



ATHLETIC TRAINING

THE JOURNAL OF THE NATIONAL ATHLETIC TRAINERS ASSOCIATION



IN THIS ISSUE:

THE SWIVEL FOOTBALL SHOE
ULTRASOUND
ASYMMETRY AND KNEE INJURY
STUDENT TRAINERS CORNER
NOT FOR MEN ONLY

VOLUME 8
NUMBER 2
JUNE 1973



QuickKick®

The Super Energy
Action Drink



WHY? "BECAUSE IT KEEPS 'EM GOING"

Professional trainers use Quickkick to help keep their players going through workouts, practices and competitive conditions. Quickkick was specially formulated as a thirst-quenching and energy-boosting drink for athletes. Quickkick's four flavors help prevent taste fatigue and help prevent voluntary dehydration.

WHAT QUICKICK DOES!

It helps athletes maintain sharper reflexes in the latter stages of the game, which in turn helps reduce injury exposure from dulled reflexes, muscle spasms or heat cramps. Quickkick helps restore body chemical balance quickly. Drinking Quickkick is the proper way to rehydrate. It satisfies thirst and helps reduce body temperature without bloating. Consequently, your athletes can rehydrate while exercising, drink as much as they desire after practice and still have the desire to eat a large meal.

WHERE QUICKICK HAS HELPED BOYCOTT FATIGUE!

The Super Bowl
The Indianapolis 500
Major Golf Championships
The Baseball World
The Basketball World
In getting the World Swimming
Endurance Record
Marching Band Contest
Industry
Hospitals

QUICKICK INC., Box 4006 Baton Rouge, Louisiana 70821

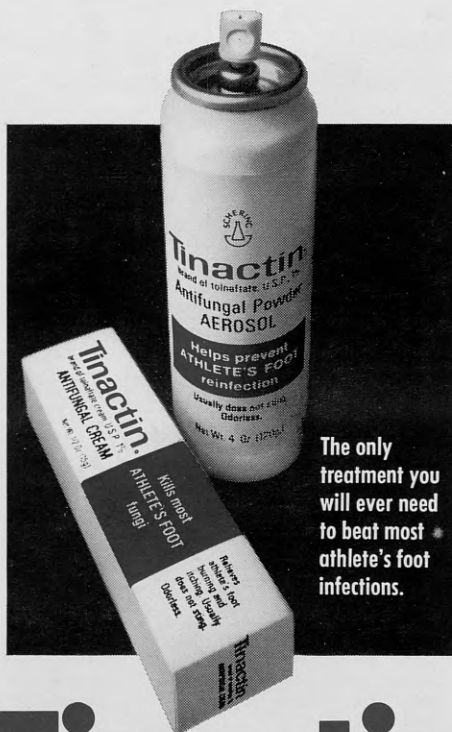
The score is 9 to 1 in favor of Tinactin[®] when doctors prescribe for athlete's foot.

Until recently Tinactin was available on prescription only.

Now you can use and recommend the athlete's foot product that has both proven efficacy and proven safety.

Here's why doctors prefer TINACTIN:
TINACTIN Cream—actually kills most athlete's foot fungi, is also effective against jock itch and ringworm of the body.

- Begins to relieve itching, burning, and soreness in 24 hours
- Clears lesions, usually in 2 or 3 weeks
- Does not usually sting or irritate
- Odorless and nonstaining



TINACTIN Powder Aerosol—helps prevent athlete's foot reinfection.

- Cooling and soothing
- Aids drying of naturally moist areas

The TINACTIN team offers almost complete protection against athlete's foot—TINACTIN Cream clears the infection...TINACTIN Powder Aerosol helps prevent reinfection.

The only treatment you will ever need to beat most athlete's foot infections.

Tinactin[®]

brand of tolnaftate, U.S.P., 1%

Now available without prescription for your use and recommendation.

"We get our players back on the field faster, with greatly reduced incidence of re-injury..."

"...and I feel that these rapid recoveries are due to the safety and efficiency of Isokinetic loading."

Fred Zamberletti, R.P.T., Head Trainer of the Minnesota Vikings, is getting results! Not only with Vikings players but with other professional and amateur athletes, in addition to typical orthopedic patients in his practice.

Mr. Zamberletti is getting these results by applying the proven advantages of accommodating resistance at controlled speeds using ORTHOTRON™.

ORTHOTRON's *reciprocal* action provides accommodating resistance for both agonist and antagonist musculature of the injured joint in a single exercise set-up.

And, ORTHOTRON is versatile—positioning for knee, ankle, shoulder or elbow is readily accomplished.

Remember, only Lumex manufactures true Isokinetic™ Systems. Nothing else works or feels the same.

For complete information on the low-cost ORTHOTRON™, contact:

Lumex, Inc.
Sports Medicine Dept.
100 Spence Street
Bay Shore, N.Y. 11706

Name _____

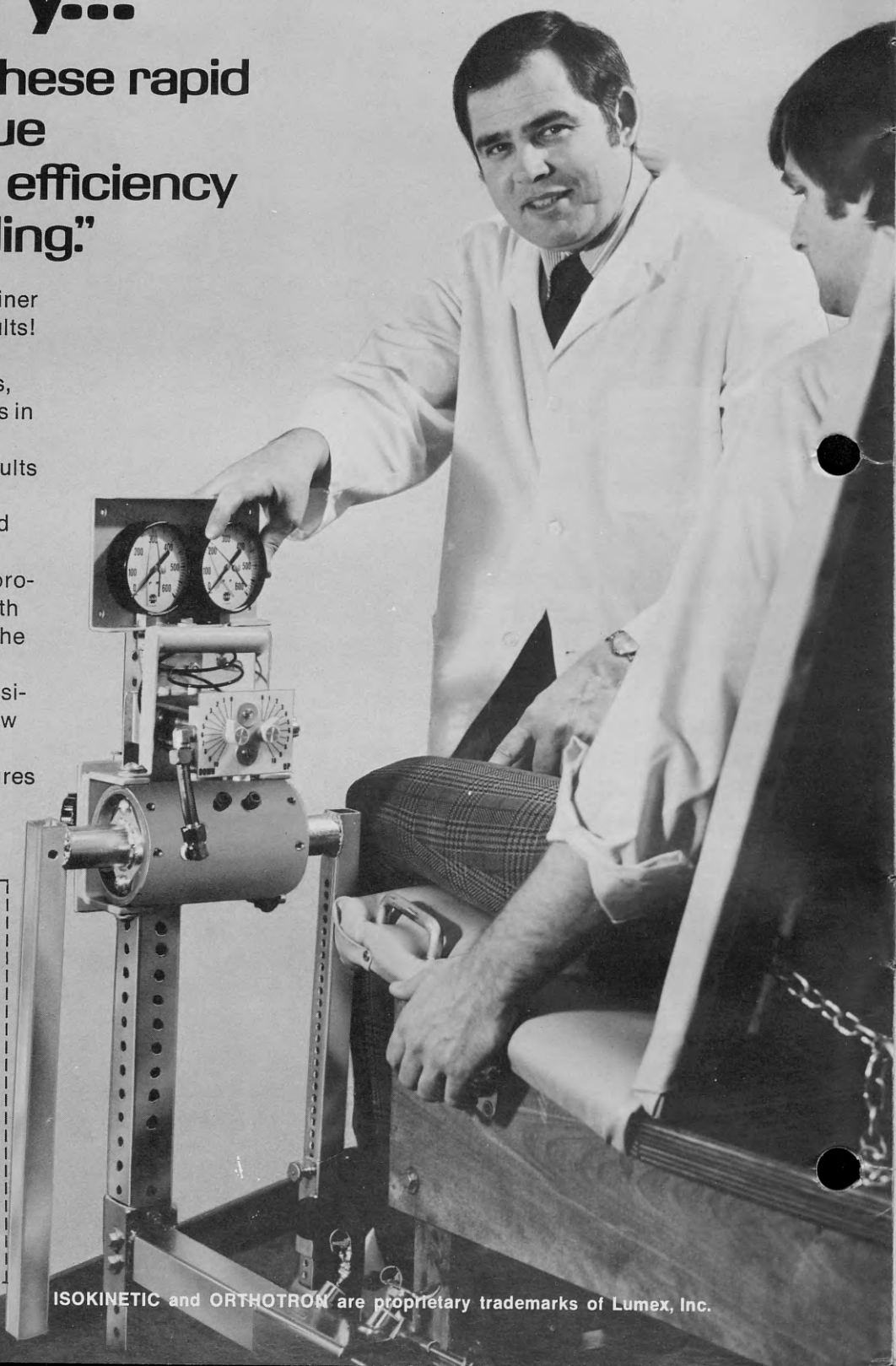
Affiliation _____

Address _____

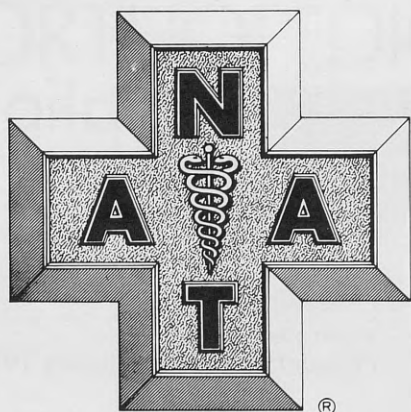
City _____

State _____ Zip _____

Phone _____



ISOKINETIC and ORTHOTRON are proprietary trademarks of Lumex, Inc.



ATHLETIC TRAINING

THE JOURNAL OF THE NATIONAL ATHLETIC TRAINERS ASSOCIATION

VOLUME 8

NUMBER 2

JUNE 1973

Editor-in-Chief
and Journal Committee Chairman

Rod Compton
Sports Medicine Division
East Carolina University
Greenville, North Carolina
Telephone (919) 758-6426

Editor

Clinton B. Thompson
Jenison Gym
Michigan State University
East Lansing, Michigan 48823

Journal Committee:

Dennis Aten
Eastern Illinois University

Tom Carter
University of Wisconsin (Madison)

Tom Waugh
University of North Dakota

Holly Wilson
Indiana State University

Jeff Fair
Oklahoma State University

Ken Murray
Eastern Kentucky University
Ray Baggett
Indiana State University

Advertising Manager:

Mrs. Harriett Franklin
3315 South Street
Lafayette, Indiana 47904
Telephone: (317) 447-6025

Athletic Training is published in the months of March, June, September, December by the National Athletic Trainers Association, a non-profit organization. Second class postage paid at Lafayette, Indiana 47904, and additional mailing offices. Address correction requested: Send Form 3579 to 3315 South Street, Lafayette Indiana 47904.

The views and opinions expressed in *Athletic Training* are those of the author

ARTICLES:

THE SWIVEL FOOTBALL SHOE: A CONTROLLED STUDY 54

Otho Davis and Bruce M. Cameron, M.D.

ULTRASOUND 60

Wayne Sawyer

DEVELOPMENTAL ASYMMETRY OF THE WEIGHTBEARING SKELETON
AND ITS IMPLICATION ON KNEE INJURY 68

Karl K. Klein

ISOMETRIC AND ISOTONICS: NO COMPARISON 98

National Federation of State High Schools Associations and the Committee on the Medical Aspects of Sports of the American Medical Association.

DEPARTMENTS:

THE STUDENT TRAINER'S CORNER 66

POTPOURRI 72

ABSTRACTS 74

CALANDER OF COMING EVENTS 78

BOOK REVIEWS 80

NOT FOR MEN ONLY 82

CURRENT LITERATURE 84

LETTERS TO THE EDITOR 96

EDITOR'S COMMENTS 97

and not necessarily those of the National Athletic Trainers Association. Nonmember subscriptions are available at \$6.00 per year and may be obtained by writing to 3315 South Street, Lafayette, Indiana 47904.

CHANGE OF ADDRESS may be made by sending old address and new address with zip code number. Instructions should state whether change is temporary or permanent. Allow thirty days for changeover.

Address changes should be sent to 3315 South Street, Lafayette, Indiana 47904.

ADVERTISING — Although advertising is screened, acceptance of the advertisement does not necessarily imply NATA endorsement of the product or the views expressed. Advertising rates available on request, 3315 South Street, Lafayette, Indiana 47904.

Copyright 1972 by the National Athletic Trainers Association.

