was no difference in level of support provided by tape and the best two lace-on braces, neither of which was the Cramer Ankle Stabilizer. So what does this mean? How could the Cramer stabilizer operate so poorly in the Bunch et al. study and be so effective overall in the study by Rovere et al.?

The answer is found by looking again at the factors that influence taping and bracing effectiveness. The Bunch et al. study (2) could only replicate the mechanical breakdown of the tape after repeated inversions. Just how much support would be lost by the introduction of moisture, reproducing mobility of the skin over the joint, and the use of an inferior grade of tape is not known. In game and practice situations, moisture will be present to decrease the support provided by tape. It is this factor (plus the time tape is worn) that may explain why the Cramer Ankle Stabilizer was associated with a lower injury rate than tape in the Rovere et al. study (10). When laces are retightened, support is returned to its initial level. With tape, however, the initial level of support cannot be regained unless the ankle is retaped. One question is still unanswered: "How much support is necessary to reduce the risk of injury?"

Athletic trainers should be armed with the knowledge to

identify flawed conclusions based on anecdotal accounts and/or misleading facts reported from poorly designed research studies. Published material, whether a general article or research study, must be critically analyzed. It was once stated, "Be skeptical, the light at the end of the tunnel may be a train."

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Tip From the Field

Ankle Taping: The '8-Stirrup' Technique

Crayton L. Moss, EdD, ATC

The ankle joint is one of the most frequently injured areas for those participating in recreational or competitive athletics (3,4,8). Research has shown that athletic taping has definite value in supporting and protecting the injured ankle (6,7,9). Over the past five decades athletic trainers have devised their own techniques on how injured ankles should be supported. From these innovations, various methods have been developed as an alternative to the closed basketweave (Gibney) (2,5). An idea which utilizes a combination of techniques to provide additional support is the '8-Stirrup'. As the name implies, this method combines a figure of eight (partial) and traditional stirrup technique. The '8-Stirrup' replaces the Gibneys and second through fourth stirrups of the closed basketweave, as described by Arnheim (1). This ankle taping method has been very successful for injury prevention in ligamentously lax athletes and injury protection. The '8-Stirrup' is recommended as an alternative to the Gibneys and stirrup technique of the standard basketweave ankle taping.

Materials needed: 1½ inch adhesive tape
heel and lace pads
pre-taping underwrap (optional)
tape adherent

Position of the athlete: The athlete sits on a table with the leg extended and the foot at a 90-degree angle.

Procedure:

1. Apply tape adherent, heel and lace pads, and pre-taping underwrap (optional). An anchor strip is applied at the

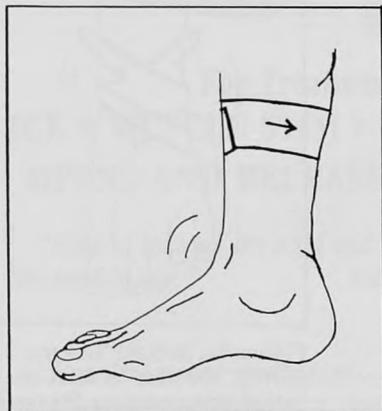


Figure 1. Anchor strip.

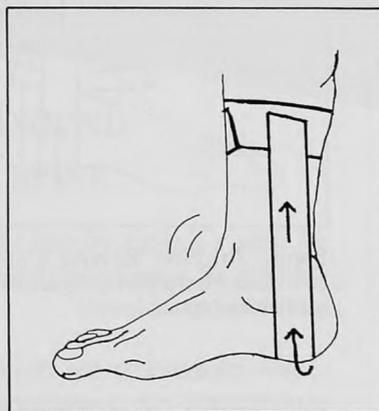


Figure 2. Traditional stirrup for inversion ankle sprains.

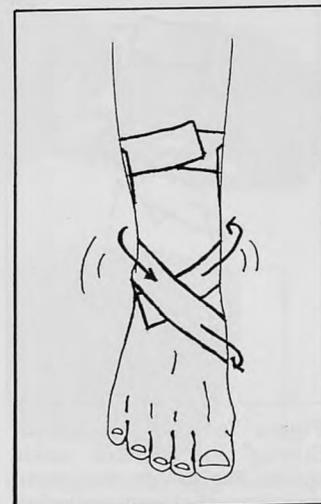


Figure 3a. First '8-Stirrup' for inversion ankle sprains. Begins with a horizontal strip above the medial malleolus.

musculotendinous junction of the gastrocnemius (Figure 1).

2. Apply a stirrup, starting on the top medial aspect of the anchor strip and running under the foot parallel to the achilles tendon, bisecting both the lateral and medial malleoli and attached to the anchor strip (Figure 2).

Note: When applying the stirrup pull the foot into eversion for an inversion sprain and into a neutral position for an eversion sprain (1).

3. The first '8-Stirrup' begins with a horizontal strip started directly above the medial malleolus and is pulled around the back of the ankle above the lateral malleolus and then continues under the arch, coming up on the lateral ankle and is pulled upward, overlapping the stirrup strip (Figures 3a and 3b). Notice how the tape forms a partial figure 8 then continues into a lateral stirrup.

Note: The above technique describes the '8-Stirrup' used for inversion ankle sprains. For eversion ankle sprains, a 'Reverse 8-Stirrup' is utilized. The 'Reverse 8-Stirrup' begins with a horizontal strip on the lateral aspect of the ankle and ends with a partial stirrup on the medial (Figures 7a and 7b). Do not force the foot into inversion but maintain a neutral position throughout the taping technique.

4. Overlapping at least one-half, apply a second '8-Stirrup' following the same procedure as Step 3. Two to

Crayton Moss in Athletic Training Curriculum Director at Bowling Green State University, Bowling Green, Ohio 43403.

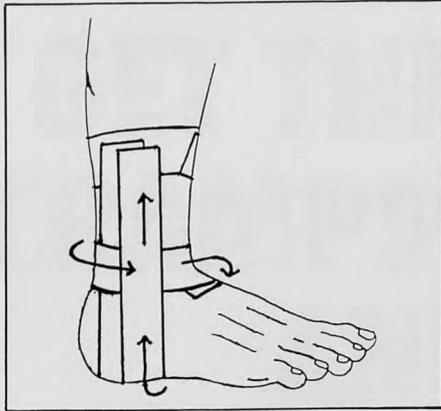


Figure 3b. First '8-Stirrup' continues from a partial figure 8 into a lateral stirrup.

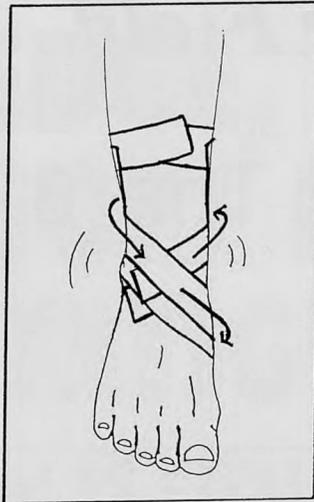


Figure 4a. Second '8-Stirrup'. Overlap at least one-half of the preceding '8-Stirrup'.

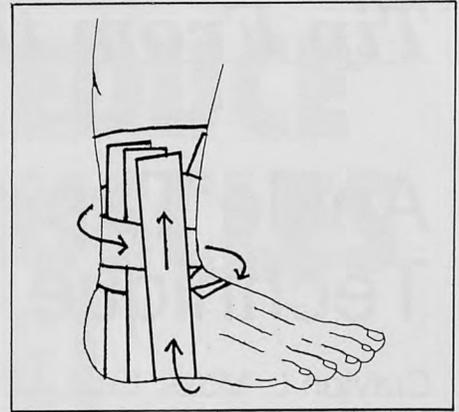


Figure 4b. Second '8-Stirrup' continued. Two to four '8-Stirrups' may be used according to ankle/foot size.

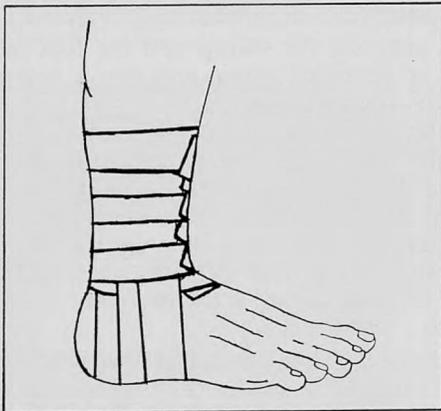


Figure 5. Anchor strips. Start from bottom and work upwards.

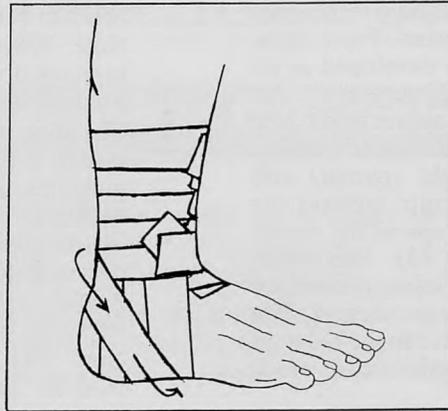


Figure 6a. Lateral heel lock.

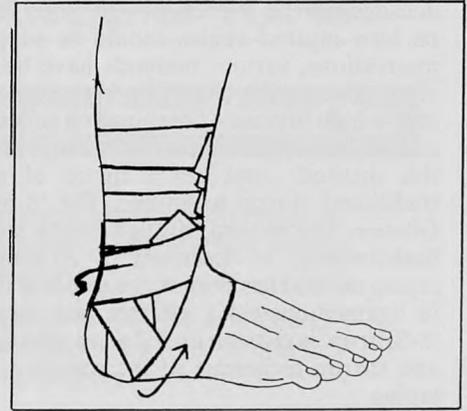


Figure 6b. Medial heel lock.

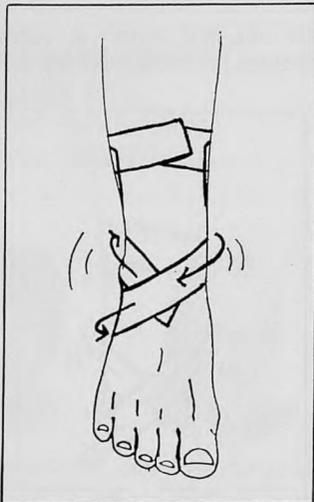


Figure 7a. First 'Reverse 8-Stirrup' for eversion ankle sprains. Begins with a horizontal strip above the lateral malleolus.

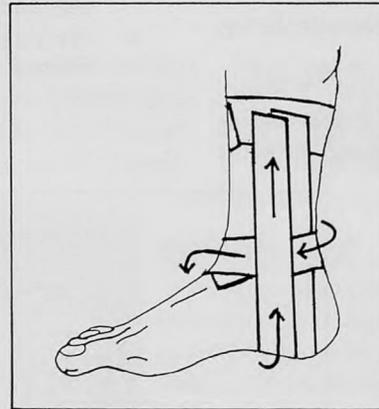


Figure 7b. First 'Reverse 8-Stirrup' continues from a partial figure 8 into a medial stirrup.

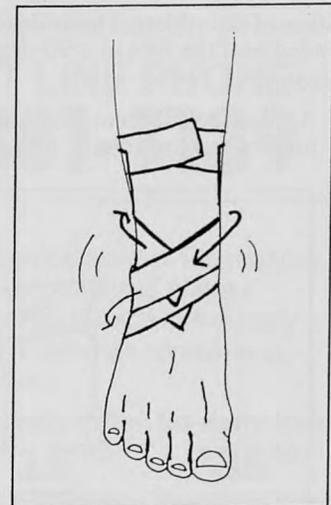


Figure 8a. Second 'Reverse 8-Stirrup'. Overlap at least one-half of the preceding 'Reverse 8-Stirrup'.

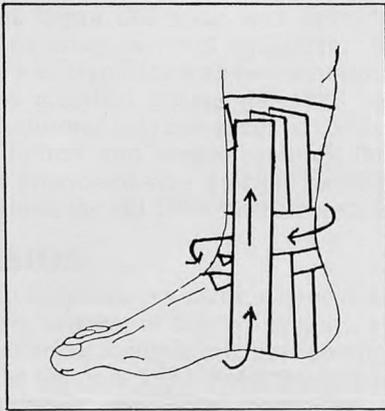


Figure 8b. Second 'Reverse 8-Stirrup' continued. Two to four 'Reverse 8-Stirrups' may be used to insure the final 'Reverse 8-Stirrup' runs directly over the navicular.

four '8-Stirrups' may be used, according to ankle/foot size, as part of the total tape support of the ankle. Remember not to pull the stirrup edge across the 5th metatarsal (Figures 4a and 4b).

Note: For eversion ankle sprains, the third and/or fourth 'Reverse 8-Stirrup' must be applied directly over the navicular (Figures 8a and 8b).

5. Anchor strips are then applied. Start from bottom and work upwards, the last strip covering all the ends of the tape (Figure 5).
6. The final support is given by a heel lock, as described by

Arnheim (1). The lateral heel lock is applied by starting high on the instep, bring the tape along the ankle at a slight angle, hooking the heel, leading under the arch, then coming up on the opposite side, and finishing at the starting point. The medial heel lock is applied in a similar manner to the lateral heel lock except on the opposite side of the ankle (Figures 6a and 6b). Extra heel locks may be applied to provide more support if the ankle is excessively weak or has been recently injured.

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Case Study

Chondroblastoma in a College Athlete

Bobby Barton, EdD, ATC
Eva J. Clifton, MA, ATC

ABSTRACT: This paper presents a case study of a chondroblastoma. Although accounting for less than one percent of primary bone tumors, chondroblastomas can occur in otherwise healthy college athletes. Athletic trainers and team physicians should be cognizant that chondroblastomas can closely mimic athletic injuries in the area of the shoulder girdle and knee joint. Chondroblastomas can be malignant, and they may reoccur. The affected bone is in a weakened condition due to both the tumor and the related surgical procedures. Rehabilitation must be conservative and medical supervision should continue to be closely monitored by the athletic trainer and team physician. The problems of diagnosing and treating chondroblastomas are discussed, along with a detailed chronology of this specific case.

A chondroblastoma is very uncommon, particularly in an otherwise healthy college athlete. These lesions comprise less than one percent of primary bone tumors found in the general population. It is estimated that less than six hundred cases have been reported in modern literature. No cases have been reported by the National Athletic Injury Reporting System, the NATA Injury Research, or by the N.C.A.A. Athletic Injury Study.

PRESENTATION OF CASE

An 18-year-old white male athlete reported to Eastern Kentucky University for pre-season football practice on August 8, 1987. He informed the athletic training staff that he had strained a ligament in his right shoulder. He had experienced periodic discomfort while participating successfully in interscholastic wrestling and football. On August 12, 1987, he passed a routine physical examination. He performed well during a fitness assessment consisting of weight lifting and running. Although slowed by a mild hamstring strain, he performed well during two-a-day football practices. On August 22, 1987, he injured his right shoulder while blocking in the initial game-condition scrimmage. He experienced an immediate burning sensation in both his neck and right upper arm. On the field, he demonstrated a restricted and painful range-of-motion. He had mild pain radiating to the fingers, sporadic numbness, and localized pain in the area of the deltoid muscle. Significantly, his signs and symptoms were very typical of

an athletic "burner or stinger" (1). The next morning sporadic numbness continued, but he reported feeling much better. The following day the student encountered shoulder pain while taking class notes. That afternoon he reported a progressive loss of feeling in his arm.

The athlete was examined in the office of the orthopedic team physician on August 25, 1987. The team physician was aware of his brief college history, but questioned the athlete at length regarding his high school discomfort. This evaluation was the first clear indication of an unusual condition. The student had experienced inconsistent difficulty while wrestling in his senior year. His shoulder had been examined twice, and diagnosed as a sprain. The athlete did not recall any radiologic tests. On August 25, the physician's X-rays showed some calcification in the inferior capsule of the right shoulder, and a possible "lucent" (transparent or semi-transparent mass) in the humeral head. Pain was felt on external rotation and abduction. The athlete had limitations on external rotation, and mild limitation on internal rotation. The impression was a possible lucent lesion in the humeral head, accompanied by a chronic rotator cuff strain, and possible subluxation. As suggested by Enneking's review of 43 cases, tomography was needed for a definitive diagnosis (3). After initial X-rays were taken at the local hospital, tomogram studies were arranged by the team physician and radiologist. Unlike routine X-rays, tomography delineates fine intrinsic calcification and identifies areas of extension across epiphyseal plates. The tomogram clearly showed a lytic (decomposing) lesion, 6 centimeters by 3.5 centimeters on the medial anterior head of the humerus. A flocculent (flaky) pseudopsammomatous (somewhat like a tumor, containing granular material) with some subchondrolerosion was noted.

On September 8, 1987, the student entered the local hospital. All pre-operative tests were within normal limits. The next morning the orthopedic surgeon performed an excision of the chondroblastoma, and an iliac bone graft on the right humerus. Pathological examinations proved all specimens of the tumor to be benign. The student remained in the hospital for several days without complications. At the time of release, his hip was causing more discomfort than his shoulder.

By September 22, 1987, the incisions were well healed. The athlete remained in an immobilizer until October 5. He began gentle range-of-motion exercises, excluding external rotation, on October 6. Moist heat treatments were begun prior to exercise; cryotherapy followed exercise. He rode an exercise bike or ran four times per week to maintain cardiovascular fitness. He began swimming in December, and worked on mild stretching exercises over the Christmas vacation. In January, the student passed a thorough physical

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Eva J. Clifton is Assistant Athletic Trainer and instructor in the College of Health and Physical Education, Eastern Kentucky University.

examination, began exercising with light dumbbells and progressed to using universal equipment. By the end of January, he was exercising with his teammates. His practice routine was modified during the 1988 spring training period; he performed only in non-contact drills; he continued his rehabilitation and weight training throughout the summer; he progressed very well and participated without pain throughout the fall 1988 football season.

DISCUSSION

A chondroblastoma is a cartilaginous tumor, usually of the epiphysis, capable of destroying bone, and characteristically containing multiple calcium deposits (2). Codman described the tumor in 1931, but it was not until 1940 that Jaffe, Lichenstein, and Portis named the tumor benign chondroblastoma. In 1951, Hatcher and Campbell indicated that partial removal by curettage (scraping) was sufficient treatment, but Evarts maintained that all chondroblastomas should be removed by thorough curettage, with care taken to protect the underlying epiphyseal cartilage.

Enneking pointed out in 1983 that chondroblastomas can mimic an internal derangement of an adjacent joint. Signs and symptoms include effusion, pain, numbness, and mobility restrictions. Areas of degeneration are common but joint fluid is usually normal, and pathologic fractures are rare. Since there are generally no accompanying health problems, the average practitioner cannot predict the occurrence of a chondroblastoma. Standard laboratory analysis of urine and blood yields negative findings, and the enlargement of lymph nodes has been noted in only a few cases (3).

Chondroblastomas do not appear to be related to athletics; however, they do occur in the age group of interscholastic and intercollegiate athletes. Nothing has been written concerning an athlete being restricted due to a chondroblastoma. Athletic trainers, team physicians, and other health professionals need to become aware of the potential of chondroblastomas.

The most common areas of occurrence are the epiphysis of the upper end of the humerus, the upper end of the tibia, and the lower end of the femur. There are reports of malignancy accompanying the tumor. Swelling has been seen in less than ten percent of reported cases. Recurrence rates vary, but chondroblastomas can reoccur, regardless of the treatment used. Marcove reported a recurrence rate of 25 percent when a bone graft follows surgical curettage (5).

Athletic trainers can serve an important function by recognizing the possible signs and symptoms. Testing and complete diagnosis must be done in a medical facility. Surgical intervention appears to be needed in the majority of cases involving active people participating in sports. Follow-up physical examinations and radiographs are recommended, as these tumors reoccur (4,5). Rehabilitation must be unusually conservative. Many therapeutic techniques are contraindicated for chondroblastomas. Electrotherapy should not be used (6,7). The involved epiphysis and/or the entire long bone may be greatly weakened. The tumor and the surgery contribute to the weakened condition of the bone. Aggressive athletic reconditioning must be avoided. Recovery time varies greatly, but the injured athlete should be monitored daily by the athletic trainer, and regularly by the team physician.

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UNDERGRADUATE ATHLETIC TRAINING from page 332

Table 2:

Internal Consistency of Survey Response

Inconsistent

- clinical hours record-keeping
- designated laboratory/study area
- frequency of student evaluation of education program
- frequency of staff meetings

Moderately Consistent

- frequency of student evaluation of clinical instructors
- person who schedules student trainer clinical hours
- student trainer sport assignments
- dress code
- period of time in which orientation session is conducted
- program fundraising activities and use of money raised
- athletic training club organization
- use of various allied medical settings
- use of various affiliated settings

Very Consistent

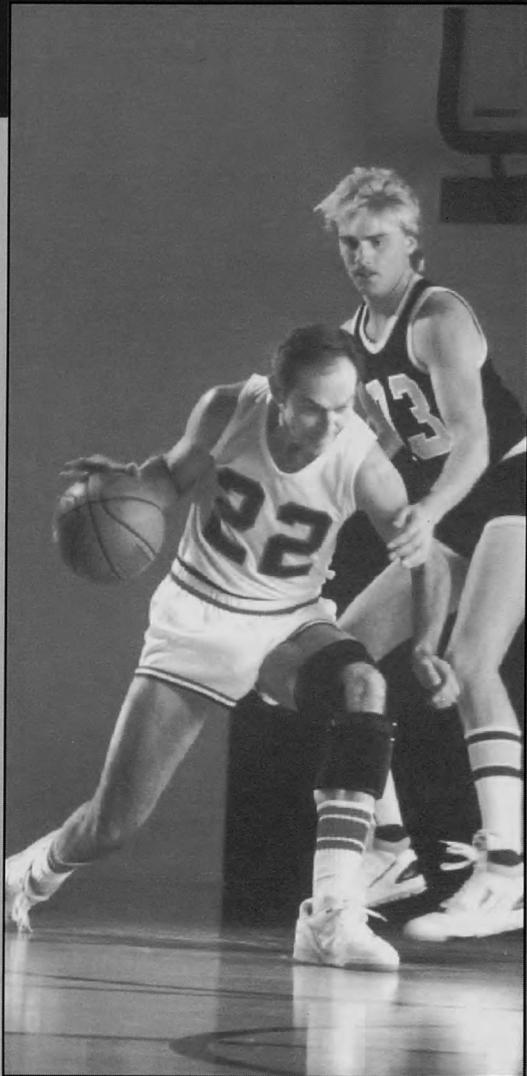
- frequency of student progress evaluation
- method by which student evaluations are reviewed
- new student orientation sessions
- content of orientation sessions
- pre-season in-service seminars
- use and content of student trainer manuals
- absence of program constitutions
- absence of head student trainer position (those programs which have the position have very consistent selection method and responsibility delineation)
- functions of athletic training club

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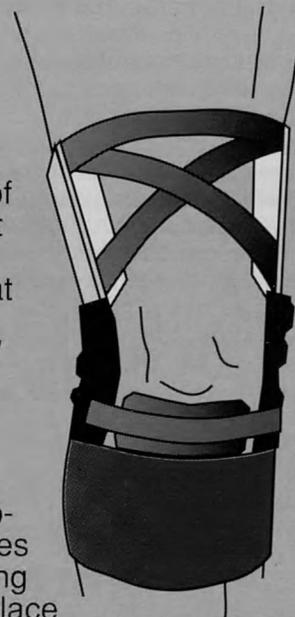
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Calendar of Events

Jeff Fair, EdD, ATC, CCT

JANUARY 1990

7-8 Forty-first Annual Meeting of the Eastern Athletic Trainers' Association, Inc., Monticello, NY. Contact Matthew D. Gerkin, Bridgewater State College, Bridgewater, MA 02325. (Telephone 508/697-1252).