The National Athletic Trainers Association

President

Robert Gunn
Houston Oilers
P.O. Box 1516
Houston, Texas 77001



Executive Director

Otho Davis
Philadelphia Eagles
Veterans Stadium
Philadelphia, Pennsylvania 19148

Board of Directors

Dist. 1 Frank George
Brown University
Providence, Rhode Island 02912

Dist. 2 Francis J. Sheridan
Lafayette College
Easton, Pa. 18042

Dist. 3 Joseph Gieck
University of Virginia
Charlottesville, Va. 22903

Dist. 4 Roland E. La Rue
Western Hall
Western Illinois University
Macomb, Illinois 61455

Dist. 5 Byron J. Bird
Athletic Department
Oklahoma State University
Stillwater, Oklahoma 74074

Dist. 6 Eddie Lane
3116 Hanover
Dallas, Texas 75225

Dist. 7 Rodney Kimball
Brigham Young University
Provo, Utah 84601

Dist. 8 Lewis C. Crowl
5207 J Street
Sacramento, California 95827

Dist. 9 Warren Morris
University of Georgia
Athens, Georgia 30601

Dist. 10 Sayers Miller
University of Washington
Graves Building
Seattle, Washington 98105

District Secretaries

Dist. 1 Joseph Abraham
Hobart College
Athletic Department
Geneva, New York 14456

Dist. 2 Joseph Abraham
Hobart College
Athletic Department
Geneva, New York 14456

Dist. 3 Craig Lewellyn
The Citadel
Athletic Department
Charleston, South Carolina 29409

Dist. 4 Charles Vosler
Ohio University
Convocation Center
Athens, Ohio 45701

Dist. 5 William W. Flentje
University of Missouri at Rolla
Rolla, Missouri 65401

Dist. 6 James Dodson
Midland High School
Athletic Department
Midland, Texas 79701

Dist. 7 Warren H. Lee
Department of Athletics
University of Arizona
Tucson, Arizona 85721

Dist. 8 Tom Little
Athletic Department
Chico State College
Chico, California 95926

Dist. 9 Steve Moore
Tennessee Technological University
Athletic Department
Cookeville, Tennessee 38501

Dist. 10 John Andersen
University of Washington
Graves Building
Seattle, Washington 98105

Division Directors and Committee Chairmen

Audio-Visual Aids—Gordon Stoddard
Certification—Lindsay McLean
Drug Education—Al Hart
Ethics—L. F. "Tow" Diehm
Grants and Scholarships—W. E. "Pinky" Newell
Honor Awards—George Sullivan
Journal—Rod Compton
Membership—Bruce Melin

National Convention—Fred Hoover
Placement—A. G. Edwards
Professional Education—Sayers "Bud" Miller
Sub-Committee for Graduate and
Continuing Education—Gary Delforge
Public Relations—Dick Malacrea
Recruitment—Mel Blickenstaff
Research and Injury—Gordon Graham

ORTHOPEDIC EQUIPMENT COMPANY



immobilizes

Orthopedic Equipment Company manufactures a wide selection of supports, collars, belts, slings and splints, so you can select – from a single catalog – exactly the right device to immobilize any part of your patient's anatomy.

OEC products incorporate the results of many years of manufacturing experience, and many hours of design consultation

with leading surgeons. We have become one of the largest manufacturers of orthopaedic immobilizers, and many members of the profession have complimented us through their acceptance of these products. The OEC label is thus your assurance of quality. Ask your OEC representative for complete information about OEC immobilizers.

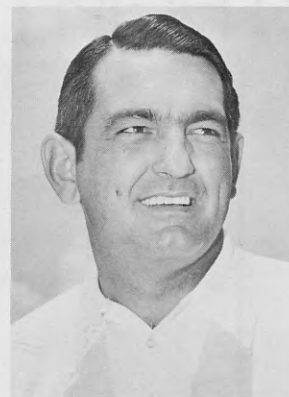


The swivel football shoe: A controlled study

OTHO DAVIS, M.A.; A.T.,C.
BRUCE M. CAMERON, M.D.

Fixation of the foot through rigid cleating is a primary factor in the production of football knee and ankle injuries.

Copyright © 1973, The Journal of Sports Medicine, Sports and Medicine Publications, Inc. All rights reserved.



OTHO DAVIS

For many years it has been recognized that the unnatural action of rigid cleating enhances all of the dangerous forces applied to the ankle and knee joints during the playing of football. Most injuries common to football (cerebral, ocular, facial, dental, spinal, chest, abdominal, trunk, arm, and thigh) have been continually reduced in number and degree by rule changes and improved protective equipment, conditioning, and techniques of coaching, but knee and ankle injuries have persisted at a high rate of occurrence since the rigid-cleated football shoe was introduced some 90 years ago. In fact, the incidence of these two injuries has increased in recent years, because greater forces are now coupled with the unchanged principle of the rigid cleat.

Initially, the scientific attack against rigid cleating was directed by Hanley of Bowdoin, Maine¹ who advocated the removal of heel cleats to permit increased foot mobility and absorption of forces. Subsequently, short cleats, with or without cleatless heels, were recommended, which decreased the rigidity of the foot still further. These two innovations were field-tested by Rowe of Buffalo² and Torg of Temple University³ and were found to be effective in reducing injuries. However, high rates

of injury persisted, and it became apparent that even forefoot rigid cleating was dangerous. Artificial turf, developed in an effort to provide a surface upon which the foot would be held less rigidly, also yielded discouraging results.

The swivel shoe principle, introduced in 1962, was the next development in the effort to replace rigid cleating. To Hanley's cleatless-heel principle were added movable forefoot cleats, mounted upon a 360° turntable (a torsion joint), which further reduced fixation to the ground, allowing the player to be cleated yet relatively protected from injury. Over 350 different designs were tested with the goal of embodying, in one design, proper cleat placement; support for a 250+ lb high-stress football player on 1/8 inch of sole material; adherence to present-day shoe manufacturing standards; reasonable cost; lightness and resistance to mud, muck, and water; a full season's durability; the advantage of cleat replacement; and player acceptance.

After six years of testing and redesigning, in 1968 a model that met these criteria was developed (Figure 1). It was successfully tested in 1969; this paper is a report of that study.

DISCUSSION

The swivel shoe contains a sealed, metallic forefoot turntable within a molded sole upon which are mounted four football cleats. (In this study, the length of these cleats was 5/8 of an inch.) This turntable is capable of rotation

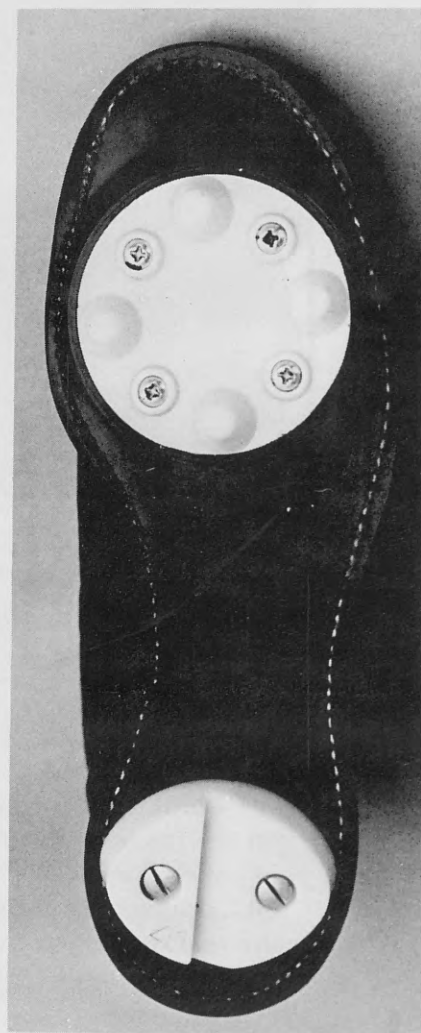


FIGURE 1—The swivel shoe (Wolverine Swivler (TM), Wolverine World Wide, Inc., Rockford, Mich.). Note the four cleats mounted on a turntable, and the platform heel. The axis of rotation lies in the center of the turntable.

Dr. Bruce M. Cameron is Assistant Clinical Professor of Orthopedics, Baylor University College of Medicine, Houston, Texas. Otho Davis is former Assistant Professor Physical Education and Head Athletic Trainer, Duke University, Durham, North Carolina, and presently with the Philadelphia Eagles Football Club.

Reproduced with permission of The Journal of Sports Medicine, Sports and Medicine Publications, Inc., Brookfield Center, Connecticut.

360° in either direction, but it is not free-spinning, requiring at least 10 lb torque to initiate movement.

The outside diameter of the plastic turntable joins with that of the sole at an angle of 45°, forming a two-purpose wedge joint that acts first as a seal and second as a regulator of the torque required to turn the shoe over the turf-held cleats. The standing player closes this wedge directly in proportion to his weight: thus, a 150-lb player will require less torque than one weighing 250 lb, but the heavier man will have more torque available.

The concealed metallic portion of the unit prevents binding by avoiding overloading of the wedge. Hence, the concept of the function of the shoe is not demonstrated effectively by holding it in one hand and spinning the cleats with the other. The shoe must be put on and placed on turf to get the proper effect.

The heel is a cleatless, molded, replaceable platform which contains a beveled notch, the principle of which will be explained. The forefoot rotates and the heel skids around on a single axis: the pivot point of the forefoot turntable. (A shoe with more than one axis of rotation would violate the basic principle of rotation, since a single, intact object cannot be expected to rotate around two axes simultaneously.)

PRINCIPLES OF SHOCK ABSORPTION

Newton's First Law

"Every body remains in a state of rest or uniform motion . . . unless it is compelled by impressed forces to change that state." As applied to the knee or ankle, or any joint, this can be interpreted as meaning that a joint rests or uniformly moves within anatomic axes and a normal range of motion unless compelled by impressed forces to rest or move otherwise.

Newton's second law

"Change of motion is proportional to the impressed force, and takes place in the direction of the straight line in which that force is impressed." Newton further explains this law: "If a force generates any motion, double force will generate double motion, a triple force, a triple motion, whether they be applied simultaneously and at once, or gradually and successively. This motion, if

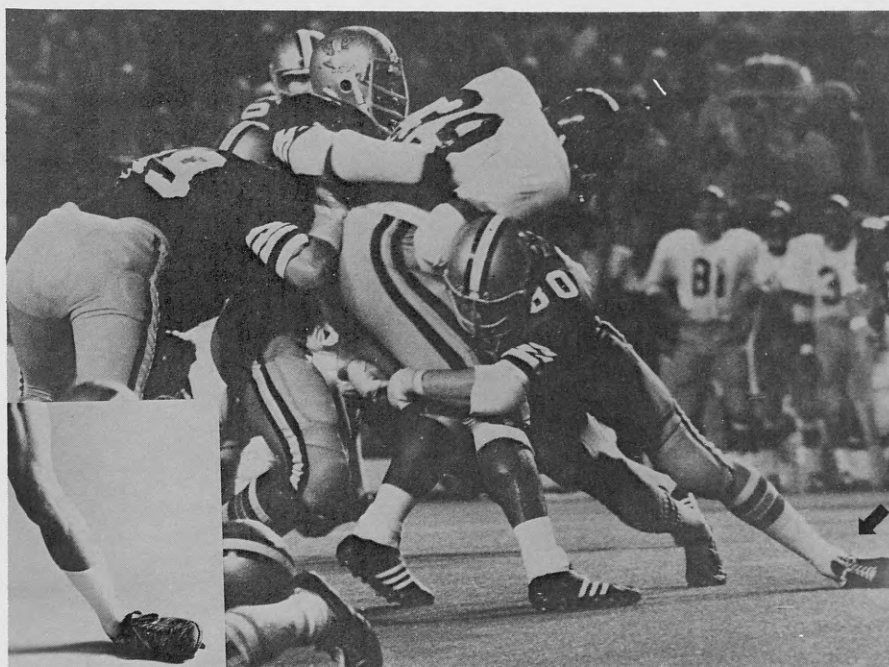


FIGURE 2 — The tackler's left foot is fixed on the inner margin, with great force being exerted against it. The ballcarrier's right heel is forced into valgus and the foot is beginning fixation on the medial margin as he is being hit with a total of over 600 man-pounds. Potential for injury is great.

the body were already moving, is either added to the previous motion, if in the same direction, or subtracted from it, if directly opposed, or compounded with it if the two motions are inclined at an angle."

Thus, acceleration or deceleration (change of motion) occurs about a joint, proportional to the applied forces and in the direction of the resultant of these impressed forces. This motion will be normal and harmless if it moves within the normal axes and range of the joint and does not exceed the margin of safety of the anatomic structure of the joint. If the resultant line of force and motion does not lie within the normal axes or range of motion, then the joint must be either correctively realigned to cause this resultant to fall within the normal axes or removed from the force before the margin of safety of the joint is exceeded and damage occurs.