12-14 Fourth Annual Baseball Injury Prevention and Treatment Techniques Seminar, Cambridge, MA. Contact Linda Savers, Lapin East/West, 2113 Victory Boulevard, Warner Square, Suite 215, Canoga Park, CA 91303.

FEBRUARY

17 Tarrant Sports and Rehabilitation Center's 3rd Annual Symposium on Sports Medicine, Fort Worth, TX. Contact Ben Posey, Tarrant Sports and Rehabilitation Center, 1550 W. Rosedale, Suite 210, Fort Worth, TX 76104.

17-24 The 7th Annual Office Based Sports Medicine Conference, Sun Valley, ID. Contact Extended Programs in Medical Education, Room 569-U, University of California School of Medicine, San Francisco, CA 94143.

MARCH

1-3 The Seventh Annual Advances in Cruciate Ligament Reconstruction of the Knee: Prosthetic vs. Autogenous Symposium, Palm Desert, CA. Contact Southern California Orthopedic Research and Education Center at the Southern California Orthopedic Institute, 15211 Vanowen Street #300, Van Nuys, CA 91405.

7-10 Great Lakes Athletic Trainers' Association District 4 Annual Meeting, Toledo, OH. Contact Mike Willets,

South High School, 700 South Limestone Street, Springfield, OH 45505.

16-18 NATA District 5 Meeting, Lincoln, NE. Contact Jerry Weber at telephone 402/472-2276.

16-18 NATA District 7 Meeting, Denver, CO. Contact Rich Griswold at telephone 303/247-7576.

18-20 12th National Trauma Symposium, Baltimore, MD. Contact Kimberly Unitas or Terry Young, MIEMSS, University Square Building, 11 S. Paca Street, Suite 303, Baltimore, MD 21201. (Telephone 301/328-2399; FAX 301/328-8514).

23-25 NATA District 10 Meeting, Riverside, ID. Contact Tom Koto at telephone 208/336-8250.

ATHLETIC TRAINING will list events of interest to persons involved in sports medicine, providing items are received well in advance of publication. Please include the name and address of the person to contact for further information. Send items for the CALENDAR to Jeff Fair, Ed.D., ATC, Head Athletic Trainer, Athletic Department, Oklahoma State University, Stillwater, OK 74078.

Refer to the following dates to ensure your event will appear in the desired issue.

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Book Review

Phil Callicutt, EdD, ATC

Sports Medicine of the Lower Extremity

Edited by Steven I. Subotnick, D.P.M.

Churchill Livingstone

1560 Broadway

New York, N.Y. 10036

683 pages, illustrated

Price: \$69.50

"You can't tell a book by its cover," the old saying goes, but in the case of the book under review, you can't tell the contents by its title.

Sports Medicine of the Lower Extremity, edited and principally written by the ubiquitous Steven Subotnick, is surely misleadingly titled. Fully 95% of the text is devoted solely to the foot and ankle. Of the 29 contributors only seven are MDs, one of whom is the equally ubiquitous Allan J. Ryan, who provides a three-page introductory puff on "The Emerging Sports Medicine Specialty." Much of the material, well-organized though it is, is perforce redundant and repetitive. Occasional textual/editorial errors occur. For example, Lisfranc's joint is correctly spelled on page 76 and in the index but misspelled "Lis Franc's" joint on page 246. The chapter on "Accommodating, Strapping, and Bracing" is of passing interest to the athletic trainer, as well as individual chapters covering specific sports, such as skiing, basketball, soccer, bowling, golf, and baseball. However, the remainder of the volume cannot in any way replace the accurately titled and authoritatively comprehensive two-volume set edited by Dr. James A. Nicholas and Elliott B. Hershman, *The Lower Extremity and Spine in Sports Medicine* (Mosby, 1986).

These reservations notwithstanding, Subotnick's book is certainly well-illustrated and highly informative and useful within its unstated limitation: it is a book about sports medicine of the foot and ankle. However, athletic trainers should not purchase it without first examining the text; this book commands a smaller and more highly specialized audience.

Another recent single volume text on the foot and ankle that covers essentially the same material as the Subotnick book, yet in a more general and utilitarian fashion, is Gary C. Hunt's *Physical Therapy of the Foot and Ankle* (Churchill Livingstone, 1988). Be advised that the title of this book is likewise misleading in that a good deal more than physical therapy is covered. The range of the two books is comparable, but Hunt's is the one of choice for athletic trainers.

Stuart Wright, MA, FSSCh, MBChA
Wake Forest University ⊕

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Video Review

Tom Gocke, MS, ATC

Enhancing Performance:

The Role of Nutrition in Athletics

Exceed Sports Nutritionals

Ross Laboratories

Columbus, OH 43216

16 minutes, 1/2" VHS-Color

As part of my last review, *Champions At Any Price*, I mentioned that *Champions* did an exceptional job of presenting a deterring message concerning the use of anabolic steroids. Likewise, I mentioned how *Champions* would have been more complete by giving the athlete alternatives to using anabolic steroids through proper nutrition. *Enhancing Performance: The Role of Nutrition in Athletics* has picked up where *Champions* has left off.

Enhancing Performance begins by outlining the importance of proper nutrition, a well balanced diet and the role water consumption plays in exercise as well as in the metabolism of energy. The well-balanced diet is broken down into three (3) essential food groups: Carbohydrates, Proteins and Fats.

Enhancing Performance explains how each of these foods is important in supplying the body's need for energy during activity. Particular importance is given to glucose as a form of energy and how it is utilized by the body during exercise. Also, it is mentioned that in the well-balanced diet the athlete has little need for added vitamin supplementation. Concurrently, the use of amino acid supplements are of little or no value to the athlete.

Enhancing Performance brings out important concepts concerning fluid intake before, during and after activity. It describes the role water plays in the regulation of heat, energy metabolism, and the way these effect the athlete's overall exercise productivity.

Lastly, *Enhancing Performance* divides nutrition for the athlete into four (4) critical periods. These are **training, pre-event, competition, and post-competition**. In each of these respective sections, the importance of proper nutrition is explained and how this will enhance the athlete's performance. Likewise, the adverse effects of improper nutrition are described. The prevalent message here is how improper nutrition has a negative effect on the athlete's performance.

At first glance, I thought *Enhancing Performance: The Role of Nutrition in Athletics* would be an advertisement for Exceed Sports Nutritional products. I am happy to report this is not the case. A short segment of the presentation is devoted to Exceed products and how they will enhance the athlete's performance through nutritional supplementation. However, *Enhancing Performance* is centered around proper nutrition and the role a well-balanced diet plays in enhancing the athlete's ability to compete. This is quite obvious throughout the entire video tape.

In addition to this video presentation, Exceed, through Ross Laboratories, has published various text materials dealing with sports and nutrition. A brief list includes, *Muscle Development: Nutritional Alternatives to Anabolic Steroids*, 1988, *Nutrients Utilized During Exercise*, 1983, and *Theory and Practice of Athletic Nutrition: Bridging the Gap*, 1989.

I was very impressed with *Enhancing Performance: The Role Nutrition Plays in Athletics*. It offers the athlete sound nutritional alternatives to using anabolic steroids. I also feel that the tape could be a useful tool to the Certified Athletic Trainer when trying to convince coaches and athletes of the importance of a well-balanced diet. ⊕

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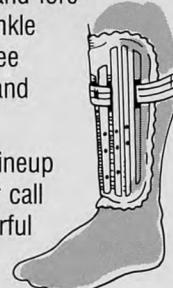
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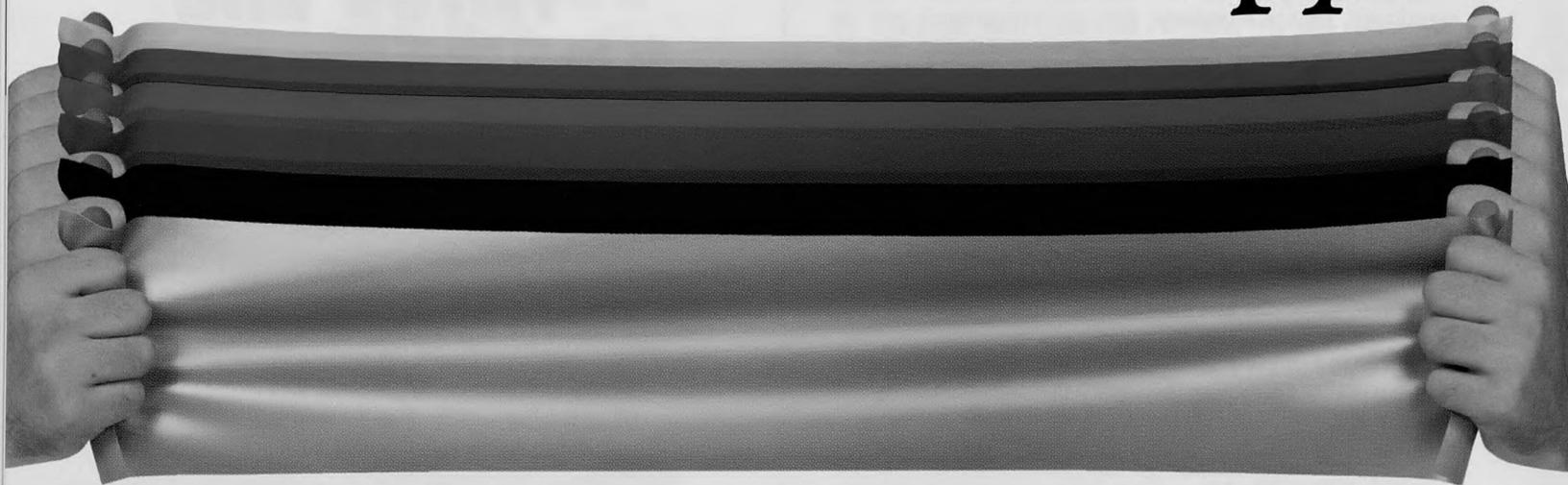
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Student Athletic Trainer Forum

Deloss Brubaker, EdD, ATC

Rehabilitation of the Knee Following Arthroscopic Meniscal Repair

Deidre Dianne Leaver, ATC

ABSTRACT: A rehabilitation program designed specifically for arthroscopic meniscal repair is presented. The guidelines, concepts, and exercises represent a synthesis of the available information regarding rehabilitation after arthroscopic meniscal repair with or without anterior cruciate ligament injury or surgery. The three month regimen is composed of five phases and includes a controlled period of protective immobilization and specific range of motion, strengthening, and motivational exercises using the SPORT CORD™. The slow and gradual return is necessary to allow healing of the sutured meniscus.

In recent years there has been a growing recognition of the multiple functions of the meniscus in maintaining the health of the knee joint. The meniscus provides stability and lubrication of the knee, enhances nutrition of the articular cartilage, and transmits considerable loads across the knee joint (1,8,9,11).

Much of the discovery of the roles of the meniscus stems from post-operative changes noted in knees that have undergone meniscectomy. Increased loads on articular cartilage and subchondral bone (4,8,11) lead to the development of degenerative joint disease and osteoarthritis (3,4,6,11) in knees following total meniscectomy. These alterations led to the evolution of partial meniscectomy (3,7) for meniscal tears. Most recently in the attempt to prevent degenerative changes following meniscal injury, surgeons have developed techniques for arthroscopic repair of meniscal lesions (1,3,7,11).

Rehabilitation of the knee following arthroscopic meniscal repair necessarily differs from that of partial meniscectomy in that a greater period of protective immobilization and therapeutic exercise is required to protect and promote meniscal healing. The program described here involves a three month period of rehabilitation from repair to return to competition. Although this regimen is specific to arthro-

scopic meniscal repair, the concepts and exercises can be applied to all knee rehabilitation programs.

REVIEW OF LITERATURE

A review of the literature concerning arthroscopic meniscal repair yields very little information concerning post-operative rehabilitation. Stone and Miller (11) present the most descriptive account of rehabilitative procedures and exercises in relation to arthroscopic meniscal repair. The anterior cruciate ligament rehabilitation programs outlined by Bartlett (2) and DePalma and Zelko (5) present guidelines and exercises which can be easily adapted to rehabilitation following arthroscopic meniscal repair.

PHASES OF REHABILITATION

The program is divided into five phases, totaling twelve weeks from repair to return to competition. Goals of the program are full pain-free range of motion, bilateral equal thigh and lower leg girth, and five over five hamstring and quadriceps strength in the affected and unaffected legs.

Phase I, 0-3 Weeks (Table 1)

Following repair the knee is immobilized in a hinged post-operative splint fixed at 30 degrees. The athlete is non weight-bearing on crutches as well. This period of immobilization is necessary to allow healing of the soft tissues and the meniscus itself. Ice is used to control pain and swelling. Early in Phase I controlled passive ROM is begun with CPM up to one hour daily. If CPM is not available, passive range of motion can be carried out through the use of the unaffected leg. The athlete is asked to lie prone with the dorsum of the affected foot supported on the back of the unaffected ankle. By slowly flexing and extending the unaffected knee the athlete can passively flex and extend the affected knee. The athlete is instructed to perform this type of passive range of motion to fatigue twice daily.

Exercises in Phase I begin on the first day following repair and include ten daily exercises. Quadriceps and hamstring setting to delay atrophy are begun as soon as pain tolerance permits. The athlete is asked to hold the contraction for three seconds with a five second rest period between contractions. As strength and pain levels improve, the athlete is instructed to hold the contractions for up to 10 seconds. The athlete is requested to perform these isometric exercises a minimum of one hundred repetitions daily.

The third exercise is straight leg raising without weights for the affected leg. While in a supine position the athlete is asked to perform a quadriceps set and to maintain this contraction while performing the straight leg raises. Three sets of ten repetitions are done twice daily.

Deidre Dianne Leaver graduated from East Carolina University, Greenville, North Carolina in May 1989 with a BS in Health and Physical Education and a concentration in Sports Medicine. She is currently attending the University of Virginia, Charlottesville, working on a Master of Education in Physical Education-Athletic Training. The majority of the research for this paper was completed from May to August 1988 during an internship under Dr. Edwin C. Bartlett at Eastern Orthopaedic Group, Inc. in Greenville.

Direct correspondence to: Deidre Dianne Leaver, ATC, 3615 Britt Street, Durham, NC 27705.

EDITOR'S NOTE: This paper was the First Runner-up in the Eleventh Annual Student Writing Contest.

Exercises four, five, six, and seven involve hip adduction lying on the affected side, hip extension lying prone, and hip abduction and hip oblique patterns lying on the unaffected side. These exercises follow the same guidelines as the straight leg raises. The athlete is asked to perform three sets of ten repetitions twice a day. Because of the similarity of these exercises to straight leg raises, it is often convenient to combine the five exercises into a circuit.

The eighth exercise in Phase I consists of dorsiflexion, plantar flexion, inversion, and eversion of the affected ankle against the resistance of Theraband™ or surgical tubing. As with the hip patterns, the athlete is asked to perform three sets of ten repetitions twice daily and may find it convenient to do these exercises in circuit form.

The final exercises in Phase I consist of conditioning and upper body and unaffected leg free weight or Nautilus training. The athlete is instructed to continue his weight lifting program, eliminating all lifts that require the use of the affected leg. Not only does this step help to maintain the athlete's overall body condition, but being involved in team activities such as weight workouts also helps to keep the athlete motivated and in a positive psychological state. The athlete's cardiovascular fitness is maintained through the use of an upper body ergometer for twenty minutes daily.

Phase II, 3-4 Weeks (Table 2)

To begin Phase II the post-operative splint is opened to 10-90 degrees and the athlete may progress to light weight-bearing on crutches. Ice and cold whirlpool are used to control swelling. Phase II involves the continuation of Phase I exercises with the addition of five new daily exercises. The splint may be removed for the new exercises but should be worn at all other times.

The athlete is instructed to continue the weight and cardiovascular fitness program begun in Phase I and to continue the exercises begun in Phase I as well. The number of repetitions is increased to twenty per set and light ankle weights are added as resistance on the straight leg raises and hip patterns.

The first new exercise in Phase II involves passive range of motion using the Airdyne™ bicycle. This exercise is performed by having the athlete sit on the seat at a height that allows the affected foot to rest on the pedal. The athlete is asked to slowly move the handles of the bicycle which causes the pedals to turn. The athlete should use his hands not the unaffected leg. By slowly moving the handles back and forth the athlete causes the pedals to rock within the pain-free range of motion of the affected knee. As the athlete is able to move through a complete turn of the pedals, the seat is lowered and the procedure is begun again. This bicycle range of motion is performed up to one hour daily.

Exercise two begins active range of motion of the affected knee. Late in Phase II the athlete is instructed to begin actively pedaling the bicycle using the same rocking motion used during passive range of motion on the bicycle. When the athlete is able to pedal a revolution easily, the seat is lowered and the process begins again. The athlete is instructed to increase the intensity of the pedaling as strength improves. The bicycle should be ridden up to one half-hour daily.

The third and fourth exercises consist of active knee flexion in prone position and active knee extension in sitting position, without resistance. The athlete is instructed to move the knee throughout its pain-free range of motion, isometrically contracting the hamstrings and quadriceps at each extreme. The athlete is asked to perform three sets of ten repetitions in both flexion and extension twice daily.

Finally in Phase II the athlete is asked to perform pain-free active flexion and extension of the knee while receiving cold whirlpool treatment. These exercises are executed as

were the third and fourth exercises. The athlete remains in the cold whirlpool for twenty minutes daily.

TABLE 1

Phase I, 0-3 Weeks

1. 30 degree post-operative splint
2. Non weight-bearing on crutches
3. CPM and controlled passive range of motion
4. Quadriceps setting
5. Hamstring setting
6. Straight leg raising without weights
7. Hip abduction without weights
8. Hip adduction without weights
9. Hip extension without weights
10. Hip oblique patterns without weights
11. Theraband™ or surgical tubing for calf
12. Free weight or Nautilus program for unaffected leg and upper body
13. Upper body ergometer for cardiovascular fitness

TABLE 2

Phase II, 3-4 Weeks

14. Open post-operative splint to 10 to 90 degrees
15. Light weight-bearing with crutches
16. Airdyne™ passive range of motion
17. Stationary cycling
18. Knee extensions without weights
19. Knee flexions/hamstring curls without weights
20. Cold whirlpool range of motion

TABLE 3

Phase III, 4-6 Weeks

21. Progress to full weight-bearing on crutches
22. Discontinue post-operative splint
23. Discontinue crutches
24. Toe raises
25. Swimming/aquatic rehabilitation
26. Contrast and warm whirlpool range of motion

TABLE 4

Phase IV, 6-8 Weeks

27. Begin straight ahead jogging
28. SPORT CORD™ exercises
 - a. double knee dips (10)
 - b. single knee dips (10)
 - c. seated leg press (10)
 - d. seated hamstrings (10)
 - e. inside-outside leg toners (10)
 - f. gluteal strengtheners (10)
 - g. hip pulls (10)

TABLE 5

Phase V, 8-12 Weeks

29. Full stride running
30. Gradual sprinting program
31. Sport-specific agility and cutting drills
32. Figure 8's
33. Full free weight program for affected and unaffected legs
 - a. knee flexions/hamstring curls
 - b. knee extensions
 - c. parallel squats
 - d. leg presses
 - e. toe raises

Phase III, 4-6 Weeks (Table 3)

Phase III begins when the athlete obtains full pain-free range of motion and concentrates on strengthening the thigh and lower leg musculature. The post-operative splint is discontinued and the athlete progresses to full weight-bearing with crutches before the crutches are discontinued. Contrast and warm whirlpool treatments are used for twenty minutes as a prelude to rehabilitation each day. With the exception of the weight program and the cardiovascular fitness program, all Phase I exercises are discontinued. Exercises in Phase III include the Airdyne™ bicycle program and knee motions from Phase II.

Exercises one and two in Phase III are continuations from Phase II as the athlete maintains performance of knee flexion and extension while in the warm whirlpool.

The third and fourth exercises of Phase III involve the addition of light ankle weights during sitting knee extension and prone knee flexion. As with these exercises in Phase II, the athlete is asked to isometrically contract his hamstrings and quadriceps at the end point of each motion. The athlete is requested to complete three sets of twenty repetitions twice daily and to increase the weight resistance as strength improves.

The fifth exercise consists of increasing the intensity of the stationary bicycling program begun late in Phase II. As the athlete's leg strength improves, the duration of the workout is increased to one hour daily with consecutive twenty or thirty minute bouts. This bicycle workout may replace the upper body ergometer as a means of maintaining cardiovascular fitness.

New to Phase III is the use of toe raises as a calf strengthener. The athlete is asked to begin with two leg toe raises held for four seconds with twenty-five completed daily. As strength improves the athlete is asked to progress to one leg toe raises using the affected leg, to two leg drop toe raises on the edge of a step or stool, and finally to toe raises with light weight as resistance.

Swimming and aquatic rehabilitation are introduced during Phase III. The athlete is asked to perform flutter kicks in prone and supine positions. These kicks may be done with the athlete holding onto the side of the pool or the athlete may use a kick board. The athlete is also asked to jog in place and hop or "bob" in the shallow end of the swimming pool. Aquatic rehabilitation should be done for a total of thirty minutes three to four times a week. Aquatic rehabilitation is very relaxing and motivational for the athlete. Water exercises are a welcome change in the rehabilitation program and help keep the athlete interested in recovery. The athlete must be cautioned to use flutter kick only; the torsion of the whip kick might damage the repair site on the meniscus.

Phase IV, 6-8 Weeks (Table 4)

Phase IV of the rehabilitation program involves the continuation and progression of the toe raises and bicycling program from Phase III with the addition of the SPORT CORD™ strengthening exercises and running. The unaffected leg and upper body weight lifting program should also be carried over into Phase IV. Warm whirlpool for twenty minutes should still precede all exercises.