Newton's third law

"Action and reaction are equal and opposite." The ligaments are the most vulnerable supporting structures of any joint; their strength is always less than that of the adjoining bone, and their elasticity is less than that of the overlying muscles and tendons. But there is inherent in their design a protective

mechanism consisting of the anatomic axes and structure which guard the normal range of motion. These mechanisms essentially route forces past the weaker ligaments, to be absorbed by the stronger bones and elastic musculotendinous structures, which supply an "equal and opposite" harmless reaction to the impressed forces (action). However, if this action malaligns the joint into abnormal axes or exceeds the normal range of motion, then much of the reaction lies in the ligamentous structures, which become vulnerable to injury. In these abnormal axes, motion has a much lower margin of safety, because it acts primarily upon the ligaments, not upon the normal design of the joint. This statement agrees with that of Nicholas,^{4,5} who equates soft, elastic ligaments to increased vulnerability to injury.

Thus, the protective shock-absorbing mechanism of an excessive force is either corrective anatomic realignment or removal of the joint from the force before damage can occur. These two protective mechanisms, which have not been well appreciated in the study of athletic injuries, are extremely important. Shock absorption, occurring primarily by removal of the joint from the offending force and secondarily by pre-

vention of malalignment, is particularly well demonstrated by the effect of excessive force on the arm. In football, injury occurs less frequently in the elbow and wrist than in the leg, because the offending forces (sustained while the player is upright) are immediately, equally, and effectively counteracted by the extreme mobility of the shoulder, which causes the joints to be removed from the resultant of these forces and simultaneously or secondarily maintains the correct anatomic axes.

Because a ground-contact support phase occurs in standing, walking, trotting, and running, the standing athlete's knees and ankles are less protected than his elbows and wrists, which have less effective aligning and escape mechanisms. There is more fixation of the foot than the hand, and less mobility of the hip than the shoulder. During the single-support phase of walking, trotting, or running, when the total body weight is on one leg, the knees and ankles are still more vulnerable, because the increased weight further increases the fixation of the foot and diminishes the mobility of the hip.

Hence, as opposed to the arm, in which escape is the primary shock-absorbing mechanism and corrective alignment is secondary, in the leg, corrective alignment is primary and escape is secondary; corrective alignment depends almost entirely upon rotation which, in turn, depends almost entirely upon the ability of the foot to slide over the ground. Although a few degrees of rotation can occur in the fixed foot as the result of midtarsal joint motion, this is almost negligible as compared to the rotation available when the sole slides freely, allowing the knee and ankle a continuing rotatable range of 360° in either direction. Escape, secondary in the leg, is found in the capacity to shift weight to the opposite extremity—thus removing fixation of the foot and increasing the mobility of the hip (simulating a free-swinging arm)—and in the ability of the foot to rotate or slide in any direction.

It then follows that increased mobility of the foot adds to the effectiveness of the shock-absorbing mechanism of the knee and ankle. If this is true, then the opposite must be true: decreased mobility of the foot diminishes the effectiveness of this mechanism and is

therefore dangerous to the knee and ankle.

MATERIALS AND METHODS

In the Duke-Durham area, Otho Davis, Assistant Professor of Physical Education and Head Athletic Trainer of Duke University, programed knee and ankle injury data obtained during the 1969 football season from a test group of 466 high school players wearing swivel shoes and a control group of 2373 high school players wearing conventional shoes (Table I). The data were assembled by an investigating team, which observed the players carefully as the season progressed. If a knee or ankle injury occurred, a member of this team personally contacted the player and trainer to obtain the information; if necessary, the attending physician was questioned. All these data were placed on computer cards, using the National Tackle Football Questionnaire as a guide to organization; this produced a unit with 60 columns, each containing an average of ten variable, so that a possible 600 factors on each player were available at the season's end.

Additionally, 386 players were agility-tested in conventional shoes early in the season and later in swivel shoes. As a comparison, 126 were tested both early and late in conventional shoes. These data were collected, tabulated, and studied by the Department of Computer Science at Duke University.

The following eight standard Duke agility tests were selected as performance criteria:

Test 1: 50-yard dash with a football

Test 2: zig-zag run

Test 3: cloverleaf run

Test 4: run forward—run backward

Test 5: Duke agility drill—a running test requiring multiple falls and recoveries

Test 6: pull out—right

Test 7: pull out—left

Test 8: 40-yard dash with a football

A total of 512 men was divided into two groups (A = 386 men; B = 126 men) and timed through these tests twice ($512 \times 8 \times 2 = 8192$ observations). These data were separated into four groups for computation:

Group 1: 100C: Group A, 386 players tested at the beginning of the season in conventional shoes

Group 2: 200S: Group A, the same 386 players tested six weeks later after physical conditioning but now wearing swivel shoes

Group 3: 300C: Group B, 126 players tested at the beginning of the season in conventional shoes

Group 4: 400C: Group B, the same 126 players tested six weeks later after physical conditioning but continuing to wear conventional shoes

RESULTS

These data were processed using a chi-square to determine significant differences in performances.

1. Physical conditioning increased performance significantly in all tests but Test 5, which required more than running. Hence, significant differences were noted in the times between 100C and 200S and between 300C and 400C, but these differences were the result of conditioning and did not reflect the type of shoe worn.

2. There was no significant difference between the performance of the conditioned swivelers and the conditioned athletes wearing conventional shoes (200S compared to 400C); the swivel shoe neither enhanced nor hampered function. However, it must be noted that the swivel shoes of that time were of heavy, Goodyear-welt construction, weighing considerably more than the lightweight, molded soccer-type or Littleway constructed shoes worn by groups 100C, 300C, and 400C. It may be anticipated that the new, lighter swivel shoes will yield more significant findings.

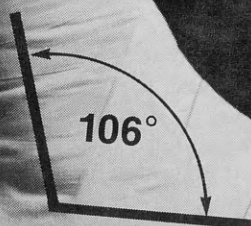
Table II summarizes the incidence of knee and ankle injury in the control and test groups; Table III shows the computation of the safety of the swivel shoe compared to the conventional shoe worn by the control group.

MECHANISMS OF INJURY

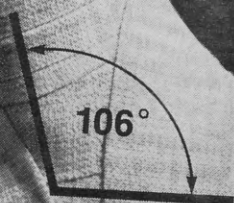
Contact injury without cleat fixation

During the playing of football, foot fixation can occur by one or a combination of means other than cleats. If the foot simply rests on the outer or inner

Conventional white tapes



Conform[®] tape



White tape can keep you from getting a sprain. It can also keep you from getting a touchdown.

The difference between white tape and Conform Tape (Conform[®], HTC[™] and Pro-Lastic[™]) is the difference between being in a hospital and being in a football game.

Because conventional white tape was developed for hospital use. It was intended to immobilize, and it does that very well. In fact, most players have to spend almost half the game just loosening up their tape enough to move freely.

Conform Tape was developed for

sports. It's intended to support: To protect from injury while giving the maximum range of motion, and a lot more comfort.

And that range of motion and comfort can mean everything to a player in a game of inches. More protection with more motion has been the incentive behind every development in football equipment over the last seventy or so years; from plastic pads to low-cut shoes to super-lightweight uniforms.

But that new range of motion isn't the end of the Conform Tape Story. There's the reduced taping time of Conform Tape (you can tape three teams in the time it used to take you to tape one). And there's a lot more.

Frank Howard would love to tell it to you. Write him at Kendall Sports, Bike Division, 20 Walnut Street, Wellesley Hills, Mass. 02181. Or just ask any player who's ever played in Conform Tape.

BIKE[®]

The Kendall Company, Sports Division, Wellesley Hills, Mass.

margin but not on the sole, it is relatively fixed, because rotation and the ability to skid laterally are diminished. Frequently, the foot slides laterally and becomes fixed on the inner margin (Figure 2). However, the opposite can occur (fixation on the outer margin), especially if the turf surface and footwear fail to provide adequate fixation against the slide. If a force is applied (with or without contact) to the knee or ankle at this instant (with the foot on its side), injury can occur because neither corrective alignment nor escape can be implemented. Additionally, these joints lie in a dangerous "bridged" position. This malalignment can occur on any turf and the player can be wearing any type of shoe or none at all.

Study of slow-motion films shows that many players "cut" or change direction by using the inner margin of the sole, not the cleats or the sole, as a base from which to push. Here again, they are vulnerable to injury in any shoe.

A player's foot can become fixed against an object, such as another player's foot or other body portion, or against the sides of a depression in the turf. In this situation, theoretically he could be barefoot, resting on the sole of his foot, and injury could occur.

The classic example of damaging deceleration and fixation can occur if even a barefoot player is struck from the front of his knee with his advancing leg in the position of foot-strike. The knee cannot escape the hyperextending force because the foot is fixed, and no relief from hip or sole movement is possible. Serious damage can result.

The "dangling knee" in football, when a player lies prone with his knee flexed and his foot loose in the air, produces a dangerous type of foot fixation; if another player falls upon this leg and forces the knee or ankles or both, into an abnormal axis, little opportunity exists for the hip to correct this malalignment or to remove it from harm. Injury may occur regardless of the shoe style worn. An analogous situation occurs during the stage of loft, when both feet are airborne, or during the stance phase of running, when one foot is off the ground. If a free foot is seized by another player, it can be held in a fixed position or moved into an abnormally fixed position and extreme mala-

ignment can occur through the forces of superimposed body momentum. Severe damage can result even though the affected foot was not in contact with the ground.

Contact injury with cleat fixation

Of all known causes of foot fixation, rigid cleating is the most common and thus is responsible for more injuries than any other. This cleating occurs in running from foot-strike to take-off, in all phases of walking (with the exception of levitation), in all phases of hopping except loft, in standing, in crouching, and in all phases of the precontact football position. Cleating occurs much more commonly in these activities than it does in those previously described: it is much more common, for instance, for a player to be struck during a stage of support than it is for his foot to be trapped during loft or swing, or against another player's foot. He is more often in the upright, support phase than he is on the outside of his foot or in the "dangling knee" situation. In the overwhelming percentage of cases of injury, he is struck while a foot is in support, and, during the succeeding moments after contact, he may find the other foot cleated in an exceedingly abnormal and injury-provoking position.

These injuries to the knee (and ankle) occur mainly when the knee is semiflexed. Three factors support this observation:

1. The knee is held in semiflexion for a longer period of time during football than it is in any other position, e.g., fully extended or fully flexed. All precontact "set" football positions include a semiflexed position; coaches vigorously discourage an on-the-heel, knee-extended position. During running, the knee is in semiflexion through all of foot-strike and support and is completely extended only at the instant of take-off. During loft, it remains semiflexed and is fully flexed only momentarily in the forward-swing phase of recovery. Thus, in running, the position of complete extension or complete flexion is maintained only momentarily, and this powerful, crouched semiflexed running is utilized more than any other type (Figure 3). As stated, it is quite rare to see a player with a fully extended knee unless he is free-running, not anticipating contact, or driving in a tackle.

2. The semiflexed position is most inviting to injury because the anatomic locking of the knee, the so-called screw-home motion, occurs only momentarily and is not operable with any degree of flexion. This loss of flexion renders the joint weaker and more subject to injury; having lost its anatomic coupling, it is more dependent upon its ligaments and muscles for stability. The joint is screwed home and securely locked only at the instant of take-off (Figure 3-C), when the heel is elevated and only the forefoot touches the ground. In this instance, the protective mechanism of increased hip and foot mobility for corrective alignment and escape is more effective, because in the next instant no weight of the body will rest on this leg as it is about to begin its loft. A blow occurring at this time will strike a leg with a securely coupled knee whose foot is in the process of being lofted and freed of fixation so that it resembles an arm with its excellent protective design.

3. From the instant of foot-strike through support (Figure 3, A and B), the semiflexed, unlocked knee is supported by a cleated, fixed foot; fixation increases according to the force with which the heel and forefoot are planted. This stage of fixation occupies a substantial period of the various stages of running and other football stances.

Thus, for three reasons, the knee and ankle are most frequently injured in a position of semiflexion, which is also the most common stance of the football player. Injury is most likely to occur in this situation because the joint has lost its anatomic coupling, and cleat fixation is most rigid during semiflexion of the knee in the stage of support.

This discussion has been concerned with forces that impress on the joints and cause damage by distortion of the joint axes and tearing of ligaments. In the majority of cases, damaging external forces are generated in football by the players' blocking or being blocked, or tackling or being tackled (Figure 2). Of course, other factors such as positional vulnerability, type of play, condition of field, weather, fatigue, conditioning, and ligamentous tightness contribute to injury. However, repeated examination of football knee and ankle injuries most frequently implicates foot fixation as the main mechanism of injury.

(con't. on page 88)

GUARD-TEX

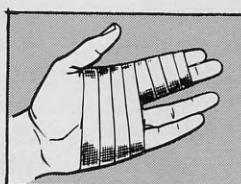
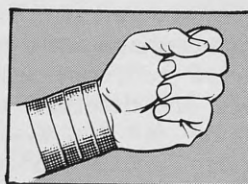
Self-Adhering
WRAP-AROUND
TAPE



GUARD-TEX has been recommended and used by leading trainers, coaches and athletic directors at all levels of organized sports.