The first new exercise for Phase IV is the introduction of straight ahead running on a flat surface. The athlete is asked to begin jogging slowly for a distance of one-quarter mile and to gradually increase both the distance and the speed of the runs. The athlete is instructed that no sprinting is involved in this stage of the running program.

Additional strengthening, particularly of the quadriceps and hamstrings, is achieved through the use of a SPORT CORD™ in seven specific exercises. These exercises are excellent motivators and are all performed in sets of ten

repetitions (10) progressing from one set to three sets as strength increases.

The first exercise, double knee dips (10), is performed with the athlete standing on the cord and holding each end at waist level. The athlete is instructed to squat to a one-third knee bend and then to stand. As the athlete's strength improves and three sets can be completed, single knee dips (10) are incorporated with the athlete performing a one-third knee bend on the affected leg against the resistance of the SPORT CORD™.

The seated leg press (10) is the third SPORT CORD™ exercise that is introduced in Phase IV. This exercise is executed with the athlete sitting in a chair, pulling the mid-portion of the cord with the hand on the affected side, and with the affected foot in the handle of the cord. The athlete is asked to push out and down against the pulling resistance of the cord. This motion is similar to the pressing of the accelerator in an automobile.

The seated hamstring (10) is similar to the third exercise, but differs in that the SPORT CORD™ is placed in a door jamb and the athlete is asked to drag the affected foot backwards along the floor against the cord's resistance.

Exercise five in the SPORT CORD™ series is the inside-outside leg toner (10). To execute this exercise the athlete is instructed to place the affected ankle through the handle of the cord and to abduct and adduct the affected leg against the resistance of the SPORT CORD™. The cord should be secured in a door jamb. When one exercise has been completed, the athlete has only to turn and face the opposite direction to carry out the second exercise.

The sixth and seventh SPORT CORD™ exercises also involve similar cord and body positions. Both gluteal strengtheners (10) and hip pulls (10) are carried out with the cord secured in a door jamb and with the handle around the affected leg, just above the knee. To execute hip pulls (10) the athlete is instructed to face away from the cord and to flex the affected hip against the pull of the cord. The athlete is asked to turn and face the cord in order to perform gluteal strengtheners (10). The affected hip is extended against the SPORT CORD™ resistance in executing this exercise.

Phase V, 8-12 Weeks (Table 5)

The SPORT CORD™ exercises from Table 4, aquatic rehabilitation, and cardiovascular conditioning program are all continued into Phase V of the rehabilitation program. Emphasis in Phase V is on further strengthening, sprinting, and sport-specific agility running.

Along with the SPORT CORD™ exercises, the athlete should gradually resume a full free weight program for the affected and unaffected legs. This program should begin with high repetition work to increase muscular endurance and then progress according to the modified DeLorme method presented by DePalma and Zelko (5). This free weight program should include hamstring curls (knee flexions), knee extensions, parallel squats, leg presses, and toe raises. The athlete is instructed to follow this lower body weight program on alternating days with upper body lifting.

From the running program introduced in Phase IV, the athlete is now asked to gradually increase to full stride running and full speed sprinting. Figure 8's, cariocas, box drills, and other sport-specific agility and cutting drills are incorporated into Phase V following the beginning of sprinting.

The athlete is allowed to gradually return to competition at the completion of Phase V. To ensure maintenance of the athlete's strength and cardiovascular fitness, the athlete is instructed on a program of distance and sprint running three to four days weekly and an alternating day schedule of upper and lower body weight lifting.

SUMMARY

In an attempt to prevent degenerative changes in the knee after meniscal injury, surgeons have developed techniques of arthroscopic meniscal repair. Literature concerning rehabilitation following arthroscopic meniscal repair is very scarce. The rehabilitation program presented here draws on existing programs for meniscal repair and anterior cruciate ligament injury in order to create a rehabilitation protocol designed specifically for arthroscopic meniscal repair.

Acknowledgement

I would like to thank Edwin C. Bartlett, MD, Eastern Orthopaedic Group, Inc., Greenville, NC and H. Boyd Overman, Jr., LPT and Tom White, LPT, Eastern Carolina Physical Therapy Associates, Greenville, NC, for their suggestions and encouragement.

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Twelfth Annual NATA Student Writing Contest

In an effort to promote scholarship among young athletic trainers, the National Athletic Trainers Association, Inc. sponsors an annual writing contest.

1. This contest is open to all undergraduate student members of the NATA.
2. Papers must be on a topic germane to the profession of athletic training and can be case reports, literature reviews, experimental reports, analysis of training room techniques, etc.
3. Entries must not have been published, nor be under consideration for publication by any journal.
4. The winning entry will receive a \$200.00 cash prize and be published in *Athletic Training* with recognition as the winning entry in the Annual Student Writing Contest. One or more other entries may be given honorable mention status.
5. Entries must be written in journal manuscript form and adhere to all regulations set forth in the "Guide to Contributors" section of this issue of *Athletic*

Training. It is suggested that before starting students read: Knight KL: Writing articles for the journal. *Athletic Training* 13: 196-198, 1978. NOTE: A reprint of this article, along with other helpful hints, can be obtained by writing to the Writing Contest Committee Chairman at the address below.

6. Entries must be received by March 1. Announcement of the winner will be made at the Annual Convention and Clinical Symposium in June.
7. The Writing Contest Committee reserves the right to make no awards if in their opinion none of the entries is of sufficient quality to merit recognition.
8. An original and two copies must be received at the following address by March 1, 1990.

NATA Student Writing Contest
Deloss Brubaker, EdD, ATC
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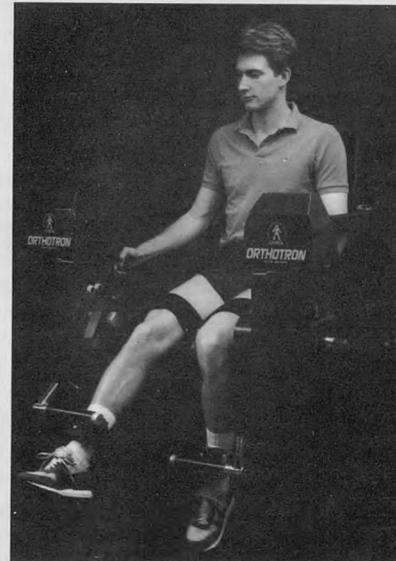
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Certification

Certification Examination Schedule for 1990

All regional sites are subject to a **minimum** of six candidates per site and limited to a **maximum** of forty candidates. Completed applications must be received by the Certification Office within the prescribed deadline for the examination date chosen.

January 14, 1990 — Deadline for the receipt of application is December 8, 1989.

Albuquerque, NM	Kansas City, MO
Boston, MA	Montclair, NJ
Chicago, IL	Mt. Pleasant, MI
Columbia, SC	Omaha, NE
Costa Mesa, CA	Orlando, FL
Eugene, OR	Pittsburgh, PA
Fort Worth, TX	Santa Clara, CA
Granville, OH	

May 20, 1990 — Deadline for the receipt of application is April 6, 1990.

Anderson, IN	Kansas City, MO
Boston, MA	Lexington, KY
Caldwell, NJ	Minneapolis, MN
Chicago, IL	New Britain, CT
Columbia, SC	Phoenix, AZ
Costa Mesa, CA	Santa Clara, CA
Denver, CO	Seattle, WA
Hershey, PA	
Houston, TX	

July 8, 1990 — Deadline for the receipt of application is June 1, 1990.

Ann Arbor, MI	Kansas City, MO
Boston, MA	Madison, WI
Cheney, WA	Minneapolis, MN
Claymont, DE	New Britain, CT
Costa Mesa, CA	Omaha, NE
Dayton, OH	Raleigh, NC
Denver, CO	Salem, OR
Edinboro, PA	Santa Clara, CA
Ft. Worth, TX	Scranton, PA
Indianapolis, IN	St. Louis, MO

November 18, 1990 — Deadline for the receipt of application is October 5, 1990.

Albuquerque, NM	Madison, WI
Anderson, IN	Mechanicsburg, PA
Birmingham, AL	Providence, RI
Bowling Green, OH	Seattle, WA

July 9, 1990 — Deadline for the receipt of application is June 1, 1990.

Columbus, GA

Continuing Education

The Board of Directors of the National Athletic Trainers' Association, Inc. at the June, 1988 Board meeting in Baltimore, Maryland approved the Continuing Education Committee's request to *delete* the Continuing Education Requirements for the Associate and Graduate Student (4B) members of our Association.

This action is retroactive to January 1, 1988. Therefore,

as an Associate or Graduate Student (4B) member you *no longer* are required to report Continuing Education Units.

In the future only Certified members will be required to maintain Continuing Education Units.

If you have any questions regarding this action contact the National Office.

CONTINUING EDUCATION REQUIREMENTS AND APPEAL PROCESS FOR THE CERTIFIED ATHLETIC TRAINER

Units of Continuing Educational shall be approved by the Continuing Education Committee of the National Athletic Trainers' Association, Inc. Where it is applicable, the Continuing Education Unit (CEU) will be adopted as the unit of measurement to meet the Continuing Education requirements of the Certified Athletic Trainer of the NATA. The Continuing Education Unit (CEU) is defined as "ten contact hours of participation in an organized Continuing Education experience under responsible sponsorship, capable direction, and qualified instruction" (10 contact hours = one CEU).

To maintain Certification the minimum number of units to be accumulated each three (3) year Continuing Education period shall be 6 CEUs. Those Certified within the 3-year period shall have their CEU requirement prorated for that period only. The CE report periods are January 1, 1985 through December 31, 1987; January 1, 1988 through December 31, 1990; etc.

THE CERTIFIED ATHLETIC TRAINER is responsible for sending to the Continuing Education Office proof of completion of any Continuing Education Units (CEUs) and activities to be used in updating his/her record in a required period of **THIRTY DAYS** after completing the activity.

THE CERTIFIED ATHLETIC TRAINER who does not accumulate the required number of CEUs during the designated 3-year period shall have his/her name turned over to Membership and Certification for appropriate action. Any action taken affecting the status of a Certified Athletic Trainer relating to Continuing Education may be appealed to the Board of Certification (Please refer to the Appeal Process section).

Certified Athletic Trainers serving as members of the Armed Forces **may** request (in writing) a waiver of CEUs during their tour of active duty. The request will be granted at the discretion of the Continuing Education Committee. This waiver would apply only to time spent stationed overseas.

Certified Athletic Trainers who are not members of the NATA, Inc. should consult the Board of Certification Office for the recording of their CEUs and appropriate fees.

The Continuing Education Committee has developed the following definitions of acceptable Continuing Education for Certified Athletic Trainers:

- A. **NATA ANNUAL MEETING AND CLINICAL SYMPOSIUM:** 2 CEUs for registration and attendance of each annual meeting.*
- B. **SCIENTIFIC WORKSHOPS OFFERED AT NATA ANNUAL MEETING AND CLINICAL SYMPOSIUM:** 1 CEU for every 10 contact hours of workshop. (1 contact hour = .1 CEU.)*
- C. **NATA DISTRICT MEETINGS:** 1 CEU for every 10 contact hours will be awarded for the scientific program

content offered at the District Meeting. (1 contact hour = .1 CEU.)

- D. **SHORT TERM COURSES AND SCIENTIFIC MEETINGS:** Clinics, workshops, seminars, or NATA approved courses, etc., endorsed by the Continuing Education Committee. One CEU will be awarded for every 10 contact hours. **Maximum of 2.0 CEUs per meeting.** (1 contact hour = .1 CEU.)
- E. **PUBLICATION OF ORIGINAL WORK:** Publication of an original paper in the NATA's quarterly publication *ATHLETIC TRAINING* will be awarded 1.5 CEUs per original paper. One CEU will be awarded per original publication in a state or national scientific journal or publication of a related professional organization. Newspaper/newsletter articles awarded .5 CEUs.
- F. **PROGRAM PARTICIPATION AT STATE, DISTRICT OR NATIONAL MEETINGS:** Credit units will be awarded for the presentation of an original paper or program participation at State, District or National level NATA meetings. One CEU will be awarded per meeting.
- G. **PROMOTION OF ATHLETIC TRAINING:** The presentation of athletic training, or any aspect thereof, to organizations, school groups, civic groups, etc. will be awarded .5 CEUs per meeting. This also includes participation in workshops/seminars/symposiums as a speaker.
- H. **TEACHING OF ATHLETIC TRAINING COURSES:** .5 CEUs will be awarded for each credit hour of actual teaching that is not a part of your job description, not to exceed 2 per year.
- I. **STUDENT TRAINER SUPERVISION:** (inclusive of high school trainers). .5 CEUs per year will be awarded for supervision of a student trainer program for a full calendar year. If more than one Certified Athletic Trainer is supervising the student trainer, each receives equal credit.
- J. **POSTGRADUATE STUDY:** Any study completed after receiving a Bachelors degree may be submitted for consideration by the Continuing Education Committee. The study must be related to improving one's Athletic Training skills and/or knowledge. There will be .5 CEUs awarded for each credit hour accepted, with a limit of 2.0 CEUs per year to be accompanied by a copy of the transcript and course description.
- K. **CORRESPONDENCE COURSES:** Correspondence courses in *ATHLETIC TRAINING*, *The Journal of the National Athletic Trainers Association, Inc.* will be awarded .3 CEUs per course. Correspondence courses offered by other publications related to Athletic Training will need to be approved in advance by the Continuing

Education Committee. All courses approved by the Continuing Education Committee will require an examination that certifies the satisfactory completion of the course.*

L. OTHER NATA ACTIVITIES:

1. Serving as a National or District Officer in the NATA will be awarded one CEU per year.*
2. Committee membership in the NATA at the National level and/or District level will be awarded one CEU per year. An additional .5 CEUs each year will be awarded for the chairmanship of the committee.*
3. Certification testing. Those members participating in the certification examination will be awarded .5 CEUs per testing date.*
4. Examiner Development Workshop. Completion of an NATA Certification Examiner Development Workshop will be awarded .3 CEUs.*
5. Official liaison activity. Those members participating in the capacity of a liaison for the NATA will be awarded .5 CEUs each year.
6. State Organizations. Those members serving as elected officers or committee chairpersons in a formally organized State Athletic Trainers organization recognized by the NATA shall receive .5 CEUs for each full calendar year served in that capacity. This would include those committee persons officially designated as working toward state licensure.
7. Visitation team members doing curriculum evaluations shall be awarded .5 CEUs per visit not to exceed 1.0 CEUs per year.

M. AUDIO TAPES AND CASSETTES OF PROCEEDINGS: Purchase of audio cassette tapes from NATA will earn .1 CEU per tape acquired. Proof of purchase is necessary to receive credit.

N. SPECIAL PROJECTS AND CONSIDERATIONS: All projects and educational activities must be submitted to the Continuing Education Committee District Representative for consideration. Projects such as development of, or participation in films, radio conferences, television programs or other audio-visual aids that may be used as a teaching aid or for public relations in the field of athletic training will be awarded .5 CEUs per project. Preparation and presentation of scientific athletic training exhibits at the local, District or National level: Limit .5 CEUs per exhibit. Current CPR and First Aid is creditable for .5 CEUs per year. Teaching CPR and First Aid is also creditable for .5 CEUs per session taught. EMT is creditable for up to 1.0 CEUs per Continuing Education period.

O. U.S.O.C. ATHLETIC TRAINING SERVICES: Any Certified Athletic Trainer who volunteers two (2) weeks service to any United States Olympic Committee sponsored training center will be awarded 2.0 CEUs. U.S.O.C. will validate CEU credit to the National Office in December of each year.

P. VIDEO TAPES: CEUs will be awarded for video tapes based on subject matter, running time and producer. Appropriate information must be provided on the CEU report form. (.1 CEU for tapes 1 hour or less.)

***CEUs for categories A, B, K, L-1, L-2, L-3 and L-4 are automatically recorded and do not require individual reporting.**

PLEASE REFER ALL QUESTIONS CONCERNING APPROVAL OF CEU PROGRAMS TO YOUR DISTRICT CONTINUING EDUCATION REPRESENTATIVE, ALONG WITH A SELF-ADDRESSED STAMPED ENVELOPE.

APPEAL PROCESS

The certified Athletic Trainer will receive an annual statement showing the number of CEUs accumulated. CEUs earned in excess

of requirements for the current period cannot be credited to the next recording period.

If a Certified Athletic Trainer has not earned, reported, and had recorded the appropriate number of CEUs for the current period, his/her name will be turned over to Membership and Certification for appropriate action.

A Certified Athletic Trainer who fails to accumulate sufficient CEUs will receive notice that his/her name has been turned over to Membership and Certification. The Certified Athletic Trainer may appeal this action.

An appeal may be filed by notifying the Board of Certification IN WRITING WITHIN SIXTY DAYS of the receipt of such notice. The appeal should be sent to the following address:

NATA Board of Certification/
Continuing Education Office
2952 Stemmons Freeway
Suite 250
Dallas, TX 75247

**National Athletic Trainers Association, Inc.
Continuing Education Committee**

James B Gallaspy - Chairperson
University of Southern Mississippi
P.O. Box 5142
Southern Station
Hattiesburg, MS 39406-5105
(601)266-5577

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Sports Center
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Piscataway, NJ 08854
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Bettendorf, IA 52722
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State University, AR 72467
(501)972-3342

DISTRICT 7
Submit requests
to Committee
Chairperson

DISTRICT 8
Dan W. Bailey
Cal State University
Athletic Department
Long Beach, CA 90840
(213)985-4660

DISTRICT 9
Linda Arnold
Memphis State University
Athletic Office Building
Memphis, TN 38152
(901)678-2315

DISTRICT 10
Jackie Smaha
P.O. Box 8645
Moscow, ID 83843
(509)332-1919

NOTE: All CEU requests should be sent directly to the National Office. Workshop, seminar, and/or course pre-evaluations should be sent to the Representative in whose district the event is to take place.

CEU REPORT FORM

FOR CEU PERIOD JANUARY 1, 1988 — DECEMBER 31, 1990

NATA BOARD OF CERTIFICATION, INC.

2952 Stemmons Freeway Suite 250 Dallas, Texas 75247

Certified members of the NATA are responsible for submitting to the Board of Certification proof of completion of any Continuing Education Units (CEUs) and activities to be used in updating his/her record within THIRTY (30) DAYS of completing that activity. *Failure to do so will mean no credit will be given for that activity.*

ENCLOSE A COPY OF THE PROGRAM IF ADVANCE NATA APPROVAL HAS NOT BEEN GIVEN. INCLUDE A TRANSCRIPT IF APPLYING UNDER CATEGORY J, POSTGRADUATE STUDY.

- A. NATA ANNUAL MEETING AND CLINICAL SYMPOSIUM
- B. SCIENTIFIC WORKSHOPS OFFERED AT NATA ANNUAL MEETING AND CLINICAL SYMPOSIUM
- C. NATA DISTRICT MEETINGS
- D. SHORT-TERM COURSES AND SCIENTIFIC MEETINGS:
1 contact hour = .1 CEU (Maximum of 2.0 CEUs per meeting.)
- E. PUBLICATION OF ORIGINAL WORK:
ATHLETIC TRAINING Journal = 1.5 per original paper.
Publication in a state or national scientific journal = 1.0
Newspaper/Newsletter articles = .5 CEUs.
- F. PROGRAM PARTICIPATION AT STATE, DISTRICT OR NATIONAL MEETINGS: One CEU will be awarded per meeting.
- G. PROMOTION OF ATHLETIC TRAINING: .5 CEUs will be awarded per meeting.
- H. TEACHING OF ATHLETIC TRAINING COURSES: .5 CEUs will be awarded for each hour of actual teaching that is not a part of your job description, not to exceed 2 per year.
- I. STUDENT TRAINER SUPERVISION: .5 CEUs per year will be awarded for supervision of a student trainer program for a full calendar year, (January - December).
- J. POSTGRADUATE STUDY: The study must be related to improving one's Athletic Training skills and or knowledge. There will be .5 CEUs awarded for each credit hour accepted, with a limit of 2.0 CEUs per year to be accompanied by a copy of the transcript and course description.
- K. CORRESPONDENCE COURSES: Correspondence courses in ATHLETIC TRAINING, the journal of the National Athletic Trainers Association, Inc. will be awarded .3 CEUs per course.
- L. OTHER NATA ACTIVITIES:
 - 1. Serving as a National or District Officer in the NATA will be awarded one (1) CEU per year. *
 - 2. Committee membership in the NATA at the National level and/or District level will be awarded one CEU per year. An additional .5 CEUs will be awarded for the chairmanship of the committee. *
 - 3. Certification Exam Participation = .5 CEUs*
 - 4. Examiner Development Workshop = .3 CEUs*
 - 5. Official liaison activity = .5 CEUs per year.
 - 6. State Organizations. Those members serving as elected officers or committee chairpersons in a formally organized State Athletic Trainers organization recognized by the NATA shall receive .5 CEUs for each full calendar year.
 - 7. Visitation team members doing curriculum evaluations shall be awarded .5 CEUs per visit not to exceed 1.0 CEUs per year.
- M. AUDIO TAPES AND CASSETTES OF PROCEEDINGS: .1 CEUs per tape with proof of purchase.
- N. SPECIAL PROJECTS AND CONSIDERATIONS:
 - 1. Current CPR and First Aid is creditable for .5 CEUs per year to be accompanied by a copy of the card.
 - 2. EMT is creditable for up to 1.0 CEUs per Continuing Education period.
 - 3. Teaching CPR and First Aid is creditable for .5 CEUs per session taught to be accompanied by a copy of the official Red Cross list of participants. Projects such as development of, or participation in films, radio conferences, television programs or other audio visual aids or for public relations in the field of athletic training will be awarded .5 CEUs per project.
 - 4. Preparation and participation of scientific athletic training exhibits at the local, District or National level: limit .5 CEUs per exhibit.
- O. U.S.O.C. ATHLETIC TRAINERS SERVICES: 2.0 CEUs.
- P. VIDEO TAPES: .1 CEU for tapes 1 hour or less.

* CEUs for categories A, B, K, L-1, L-2, L-3 and L-4 are automatically recorded and do not require individual reporting.