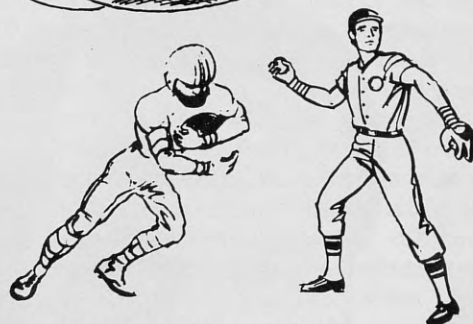
Protects - Supports

GUARD-TEX provides excellent protection and support for fingers, hands, wrists, knees. It stays in place despite heavy perspiration. Is quick and easy to apply—can be removed without pulling hair or skin.



GENERAL BANDAGES, Inc.

8300 Lehigh Avenue
Morton Grove, Illinois 60053



STICKS ONLY TO ITSELF —
NOT TO HAIR OR SKIN!



SEND FOR
FREE SAMPLE

THROAT



EASY TO USE
COLD APPLICATION

REUSABLE

Col Pac
HYDROCOLLATOR®

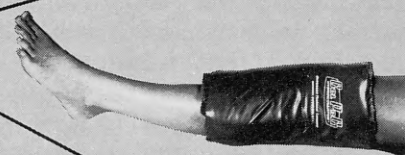
HAND
WRIST



SHOULDER
SCAPULA



KNEE-THIGH



A SIZE FOR
ANY AREA

ANKLE-FOOT



NECK



CHATTANOOGA PHARMACAL CO.
CHATTANOOGA, TENNESSEE 37405

ULTRASOUND



Wayne Sawyer went to the University of Texas at Arlington and East Texas State College for his undergraduate work. In September 1962 he received his Certificates of Physical Therapy from Hermann School of Physical Therapy. Along with his private practice Wayne provides athletic trainer service to several teams in the Dallas, Texas area.

Toward the end of the eighteenth century Spellanzani studied the flight of bats and noted that in spite of partial blindness, they did not fly into obstacles unless their hearing was impaired. He recognized that there was a "sound" reflecting from objects.^{1,2} In 1847 Joule discovered that high frequency electrical energy may be transformed efficiently into ultrasound. In 1880 the brothers Curie showed that certain crystals which lack a center of symmetry produce an electrical current when pressure or tension is applied to them along certain crystalline axes. This is called piezoelectric effect and is the principle by which all ultrasound machines operate and may be displayed by tourmaline, quartz, Rochelle salt and barium titanate. The first suggestion for ultrasonotherapy was made in 1933 when it was proposed that deafness could be reduced with use of it.⁴ Ultrasound has also been used in inner ear disease where the inner ear causes dizziness due to pathology. The ultrasound destroys the inner ear

and this cures the problem of dizziness. A real stimulus to medical ultrasound was in 1937 when a report on the effects of ultrasonic energy on tissues was published. The first treatment was given in 1938 to a woman with sciatica. Progress in development was interrupted by high priorities on electronic equipment for World War II and only a few people were using ultrasound. In 1942 the work of Gohr and Wedkind that was completed just before the war was published and explained that actual ultrasound as "micromassage".⁴ Since that time research in the United States has been done on many things from destruction of mineral deposits in the human body to brain surgery by focusing ultrasonic beams to a predetermined area and destroying the tissue in this area.⁵ Ultrasound is used today in medical research, medical treatment and in industry. It has become in the past few years a useful tool where high frequency vibrations are needed. Radiologists use the echo-encephalogram which produces an image on film of reflected ultrasound waves, abnormal images are detected and diagnosis is confirmed. Cleaning is the most frequent industrial use although ultrasound is being used to determine structural strength using a method similar to the echo-encephalograph.⁴ One example of cleaning is in the rebuilding of jet engines where the fan blades are cleaned by ultrasound. This is a procedure which is done by hand would take many hours and many blades would be destroyed. Cleaning is done also in hospitals of surgical equipment before autoclaving.⁷

The first step in producing ultrasound is in generating high frequency alternating current similar to the usual diathermy generator. This energy is converted into mechanical vibrations by means of the piezoelectric crystal.⁶ One of the most satisfactory and commonly used crystals is pure quartz. Other crystals are barium titanate and lithium sulfate. The quartz is the most stable material and requires high voltage and consequently a stiff cable. A 3 watts per square centimeter, output for a quartz crystal may require 2000 volts; barium, 100; and lithium, 500, approximately. Barium titanate is very popular with manufacturers because it is easily molded into large diameter crystals, this being less expensive than quartz but is also less sturdy.^{3,4} However, some manufacturers state that they have less trouble with breaking with barium titanate than with quartz.

Ultrasonic intensity is expressed in watts/cm² to describe the ultrasonic field produced by a therapeutic soundhead. Usually this term refers to the average intensity of the field, that is, the total output of the applicator is measured in watts and then is divided by the size of the radiating surface of the applicator or cm². Thus a machine with 30 watts total output and a radiating applicator surface of 10 cm² has an average intensity in the field of 3 w/cm². This is an arbitrary figure and is influenced by the efficiency of the crystal and what type of beam is produced. The diameter of

the soundhead is important because the total output of the machine is in direct proportion to the size of the soundhead. If the average output of the generator is 3 w/cm² and the radiating surface of the applicator is 10 square centimeters, the total output is 30 watts. On the other hand if the machine has 3 watts cm² and a radiating surface of the applicator of 5 centimeters the total output is only 15 watts. From this point of view large applicators are preferred.

The paragraph on physiology will give some indication of the intensity to be used. Most people conform to the intensity of 1 to 1½ watts per square centimeter for five minutes and this is due to the fact that one watt per square centimeter tends to decrease the number of nerve impulses and therefore will tend to make a patient relax a muscle spasm. The soundhead must be kept in constant motion to prevent heat build-up in the tissues and on the surface of the soundhead. The alternative to this method is a large stationary, multi-crystal soundhead where you treat a smaller area for a longer time with much less intensity. Too high intensities in either method or not moving the soundhead fast enough will cause stimulation of the sensory receptors in the covering of the bone and intense pain will be produced. This is a clear indication to change the method of treatment of this area. The treatment dosage is effected by factors such as crystal area, contact area of soundhead, pulsed or continuous and speed of motion of the soundhead.

Trigger points are located by a method of increasing the amount of ultrasound to 2½ watts per square centimeter to the area where you suspect the trigger point. This can either be done by increasing the machine output or holding the crystal still at one spot. The nerve impulses are increased by the ultrasound and the area becomes much more painful and causes the pain to radiate to a secondary area. The area is **then** treated by the standard clinical method of **being** injected with cortisone and xylocaine by the **referring** physician. This is somewhat controversial because the area where the pain is radiated does not follow the anatomical dermatones. It is often observed that after one to three hours of treatment there may be an increase in the discomfort followed by a diminished pain and beneficial effect. Many observers felt that it requires three to six treatments before beneficial results may become apparent.

The most common method of transmitting ultrasound from soundhead to skin and to underlying tissues is by means of coupling with mineral oil or similar substance. It is essential that there be no air gaps between the soundhead and the underlying skin so that an ample amount of coupling fluid must be used at all times. Some consideration must be given when using something other than water or mineral oil. If the agent has too many bubbles, the sound will not conduct the same as if the bubbles are formed during underwater treatment.³

The literature pertaining to the physiological effects of ultrasonic energy is difficult to read and often presents apparently conflicting conclusions. It must be emphasized that the physiological effect of ultrasonic energy is just beginning to be understood. In all the literature the main indication for using ultrasound is for the heating effect caused by the "micromassage" of the molecules. Ultrasound is a good source of heat because more energy per unit of time of exposure is realized than from moist heat, infrared radiation, diathermy or ultraviolet. Most of the energy per unit of time can be added without harm to the patient because of the greater depth of penetration so that there is more uniform rate in the rise of tissue temperature than can exist when most of the energy is absorbed by superficial tissues and only secondarily passed on to the underlying structures.

When energy is added, in whatever form, four things happen to it: it can be absorbed; transmitted; reflected; or refracted. Knowledge as to how much of each has taken place is not easily obtained, especially in a human patient. In clinical work, the only dosage guide is the patient's sensation, which can be moderated by many factors.

Absorption of energy is an important role in the clinical use of ultrasonic energy. In underwater emersion techniques such as commonly used, ultrasound will cause bubble formation in the water, and more importantly on the radiating surface of the soundhead. This formation absorbs the energy of the soundhead each time they form. A more efficient way of dealing with the problem is to substitute unheated mineral oil for the water as a large volume coupling agent.⁶ Another factor related to the absorption of ultrasonic energy which will probably receive increasing attention is the quantity of energy added per unit of time. Many studies are being done on animals with high intensities and short durations in an attempt to obtain the desired measurement without masking by the nervous central compensation, that is, increased circulation. A given amount of tissue exposed to 1 watt per square centimeter for five minutes is the same in total energy as 0.3 watts per square centimeter for 17 minutes for 0.1 watt per square centimeter where used for 51 minutes. The physiological effect would be quite different because of the difference in the amount of energy added per unit of time and the change in the environment from the increased circulation and resultant heat.⁶ This is the rationale for the multicrystal large size head. There is also the possibility of reflected ultrasonic energy from bone which is thought to be about 35%. This will increase the amount of energy received by the tissues next to the bone and raise their temperature. This is especially apparent when treating a shoulder with bursitis. The bursa is tender and inflamed and will not tolerate the temperature rise and intense pain will be produced. Without reflection and with the continuous moving soundhead, soft tissues rise is on the order of 1 to 2 degrees centigrade when

Ever wish that someone would come up with a tape and bandage cutter that really worked? That you could cut through several layers with and not have to change the blade after one use? We've got one—The SHARK.

In field testing, trainers and athletes have told us that the new SHARK Tape and Bandage Cutter is faster, easier to handle and more comfortable than anything they've ever used before.

The longer-life, surgical carbon steel blade is so effective and sharp, it will quickly cut through up to 10 layers of elastic tape. Yet it is extremely safe with an easy-to-replace, one-piece blade cartridge that snaps in place in seconds without screws or hooks.

The SHARK is the latest addition to the Protective Products, Inc. complete

line of training supplies, which includes ACE® bandages, aerosols, liniments, powders, vitamins, and other products to fulfill your training room needs. All are backed by the extensive testing facilities of P.P.I.'s parent company Becton, Dickinson and Company, a leader in health care products since 1897.

For our new catalog outlining our complete line which also includes helmets, shoulder pads and body pads, write Dept. B, Protective Products, Inc., P.O. Box 291, 1913 E. Pine, Grand Prairie, Texas 75050.

The SHARK is a trademark of Protective Products, Inc.



**Introducing The SharkTM:
P.P.I. will match it against any
other tape and bandage cutter
on the market for speed
and safety.**



Protective Products Inc., A Subsidiary of Becton, Dickinson and Company

"We've got a lifetime of health care products behind us."

standard intensities and durations are used.

Refraction of the energy when passing from one substance to another is a factor involved in absorption also. Pathological effects from refractionary waves are kept at a minimum by the use of the standard clinical technique and keeping the soundhead in continuous motion.

It is fairly well accepted that the exposure of normal tissues to one megahertz of ultrasound energy at intensities of less than 3 watts per square centimeter does not give rise to tissue damage. The frequency of one megahertz is carefully chosen compromise frequency, from the standpoint of energy spread penetration, and for inducing both thermal and nonthermal effects in the exposed tissues. The greater the frequency, the higher the heat and the less the penetration. The lower frequency the greater the penetration and the lower the heat.⁶ Therefore, the compromise.

Pulsed ultrasound is indicated when the employment of continuous waves would give rise to either the overheating of the transducer, the medium, or the underlying tissues. When allowance is made for pulsing and the normal procedure of moving the transducer continuously over a considerable area, so few calories are produced that even if the circulation were cut off completely, the temperature rise would be insignificant in the soft tissues at any distance from bone. It is only when the high reflection of bone is present that the temperature rises to a point capable of stimulating the nerves of the covering of the bone.⁴ For calibration purposed pulsed ultrasound is spoken of in percentages of duty cycle. The duty cycle is from the beginning of one set of ultrasound waves to the end of the rest period and the beginning of the next set of ultrasound waves. The duty cycle should be known and should produce a square wave when read on an oscilloscope.

Phonophoresis is the driving of medication molecules into the cells and differs from iontophoresis in two important aspects. First, the whole molecule is driven in, rather than a charged component of the disassociated molecule. The second difference is the depth of penetration. It has been shown that measurable quantities of hydrocortisone can be driven in at least two inches whereas with ion transfer, with occasional exception, the active component does not penetrate through the skin. There is some indication that when standard needle injection of hydrocortisone does not produce the desired pain relief, ultrasonic-driven cortisone will. This is thought to be brought about by the reaction of the absorbing cells to ultrasound. The increased permeability would make it easier for the hydrocortisone to reach the cells interior.⁷ Some physicists feel that no convincing evidence has been produced that any such effect is true ultrasonic action and that the result is of mechanical massaging of the transducer on the skin and of the increased blood supply produced by the ultrasound.²

Ultrasound therapy cannot be considered a

specific cure of any disease. It is known to give symptomatic relief of pain, soreness, and tenderness associated with such conditions as bursitis, arthritis, fibrositis, tendosynovitis, myofascitis and myositis. There has also been reported successful treatment of traumatic conditions, such as strains, sprains, and muscle and soft tissue contusions. Ultrasound may also be used to reduce the pain of muscle spasm associated with rheumatoid arthritis and osteoarthritis.³ Because of the possibility of injuring the nervous tissue, ultrasound should not be applied in and about the brain, spinal cord, eye, ear, heart, reproductive organs, epiphysis of growing bones, and the large autonomic structures, such as the mesenteric and stellate ganglions. The physiology of these structures can be affected the increased heat and may produce undesirable effects. Ultrasound is contraindicated to areas of the body where there is impaired circulation such as from occlusive vascular disease or where sensation is impaired. The council of physical medicine and rehabilitation also indicate that ultrasound should not be applied to acute infections or malignant lesions.

To speculate is to theorize from conjecture without sufficient evidence. This is precisely the approach which is taken in succeeding paragraphs because there is no sufficient evidence to offer a complete story on the physiological effects of ultrasonic energy as it is used clinically. The major justification for the use of ultrasonic energy is to relieve pain, at a molecular level, no one knows what causes pain, likewise, no one knows how aspirin relieves pain, although all know that it is effective in various disorders of widely differing origin. The fact that no one is certain how it works does not prevent the physician from making effective use of it. On the other side of the coin, if the mechanism of aspirin action was known, a physician could probably make far more effective use of it.

One might speculate concerning the mechanism by which ultrasonic energy relieves pain. First, there is a rise in tissue temperature, especially small with the standard technique of continuously moving the soundhead. The tissue temperature rise relieves the kind of pain which responds to an increase in circulation and an increase in metabolism. Other physical agents produce an equal or greater rise in tissue temperature but not as fast nor as deep. The temperature rise produced by the other commonly used physical agents are largely the result of the combination of conduction, convection, and radiation of energy throughout the exposed tissues. The effects of this combination is frequently lessened by the ever-present subcutaneous fat layer. Fat absorbs relatively little energy of clinical ultrasound. Fat absorbs a great deal of electromagnetic energy to which patients are exposed. Ultrasound also penetrates better because it is of lower frequency in comparison to the high frequency of electromagnetic energy.

Second, ultrasound can alter peripheral nerve

impulse. Intensities on the order of 0.5 watt per square centimeter tend to increase the number of impulses while 1 w/cm² diminished them. Intensities of 2.5 watt per square centimeter tend to increase the nerve impulses. A peripheral nervem such as ulnar nerve contains many sensory and motor fibers. If sensory fiber impulses diminish there can be among other things, relief of pain, simply because the central nervous system no longer is being stimulated and the patient is no longer aware of the pain producing circumstances. This has certain obvious hazards, dramatically seen in the infant born without a sensory nervous system. Such an infant does not live to a ripe old age, in art, because he receives so many more injuries as he grows up. If motor fiber impulses diminish there can be a relief of pain because of the muscle fiber supplied by the nerve no longer receives orders to maintain tension and relaxes.

Third, in various pathological conditions which produce proliferation of connective tissue or excess calcium deposition, pain relief and increased range of motion could be brought about by reabsorption of adhesions and excess calcium. This is speculation, theorizing from conjecture without sufficient evidence. It is not know whether the changes which take place upon exposure to ultrasound which was discussed above actually take place in the intact human being. It will be difficult to find out, because the changes which take place at a molecular level are so small and difficult to measure. It is hard to measure minute changes in a test tube and it is infinitely harder to measure molecular changes at a physiological level in a living patient.

In summary, ultrasound is not a specific cure for any specific injury or disease. It is a useful modity that produces the deepest and most useful heat. It is not the miracle that will return anybody to normal in a short period of time but will aid in increasing circulation to an area of injury. The normal healing time is observed to be 14 to 21 days.

There are many cures attributed to and many claims for ultrasound, but the author requests that you study these before you decide they are true. Very little has been documented about ultrasound and that which has is very hard reading. Physics books disclaim medical benefit from ultrasound and medical publications state many great claims for its use.

REFERENCES

1. *Theraputic Heat & Cold*, Second Edition, Sidney Lict, Elizabeth Publisher, Newhaven, Conn., 1965.
2. *Ultrasound Physical, Chemical, and Biological Effects*, El'piner, Issak Efimovich, Consultant Bureau, New York, New York, 1964.
3. *A Manual of Electrotherapy*, Arthur L. Watkins, Lea & Febiger, 1958.
4. *Ultrasonic Techniques in Biology and Medicine*, B. Brown and D. Gordon, Lliffe Books Ltd., 1967.
5. "Patients Treated With Ultrasonic Driven Hydrocortisone and With Ultrasound Along", *Journal of the American Physical Therapy Association*, Vol. 47, Number 7, 1967.
6. "Physiological Effects of Ultrasonic Energy as it is Used Clinically", James E. Griffin, *Journal of the American Physical Therapy Assn.*, Volume 46, Number 1, 1966.
7. "Effect of Intensity of Ultrasound of Conduction of Motor Axons", Wayne C. Farmer, *Journal of the American Physical Therapy Assn.*, Volume 48, Number II, 1968.
8. "Low-Intensity Phonophoresis of Cortisol in Swine", Jas E. Griffin and Joseph C. Touchstone, *Journal of the American Physical Therapy Assn.*, Volume 48, Number 14, 1968.
9. "Report of the Council on Ultra Sonic Energy for Theraputic Purposes", Volume 157, Number 16, PP. 1407, *Journal of the American Medical Assn.*, April, 1955. ■

IF YOU DON'T NOURISH THEM, NOTHING WILL GROW.



The fruit of the human body is the mind. If it's left to lie uncultivated, its contributions wither. Its mechanism falters. And something, somewhere dies.

And that should frighten you.

Because college-trained minds and results of college and university sponsored research have helped make your company what it is today.

And they are your biggest hope for growth tomorrow.

But what if the money runs out?

The bright young college kids you've been counting on will become scarce. More expensive.



And if you think your company can afford to take up the training slack, think about this.

While half the college trained minds that are employed go into business, business contributes only about 15% of the voluntary support given to colleges.

That's a pretty good return on investment.

So protect it. Invest in progress and the future.

Give to the college of your choice.

Advertising contributed for the public good.  

Council for Financial Aid to Education, Inc.
6 East 45th St., New York, N.Y. 10017

NEW... repeat action!

Here's the cold pack
that will work for
you time and
time again



Double Bag Protection

Two sealed plastic bags extend life of pack
protect against leakage.

Exclusive Foam Insulator

...Better directs cold to affected area.
...Prevents against dissipation of cold.
...More comfortable to hold.

Reusable

Special repeat-action feature saves money.

Unique Construction

JOHNSON & JOHNSON now offers you a cold pack that provides instant cold with a simple squeeze of the bag. The pack can be reused as a cold compress by placing it in the freezer compartment for 2 hours or more. It will form into a soft jelly-like pack.

Code # 0740 Packaged 48 per cs. (6 per ctn., 8 ctns. per cs.)



New Brunswick, New Jersey 08903



they call 'em...
**"The Amazing
 Machines"**

ILLE TRAINERS-AID WHIRLPOOLS

It's incredible how often Ille Whirlpools "keep your players in the line-up," and they are unequalled for power and high quality.



STATIONARY UNIT
 Model THM 100-48 (S)

Ille Trainers-Aid Whirlpools are available in two basic model types: STATIONARY UNITS (as illustrated above) and MOBILE UNITS which include two (2) motors. Both basic model types are available with inside tank lengths of 42, 48 or 54 inches.



**ARM PARAFFIN
 BATH — Model PB114**
 For higher heat application, safely thermostatically controlled; double wall stainless steel tank.



**ILLE ELECTRIC
 Corporation**

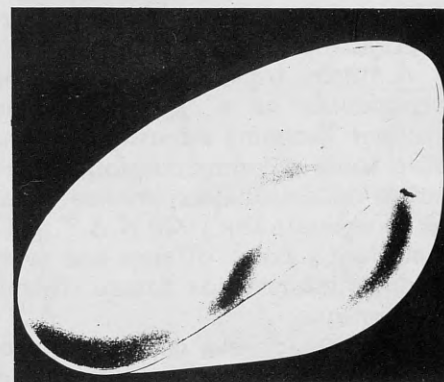
Reach Road,
 Williamsport, Pa. 17701

PIONEERS IN HYDROTHERAPY



MR. TRAINER!

**WE
 CALL
 IT
 YOUR
 AGGRAVATION
 RELIEVER**



M-F HEEL PROTECTORS

- Prevents Bruises, Ankle Sprains, Spurs And Shin Splints
- Protects Against Blisters And Callouses
- Even Allows An Injured Athlete To Compete Safely, Comfortably



This tough unbreakable heel cup will save aggravation and work after the game or meet. Protects against sprains, bruises, ankle twisting; takes the pressure off the achilles tendon and acts as a lift for hamstring strains or pulls.

Best made heel protector — one piece construction forms to the foot like a second skin, fits snugly, tightly, comfortably. Regular and junior sizes (for small builds) available; \$1 each, \$9 dozen, at supply houses.

Write for article containing doctors' findings on use of M-F Heel Protectors.

**M-F ATHLETIC
 COMPANY**

P. O. Box 6632 • Providence, R. I. 02904

STOPS THE ITCH and THE OUCH.

Now Tincture of Benzoin in its most convenient, easiest-to-use form. And the only spray with genuine U.S.P. Tincture of Benzoin Compound. Spray on to condition skin before tape or cast is applied. Lessens chance of dermatitis or infection. Cuts down irritation as tape or cast is removed. Never messy. Never sticky. Dries fast. Economical to use.

East / West
 Of Rockies

12-oz. spray can **\$2.25 2.50**
 Case (twelve 12-oz. cans) **18.50 18.90**



ALCONOX H&L
 TINCTURE of BENZOIN
 COMPOUND U.S.P.
 available through your
 Hospital or Surgical
 Supplier or write:

ALCONOX, INC.

215 Park Avenue South
 New York, N. Y. 10003



THE STUDENT TRAINERS' CORNER

By Ray Baggett
Indiana State University

The title of this column indicates that it will be for and by student trainers. I plan to keep the column flexible and have students write articles, introduce new ideas, express their opinions and give constructive comments. They may choose to express themselves on matters related to the Athletic Training profession or the N.A.T.A. Journal.

A future topic might be to comment on your experiences as a Student Trainer during your Student Teaching semester. I am sure some of you have some recommendations on how to make it a better educational experience. Another topic could be to evaluate the 1973 N.A.T.A. Convention from a student's point of view and to suggest topics of student interest for future district meetings and conventions.

In summary this column will serve as the voice of the Student Trainers expressing their points of view concerning matters related to Athletic Training. OK students. Let me hear from you!

One of the Student Trainers at Indiana State University wrote the following article for the column.

Why An Approved Curriculum?

The N.A.T.A. has established guide lines for the young man or woman to follow in persuing a career in athletic training with the final outcome being that of certification. One of these guide lines is that of completing an approved curriculum, such as the one at Indiana State University in which the author is enrolled. The curriculum is superior academically and much experience and practical knowledge is gained while working on an apprenticeship basis; but how has our position changed with the N.A.T.A.? The student has completed the required courses, worked under certified trainers, had two years of student membership in the N.A.T.A., but still lacks being certified by the fourth requirement; the certification test. Idealistically the student should be well enough prepared that the test would not be required, however, the skill of two men or women can never be exactly alike and there must be a screening device. The certification test may be used, but why couldn't the grade average be used also? If the student's accumulative grade average in athletic training is a B or above, haven't they

proved their worth? Also, if the test is to be given, why can't the University's testing center give the test at that campus? The university trainer could then give the practical test. Approved curriculums are a great asset, why don't we start taking advantage of them?