MEMBERSHIP NUMBER _____

CERTIFICATION NUMBER _____

VIDEO TAPE INFORMATION

I request CEUs for the following activity(s): _____

Title: _____

Total Contact Hours, excluding breaks, meals, etc. _____

Category: _____ Date of Activity: _____

Name: _____

(As printed in NATA record)

Address: _____

Running Time: _____

Producer: _____

I certify that the above information is correct _____

(Signature of applicant)

PHOTOCOPY THIS FORM FOR FUTURE USE

OFFICIAL USE ONLY

CEUs awarded: _____

Drug Education

DRUG TESTING LABORATORIES AVAILABLE TO ATHLETIC TRAINERS

Mandatory Guidelines for Federal Workplace Drug Testing were developed in accordance with Executive Order 12564 and section 503 of Public Law 100-71. Subpart C of the Guidelines "Certification of Laboratories Engaged in Urine Drug testing for Federal Agencies" sets strict standards which laboratories must meet in order to conduct urine drug testing for Federal agencies. To become certified an applicant laboratory must undergo three rounds of performance testing plus an on-site inspection. To maintain that certification, a laboratory must participate in an every-other-month performance testing program plus periodic on-site inspections. As of June 1, 1989, the following laboratories meet the standards established in Subpart C.

American BioTest Laboratories, Inc.
3350 Scott Boulevard, Building 15
Santa Clara, CA 95054, 408/727-5525

American Medical Laboratories
11091 Main Street, Box 188
Fairfax, VA 22030, 703/691-9100

Bio-Analytical Technologies
2356 North Lincoln Avenue
Chicago, IL 60614, 312/880-6900

Center for Human Technology
417 Wakara Way, Room 290
University Research Park
Salt Lake City, UT 84108, 801/581-5117

Chem-Bio Corporation
140 East Ryan Road
Oak Creek, WI 53154, 800/365-3840

CompuChem Laboratories, Inc.
600 West North Market Boulevard
Sacramento, CA 95834, 916/923-0840

CompuChem Laboratories, Inc.
3308 Chapel Hill/Nelson Highway, Box 12652
Research Triangle Park, NC 27709,
919/549-8263

Doctors and Physicians Laboratory
801 East Dixie Avenue
Leesburg, FL 32748, 904/787-9006

Laboratory of Pathology of Seattle, Inc.
1229 Madison Street, Suite 500
Nordstrom Medical Tower
Seattle, WA 98104, 206/386-2872

MedArts/South Community Hospital
1001 Southwest 44th Street
Oklahoma City, OK 73109, 405/636-7041

MetPath Inc.
One Malcolm Avenue
Teterboro, NJ 07068, 201/393-5000

MetParth Inc.
1355 Mittel Boulevard
Wood Dale, IL 60191, 313/595-3888

The above laboratories are certified by the United States Department of Health and Human Services, National Institute on Drug Abuse. Certification by the National Institute on Drug Abuse is not the same certification conducted by the International Olympic Committee. The Athletic Trainer should keep this in mind when considering one of the above drug testing laboratories.

Journal

The Journal office gets its mailing labels from the National Headquarters. Labels for NATA members are produced from the membership roster as maintained and updated by the Membership Office. NATA Members who do not receive a Journal should contact the Membership Office to check on their address of record. If an address change was made just prior to a Journal being mailed, it's possible that the change did not get to the Membership Office in time to have a correct label produced. If the member did not authorize Second Class mail forwarding with the post office, then that issue was probably thrown away when received at the post office. After a member has checked with the Membership Office at National Headquarters and determined that the address change was not received in time for a correct label to be produced, hence an issue was missed, then the member can purchase the back issue from the Journal office as long as the supply lasts.

Journal Replacement Policy

The Policy for handling claims for missing Journals due to *address change* is based on the stipulation that the notice of change of address be received at National Headquarters at least 30 days prior to publication, in order for the member to receive a gratis replacement Journal. If the member did not meet the "30 day" requirement, or did not authorize the post office to forward Second Class mail, then the responsibility for not having received the Journal rests with the member and a minimum replacement charge is made. *New members* and *Reinstated members* do not receive back issues published before their membership was validated. *New members* will receive the first issue published after NATA membership is in effect. *Reinstated members* (previously deleted due to nonpayment of dues) will receive the first issue published after confirmation of reinstatement is issued from the Membership Office.

NATA members who do not receive their Journals should check with the Membership Office at the National Headquarters to determine if the membership roster reflects an incorrect address.

Thanks

The Journal committee would like to thank the following people who have assisted Ken Knight with his editorial duties:

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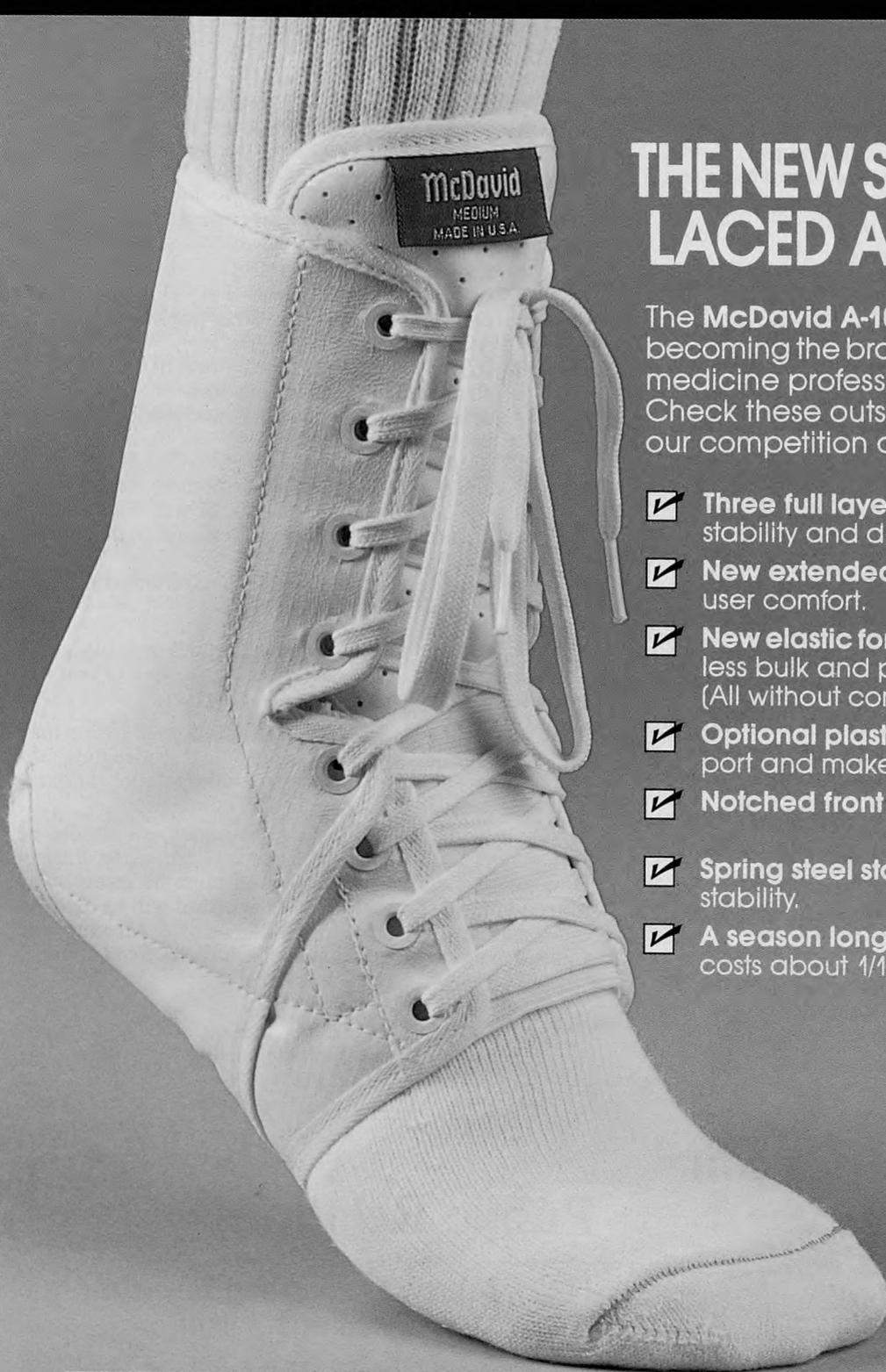
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6. Evidence of quality in publications and public speaking on topics in athletic training/sports medicine.

II. Nomination Procedures

1. The candidate's current personal resume which includes:
 - a. academic background
 - b. employment background
 - c. published research and other publications (journal articles, books, etc.)
 - d. course work taught (during past five years)
 - e. classroom teaching innovations
 - f. course work/curriculums developed
 - g. professional memberships
 - h. positions on state, district, or national level of the National Athletic Trainers Association, Inc.
 - i. positions on state, district, or national level or related sports medicine professional organizations
 - j. consultant work
 - k. speaking engagements on community, state, regional, and national levels
 - l. community service
 - m. college or university service (i.e., committee involvement, thesis advertising, etc.)
 - n. any other pertinent materials
2. A minimum of three letters (additional letters may be submitted) from professional colleagues, administrators, or students providing detailed rationale in support of the candidate's nomination.

Nominations including the above materials should be sent to the Professional Education Committee Project Director, Honors and Awards, and must be received by **March 1, 1990**. Presentation of the award will be made to the recipient at the 1990 NATA Annual Meeting and Clinical Symposium in Indianapolis, Indiana. Send nominations to:

Ken Murray
Athletic Department
Texas Tech University
P.O. Box 4199
Lubbock, Texas 79409

Professional Education

Sayers "Bud" Miller Distinguished Athletic Training Educator Award

Nominations are being received for the annual **Distinguished Athletic Training Educator Award** to be presented by the NATA Professional Education Committee in recognition of excellence in athletic training education:

I. Qualifications

To be nominated for the award, educators must have the following qualifications:

1. Current member of the National Athletic Trainers Association, Inc.
2. Member of a teaching faculty in the area of athletic training/sports medicine for at least ten (10) years.
3. Minimum of ten years of outstanding service in the area of athletic training education and research.
4. Recognized excellence in the field of athletic training education.
5. Outstanding service in district, state or national professional organizations concerned primarily with the field of athletic training.

Public Relations

Injury Toll in Prep Sports Estimated at 1.3 Million

(June 12, 1989, Dallas, Tex.) — After reviewing final results of their injury surveillance studies conducted since 1986, leaders of the National Athletic Trainers' Association said today the injury toll in high school sports is about 1.3 million per year.

Athletic trainers kept medical records on 32,647 high school athletes in football, basketball and wrestling since 1986 to determine the number and severity of injuries in those sports. Based on projections of results from those studies to more than 19,000 schools with interscholastic athletic programs, the NATA said 564,914 players were injured at least one time in those three sports alone. When adding multiple injuries, cases where a player sustained more than one injury per year, NATA officials said the combined annual injury toll in football, basketball and wrestling was 905,718 per year.

The NATA said 2 million student athletes participate nationwide in either football, basketball or wrestling, about

one-third of the estimated 5.8 million prep athletes in the U.S. Athletes who participate in more than one sport are counted separately for each sport they play.

"We weren't able to conduct studies in gymnastics, hockey, baseball or the other sports," NATA Executive Director Otho Davis said. "But it's probably safe to say that if they were included, the injury toll in high school sports would be about 1.3 million per year."

The study found that an average of 331,865 high school football players, one-third of the million who play the game each year, were sidelined by injury at least one time. When multiple injuries were factored in, the average annual injury count in football since 1986 was 552,229.

In other sports, the NATA announced today that the average annual injury toll was 119,056 in boys basketball; 110,473 in girls basketball; and 123,960 in wrestling.

NATA President Mark Smaha noted that 70-75 percent of all injuries were minor, which means they sidelined a player for a week or less.

"But our studies were conducted at schools that had certified athletic trainers on staff," added Smaha, who serves as head athletic trainer at Washington State University. "Projections were based on medical records kept at those schools, schools that provide a level of care similar to college and professional sports. Keep in mind that only 16 to 18 percent of all high schools in the country have the services of an athletic trainer, or someone with equivalent credentials, to handle sports-related injuries."

Davis, who also serves as head trainer for the NFL's Philadelphia Eagles, said the NATA is suspending its high school research studies for now.

"We were the first organization to take a clinical look at the injury situation in high school sports across the

country," Davis said. "We feel like we've made a valuable contribution to interscholastic athletics. We're working now to find new ways to help coaches, school administrators, physicians and our own members reduce the rate of injury to the lowest level possible."

ATTENTION NATA MEMBERS

Contact the National Headquarters in Dallas, Texas (telephone: 214/637-6282) for Association matters OTHER THAN those relating to the Certification Office, which will continue operations in Greenville, North Carolina (telephone: 919/355-6300) until further notice.

The Journal production office may be reached at telephone 919/355-5144.

Sports Injuries in High School Basketball & Wrestling

Based on Projections of Schools Surveyed by NATA 1986-89

	Boys Basketball*	Girls Basketball**	Wrestling*
Avg. # of schools participating in U.S.	18,897	18,532	9,429
Avg. annual number of players in U.S.	380,783	333,149	277,965
# of players per school	20	18	29
Annual injury toll***	119,056	110,473	123,960
# of players injured at least once per year	84,066	75,873	73,110
Avg. # injuries per school***	6.3	6.0	13.2
Avg. # players injured per school	4.4	4.1	7.8
Percent of players injured	22.1%	22.8%	26.8%
MINOR INJURIES:			
Projected annual avg.	86,064	78,148	82,607
Percent of total	72.3%	70.7%	66.6%
MODERATE INJURIES:			
Projected annual avg.	19,296	18,734	21,693
Percent of total	16.2%	17.0%	17.5%
MAJOR INJURIES:			
Projected annual avg.	13,696	13,591	19,660
Percent of total	11.5%	12.3%	15.9%

* Based on NATA survey for two school years: 1987-89.

** Based on NATA survey for three school years: 1986-89.

*** Since some players incur more than one injury, this figure includes multiple injuries to individual players.

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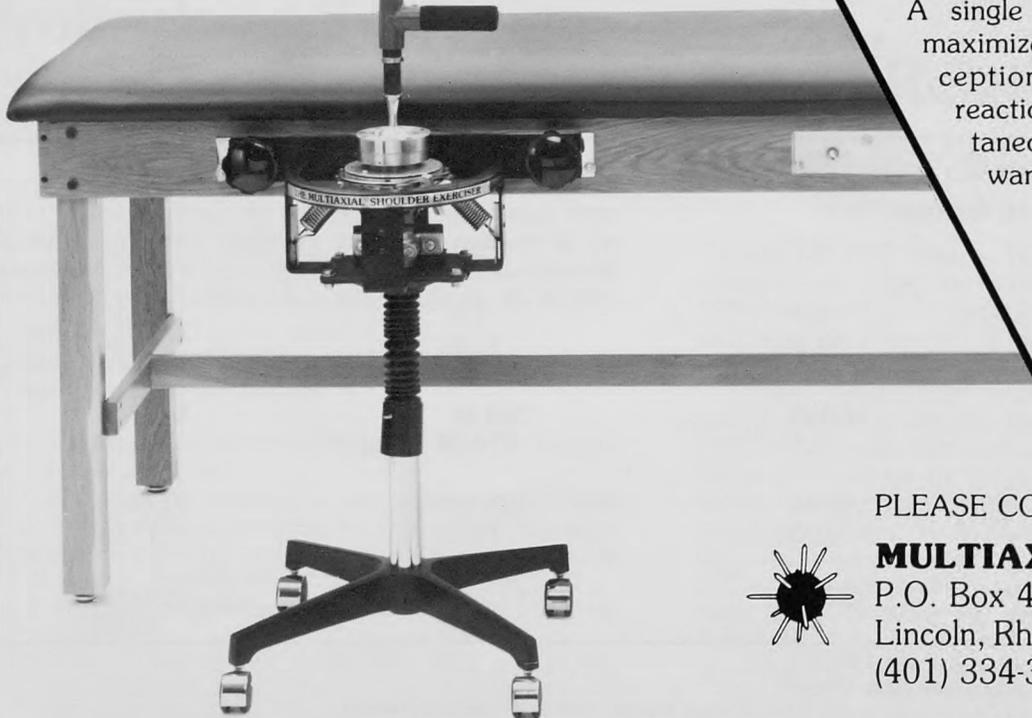
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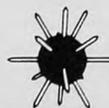
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Where It Hurts
High School Girls Basketball
Based on Projections of Schools Surveyed by NATA 1986-89

Body Area	1987	1988	1989	3-year Avg.
ANKLE/FOOT	37,532	35,745	31,413	34,897
% of Total	30%	34%	31%	32%
KNEE	21,877	17,231	19,065	19,391
% of Total	15%	9%	19%	18%
FOREARM/ WRIST/HAND	18,666	18,148	12,132	16,315
% of Total	15%	17%	12%	15%
HIP/THIGH	15,655	12,832	12,565	13,684
% of Total	12%	12%	13%	12%
TRUNK	10,838	6,049	5,850	7,579
% of Total	9%	6%	6%	7%
OTHER	9,433	3,483	7,149	6,688
% of Total	8%	3%	7%	6%
FACE/SCALP	6,824	5,683	5,850	6,119
% of Total	5%	10%	6%	6%
HEAD/NECK/SPINE	3,211	2,933	2,816	2,987
% of Total	3%	3%	3%	3%
SHOULDER/ARM	2,408	2,566	3,466	2,813
% of Total	2%	3%	4%	2%
Total	126,444	104,670	100,306	110,473

Source: National Athletic Trainers' Association, Inc. (1989)

Types of Injuries
In High School Girls Basketball
Based on Projections of Schools Surveyed by NATA 1986-89

Type of Injury	1987	1988	1989	3-year Avg.
SPRAINS	52,384	46,377	38,779	45,846
% of Total	41%	44%	39%	41%
GENERAL TRAUMA	22,278	19,248	18,198	19,908
% of Total	18%	18%	18%	18%
STRAINS	19,067	19,981	11,699	16,916
% of Total	15%	19%	12%	15%
GENERAL ILLNESS	12,444	4,399	9,315	8,719
% of Total	10%	4%	9%	8%
MUSCULO- SKELETAL	8,229	4,949	11,049	8,076
% of Total	7%	5%	11%	7%
FRACTURES	8,229	6,599	8,016	7,615
% of Total	7%	6%	8%	7%
NEUROTRAUMA	3,011	2,750	2,600	2,787
% of Total	2%	3%	3%	3%
THERMOTRAUMA	802	367	650	606
% of Total	1%	1%	1%	1%
Total	126,444	104,670	100,306	110,473

Source: National Athletic Trainers' Association, Inc. (1989)

Where It Hurts High School Boys Basketball

Based on Projections of Schools Surveyed by NATA 1987-89

Body Area	1988	1989	2-year Avg.
ANKLE/FOOT	54,384	46,801	50,593
% of Total	43%	42%	42%
FOREARM/ WRIST/HAND	14,008	12,561	13,284
% of Total	11%	11%	11%
HIP/THIGH	14,214	12,156	13,185
% of Total	11%	11%	11%
KNEE	1,133	12,967	12,149
% of Total	9%	12%	10%
FACE/SCALP	12,360	9,928	11,144
% of Total	10%	9%	9%
TRUNK	8,240	7,901	8,071
% of Total	7%	7%	7%
OTHER	6,180	5,470	5,825
% of Total	5%	5%	5%
SHOULDER/ARM	2,678	2,431	2,555
% of Total	2%	2%	2%
HEAD/NECK/SPINE	2,678	1,823	2,250
% of Total	2%	2%	2%
Total	126,072	112,039	119,056

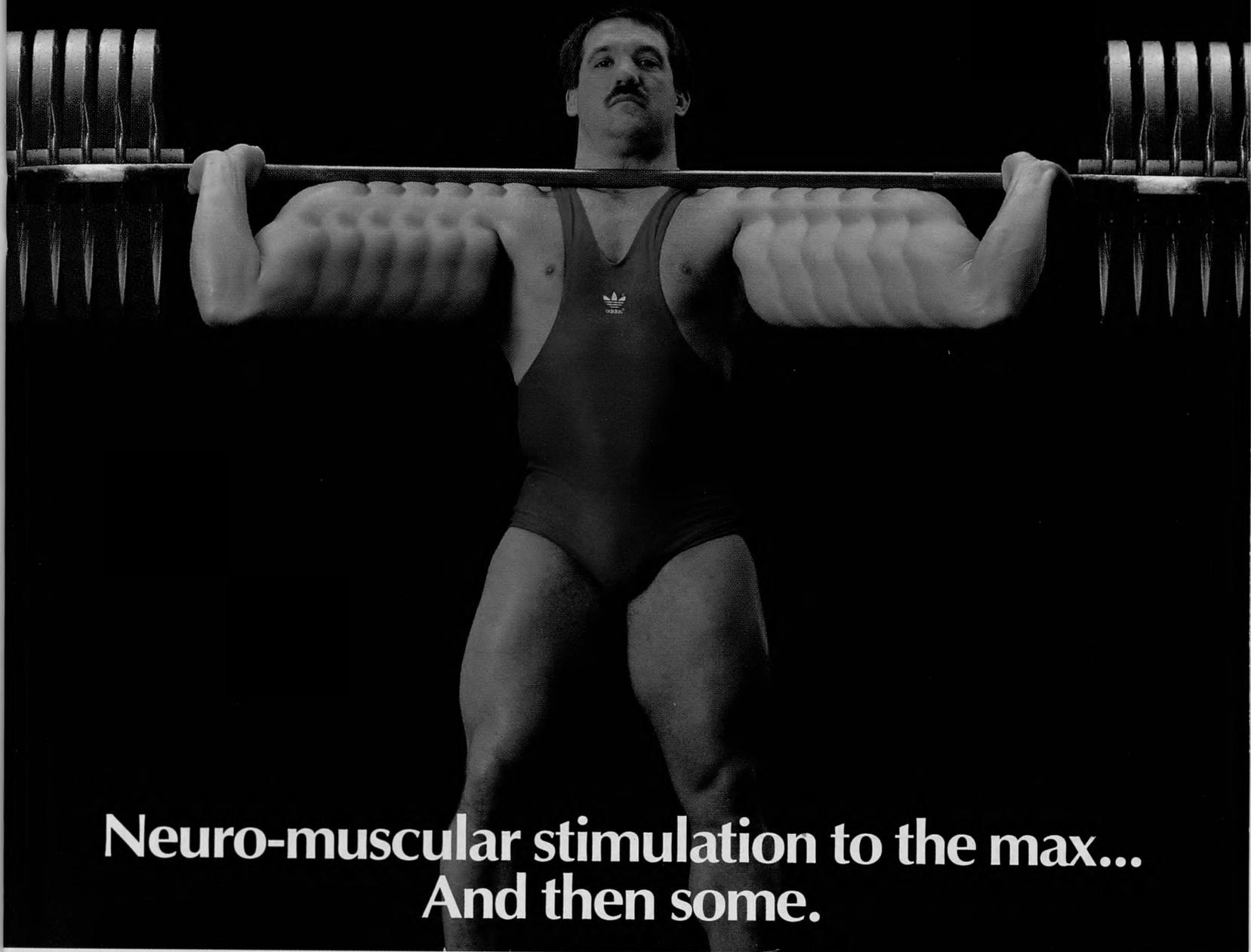
Source: National Athletic Trainers' Association, Inc. (1989)