Pete Koehneke
Student Trainer
Indiana State University
Terre Haute, Indiana 47809

Dear Pete:

You have raised several legitimate questions. I agree with your contention that the N.A.T.A. approved curriculum should provide a superior academic preparation for athletic trainers, and eventually the results of the certification examination should bear this out statistically. You are fortunate to be enrolled in an N.A.T.A. program since your chances of doing well on the examination are greatly enhanced.

In the future, use of the examination for curriculum students should theoretically prove to be of great value to the Professional Education Committee. Comparison of examination results should assist each school in evaluating the relative effectiveness of its educational program and should aid in standardizing the quality of instruction in the various programs throughout the country. For example, if graduates of a certain curriculum were found to be consistently failing in one area (use of therapeutic modalities, for example), the program can then be upgraded in that area. You can see that for these objectives to be possible, superior as well as inferior students must contribute to the examination data at least for the first few years.

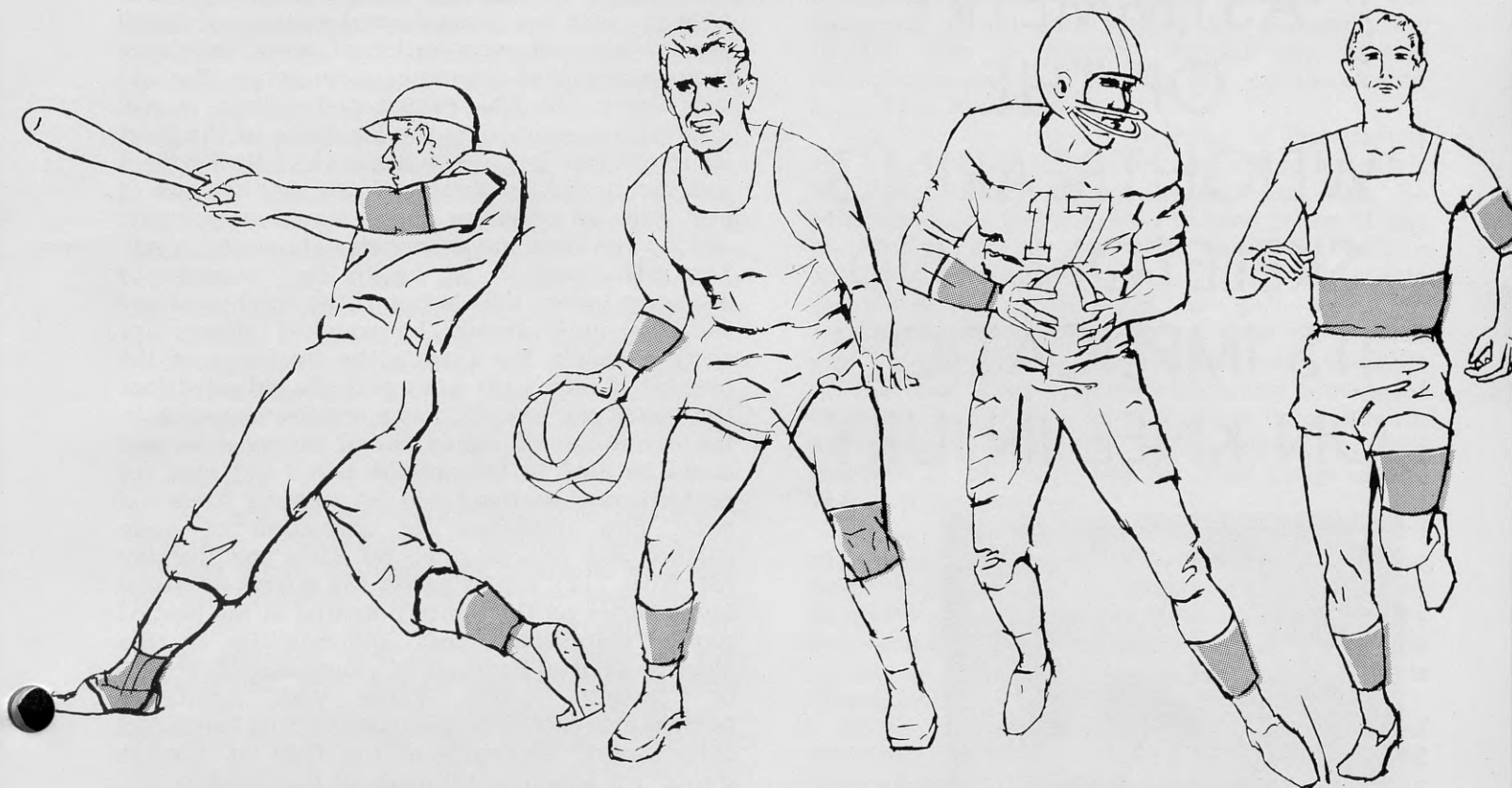
Comparison of curriculum and non-curriculum graduates is also an important reason for requiring all athletic trainers to take the examination. In the long run curriculum graduates should compare very favorably to non-curriculum students and this could lead to the eventual phasing out of certain sections of the Procedures for Certification in favor of the curriculum section. This is another very important reason for requiring all certification candidates to take the examination.

The N.A.T.A. has gone to great lengths to seek professional guidance as to how and where the examination should be administered in order to protect our investment (over \$7,000.00 development cost) in the examination content as well as to assure that all candidates are evaluated fairly and consistently. The Professional Examination Service of New York, New York, has advised us on these matters, and they felt that semi-annual examinations on a regional and national basis were the most secure manner of administration. Even though the university testing center could administer the written examination, the P.E.S. recommended that all practical examinations be administered by examiners who did not know the individual candidate personally so that all bias might be eliminated. We realize that

(con't. on page 86)

THERMAL WRAPS FOR

SHIN SPLINTS
BRUISED OR STRAINED GASTROCNEMIUS
BRUISED KNEES AND UPPER ARMS
BRUISED OR STRAINED QUADS AND HAMSTRINGS
STRAINED ABDOMINAL MUSCLES AND LOW BACK STRAINS



THERMAL WRAPS—A NEW CONCEPT IN THE TREATMENT OF MUSCLE INJURIES

ADAMS THERMAL WRAP PRESENTS A NEW APPROACH TO THE OVERALL **TREATMENT OF MUSCLE STRAINS AND CONTU-SIONS**. KEEPS THE BODY HEAT FROM ESCAPING DUE TO ITS THERMAL PROPERTIES, AND IT FUNCTIONS AS A WRAP BY **SUP-PORTING THE MUSCLE GROUP**. MUSCLES RESPOND BETTER IF CONSTANT HEAT IS APPLIED DURING EXERCISE.

WITH THE ADVENT OF THE THERMAL WRAP, WE ARE ABLE TO APPLY **SUPPORT AND HEAT** TO THE INJURED MUSCLES USING ONE SIMPLE STEP—THE APPLICATION OF A **SLIP-ON THERMAL WRAP**.

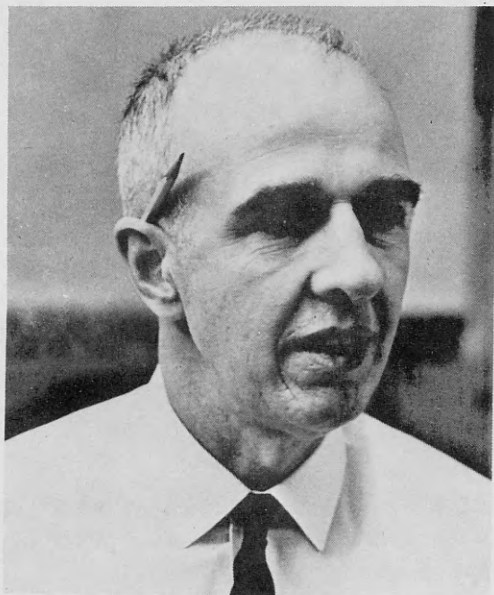
ADAMS THERMAL WRAPS ARE MANUFACTURED FOR THREE SPECIFIC AREAS OF THE BODY: (1) THERMAL ARM WRAPS. (2) THERMAL WAIST WRAPS. (3) THERMAL LEG WRAPS. EACH ONE COMES IN SEVERAL SIZES TO INSURE PROPER FIT.

1. THE WRAP HAS GOOD INSULATION QUALITIES AND MAINTAINS MAXIMUM FLEXIBILITY.
2. THEY ARE SIMPLE TO SLIP ON.
3. THEY GIVE A CONSTANT TREATMENT OF MUSCLE INJURIES DURING EXERCISE BY HOLDING HEAT IN THE AREA AND BY GIVING SUPPORT TO THE AREA.
4. THEY ELIMINATE THE APPLICATION OF LARGE QUANTITIES OF ANALGESIC BALM TO THE SKIN.
5. THEY ELIMINATE THE EVERDAY TAPING OF MUSCLE INJURIES, THEREBY ELIMINATING THE PROBLEM OF TAPE RASH.
6. THEY REDUCE THE TAPING TIME FOR THE TRAINER AND FREE HIM FOR OTHER WORK.

WRITE FOR FREE CATALOG

Adams Plastics, Inc., P. O. Box 489, Cookeville, Tenn. 38501

DEVELOPMENTAL ASYMMETRY OF THE WEIGHTBEARING SKELETON AND ITS IMPLICATION ON KNEE INJURY



Karl K. Klein
Professor
University of Texas, Austin

Karl Klein is a professor of Health, Physical Education and Recreation at the University of Texas at Austin. He is in charge of the Rehabilitation Laboratory. He is an associate member of the National Athletic Trainers Association, a Fellow of the American College of Sports Medicine and the American Corrective Therapy Association. Karl has been at the University of Texas at Austin since 1954.

Major skeletal asymmetries developing during the period of growth may be recognized early in life and may eliminate young people with significant problems from participating in certain sports. Minor asymmetries are rarely recognized unless pain or structural fatigue syndromes call the

problems to the attention of those concerned with the individual's health and welfare. The prevalence of minor asymmetries (short leg syndrome) was pointed out by Pearson (8) in an eight year study of children's growth during the school years. Over that period of time 93 percent of the children x-rayed every two years showed evidence of lateral asymmetries and perpetuation of lateral imbalance in growth with no spontaneous correction. Beal (1) and Green (2) also contributed certain factual information concerning the incidence of the short leg syndrome. Previous to the work of Redler (9) it was mentioned by Strachan (10) that the use of heel lifts on children's shoes should compensate slightly less than the asymmetry shown by x-ray. The differences in leg length may decrease or disappear before the closing of the epiphyseal line and the child should be watched closely for changes calling for altering the thickness of the heel lift. Redler's (9) work strongly indicated that the use of the heel lift was a positive approach to the correction of minor lateral asymmetries and could be used to balance the pelvis and legs, for correcting awkward gait, and for relieving stress and pain. This technique for correction of body balance was reinvestigated by Klein and Buckley (3). Rose (11), reporting on the effects of lateral asymmetries on the injury potential in the field of sports, emphasized that abnormalities in the musculo-skeletal structure of young athletes should be "caught early". Those with significant asymmetries should be discouraged from continued participation, especially in the field of contact sports. An adequate rationale of the problem will be accepted by the sportsman.

But, where do minor lateral asymmetries begin? Reviewed studies (1,2,4,8,9,10) pointed out that the problem is evident in early childhood but stress and pain factors are by-and-large non-existent at the early age levels. Minor asymmetries are not noticed unless a trained observer looks for them specifically. The high posterior iliac spine, high hip, and low shoulder on the same side torquing backward with a slight spinal curvature in the opposite direction are obvious signs. The Adam's test can also be used to provide further evidence of the short leg syndrome. The low posterior iliac spine will be on the side of the short leg. The high side of the back will be on the side of the high posterior iliac spine if the curve is functional.

In the erect standing position, placement of the heel wedge under the short leg side will level the posterior spines, and will straighten as well as derotate the functional lateral spinal curve. On the forward bending it will maintain the level of the iliac and have a similar effect on the back. If lateral correction is made with a wedge a positive effect should result on the redevelopment of the symmetry of movement.

In observing gait patterns of people with lateral asymmetry, abnormalities may be noted in the movement of the leg, ankle and foot. Common observations are the "toeing outward" of the foot

on the short leg side, an ankle pronation as the foot is placed on the ground as well and a valgus knee position as the leg is carried forward. On the opposite side the knee and the foot will be carried straight forward toward the foot's contact with the ground. These observations will be fairly consistant.

It may be surmised that there is a neurological basis for this action in that, as the short leg swings forward the toe will automatically point outward to balance the abnormal lateral sway of the body when the weight is shifted to the short leg side. A slight foot supination, ankle pronation and valgus knee commonly accompan this body action.

Having observed this lateral imbalance anomaly for a number of years in our work involving knee problems a program of measuring to the incidence of knee injury. Data were collected from the majority of cases coming to the Rehabilitation Laboratory for specific exercise programming.