Types of Injuries In High School Boys Basketball

Based on Projections of Schools Surveyed by NATA 1987-89

Type of Injury	1988	1989	2-year Avg.
SPRAINS	53,972	48,422	51,197
% of Total	43%	43%	43%
GENERAL TRAUMA	27,810	23,704	25,758
% of Total	22%	21%	22%
STRAINS	18,128	15,195	16,616
% of Total	14%	14%	14%
FRACTURES	11,124	8,712	9,918
% of Total	9%	8%	8%
GENERAL ILLNESS	7,416	8,104	7,760
% of Total	6%	7%	7%
MUSCULO-SKELETAL	4,738	5,673	5,206
% of Total	4%	5%	4%
NEUROTRAUMA	2,266	1,418	1,842
% of Total	2%	1%	1%
THERMOTRAUMA	618	811	714
% of Total	1%	1%	1%
Total	126,072	112,039	119,056

Source: National Athletic Trainers' Association, Inc. (1989)



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Types of Injuries In High School Wrestling

Based on Projections of Schools Surveyed by NATA 1987-89

Type of Injury	1988	1989	2-year Avg.
SPRAINS	42,299	32,138	37,219
% of Total	30%	30%	30%
GENERAL TRAUMA	38,875	30,677	34,776
% of Total	28%	28%	28%
STRAINS	31,825	24,417	28,121
% of Total	23%	22%	23%
FRACTURES	10,474	7,513	8,993
% of Total	8%	7%	7%
GENERAL ILLNESS	8,058	5,009	6,534
% of Total	6%	5%	5%
MUSCULO-SKELETAL	3,827	6,052	4,939
% of Total	3%	6%	4%
NEUROTRAUMA	3,223	2,504	2,864
% of Total	2%	2%	2%
THERMOTRAUMA	403	626	515
% of Total	1%	1%	1%
Total	138,984	108,936	123,960

Source: National Athletic Trainers' Association, Inc. (1989)

Where It Hurts High School Wrestling

Based on Projections of Schools Surveyed by NATA 1987-89

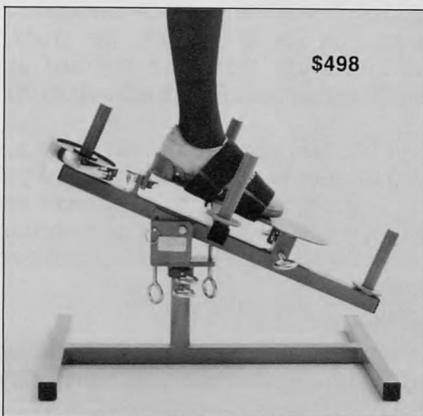
Body Area	1988	1989	2-year Avg.
SHOULDER/ARM	22,963	17,321	20,142
% of Total	17%	16%	16%
FOREARM/ WRIST/HAND	23,970	15,652	19,811
% of Total	17%	14%	16%
TRUNK	23,567	15,860	19,713
% of Total	17%	15%	16%
KNEE	19,740	17,739	18,740
% of Total	14%	16%	15%
FACE/SCALP	11,280	12,521	11,900
% of Total	8%	11%	10%
HEAD/NECK/SPINE	10,474	10,434	10,454
% of Total	8%	10%	8%
ANKLE/FOOT	11,884	8,348	10,116
% of Total	9%	8%	8%
HIP/THIGH	8,258	7,722	7,990
% of Total	6%	7%	6%
OTHER	6,848	3,339	5,094
% of Total	5%	3%	4%
Total	138,984	108,936	123,960

Source: National Athletic Trainers' Association, Inc. (1989)

Comparison of Some Other Findings

	Boys Basketball	Girls Basketball	Wrestling
PRACTICE VS. GAME INJURIES	60% practice; 40% game	59% practice; 41% game	66% practice; 34% game
1ST HALF VS. 2ND HALF GAME INJURIES	41% 1st half; 59% 2nd half	37% 1st half; 63% 2nd	DNA
NEW INJURIES VERSUS RE-INJURIES	85% new injuries; 15% re-injuries	85% new injuries; 15% re-injuries	91% new injuries; 9% re-injuries
AREAS OF PRIMARY CONCERN	Ankle/foot & knee injuries account for 52% of total	Ankle/foot & knee injuries account for 50% of total	shoulder/arm; knee; trunk; forearm/wrist/ hand each account for 15-16% of total
SPRAINS AND STRAINS	Account for 57% of total	Account for 57% of total	Account for 53% of total
FRACTURES	8% of total	7% of total	7% of total
SURGERIES	2.5% of total; annual average of 2,967	3.4% of total; annual average of 3,705	2.8% of total; annual average of 3,367
INJURIES THAT SIDELINE 7 DAYS OR MORE	28% of total; annual average of 32,992	29% of total; annual average of 32,325	33% of total; annual average of 41,353
INJURY TREND*	Declined 11% in 1989 vs. 1988	Declined 21% in 1989 vs. 1987	Declined 22% in 1989 vs. 1988

* Historically, first year results of injury surveillance studies such as these are higher than ensuing years, which "gives appearance of significant decline," said NATA research director Dr. John Powell. Consequently, the NATA focuses on "average number of injuries" over the two-to-three year period to form the basis of its recommendations.



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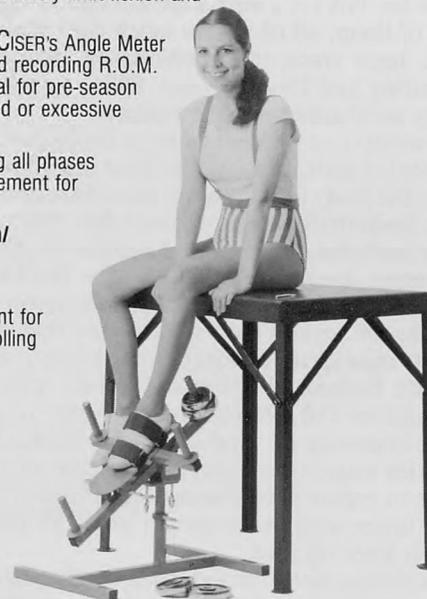
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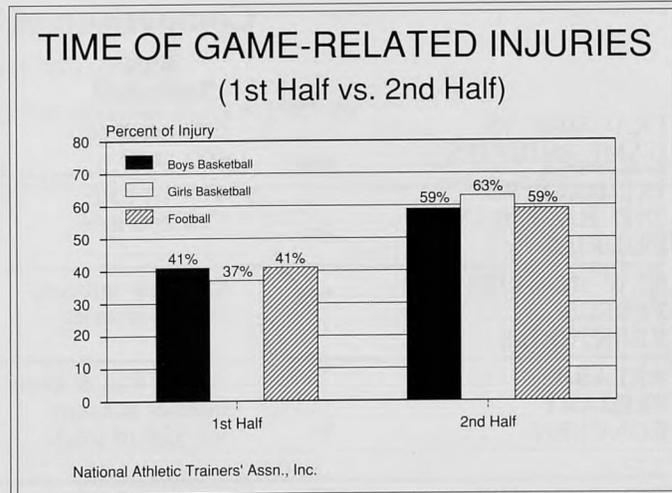
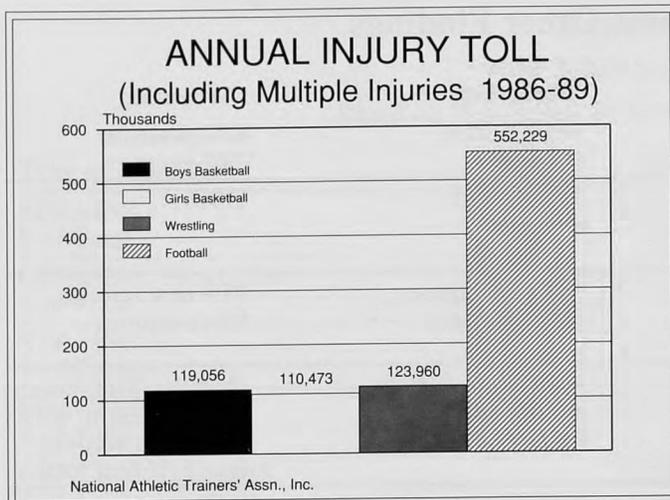
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Final Report Shows Prep Injuries Most Likely in Practice, During Late Stages of Game

(June 12, 1989, Dallas, Tex) — Sixty percent of injuries in high school basketball games occur during the second half, and about two-thirds of the estimated 120,000 injuries endured by prep wrestlers each year happen during practice.

Those were two of the findings released today in a final report issued by the National Athletic Trainers' Association after monitoring high school sports injuries for the past three years.

Results of the study show why girls who play high school basketball should give special attention to specific leg exercises that protect their knees, while boys should be aware that impairment to ankles and feet is four times more likely to sideline them than any other variety of injury.

Four thousand athletic trainers are in Dallas today to open the NATA's 40th annual clinical symposium. About 300 of them, all of whom work with high school athletes, have been tracking sports-related injuries in basketball, wrestling and football since 1986. Results of the football study were announced in January.

Twenty-two percent of boys basketball players, and 23 percent of girls, sustained at least one time-loss injury each year, the study found. Injury records kept on 8,700 boys and girls basketball players showed that when multiple injuries were included, the projected number of injuries each year in the sport averaged 229,529. The NATA said there are 714,000 high school basketball players in the U.S.

One of several key discoveries that may help reduce sports injuries in the future focused on knee injuries among female basketball players. Overall, girls experienced an average of 110,473 injuries per year, 18 percent of which were knee-related. And while only 3,700 (3.3 percent) of all injuries required surgery, 89 percent of the surgical cases were to repair knee damage. In contrast, boys experienced 700 fewer surgical cases per year, 59 percent of them to repair knee injuries.

A similar study for wrestling conducted over the past two school years found that 27 percent of the participants, or 73,110 of 278,000 in the sport, were injured at least once each year. Multiple injuries to wrestlers brought the average annual injury count to 123,960. The study reaffirmed the gruelling nature of wrestling when it found that one-third of all injuries sidelined the athletes for more than a week.

It came as no surprise to athletic trainers who reviewed the results that most basketball injuries were to the lower

extremities. Forty-two percent of boys injuries were to the ankle and foot, far outnumbering other injured body categories like hip/thigh (11 percent); forearm/wrist/hand (11 percent) and knee (10 percent).

While the study suggests a downward trend of injuries, NATA research director John W. Powell, Ph.D., who supervised the project, cautioned against being too optimistic.

"When taken as a whole, the research provides us with an excellent overview of injuries in these particular sports," Powell said. "We can say with a reasonable degree of certainty, for instance, that about one-in-four high school basketball players and wrestlers will be sidelined by injury each year.

"But the study does not provide an accurate reflection of injury trends," added Powell, a research associate at the University of Iowa. "In the first place, the study only measures injuries at schools that have certified athletic trainers. Less than 20 percent of all high schools in the U.S. have them.

"Second, studies like this one consistently show a sharp decline of recorded injuries in the second and third years of the study, which is probably due to aggressive record-keeping in the initial phase. We feel it is more prudent to examine the average rate and severity of injuries over the full term of the study."

Among the findings cited by Dr. Powell:

- Injuries occur more often in practice than in games, due in part that most teams practice more than they play, and more athletes participate. Sixty percent of boys basketball injuries occurred during practice; 59 percent among girls; and a surprising 66 percent among wrestlers.
- Fifty-nine percent of boys "game-related" injuries and 63 percent of the girls "game" injuries occurred during the second half. "Fatigue may be a factor," Powell said, "since 35 percent of boys' injuries were in the fourth quarter compared to 10 percent in the first period, but there's probably more to it than that." Girls sustained 32 percent of game injuries in the third quarter, only 9 percent in the first period.
- Re-injuries are an athletic trainer's nightmare, and they can be minimized, but not prevented entirely. The rate of re-injury (second injury to the same body part) in basketball was 15 percent; 9 percent in wrestling.
- Fractures accounted for a relatively small number of time-loss injuries — 7 to 8 percent — in all 3 sports.
- Ironically, wrestlers and female basketball players face



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almost the same chance of sustaining an injury requiring surgery. The odds among wrestlers are one in 83; one in 90 among girls basketball players; and one in 128 among boys.

Here Are Some Ways To Minimize Risk of Prep Sports Injuries

(June 12, 1989, Dallas, Tex.) — Two of the nation's leading athletic trainers who have been working with high school athletes for a combined total of 38 years outlined measures today that can be taken by coaches, parents and athletes to minimize risk of sports-related injuries.

James Dodson has been head athletic trainer at Midland High School in Texas since 1959. Hal Hilmer assumed the head athletic trainer title in 1981 at John Hersey High School in Arlington Heights, Ill. Dodson serves as Secretary of District Six, one of 10 geographic districts within the National Athletic Trainers' Association, which encompasses Texas and Arkansas. Hilmer is national chairman of the NATA's High School Athletic Trainers Committee.

While their list is not comprehensive, Dodson and Hilmer said adherence to these recommendations, preferably combined with the presence of an on-site athletic health care professional, can help reduce the risk of high school sports injuries.

1. Student-athletes should receive a pre-participation physical exam, which includes a general exam and an orthopedic exam. The general exam should include checks on height, weight, blood pressure, pulse, respiration, eye, ear, nose, chest and abdominal. The orthopedic exam should include re-examination of past bone and joint injuries, joint flexibility and joint range of motion.
2. Off-season weight training and conditioning is strongly recommended for all athletes.
3. A 15-minute warm-up period before games and practice and a 15-minute cool-down period afterward should be mandatory. Athletes are advised to warm-up for 5 minutes during half-time, between periods or during long periods of inactivity.
4. Workout (practice) periods should not exceed 2 hours.
5. Mandatory fluid breaks should be offered at least every 45 minutes. Athletes should be entitled to unrestricted amounts of fluids to help prevent dehydration and other forms of heat-related illness.
6. Ice, not heat, should be applied to new injuries. Ice should be mandatory on the sidelines of every game and practice.
7. Injuries involving bones or joints should be examined by an orthopedist.
8. Mouth guards should be mandatory in all contact sports, including hockey, football, lacrosse, etc.
9. Dodson and Hilmer remind us that spearing is banned in football. Both added that blocking below the waist should be minimized during football practice because it creates unnecessary risk of injury. Any player engaging in either activity should be taken aside and instructed about the dangers of these tactics.
10. Shin guards should be mandatory in soccer.
11. Eighty-nine percent of injuries that require surgery in girls basketball are to the knee. Girls should give special attention to leg conditioning exercises, specifically those that develop strong quadriceps to protect the knee capsule.
12. Forty-two percent of injuries among boys basketball players are to the ankles and feet. Conditioning exercises for the legs and, specifically, ankles and feet, can reduce the risk of these types of injuries. Also, proper fitting

footwear also can minimize risk of ankle and foot-related injuries.

13. Food and fluid depletion in order to make a particular weight class in wrestling poses one of the greatest areas of concern. Depletion practices sap energy and strength necessary to succeed, and should be banned.
14. Parents should be aware of who is responsible for injury care at their child's school. Parents should ask if this person is qualified to handle all injuries, provide proper instruction and rehabilitation, and whether he or she is available for both practice and games.
15. Parents should ask for a copy of the school's "Injury Procedure Manual." This manual should answer any questions a parent may have regarding how an injury is to be handled and who will be primarily responsible.
16. The athletic department should have an "Emergency Medical Authorization Card" on file for every athlete. This card gives parental permission to administer emergency medical care if it is required. The card should include name, address, parents home and work phone number, etc.
17. The athletic department should have a parent sign a waiver that indicates the parent is aware of the inherent risk of injury to their child.
18. Coaches should be certified in First Aid and C.P.R. and, where possible, earn a state- or nationally-approved certificate to coach their specific sport. Several state coaching organizations have a certification program, while several national organizations are currently working to develop a certification program that would apply to coaches in most or all states.

I. BACKGROUND ON THE NATA INJURY SURVEILLANCE STUDY

- A. The purpose of the NATA's injury surveillance studies was to determine the number and severity of time-loss* injuries in high school sports. Between 1986 and 1989, the NATA recorded injuries in football, basketball and wrestling. By accurately measuring the risks associated with high school athletics, the NATA can use the results to outline sound recommendations to minimize those risks.
- B. There were no fatal or catastrophic (paralyzing/brain damage) injuries directly related to any of the sports among the combined total of 32,647 players monitored during the three years of the NATA study. However, there is an annual average of 24 fatal or catastrophic injuries related to high school football each year, and an average of 36 fatal or catastrophic injuries related to all high school sports, according to researchers who conduct the "Annual Survey of Football Injury Research."¹
- C. No conclusions can be drawn from this study with regard to natural grass versus artificial turf since the use of artificial surfaces in high school sports is minimal. But for the record, 96 percent of football injuries occurred on natural grass.
- D. The research team was directed by John W. Powell, Ph.D., chairman of the NATA's Research and Injury Committee. Powell is a research associate in the Department of Orthopaedic Surgery at the University of Iowa. A certified athletic trainer, Powell also supervises the National Football League Injury Surveillance Program.
- E. Funding for the NATA injury surveillance studies are provided in large part by The Quaker Oats Company, maker of Gatorade® Thirst Quencher; from the Athletic Products division of Johnson & Johnson Products,



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*TIME-LOSS INJURIES are defined by the NATA as those that require the player to suspend activity for at least the remainder of the day the injury occurred, or the day after onset of injury.

II. REFERENCES

- (1) Fred Mueller, Ph.D., is the director of the **Annual Survey of Football Injury Research** at the University of North Carolina at Chapel Hill. For more information regarding fatal or catastrophic injuries in football, please contact Dr. Mueller at 919/962-2021.
- (2) The National Federation of State High School Associations (NFSHSA) reportedly represents 89 percent of U.S. high schools. The NATA arrived at its total number of high schools with either basketball, wrestling or football programs in the U.S. by dividing the number of NFSHSA schools by .89. In 1988-89, for instance, the NFSHSA reported 16,679 boys basketball programs among its member schools in its 1988-89 handbook (page 71). We divided 16,679 by .89 to arrive at the total of 18,740 basketball programs in the U.S. for that school year. We then added the number of programs for each year we monitored student-athletes in that sport and divided the total by the number of years to arrive at the average number of teams participating in each sport during the life of the NATA study.
- (3) To arrive at the total number of athletes participating in the U.S., we calculated the average number of athletes participating in each sport at schools monitored by the

NATA. We arrived at projected totals for the U.S. by multiplying the average number of participants in each sport by the average number of schools participating in that particular sport.

Research & Injury

CALL FOR ABSTRACTS INDIANAPOLIS, JUNE 1990

Each year during our National Convention, members are continually sharing ideas, procedures, techniques, innovations in and for the profession of athletic training. Most of these conversations are among small groups of members and much of the information exchanged would be highly meaningful for the larger group. Many of these ideas have been developed through systematic data collection and observations made by the athletic trainers in the performance of their responsibilities. The accumulation of this information represents an important form of applied research.

With this in mind, the NATA Research and Injury Committee will offer a **Free Communications Section** and a **Poster Presentation** at our National Meeting in Indianapolis, June 1990. In order to provide organization to these sessions, the Committee is issuing a **CALL FOR ABSTRACTS** from the NATA membership. The titles of the projects to be presented will be available to members prior to the convention so that they will know which topics will be discussed and at what time during the session. All selected abstracts will be published in the Summer edition of *Athletic Training*.

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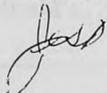
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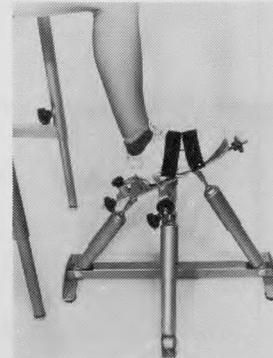
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(Revised December 1989)

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7. See Day (Reference b in #19 below) for elaboration of the following points.

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- Text (body of manuscript)
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11. Begin numbering the pages of your manuscript with the abstract page as #1 and consecutively number all successive pages.

12. Titles should be brief within descriptive limits (a 16 word maximum is recommended). The name of the disability treated should be included in the title if it is the relevant factor; if the technique or type of treatment used is the principle reason for the report, this should be in the title. Often both should appear.

13. The title page should also include the names, titles, and affiliations of each author, and the name, address, and phone number of the author with whom correspondence is to be directed.

14. A comprehensive abstract of 75 to 200 words must accompany all manuscripts except **Tips From the Field**. Number this page one, type the complete title (but not the author's name(s)) on the top, skip two lines and begin the abstract. It should be a single paragraph and succinctly summarize the major intent of the manuscript, the major points of the body, and the authors summary and/or conclusions. It is unacceptable to state in the abstract words

to the effect of "the significance of the information is discussed in the article". Also, do not confuse the abstract with the introduction.

15. Begin the text of the manuscript with an introductory paragraph or two in which the purpose or hypothesis of the article is clearly developed and stated. Highlights of the most prominent work of others as related to the subject at hand is often appropriate for the introduction, but a detailed review of the literature should be reserved for the discussion section. An overview of the manuscript is part of the abstract - not the introduction.

16. The body or main part of the manuscript varies according to the type of article (examples follow). Regardless of the type of article, however, the body should include a discussion section in which the importance of the material presented is discussed and related to other pertinent literature. Liberal use of headings and subheadings; charts, graphs and figures is recommended.

a. The body of an experimental report consists of a methodology section, a presentation of the results, and a discussion of the results. The methodology section should contain sufficient detail concerning the methods, procedures, and apparatus employed that others can reproduce the results. The results should be summarized using descriptive and inferential statistics and a few well planned and carefully constructed illustrations.

b. The body of a review of the literature article should be organized into subsections in which related thoughts of others are presented, summarized, and referenced. Each subsection should have a heading and brief summary, possibly one sentence. Sections must be arranged so they progressively focus on the problem or question posed in the introduction.

c. The body of a **Case Study** should include the following components: personal data (age, sex, race, marital status, and occupation when relevant - but not name), chief complaint, history of present complaint (including symptoms), resulting or physical examination (example: "Physical findings relevant to the rehabilitation program were..."), medical history (surgery, laboratory, exam, etc.), diagnosis, treatment and clinical course (rehabilitation until and after return to competition, criteria for return to competition, and deviation from the expected (what makes this case unique). NOTE: It is mandatory that *Athletic Training* receive, along with the submitted manuscript, a signed release form by the individual being discussed in the **Case Study**. **Case Studies** cannot be reviewed if the release is not included.

d. The body of a technique article should include both the "how" and "why" of the technique: a step-by-step explanation of how to perform the technique supplemented by photographs or illustrations and why the technique should be used. The discussion of "why" should review similar techniques, point out how the new technique differs, and the advantages and disadvantages of the technique in comparison to the other techniques.

e. A **Tip From the Field** is similar to a technique article but much shorter. The tip should be presented and its significance briefly discussed and related to other similar techniques.

17. The manuscript should not have a separate summary section - the abstract serves as a summary. It is appropriate, however, to tie the article together with a summary paragraph or list of conclusions at the end of the discussion section.

18. Citations in the text of the manuscript take the form of a number in parentheses, (7), directly after the reference or name of author being cited, indicating the number assigned to the citation. References should be used liberally. It is unethical to present others' ideas as your own, but also, readers who desire further information on the topic should be able to benefit from your scholarship.

19. The Reference page(s) accompanying a manuscript should list authors numerically and in alphabetical order and should be in the following form: a) articles: author(s) (list all) with family names then initials, title of article, journal title with abbreviations as per Index Medicus (underlined), volume, inclusive pages, year; b) books: author(s), title of book (underlined) publisher, city and state of publication, year, inclusive pages of citation. Examples of references to a journal, book, chapter in an edited book, and presentation at a meeting are illustrated below.

a. Knight K: Preparation of manuscripts for publication. *Athletic Training* 11(3):127-129, 1976.

b. Day RA: How to Write and Publish a Scientific Paper. 3rd Ed. Phoenix: Oryx Press, 1988.

c. Albohm M: Common injuries in women's volleyball. In Scriber K, Burke EJ (eds): *Relevant Topics in Athletic Training*. Ithaca NY: Monument Publications, 1978, pp.79-81.

d. Behnke R: Licensure for athletic trainers: problems and solutions. Presented at the 29th Annual Meeting and Clinical Symposium of the National Athletic Trainers Association. Las Vegas, Nev., June 15, 1978.

20. Photographs should be glossy black and white prints. Graphs, charts, or figures should be of good quality and clearly presented on white paper with black ink in a form which will be legible if reduced for publication. Tables must be typed, not handwritten. Photographs cannot be returned if the manuscript is published. Please refrain from putting paper clips on, or writing on the back of photographs.

All artwork to be reproduced should be submitted as black and white line art, with a Rapidograph, a velox stat, or PMT process. Tonal values, shading, washes, Zip-a-tone - type screens effects, etc., are not to be used. All artwork to be reproduced in black plus a second (or more colors) should be submitted as black and white line art (see above paragraph), with an Amberlith or similar-type overlay employed for each area of additional color(s). Also, all areas of tonal value, shading, washes, etc., should be supplied on a separate clear or frosted acetate or Amberlith overlay. In addition, all areas to be screened (a percent or tint of black or color) should be supplied on an Amberlith overlay.

Send manuscripts, **Case Studies**, and **Tips From the Field** to:

Ken Knight, Editor
Physical Education Department
Indiana State University
Terre Haute, IN 47809

In order to avoid confusion and delays on other contributions to the Journal, the deadlines and designees are provided below.

Journal	Deadline
Spring issue	December 15
Summer issue	March 1
Fall issue	June 15
Winter issue	September 15

Send material for **Committee Forum** and **Letters to the Editor** to:

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Wake Forest University
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Material for the **Student Athletic Trainer Forum** should be sent to:

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Dept. of Sport Health Sciences
Life College
1269 Barclay Circle
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Information on upcoming events for the **Calendar of Events** section should be sent to:

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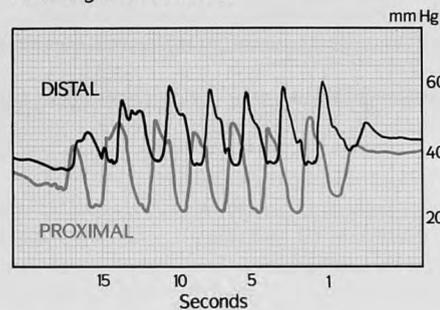
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1. Bergfeld JA, Cox JS, Drez D, Raemy H, Weiker GG: Symposium: Management of acute ankle sprains. *Contemp Orthoped* 1986; 13.
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7. Stover CN, York JM: AIRCAST/Air-Stirrup system for graduated management of lower extremity injuries. Scientific exhibit paper, AAOS, San Francisco, 1979.

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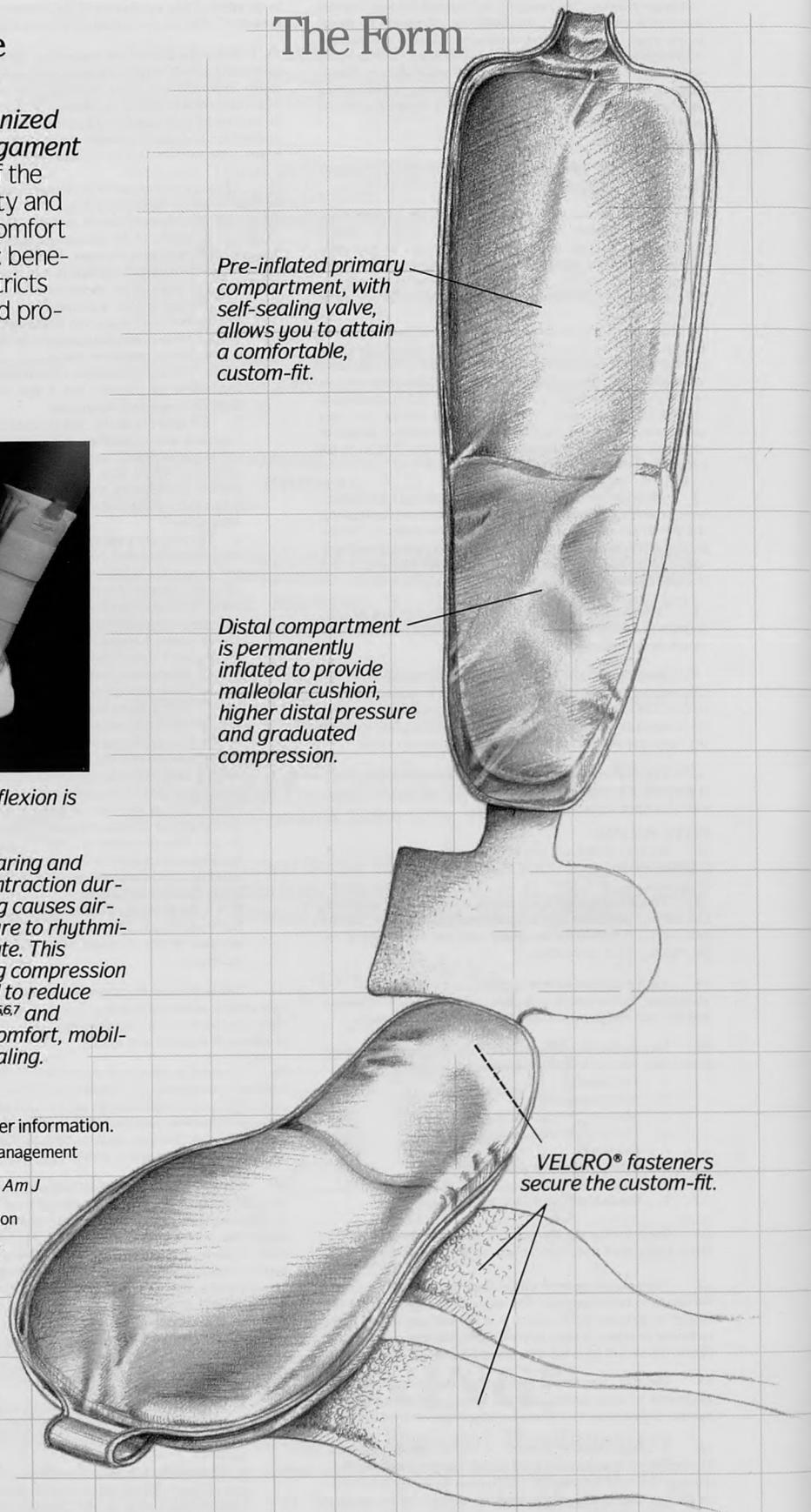
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Medical Update

Nina Partin, MEd, ATC

GENERAL MEDICINE

The Diabetic Athlete

Diabetes Mellitus is a metabolic disorder characterized by hyperglycemia and associated with an insulin deficiency. The first known description of diabetes occurred as early as 1500 B.C (1). Diabetes is an enormous health and economic burden. It is estimated that more than six million Americans have been diagnosed with diabetes and the prediction is that this figure could rise to as many as 20 million in the near future. The disease is also responsible for as many as 40,000 deaths per year, and an estimated total cost of about \$20 billion annually (1).

Diabetes is not a single disease but a group of chronic conditions. The two most common forms are Type I (insulin dependent) and Type II (non-insulin dependent). There's also gestational diabetes, which can appear during pregnancy, and secondary diabetes, which is associated with certain abnormal conditions. The high levels of glucose in the blood are what ties them all together (2).

Type I appears most often in children and young adults. With Type I, the pancreas stops producing insulin, therefore daily insulin injections are required. Type I is also called insulin-dependent diabetes (IDDM). The onset can be sudden, and if not brought under control, ketoacidosis may develop within days and can be a life-threatening disorder.

After the disease is diagnosed, a person can live a healthy life with daily insulin shots, a healthy diet, and regular exercise. Type I accounts for about ten percent of all cases of diabetes. The cause is unknown, but it's believed the body's own immune system attacks the insulin producing cells.

Some signs of Type I diabetes are: Frequent urinating, constant thirst, weight loss, always being hungry, feeling tired and weak, itchy skin, dry skin, blurry eyesight, and skin infections that don't heal (3).

Type II is much more common and accounts for about 80 percent of all diabetes cases. It usually develops later in life, after 40 years of age, and tends to strike people who are overweight. In Type II, the pancreas produces insulin, but either doesn't produce enough or the body resists the insulin. The buildup of glucose in the blood is not as dramatic as Type I because insulin is present in the body. The same threat occurs to the heart, kidneys, blood vessels, and eyes as with Type I. Once a person is diagnosed with Type II, a restricted diet and regular exercise may be all that are needed for many people to control the blood-glucose levels. Type II is also known as non-insulin diabetes mellitus (NIDDM). Some patients may require oral medication or injections for a period of time, and Type II has a stronger tendency to run in families than Type I.

Signs of Type II diabetes are feeling tired and weak, aching, numbness or tingling in fingers or toes, blurry eyesight, skin infections, and in some cases no signs at all (3).

Gestational diabetes may appear in a pregnant woman during her fourth month or later. After delivery, the blood-glucose level will usually return to normal. Those who develop this condition need to pay close attention to treatment so no harm comes to the unborn baby. Secondary diabetes is a condition usually caused from some type of outside source. An example would be someone who might be taking a certain medication or someone experiencing surgery who can develop high blood-glucose levels. Again,

this condition can return to normal after the medication or surgery is over.

Controlling blood-glucose levels is the goal of treatment for all people with diabetes. Balanced diets, proper exercise, and either daily insulin injections or oral medications can help lead to normal daily living. Daily self monitoring of blood glucose is a must for people who have been diagnosed with some type of diabetes.

As for the athlete who has been diagnosed with diabetes, either Type I or II, they can continue with their careers but they must take precautions and good care of themselves. For example, Wade Wilson, of the Minnesota Vikings was diagnosed as having Type I Diabetes in 1985. At the time, he was 26 years old and didn't know of anyone else in his family who had the disease. His symptoms started with extreme weight loss just as he was readying himself for training camp in the summer of 1985. After he was diagnosed as having IDDM, his main concern was his health, but he was going to do everything possible to maintain his pro football career. Four years later, Wade is still the starting quarterback for the Minnesota Vikings. He manages by taking two insulin shots a day, checking his blood-glucose level three times a day, making one check just before a game, taking good care of himself by eating the right foods, extra conditioning after practice, and being extremely disciplined.

Wade has become a spokesperson for the Minnesota Affiliate of the American Diabetes Association. He spends many hours talking to newly diagnosed young people who wonder if they can keep up with their sports now that they have diabetes. His answer for them is, "Keep yourself straight. Your future will be better if you take care of yourself now. Diabetes doesn't have to change your personality. It's just another thing to deal with." (4)

What the young diabetic athlete must do:

1. Meal planning. The food you eat may be the only treatment needed for your diabetes. Follow the meal plan your health care professional gives you.
2. Take the medication. If your physician wants you to take medication, take it every day and at the same time every day.
3. Self-monitoring of blood-glucose. This will directly measure the information needed to help keep blood sugar in the normal range.
4. Test your urine. If ill or if the blood-glucose level is above the safe level, it will be necessary to check the urine for ketones.
5. Exercise. This is important to help lower the blood-glucose level. But exercise within normal limits, too much can cause the blood-glucose to fall too low.
6. Learn to plan your day. Plan your day around practice or game times. Learn when to eat, test your blood-glucose, when to rest, and when to take your medication.
7. Get enough sleep and rest.
8. Keep your body clean. Clean your teeth after eating. See a dentist office, because diabetics can get gum infections easily. Take care of cuts and bruises; they may get infected easily.
9. Do not apply adhesive tape to the skin. This can cause some skin irritations that can be difficult to heal. If the skin does become cut, scratched, burned, or injured, wash the area thoroughly; apply a topical antibiotic; cover the area

with a dry, sterile pad; and call your physician if healing doesn't begin to occur by the next day.

10. Take special care of your feet. Look over your feet daily for red areas, sores, cuts, scratches, blisters, or bruises. Wash your feet daily and dry feet well, especially between toes. Trim nails straight across. Ingrown nails and calluses must be treated very carefully. Use lotion to keep skin from drying out, but do not apply between toes. Change daily into clean soft socks, making sure they are neither too small nor too large. Preferably wear socks of wool or cotton and shoes of leather. Keep feet warm and dry. Never walk barefoot. Always wear shoes that fit. Examine shoes every day for cracks, pebbles, and any other irregularities which may irritate the skin. If at all possible, have two pair of work-out shoes and alternate wearing them every other day. Shoes can have different pressure points and this helps in not having the same pressure points every day. Do not ignore redness, pain, or swelling in your feet.

11. Be aware of the signs and symptoms that can signal difficulties for you. Hyperglycemia has already been discussed, but the diabetic athlete needs to be aware of its symptoms in order to know what he or she needs to do. If the symptoms do occur, ask the athlete some simple questions such as, "Did you take the right amount of insulin today?", "Did you eat too much in the last few hours?", "Did you change your exercise schedule?", and "Is something unusual happening today, such as sickness, infection, or a difficult situation?" Once the problem is identified, correct it, or call the physician if needed.

Hypoglycemia is another problem that can occur. It can happen when too much insulin is working. Hypoglycemia, sometimes called "Insulin Shock," can happen very suddenly, and must be corrected right away. It can happen due to taking too much insulin, too little food, too much time between insulin-taking and eating, vomiting or diarrhea, unusual exercise, or emotional upsets. The athlete may feel tired, weak, shaky, nervous, dizzy, have a headache, or suddenly feel very hungry. He or she must test the blood-sugar level immediately if possible; eat or drink something, such as orange juice or soft drink, or eat several hard sugar candies. If possible, re-check the blood sugar level in 20 minutes, repeat the snack if not normal, re-check blood-sugar in 20 more minutes and, if still not normal, call the physician.

When traveling with a diabetic athlete, always take along extra insulin, syringes, and testing material. Carry a signed note from the physician that explains why you must carry the extra insulin and syringes, particularly if you must go through security or customs. Always have either hard sugar candy, orange juice, soft drinks, or Glucagon available should the need arise. Most airlines have calorie-counted menus that can be requested ahead of time. The diabetic should always wear an identification bracelet or necklace that explains what must be done in an emergency situation. There are also support groups with which diabetics can get involved if they need to discuss with someone else who has diabetes the problems that can arise or how to take care of themselves. In order to find out if one is in your area call or write:

American Diabetes Association
National Service Center
1660 Duke St.
Alexandria, VA 22314
703/549-1500

Juvenile Diabetes Foundation
60 Madison Ave., 4th Floor
New York, NY 10010
212/889-7575

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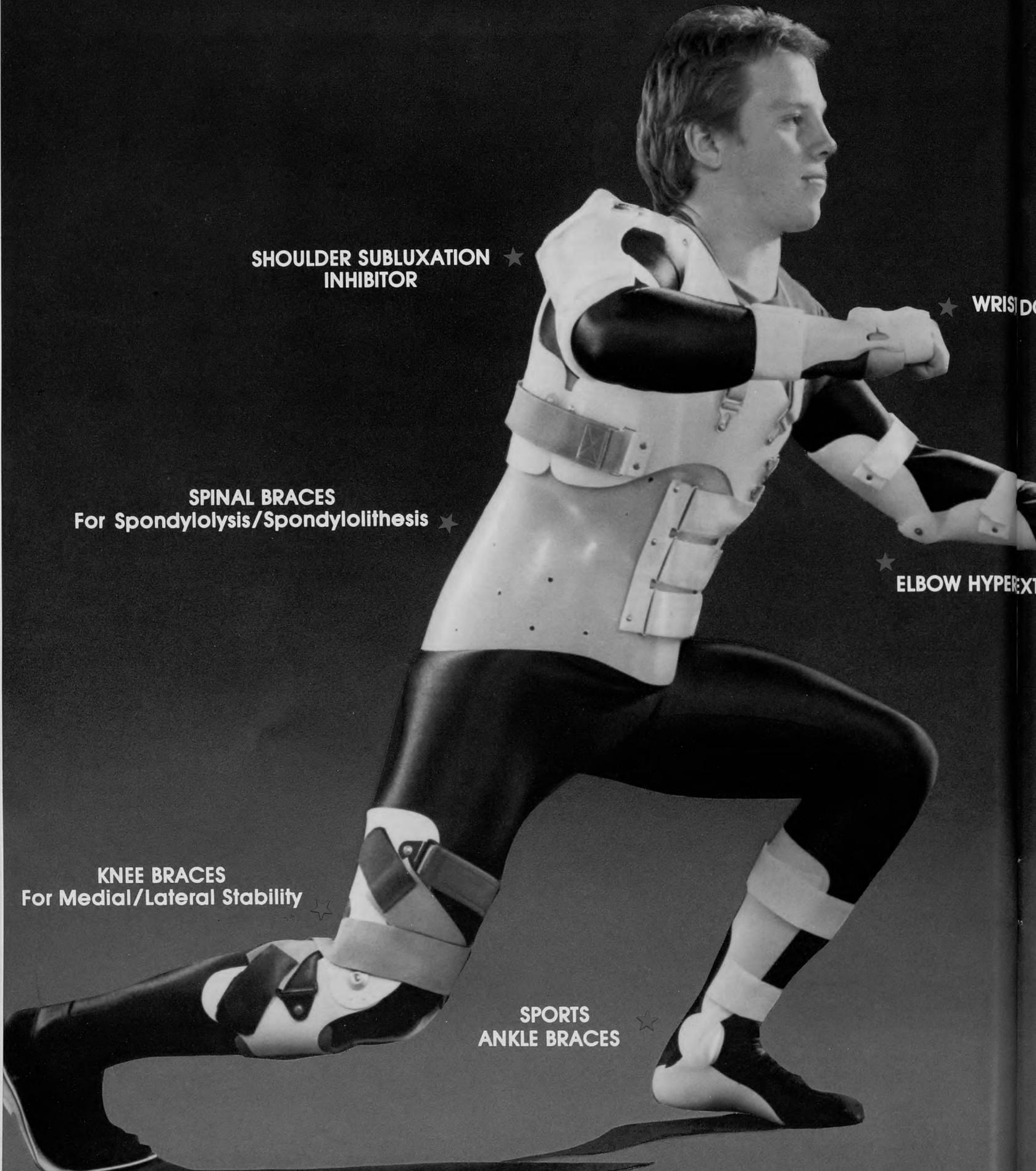
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Association Activities

David G. Yeo, DPE, ATC

EATA NEWS

The program schedule for the Forty-First Annual Meeting of the Eastern Athletic Trainers' Association, Inc., is completely planned. The Executive Committee hopes that each of our members will be as excited about the program topics as we are. We have made a larger commitment to expanding the student sessions. A special thanks goes to Wayne Rodrigues of Springfield College for developing the student program. We have added a student workshop on Sunday, January 7, 1990 and there are now four student sessions running concurrently with the regular program on Monday, January 8, 1990.

The program has a variety. It is action packed with dynamic speakers and a schedule that restricts each presentation to forty-five minutes. We hope to motivate each of you who participates and at the same time keep the program moving and hold your interest. The shorter presentation times allows us to add more quality programming.

We hope you will make every effort to attend this year's EATA Annual Meeting to be held at Kutsher's Country Club in Monticello, New York from Sunday, January 7, 1990 to Tuesday, January 9, 1990.

The following topics have been included in the 1990 EATA Program schedule:

- Fourth Annual "Pinky" Newell Memorial Address
- David G. Moyer Award Presentation
- Nutritional Concerns for the Athlete
- New Trends in Adolescent Injuries
- Arthroscopic Approach to Shoulder Injuries
- Elbow Injuries - Current Treatments
- ACL Reconstruction Using a Ligament Augmentation Device (LAD)
- "Is the Jury Still Out On ACL Reconstruction?" - A Panel Discussion
- Quaker Oats-Gatorade Sponsored Workshop - Sports Nutrition
- Hand and Wrist Injuries
- Athletic Training in The Olympics
- Financial Planning For The Not-So-Prosperous Athletic Training Professional
- Plyometrics
- AIDS Awareness and Prevention For The Sports Medicine Staff

Sunday Workshops

- Manufacturing and Fabricating of Orthotics For The Feet
- Knee Instability Classifications and Functional Activities for Rehabilitation
- Student Workshop: Electropneumatic Modalities

Student Sessions

- Patellofemoral Dysfunction
- NATA Certification Preparation Seminar
- Recurrent Anterior Shoulder Dislocation - A Case Study Presented by Castleton State College Student Athletic Trainer's Club
- Grade II Lateral Ankle Sprain - A Case Study Presented by Springfield College Athletic Training Student Organization

For further information regarding this program please contact:

Matthew D. Gerken
EATA President Elect
Bridgewater State College
Bridgewater, MA 02325
Tel: (508) 697-1252 or 1352

DISTRICT NEWS

District 2

- On July 7, 1989 the second Vito Recine Memorial Golf Outing was held at Rutgers Golf Course in Piscataway, New Jersey.

Vito Recine was one of the pioneers of high school athletic training and a member of the NATA Hall of Fame. In memory of Vito, all proceeds from the golf outing are donated to the Miami Project to Cure Spinal Cord Paralysis. Vito's son, Bobby, was paralyzed playing college football so all proceeds are donated each year in Vito's name to be used in Bobby's efforts to return to normal activity.