Measurement procedures for determining the body asymmetry known as the "short leg syndrome" have been described in the literature (4).

Procedures:

During a five year period data were collected on 200 cases, college age level, 165 post operative and 35 post injury. Standing measurements were made of the posterior iliac spines for symmetry or asymmetry, the general lateral curvature of the spine and the position of the shoulder were determined. The Adam's test (forward bending) was used as a part of the evaluation procedures to validate the standing test findings. Calibrated blocks, ranging from 1/4 to 1 inch were used as a heel wedge for determining the exact amount of lateral imbalance and amount of lift necessary to level the posterior iliac spines in both test positions.

Results:

The yearly data evaluation revealed a consistant pattern of injury relationship to the short leg syndrome injury, i.e., 82.2%, 80.7%, 83% and 82% of the cases studied each year.

Table I illustrates the composite findings for the 200 cases evaluated.

Table I

Knee Injury Relationship to the Short Leg Syndrome-200 Cases

Short Leg				Base Level				Long Leg				
Post op.		Post injury		Post op.		Post injury		Post op.		Post injury		
R	L	R	L		R	L	R	L	R	L	R	L
61	69	11	22	4(Po.L.)	19	12	0		2			
130 (65%)				33 (16.5%)	4(2%)	31 (15.5%)	2 (1%)					
P.O. +												
P. Inj. 163 (81.5%) + 4 (2%) + 33 (16.5%) = 200												

Mean Lateral Imbalance to short side	3 in.	Mean Lateral Imbalance to long side	2.8 in
	8		8

Discussion:

In the problem of knee injury it has to be recognized that there are known anatomical and mechanical causes: significant looseness of the ligaments of the knee during the teenage years (14-16) due to puberty changes (5), muscle strength imbalance of the legs (6), and the cleated heel of the football shoe (7).

Based on the evidence presented in this study it can be projected that asymmetries within the pelvis and legs (short leg syndrome) can also be considered as a factor related to knee injury. It was previously pointed out that there are certain anatomical anomalies (valgus knee and ankle pronation, etc.) as well as deficiencies in mechanical function (toeing outward movement) on the short leg side. These factors make the knee on that side more vulnerable to injury because of the basic mechanisms of injury have been put into motion: inward rotation of the femur, outward rotation of the tibia, and the knee inside of the foot in weight bearing.

As to the correction of the toeing outward movement pattern: without correction of the lateral pelvis and leg asymmetry, it seems to be an impossible accomplishment despite the individual's concentrated effort. But with mechanical balancing of the pelvis and legs the ambulation deficiency is almost self-correcting; concentration does assist.

If the evidence presented within the scope of this study has any significance to the incidence of knee injury, then coaches, trainer, team and family physicians as well as pediatricians should become more concerned with this problem of lateral imbalance and its implications. Through preventive concepts as expressed by Rose (11) and corrective procedures such as use of the heel lift technique, as well as specific movement training knee injuries as a consequence of skeletal asymmetry could be reduced.

REFERENCES

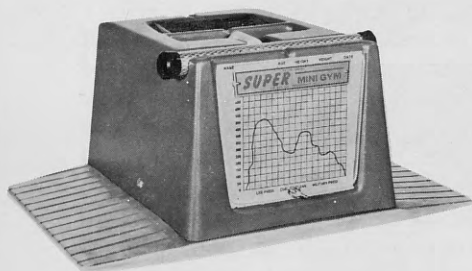
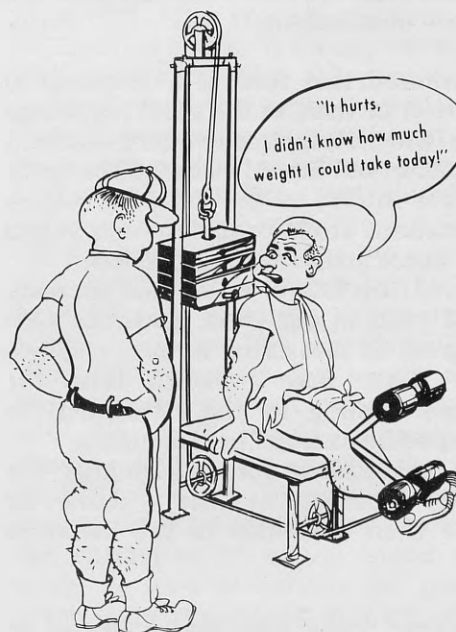
1. Beale, M.C., "A Review of the Short Leg Problem", *J. Am. Osteo. Assoc.*, XLI:5, 1954.
2. Green, W.T., "Discrepancy in the Leg Length of the Lower Extremities". *Am. Academy of Ortho. Surgeons Instructional Course Lectures VIII*, (J.W. Edwards Co. Ann Arbor, Mich., 1951).
3. Klein, K.K. and J.C. Buckley, "Asymmetries of Growth in the Pelvis and Legs of Growing Children-Summation of a three year study 1964-1967", *Am. Corr. Therapy J.*, 22:2:53, 1968.
4. Klein, K.K. and J.C. Buckley, "Asymmetries of Growth in the Pelvis and Legs of Growing Children, A Clinical and

(con't. on page 86)

ISOKINETICS *As Opposed to Fixed Weights.*

MR. TRAINER,

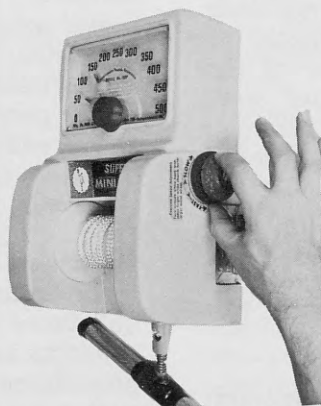
you need not ever worry what amount of resistance your athlete can take today. With the Mini-Gym Isokinetic resistance, the athlete makes his own resistance proportionate to the amount of effort he exerts; thereby, he gets maximum resistance at every angle of the range as he safely fatigues his muscles. There is no exerciser tension to set or research has proven Isokinetics resistance can rehabilitate injuries quicker and in less time than other methods heretofore used. More strength can be developed in a safe and reliable method of controlling the speed of exercises. The resistance varies as ones strength varies always adjusting to one fatiguing factor safely. All units have adjustable speed knobs that allows the trainer to adjust the speed of exercise he wishes his athlete s to exercise.



ACHIEVER MODEL

Model #300A — measures to 435 lbs.

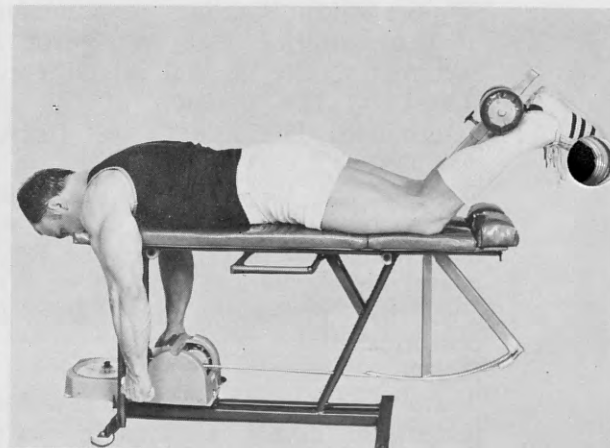
The Isokinetic Achiever model with its pen marking mechanism provides a continuous graph tracing of the user's strength over a range of motion, measuring muscle performance with great accuracy. The paper graphs are easily inserted and may be retained for permanent record, yet may be reinserted and new tracings made with different colored pens for comparison. The recoil mechanism makes possible quick reptitious exercises. There is no setting or releasing of tension.



SUPER MINI-GYM

Model #180

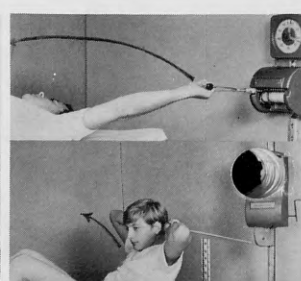
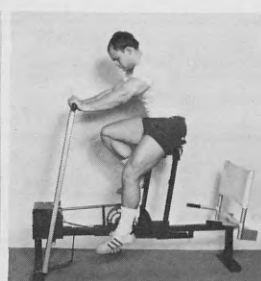
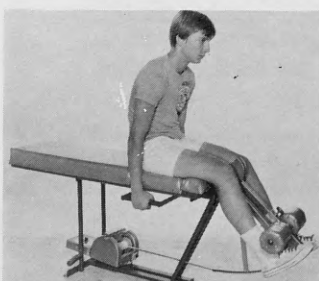
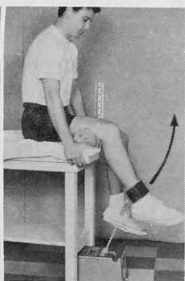
A very small Isokinetic unit that wall mounts or will sit on floor for upward pulls. The resistance accommodates to the impaired part of the body because it is only equal to the force capacity of that injured area. This unique resistance is accomplished with a controlled speed braking mechanism that allows the patient to exert maximum effort, yet at the same time, can never exert what he is able to do at that specified angle, with that specific repetition.



HAMSTRING AND QUAD

Model #15

Both an exerciser and diagnostic unit. You can **chart leg strength** of your complete team in a few minutes. . .By inserting the Mini-Gym Achiever Model and make a paper graph chart that reveals where an athlete might be injury-prone. This paper graph can determine leg imbalance or the ratio of hamstring strength to quadricep strength. This chart is retained and in the event the athlete is injured, a record is available when the athlete is rehabilitating. A new chart will tell you when he can resume field activities.



INTRODUCING A NEW LINE OF TRAINING ROOM AIDS

ECONOWRAP PRETAPE UNDERWRAP



REGULAR PACK
CODE 1001

3 INCH x 30 YARDS FOAM
50 ROLLS PER CASE
PRICE.....\$25.00 PER CASE



NEW GAME PACK
CODE 1003

3 INCH x 30 YARDS FOAM
12 ROLLS PER CASE
PRICE.....\$8.00 PER CASE

ECONO HEEL AND LACE PADS



REGULAR PACK
CODE 1002


3 INCH x 4 INCH x 1/8 INCH FOAM
1000 PADS
PRICE.....\$10.00 PER CASE



NEW GAME PACK
CODE 1004

3 INCH x 4 INCH x 1/8 INCH FOAM
300 PADS
PRICE.....\$5.00 PER CASE

- ORDERS SHIPPED SAME DAY RECEIVED
- ECONOLINE PAYS ALL SHIPPING CHARGES
- ALL PRODUCTS THOROUGHLY TESTED,
- ATHLETE AND TRAINER APPROVED
- ORDERS FOR FUTURE DELIVERY APPRECIATED
- PRICES EFFECTIVE APRIL 1, 1973

 ECONOLINE PRODUCTS, INC.
POST OFFICE BOX 201
DAVIDSON, NORTH CAROLINA 28036
PHONE 704 - 892-1516

P O T P O U R I

TENNIS ELBOW

Dr. Robert Nirachl of Arlington, Va. says that lack of forearm muscle strength is a primary cause of injury to these muscles when playing tennis. He states that there is a tremendous strain placed on the forearm musculature particularly while hitting a backhand and even more particularly while hitting a backhand poorly. Dr. Nirschl commented further that world class tennis players average 11 3/4 inches around their forearm as compared to 11 1/8 inches for the average male player and 9 3/8 inches for the average female player. Also grip power is 105 pounds for the star, but averages only 80 and 50 pounds respectively for the male and female weekend enthusiasts. "Despite this disparity in muscle mass and power," says Dr. Nirschl, "all players tend to use the same size and weight racket."

PREVENTIVE EXERCISE

VS. CONDITIONING EXERCISE

A physical therapist named Joseph Zohar has stated that athletes need to exercise all the muscles being used on a prevention basis rather than conditioning by doing only the activity that the athlete is trained for. A pitcher that conditions himself by throwing does not do himself justice. If there is weakness in any muscle concerned with the throwing pattern then he is vulnerable to injury.

Dr. Sheehan brought in the analogy of how dangerous basketball is for the football players, baseball players, and track performers. They pull so many muscles in off season basketball that many coaches forbid it as an off season activity. Yet, why don't more basketball players have injuries of that nature? Dr. Sheehan believes it is because basketball conditions all the muscles and players are therefore prepared to withstand the rigors of the activity.

Flexibility, strength, and endurance are the necessary components for all muscle groups to effectively compete in highly competitive athletic programs. Preventative exercises working toward those goals will do for more to prevent injuries than other forms of treatment can do to cure them, according to Zohar.

HORSESHOE KIDNEY

Several consultant and members of the AMA Committee on the Medical Aspects of Sports made

this statement regarding contact sports and athletes with the horseshoe kidney.