With the help of sponsors such as Johnson & Johnson, Wilson Sporting Goods, and Midlantic Bank, over one thousand dollars was given to Bobby this summer. The near capacity group of seventy-two golfers included many family and friends of Vito's. Athletic trainer winners were Andy Altman (Rutgers University), Phil Hossler (East Brunswick H.S.) and Ron Sebastiani (Hamilton East H.S.)

- On July 6-9, 1989 New Jersey held its sixth annual Garden State Games at Rutgers University in Piscataway, New Jersey. Director of Medical Services, Phil Hossler, of East Brunswick H.S., collected a medical staff which included

John Miller	Linda Laneve
Bill Battershall	Karen Hartigan
Deb Dross	Steve Straub
Evan Selbiger	Pat Vasto
Cathi Yayac	Leanne Pearce
Jim Murdock	Duane Brida
Jill McFarland	Mark Haines
Linda Ionta	Joe Przytula
Linda Stanton	Mark Cherwony

With the coordination of the Middlesex County Emergency Management communications system, ambulance and walkie-talkie capabilities prevented a possible tragic anaphylactic reaction to one of the officials. This weekend event now attracts over 6,000 athletes and continues to grow each year.

District 6

The Southwest Athletic Trainers Association's Annual Meeting was held July 27-29 in Arlington, Texas. The meeting was highlighted by the awards presentations. Larry Gardner, Director of Rehabilitation at the Sports Medicine Clinic of North Texas and Logan Wood, Jr., Trainer of the Houston Independent School District were inducted into the S.W.A.T.A. Hall of Fame. Pete Carlon, Head Trainer at the University of Texas at Arlington, received the Frank Medina Award and Cash Birdwell, Head Trainer at Southern

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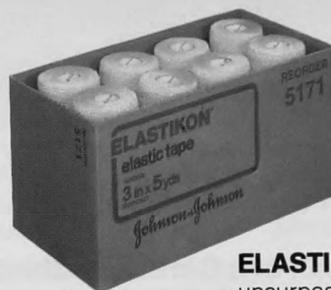
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Dates Set For NATA District and National Meetings In '90

- National Meeting:** June 9-13, 1990
Convention Center in the
Hoosier Dome 317/262-8100
Westin Hotel
Indianapolis, IN
317/262-8100
NATA Contact: Tim Kerin (615/974-1229)
- District 1 & 2** January 7-9, 1990
Kutsher's Lodge
Monticello, NY
800/431-1273 (outside New York)
or 914/794-6000 in New York
NATA Contact: Matthew Gerken (508/697-1252)
- District 3:** May 18-20, 1990
Cavalier Hotel
Virginia Beach, VA
804/425-8555
NATA Contact: Robbie Lester (919/733-3512)
- District 4:** March 8-10, 1990
SeaGate Centre — 419/255-3300
Radisson Hotel Toledo
Toledo, OH
419/241-3000
NATA Contact: Roger Kalisiak (312/882-8006)
- District 5:** March 16-18, 1990
Nebraska Center for
Continuing Education
University of Nebraska at Lincoln
402/472-3435
NATA Contact: Jerry Weber (402/472/2276)
- District 6:** July 26-28, 1990
Arlington Convention Center—
817/459-5000
Sheraton Centre Park Hotel
Arlington, TX
817/261-8200
NATA Contact: George Young (817/565-2662)
- District 7:** March 16-18, 1990
Hyatt Regency Tech Center
Denver, CO
303/779-1234
NATA Contact: Rich Griswold (303/247-7576)
- District 8:** June 22-24, 1990
Anaheim Marriott
Anaheim, CA
714/750-8000
NATA Contact: Bill Chambers (714/879-5227)
- District 9:** July 9-11, 1990
Columbus Iron Works Convention
and Trade Center—404/327-4522
Columbus Hilton
Columbus, GA
404/324-1800
NATA Contact: Jerry Robertson (615/929-4208)
- District 10:** March 23-25, 1990
Red Lion Inn
Riverside, ID (near Boise)
208/343-1871
NATA Contact: Tom Koto (208/336-8250)

Methodist University, received the Eddie Wojecki Award. Both of these awards are for outstanding service to the Southwest Athletic Trainers' Association.

There were also five honorary memberships presented. They were presented to Dr. James Bowden, Team Physician for Baylor University, Mary Edgerley, Administrative Assistant for the N.A.T.A. National Office, Dr. Robert Pierce, former Team Physician for Irving High School, and Dr. Joey Pirrung, former Team Physician for Mesquite High School. Dr. E. L. Whitley, former Team Physician for Arlington Sam Houston High School was given an honorary membership posthumously. Honorary memberships are given to those who have given a great deal of time and service to the Southwest Athletic Trainer's Association or have made significant contributions to sports medicine, the health care of athletes in the area, or to the athletic training profession. ⊕

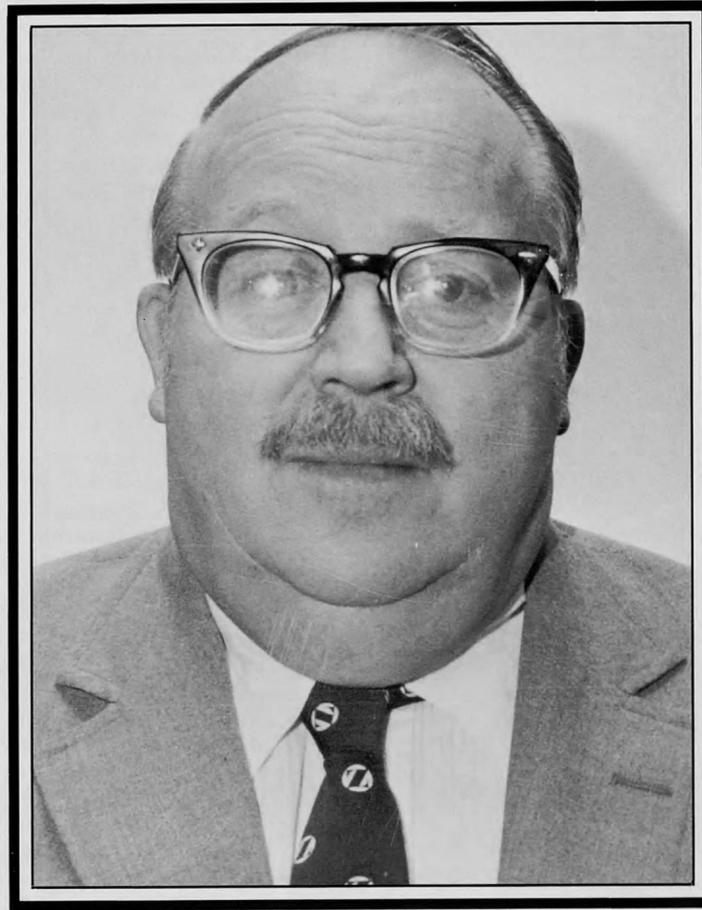
ROLE OF THE ATHLETIC TRAINER *from page 328*

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MOVING?

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In Memoriam



Neil J. Ersland

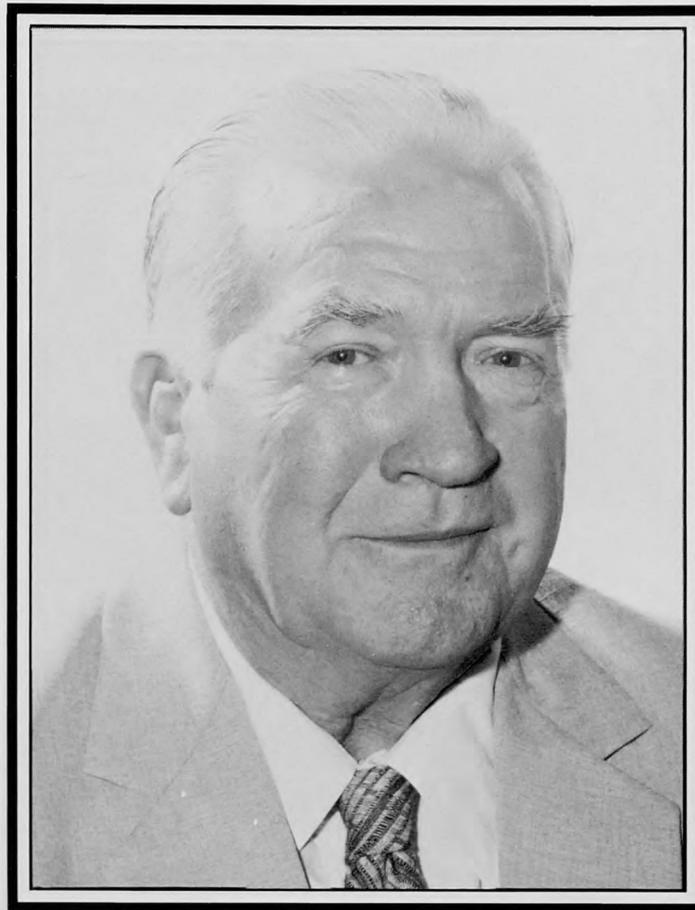
January 29, 1934 — October 6, 1988

Neil J. Ersland, known as "Doc", was a longtime athletic trainer and sports information director at Westmar College, LeMars, Iowa. He served nine years as a trainer, instructor and sports information director. As a special tribute to Neil, Westmar College will name the training room in the Lifesports Industrial Education Center "The 'Doc' Neil Ersland Memorial Training Room."

The dedication service naming the training room and a memorial plaque presentation was held Homecoming weekend September 29-30, 1989 on the Westmar Campus.

Mr. Ersland taught the anatomy, kinesiology, first aid and athletic training courses for the physical education majors at Westmar. During the past 10 years he had also worked as an orthopedic technician in Sioux City, Iowa. He also was a charter member of the LeMars Emergency Medical Technicians, and worked with the LeMars ambulance service.

In Memoriam



Edward N. "Stud" Motley

November 9, 1911 — September 8, 1989

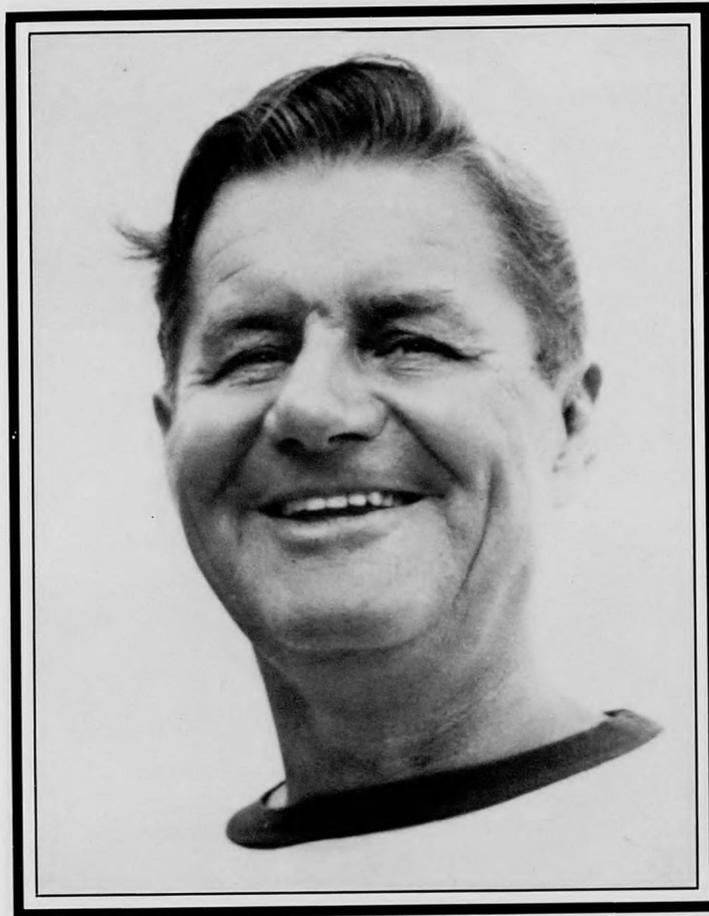
Ed "Stud" Motley, the head athletic trainer for Virginia Tech since 1952, passed away on September 8, 1989. He was 77 years old.

Ed attended William and Mary College, graduating in 1939. He was an outstanding athlete at William and Mary, playing on the basketball and baseball squads. After graduation, Ed enlisted in the Army. After completing his military obligations, he coached for ten years at Petersburg High School.

Ed received numerous awards and honors. He was inducted into the NATA Hall of Fame. In 1987 he was inducted into the Virginia Tech Hall of Fame. The Edward N. Motley scholarship was also established in 1987.

Ed, who was a loyal friend who touched many lives, will be missed by the Virginia Tech athletic staff, faculty and athletes.

In Memoriam



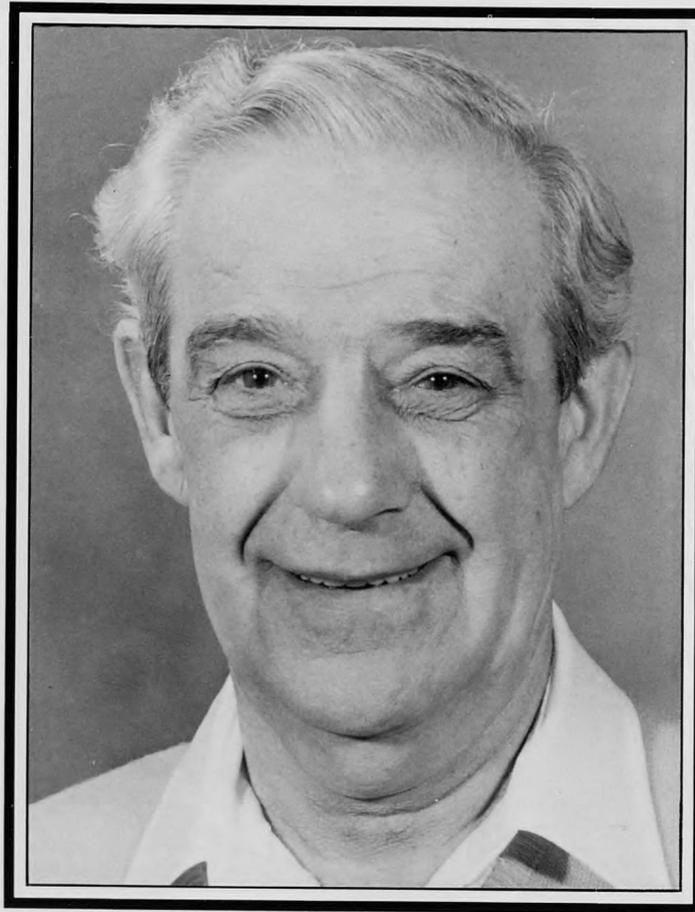
Henry L. Schroeder

March 14, 1911 — December 9, 1988

Henry L. Schroeder was a member of the New York Police department for twenty years before his retirement in 1957. He was a member of the Honor Legion. After working for two years for St. Judes Church, he became an assistant athletic trainer for Columbia University. He held this position until 1968 when he went to work at Madison Square Garden to run the Press Room. At this time he taught Physical Education at three Catholic schools during the day. He retired when Madison Square Garden changed owners.

Mr. Schroeder is survived by his wife of 51 years, Florence, and four children, Henry, Jr., Walter, Janet, and Florence.

In Memoriam



Edward B. Stofka, Sr.

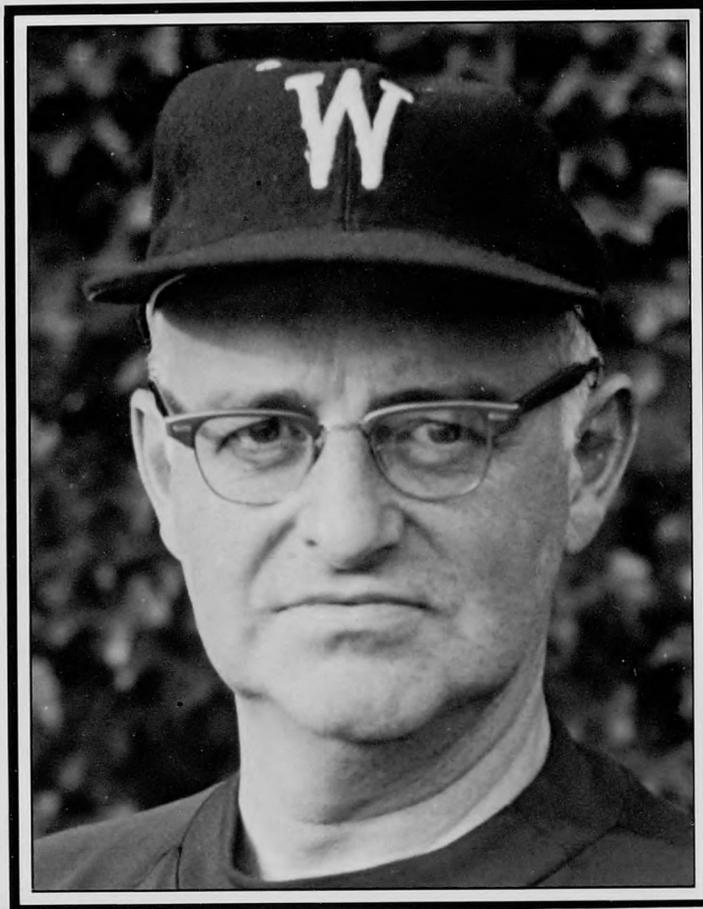
May, 17, 1920 — December 18, 1988

Edward B. Stofka, affectionately known as “Doc” was the athletic trainer at Johnstown High School (PA) for 38 years. Beginning in 1955 until his retirement in 1987, he provided for the athletes at JHS. After accepting his resignation, the school board named the athletic field after him and recognized his “inspiration and guidance to the many athletes who have graduated” and for leaving a “lasting impression on those athletes because of his devotion to them.”

Mr. Stofka was one of the first paid certified athletic trainers at the scholastic level. In 1963, he addressed the NATA at the annual convention hosted in Cincinnati, Ohio, the only high school trainer to do so. In 1984, he was inducted into the Cambria County War Memorial Hall of Fame.

He is survived by his wife of 41 years, Mildred, and three children, Edward, Jr., Nicolette, and Heleyne.

In Memoriam



Dean T. Wilton

September 17, 1922 — March 22, 1989

Dean, former head athletic trainer at Worcester Polytechnic Institute, passed away on March 22, 1989 after suffering a heart attack.

After sixteen years at Worcester Polytechnic Institute as head athletic trainer, Dean retired in the Fall of 1987.

In 1940, Dean entered the Massachusetts College of Pharmacy. From 1942-1946, he served as a corpsman with the U.S. Navy. He served his country again from 1950-1961.

Dean is survived by his two sons, Eric and Ted, and several grandchildren. He will be deeply missed by those who knew him, not only as an athletic trainer, but also as a friend.

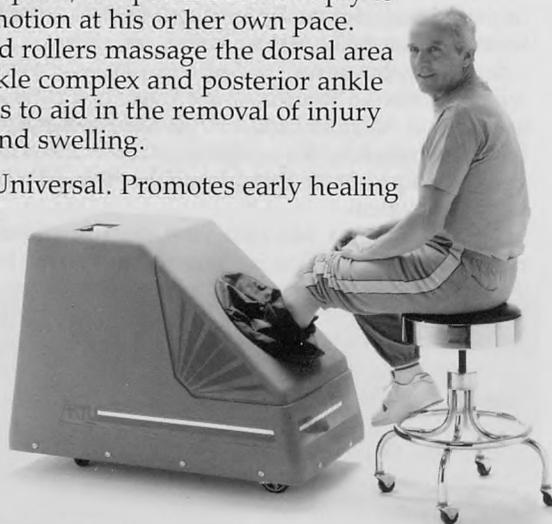
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Infectious Dermatitis in Wrestlers

Sports Medicine Update

Infectious dermatitis is somewhat common in all contact sports, but is prominent in the sport of wrestling. This is usually due to excessive contact from athlete to athlete, as well as surrounding conditions at the competing site. Infectious dermatitis can be classified in three different groups:

1. Bacterial
2. Viral
3. Fungal

These vary in many different forms beyond the scope of this laboratory, so the more common disorders will be discussed.

Impetigo is a bacterial infection with highly contagious characteristics. It is composed of staphylococcal bacteria, often following streptococcus infections. The symptoms of impetigo include: small, red, pustule lesions that burst, forming a crust-like lesion. Management includes referral to a dermatologist or sports medicine physician, who normally will prescribe antibiotics, as well as a topical treatment such as soap and water and antimicrobials. Preventative measures include abstaining from activity. Uniforms, wrestling mats and all other contact areas should be cleaned with Staphene or an equivalent.

Herpes simplex has two viral classifications. Type I is recognized as conditions restricted to above the waist and Type II is usually located on or around the genital region. These lesions are sometimes painful and require close medical attention. Herpes shows a viral characteristic which includes clusteral vesicles that with time become ulcerated and crusted. Management consists of referral to a dermatologist or sports medicine physician who may start the athlete on Benzoyl Peroxide for drying of the infection. Systemic steroidal therapy is often indicated for an anti-inflammatory response. Preventative measures are restriction from wrestling for 10-15 days or until athlete is released by a team physician. Again, cleansing of contact areas is essential for controlling this condition.

Fungal infections are less serious in most cases, but should be recognized. Tinea pedis (athlete's foot), Tinea versicolor and tinea cruris (jock itch) are a few of the common disorders. These superficial infections should be treated with germicidal soap and antimicrobial creams. Improving hygiene in locker rooms, showers as well as athletes' clothing is recommended.

These infectious diseases have many varieties and some have been known to infect the whole team. Early recognition and athlete education is the first and possibly the only preventative measure you may have to take.

(EDITOR'S NOTE: For further information see also *Superficial Skin Infections*, 1988 Schering Symposium, by Dr. Barbara Rock, p. 12, Spring 1989 issue.)

A New Role for Athletic Trainers

Industrial Athletic Trainers

More companies are realizing the benefits of hiring a professional athletic trainer and creating an in-house training room for their employees. Because of this, there is an increasing need for athletic trainers to practice their profession in the industrial environment.

To meet industrial needs, academic programs will begin to focus on the special characteristics of the industrial athlete.

For many companies, the cost savings of having a trainer on board can be tremendous. Based on a 5-day week, treating 25-30 industrial athletes per day, it is estimated that between \$60-70,000 is saved each quarter when a company doesn't need to go outside for rehabilitative and related costs.

This translates to about \$240-280,000 per year. So, a company's initial investment in equipment and staff can be returned in less than a year. And, not only is money saved, but valuable time away from the work site is decreased.

A professionally trained athletic trainer and a well equipped training room also enhance the growing number of company wellness programs. Employees can use much of the rehabilitative equipment after work for fitness training.

For more information write or call: Mark P. Hanak, ATC, Dow Chemical Co., Michigan Division, Medical Dept. 607 Bldg., Midland, Michigan 48667, Tel: 517/636-8729.

Post Injury Running Format

Forum

Dr. Leonard Janis recommends the following format as a guideline for runners after an injury.

- A. I always recommend the following "Return to Running Program" as a guideline for runners after an injury.

CATEGORY I

Continuous Pain: Refrain from running until pain free and no tenderness. Then begin Category II.

CATEGORY II

Pain Only Running: If you have short intervals of pain with running:

- A. No running for two weeks.
- B. 10 minute work out. Alternate 4 minute run and 1 minute walk. If no pain, add 5 minutes every 3 days, working up to 30 minutes, then progress to next step. If pain, cut back 5 minutes. Hold until pain free and then progress.
- C. 15 minute work out. Alternate 4½ minutes run and ½ minute walk. If no pain, add 5 minutes every 3 days, working up to 30 minutes, then progress to next step. If pain, cut back 5 minutes and work up.
- D. Steady run work out, run continuously 15 minutes. Add 5 minutes every 3 days.

CATEGORY III

Pain After Running:

- A. Cut your work out by 50% and progress by adding 10% a week.
- B. If cutting your work out 50% still causes pain, cut it by 50% again and progress by adding 10% a week.

Surgery or Drugs?

Good Health Digest

Nearly 300,000 Americans undergo coronary bypass surgery annually, but a new study reveals that the surgery

provides little or no long-term survival compared with drug treatment for clogged blood vessels. The study is believed to have widespread implications for the \$6 billion-a-year U.S. bypass industry. Bypass surgery is the most common open-chest heart operation, reports The Boston Globe.

1990 Nutrition Objectives

Contemporary Nutrition

For the past decade, the Department of Health and Human Services (DHHS) had led a major national effort to establish a public health agenda for the United States through development of measurable objectives for improved health status in priority areas of health promotion and disease prevention. The initial objectives were targeted for achievement by 1990. The process of developing objectives for the year 2000 is already well under way.

The following is a list of the national nutrition objectives as set by DHHS by 1990.

1. Iron deficiency anemia in pregnant women (estimated by hemoglobin concentrations early in pregnancy) should be reduced to 3.5%.
2. Growth retardation of infants and children caused by inadequate diets should have been eliminated in the U.S. as a public health problem.
3. The prevalence of significant overweight (120% of 'desired' weight) among the U.S. adult population should be decreased to 10% of men and 17% of women, without nutritional impairment.
4. Fifty percent of the overweight population should have adopted weight loss regimens, combining an appropriate balance of diet and physical activity.
5. The mean serum cholesterol level in the adult population aged 18 to 74 should be at or below 200 mg/dl.
6. The mean serum cholesterol level in children aged 1 to 14 should be at or below 150 mg/dl.
7. The average daily sodium ingestion (as measured by excretion) for adults should be reduced at least to the 3-to 6-gram range.
8. The proportion of women who breast-feed their babies at hospital discharge should be increased to 75% and 35% at six months of age.
9. The proportion of the population which is able to identify the principal dietary factors known or strongly suspected to be related to disease should exceed 75% for each of the following diseases: heart disease, high blood pressure, dental caries and cancer.
10. Seventy percent of adults should be able to identify the major foods which are low in fat content, low in sodium content, high in calories, good sources of fiber.
11. Ninety percent of adults should understand that to lose weight people must either consume foods that contain fewer calories or increase physical activity — or both.
12. The labels of all packaged foods should contain useful calorie and nutrient information to enable consumers to select diets that promote and protect good health. Similar information should be displayed where non-packaged foods are obtained or purchased.
13. Sodium levels in processed food should be reduced by 20% from present levels.
14. The proportion of employee and school cafeteria managers who are aware of, and actively promoting,

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USDA/DHHS dietary guidelines should be greater than 50%.

15. All states should include nutrition education as part of required comprehensive school health education at elementary and secondary levels.
16. Virtually all routine health contacts with health professionals should include some element of nutrition education and nutrition counseling.
17. A comprehensive national nutrition status monitoring system should have the capability for detecting nutritional problems in special population groups as well as for obtaining baseline data for decisions on national nutrition policies.

Bikes and Helmets: A Package Deal

Safe Kids

This holiday season, if you give a bike, give a helmet. It could save your child's life.

A bicycle is more than a toy, it is a vehicle. Every day, one child dies and another 1,000 are rushed to emergency rooms because of bike crashes. Head injuries are involved in 75% of all bike-related deaths. "Bike helmets are the vaccine against child cyclist deaths," explained Herta B. Feely, executive director of the National SAFE KIDS Campaign.

According to a study by Harborview Injury Prevention Center published in *The New England Journal of Medicine*, bike helmets can prevent 85% of all head injuries sustained in a bike crash.

The following helmet, bike and accessory holiday buying tips are offered by the National SAFE KIDS Campaign, a long-term program to prevent childhood injuries — the number one killer of children.

No Surprises

The consumer Product Safety (CPSC) says that bikes and bike helmets should be a gift from parents, not a surprise from Santa Claus. Don't surprise your child with a helmet or bike — leave a card promising a bike and a helmet, or a miniature bike with an attached IOU. "It's essential that both the helmet and the bike fit properly. Take the child shopping with you to be sure of the fit," advised Anne Pavlich, spokesperson for the CPSC.

According to Feely, the most common mistake parents make when they buy a helmet or a bike is to buy one that's too big. "Helmets must fit from the beginning. They are only safe when they fit properly. Making a bike 'last' by buying it too big means cutting corners with your child's safety," she said.

Helmet Fit

■ **Buy helmets that display the ANSI (American National Standards Institute) or Snell (Snell Memorial Foundation) safety approval label.** Helmets that don't carry these labels may not adequately protect your child.

■ **A good fitting helmet should sit on top of the head in a level position and not rock back and forth or from side to side.** The helmet should not be too tight. Most helmets come with different sized foam pads which can be inserted to make the helmet fit the shape of the child's head.

■ **The helmet should cover the child's forehead and not slide back when worn.** Helmets include adjustable straps to position the helmet properly and keep it secure.

Bike Fit

A bike that is too large or too small will be difficult to

Certificate and Plaque Order Form For NATA Certified Athletic Trainers

The Board of Certification is offering a graphically designed certificate printed in Old English Script with gold embossed NATA logo and seal of certification. Each certificate is professionally personalized with the athletic trainer's name, certification number, and date of certification. The certificate may be purchased on a 12" x 16" hardwood plaque protected by plexiglass, or ordered as the certificate of Certification only.

Please indicate below which of these two alternatives would better suit you:

_____ I wish to order the plaque mounted certificate for the price of \$45.00 each.

_____ I wish to order the certificate of Certification for the price of \$15.00 each.

Enclose this order form with a check or money order in payment for the plaque or certificate and mail to the following address:

NATA BOARD OF CERTIFICATION, INC.
218C Arlington Boulevard, P.O. Box 1726
Greenville, NC 27835

Use a permanent street mailing address. No post office boxes please. Delivery will be by United Parcel Service.
(allow 4 to 6 weeks for delivery)

NAME _____
(as you wish it to appear on the certificate)

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Certification Number _____

Certification Date _____

control and uncomfortable. John Williams, a cycling expert with Bikecentennial, a national group which promotes recreational cycling and cycling safety, advises considering the child's age and size before buying a bike. "Some bikes require more manual dexterity than others. Handbrakes are not appropriate for children under nine or ten. Young children just don't have the hand strength and coordination necessary to ride with handbrakes."

Bikes are measured by comparing the frame and wheel size to the length of the rider's legs, as demonstrated in the following chart.

Size of Bicycle for Average Child

Under 5 years old	12" or 16" wheel
5-7 years	20" wheel
8-10 years	24" wheel
11 & over	26" or 27" wheel

■ **The rider should be able to straddle the bike with both feet flat on the floor.** The rider should have one to two inches clearance at the highest point of the crossbar and be able to mount and dismount easily.

■ **The bike should not lean to one side.** Adjusting the seat will eliminate this problem.

■ **Sitting on the seat, the ball of the rider's foot should reach the pedal at its lowest position.**

■ **Standard handlebars should be set with the grips at seat level.**

■ **Dropped down handlebars (touring) should be level with or slightly below the seat.**

■ **High rise handlebars should be lower than the rider's shoulder.** Padded handlebars or padded gloves can help young riders with their grip and reduce the wear and tear on palms and wrists.

Bike Accessories

The most important accessories make bicyclists visible and safe.

■ **Lights on both the front and rear of the bike.** The front light should be white; the rear light, red. Use a battery-operated and not generator-operated light since the generator only works when the bike is in motion. The lights should be visible from 500 feet.

■ **Reflectors on the bike's front, rear, wheel sides, & pedals.**

■ **Flourescent clothing and reflective tape applied to clothing and helmets for night riding.** Children 14-years-old and younger should not ride at night.

■ **A warning bell or horn.**

■ **Attach a rear-view mirror to the bike.** But Williams warns that "it should not be used as a substitute for looking back. Studies show that drivers take their cues from riders glancing back over their shoulders. Drivers who see a rider look back are alert and watching for the rider's next move."

■ **Use reflective, high-flying flags.** Williams advises cyclists and their parents to remove the shaft or the metal mount used to hold the flag in place if the flag snaps off.

Your child's riding safety involves more than buying the right helmet, bike and accessories. Most children's bike crashes are the result of cyclist error. Young riders must be taught the skills and habits they need to become safe cyclists. Make sure they know the rules of the the road.

For more information, call Kathryn Kincaid (202/939-4993), or Kim Haddow or Brian Bursack (202/338-7227).

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were correct in their approach. A healthy body dressed for athletic activity is one thing, women in g-strings sporting come-hither looks are another.

As several colleagues noted, the ACSM convention has many of the same exhibitors, yet the "show-girl" approach was noticeably absent. Are we not worthy of the same respect? As a growing, educated, knowledgeable body of professionals we deserve better. We should demand it. Or accept the fact that exhibitors and speakers will continue to "tone it down a notch" when they step into the NATA convention hall as opposed to a "medical conference." Allowing this promotes an underlying attitude that sexism is permitted in our profession; it is tacitly condoned. It affects how the public perceives us and how we perceive one another—thus dividing the membership.

It is the same attitude that subtly encourages guest speakers to slip in slides of bikini-clad women during their lecture so they may feign surprise or wink at the audience and tell us "Hope you're seeing all the sights." This is tired, yet repeated every year. At times I think it is a bit much to endure for two CEUs and I don't think that those of us who are offended should have to sort out the wheat from the chaff in convention quality.

We cannot fret about how our profession is not taken seriously and then overlook unprofessional behavior. I am concerned that this letter will be ignored as another "feminist tirade", yet gender should not be the primary focus here—professionalism should, for it would not balance things to have more men in the exhibits with bathing suits. It is my hope that both men and women would choose to upgrade our image, amongst those outside our membership and for those of us within it. What will we choose in Indianapolis?

Sincerely,
Kelly Mead, MS, ATC
Providence College
Providence, RI 02918-0001

I recently had the pleasure to work the USA Karate Federation National Championships that were held here in Orlando, Florida. This competition included the US National Championships and the Pan American Junior Championships. The competition was exciting and our help was needed to attend to injuries from minor to major in nature.

The competition was also at a pace that there was never a dull moment. With the competition being held in as many as 15 rings at the same time, injuries were numerous, but most not severe. I feel I gained a lot of experience during this event and it was great to work an International competition.

Unlike many athletic trainers I had worked karate competition before at the high school level, but never had I experienced the competition at this level.

When talking with the organizers of this event it was noted that they have great difficulty finding coverage for their competitions throughout the country. I would like to encourage athletic trainers throughout the country to become involved with these events when held in your area. It is an experience you won't soon forget.

The USA Karate Federation will soon be in contact with our Association to enlist our help. By helping out with these competitions across the country, we can further our reputation and further the knowledge of those involved with the sport as to what an athletic trainer is. A positive step in

our public relations program. Again I would like to enlist the help of our membership in helping to cover these events.

Sincerely,
Alan Haines, MS, ATC
Lyman High School
Longwood, FL 32750

I am writing in reference to an article which has recently appeared in *Athletic Training*. The article in question, by Pawlowski and Perrin (5), was concerned with the relationship of various isokinetic measurements of upper extremity musculature to collegiate pitchers' throwing velocity. I would first like to commend the authors on their excellent contribution to the athletic training body of knowledge. However, I believe there are several points in need of discussion.

First, the authors made no explicit mention as to whether they used a damped or undamped torque signal during isokinetic testing. This point is important due to the fact that many characteristics of the torque curve are affected by damping of the signal. (7) Of particular importance is the fact that damping of the signal results in a smaller torque curve and potentially lower peak torque (PT). The reduction in the torque curve may also affect other variables such as total work (TW) and average power (AP). (3,6,7) I must point out, however, that this may be a moot point since the authors used computerized isokinetic data on which damping may have no effect. Unfortunately, to my knowledge, no data exists showing that computerized data is not affected by signal damping; therefore, consideration of the damping issue should be undertaken.

A second area of concern is the authors' use of the variable torque acceleration energy (TAE). It is not so much the variable itself but the terminology associated with the variable. TAE has been defined as the total work in the first one-eighth of a second. (1) As such, TAE is equivalent to a torque measurement divided by a time measurement which results in a measurement of work and not energy, therefore, the word energy in TAE seems inappropriate. Perhaps we need to take a look at TAE in another way. Borrowing from the biomechanics literature (4), in the study of walking and running, many investigators have used a term called impulse which is a measure of force divided by a measure of time (typically 50 msec). This biomechanical variable appears very similar to the isokinetic variable in question. Taking this similarity into consideration, we could perhaps suggest a more appropriate term such as torque impulse rather than TAE.

The final point I wish to consider is the authors' statistical treatment of the data and their subsequent conclusions. The authors demonstrated significant correlations between throwing velocity and shoulder internal rotation (SIR) PT, TAE, AP, and TW all at 240°/second. They also demonstrated similar results with throwing velocity and shoulder external rotation (SER) PT, AP, and TW all at 240°/second. In uncovering these relationships, the authors appear to have taken a simple correlation approach which by its nature examines only one predictor (independent) variable at a time with respect to the criterion (dependent) variable (in this study throwing velocity). This point is significant in light of recent results presented on isokinetic measurements of the medial collateral ligament deficient knee. (2) In that particular study, the author found a significant correlation between PT and TW at all test speeds. From these findings, the author concluded that TW analysis offered little meaningful information which could not otherwise be obtained from PT measurements.

The previous conclusion leads me to question whether the authors of the present study have made an appropriate

conclusion regarding the importance of AP and TW to throwing velocity or whether AP and TW are providing redundant information which could be obtained from the simpler measure, PT. Unfortunately, the authors do not present us with a correlation matrix of both the criterion and predictor variables. Furthermore, perhaps those of us involved in research attempting to demonstrate relationships between functional performance variables and clinical measurement variables should take a multivariate approach rather than a univariate approach to these investigations. In the present study, the multivariate approach may take the form of a multiple regression analysis attempting to predict throwing velocity from some group of multiple predictors (e.g. PT, TAE, AP, TW) in an effort to better explain the relationship between throwing velocity and isokinetic measurements. The authors may have considered taking a multiple regression approach to this study and it should be recognized that with the small number of subjects used, a multiple regression approach would be inappropriate. (8)

In conclusion, I would like to compliment the authors on their excellent and thought provoking contribution to the athletic training literature. I believe that if those of us involved in research in this area make a continuing effort to consider our methodologic and statistical approaches to our research and also to attempt to assign appropriate terminology to our measurements, the quality of both research and athlete care will be enhanced.

Respectfully,
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We wish to thank Mr. Andersen for his close scrutiny of our recent article, *Relationship Between Shoulder and Elbow Isokinetic Peak Torque, Torque Acceleration Energy, Average Power, and Total Work and Throwing Velocity in Intercollegiate Pitchers*. We are happy to respond to the concerns expressed in his letter.

Andersen is correct that damping is an essential component to accurate isokinetic testing (8,9). In short, damping minimizes the torque overshoot that occurs when a subject reaches the preset isokinetic test velocity. The need to damp is probably more important during testing of joints

such as the knee and hip (which have a larger mass to be decelerated once overshoot has occurred) than with joints such as the shoulder and elbow. Nevertheless, we used damping settings consistent with manufacturer recommendations (#2 for shoulder; #1 for elbow) (1).

We disagree somewhat with Andersen's interpretation of torque acceleration energy (TAE). TAE is a measure of work per unit time (total work in first 1/8 sec), and thus we believe it is a measurement of power. Our rationale for use of the term "torque acceleration energy" was to be consistent with terminology used by others with similar instrumentation. Regardless of what the parameter is called, we believe it is a useful measure for several reasons. We have established that TAE is a reliable measure (5), that it correlates with traditional measures of anaerobic power (4), and that it can be enhanced through isokinetic training (6).

We believe the relationship between peak torque, TAE, average power, and total work may be determined by the muscle group and sport activity in question (6,7). The reference cited by Andersen was a study of lower extremity muscle groups (2). Others have observed similar findings for the lower extremity (3). However, our data describe upper extremity muscles which typically respond differently to the influence of dominance and specificity of sport activity. Furthermore, we have previously shown that for selected upper extremity muscle groups, a given level of peak torque is not necessarily associated with similar levels of TAE, average power, and total work (7). We believe additional research is needed to clarify this issue.

Finally, our investigation utilized a sample size of ten subjects. Andersen is correct that this number of subjects did not justify a multivariate approach in the form of a multiple regression analysis because of a poor subject to predictor ratio.

We would again like to thank Mr. Andersen for his letter. We look forward to his contributions to the literature in this area.

David H. Perrin, PhD, ATC
David Pawlowski, MED, ATC

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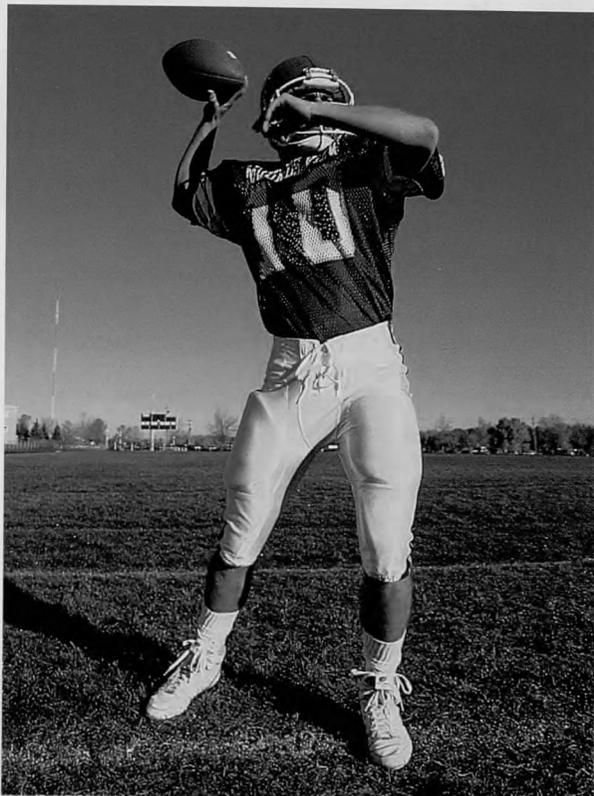
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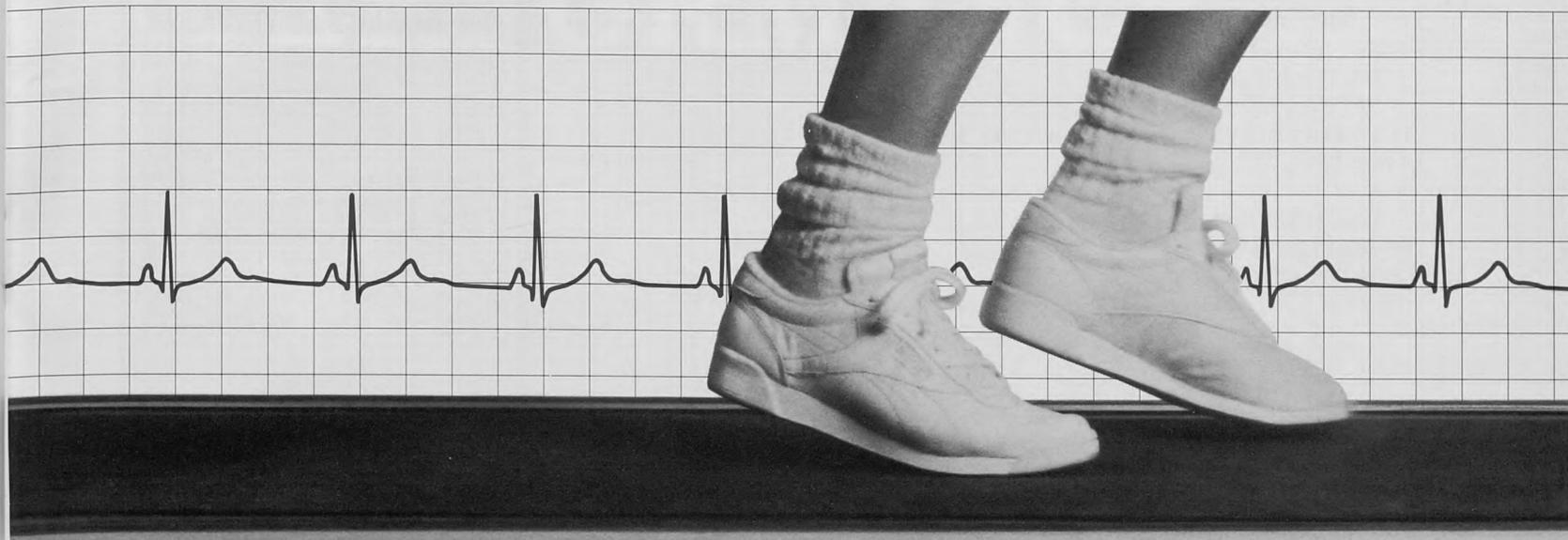


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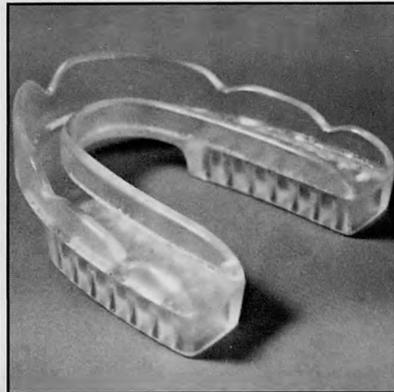
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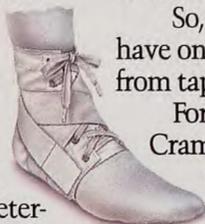
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