"The horseshoe kidney is joined across the midline and being in the pelvic area makes it more liable to injury than if it were in its normal position high in the abdomen. Our feeling is that this boy should not participate in contact sports such as football."

It should be emphasized that parents, physicians, and schools should unite to guide this youth into competitive athletics that do not involve contact. In that way he can derive the benefits of sport without undue risk.

DRUG VALUE

The chairman of the U.S. Olympic Medical and Training Services Committee said that in his 30 years of experience with athletes he has yet to find a proven case of athletic superiority arising out of the use of dope. Testing for the presence of drugs is done by a urine sampling immediately after the athletic event.

DAIRY POLYUNSATURATED FATS

Believe it or not Australian scientists have found a product, a powder made from milk protein and polyunsaturated fat, which prevents the bacteria in a cow's stomach from producing saturated fat. Diets high in polyunsaturated fats have been credited with preventing or lessening the effects of heart disease. Reports have indicated that when this substance is fed to dairy cattle in the amounts of two pounds per day, those animals produce butter with a higher content of unsaturated fats than polyunsaturated margarines currently on the market. To be of value the method must produce a significant change in the animal's ration of saturated/polyunsaturated fats.

STRESS AND INFECTIOUS MONONUCLEOSIS

Consideration must be given to the almost epidemic occurrence of Infectious Mononucleosis in athletes with excessive training. While mononucleosis is not supposed to recur, frank recurrences are fairly frequent and symptoms similar to the original problems are often reported by athletes under stress. The signs and symptoms of "staliness" (fatigue, rash, swollen glands, joint pains, poor attention span, sleep disturbances, loss of appetite) paralleled remarkably to those of mononucleosis.

NOW THERE'S A TOTALLY NEW STRAPPING TAPE THAT'S BETTER THAN ANYTHING YOU'VE EVER USED



New Arno super tape with exclusive Z-57 adhesive... a stronger tape that holds better, resists tearing and stretching and is easier to work with.

That's a strong statement... and this new Arno tape can back up every word of it. It's a better tape. There's a much higher thread count in the fabric to provide greater tensile strength and help eliminate tearing and stretching. New Z-57 high-tack adhesive stays put and reduces creeping and wrinkles. You'll also be pleasantly surprised at how evenly it unwinds from start to core.

Arno Super Tape, with Z-57 adhesive, was developed and tested in conjunction with the Arno advisory staff of professional trainers. It has already proven itself.

Try it yourself. Write for free sample.

Arno

Arno Adhesive Tapes, Inc.

the
once
both
es a
may
be
e in
foot
extra
s an
knee
start

teeth
bles'
the
and
great
e of
the
the
teeth

pirin
g of
It is
use
inal
ally
life
now

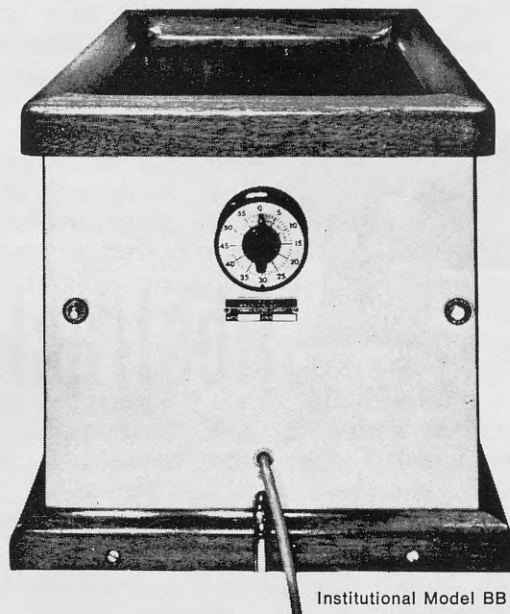
nach
and
the
ly it
astic
inst

o its
that
his

the
alth
Heel
illes
even
or

rote
over
the
The
ack
ept -
"

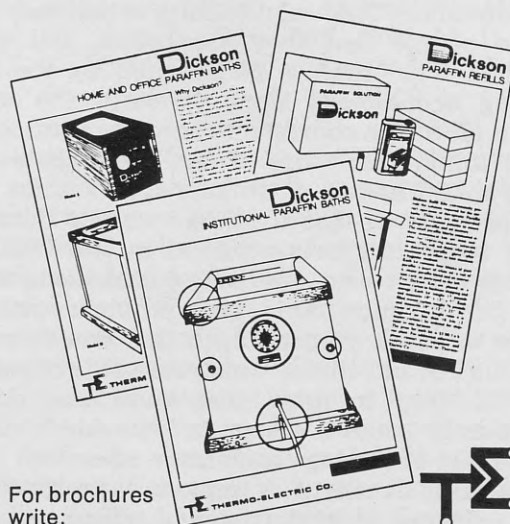
Dickson



Institutional Model BB

For the Professional

Since 1924
The finest instruments
for
paraffin therapy



For brochures
write:

THERMO-ELECTRIC CO.

1948 Columbus Road, Cleveland, Ohio 44113
(216) 241-6762



POTPOU

TENNIS ELBOW

Dr. Robert Nirachl of Arlington, Va. says that lack of forearm muscle strength is a primary cause of injury to these muscles when playing tennis. He states that there is a tremendous strain placed on the forearm musculature particularly while hitting a backhand and even more particularly while hitting a backhand poorly. Dr. Nirschl commented further that world class tennis players average 11 3/4 inches around their forearm as compared to 11 1/8 inches for the average male player and 9 3/8 inches for the average female player. Also grip power is 105 pounds for the star, but averages only 80 and 50 pounds respectively for the male and female weekend enthusiasts. "Despite this disparity in muscle mass and power," says Dr. Nirschl, "all players tend to use the same size and weight racket."

PREVENTIVE EXERCISE VS. CONDITIONING EXERCISE

A physical therapist named Joseph Zohar has stated that athletes need to exercise all the muscles being used on a prevention basis rather than conditioning by doing only the activity that the athlete is trained for. A pitcher that conditions himself by throwing does not do himself justice. If there is weakness in any muscle concerned with the throwing pattern then he is vulnerable to injury.

Dr. Sheehan brought in the analogy of how dangerous basketball is for the football players, baseball players, and track performers. They pull so many muscles in off season basketball that many coaches forbid it as an off season activity. Yet, why don't more basketball players have injuries of that nature? Dr. Sheehan believes it is because basketball conditions all the muscles and players are therefore prepared to withstand the rigors of the activity.

Flexibility, strength, and endurance are the necessary components for all muscle groups to effectively compete in highly competitive athletic programs. Preventative exercises working toward those goals will do for more to prevent injuries than other forms of treatment can do to cure them, according to Zohar.

HORSESHOE KIDNEY

Several consultant and members of the AMA Committee on the Medical Aspects of Sports made

this
with
"cr
midl
liabl
posit
this
such
It
phys
yout
invo
bene

Th
Trai
year
a pr
the
done
athl

Be
a pr
poly
a co
Diet
credi
heart
this
of t
but
than
mark
signi
satur

STR
Co
epid
athle
mon
recu
simil
by a
of "
pain
of a
mon

ONLY ARNO GIVES YOU THIS PROFESSIONAL CHOICE FOR FOOT AND LEG PROTECTION



Arno not only gives you a better product, they also give you a better choice of specialized aids for foot and leg protection. Arno doesn't make everything, or even try to. But what they do make does the job. They make sure of that by testing and evaluating every new product through a staff of professional trainer-advisors. New Arno Super Strapping Tape, with Z-57 adhesive, is just one of many examples. Whether it's insoles, foot powder, knee and ankle supports, underwraps, moleskin, tape, or a chemical cold pack, you'll find Arno has only one grade of quality. And it's totally professional.

Write for our catalog.

Arno®

Arno Adhesive Tapes, Inc.
Michigan City, Indiana 46360

ANKLE-KNEE STRENGTHENING DEVICE

A simple, but effective method of exercising the knee and ankle can be done by using a 46 ounce can and a brick. Open the 46 ounce can at both ends with a modern can opener. This produces a cylinder with safely bevelled edges. The can may be distorted into an oval so that the brick may be forced into one end. The patient places his shoe in the other end of the can. Rotating the foot through its entire range of motion with this extra weight 5 to 20 times daily was recommended as an effective method for strengthening the ankle. Knee extensions with this weight can at last be a start toward knee resistive exercise.

WHAT A GRIND!

The nervous habit of grinding and gnashing teeth may be a contributing factor to many peoples' aches and pains. Research has related pain in the area of the ears, face, jaw, eyes, throat, neck, and head to gnashing teeth. Pain often has been great enough to interfere with sleep and work. Some of the problem may be due to misalignment of the jaws or teeth, but researchers feel that the unconscious, nervous grinding of the teeth contribute a great deal to these discomforts.

"TROJAN HORSE"

Dr. Richard Farr, an allergist, referred to aspirin as a "Trojan Horse" at the 26th annual meeting of the American Academy of Allergy. He said "It is not unreasonable to look at the indiscriminate use of aspirin as a medicinal pollutant - a medicinal pollutant that has become a medically unsupervised, 13 million pound a year way of life for an uninformed population that doesn't know that aspirin can be dangerous."

Although most of aspirin's side effects (stomach upset, gastro-intestinal bleeding, and allergic reactions) are minor when compared to the good it does, Dr. Farr pointed out that recently it has been found that aspirin can cause aplastic anemia. It appeared that Dr. Farr was not against aspirin, but against indiscriminate use.

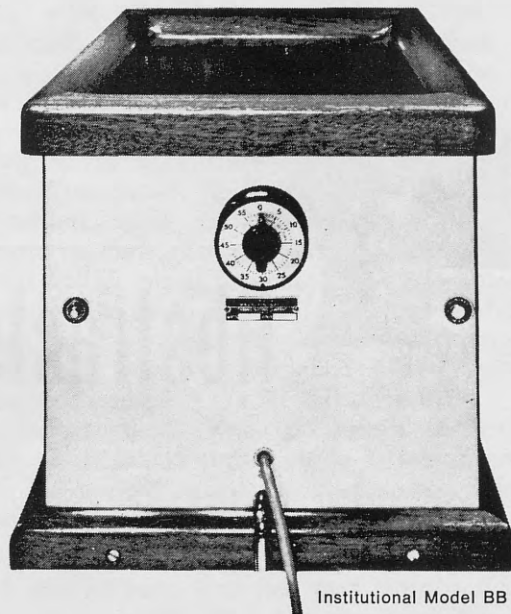
"X" FACTOR IN SPORTS MEDICINE

The foundations of any structure is vital to its endurance. It has been suggested many times that for an athlete to endure the rigors of his sport his feet must be sound.

Dr. George Sheehan is now reemphasizing the importance of well balanced foot strength to health of the lower half of the athlete's anatomy. Heel spurs, metatarsalgia, shin splints, achilles tendonitis, gastroc strains, knee problems, and even low back pain can be the result of weak or imbalanced feet.

In *Runner's World Magazine* Dr. Sheehan wrote an article discussing the victory of Tom Bache over chondromalacia. Foot imbalance seemed to be the key factor in this case. As Dr. Sheehan said, "The foot as a major cause of leg, knee, and back problems is too much for most doctors to accept - but it is true and needs to be hammered home."

Dickson

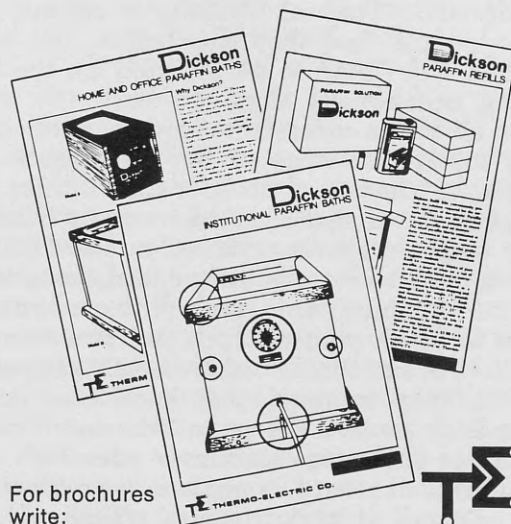


Institutional Model BB

For the Professional

Since 1924

The finest instruments
for
paraffin therapy



For brochures
write:

THERMO-ELECTRIC CO.

1948 Columbus Road, Cleveland, Ohio 44113
(216) 241-6762



Abstracts

"Drugs and the Athlete," Cooper, Donald L., M. D., *Journal of the American Medical Association* 221: 1007-1011, August 28, 1972.

"Normal" is the best there is. Drugs of any type should only be used in disease, deficiency, or injury states. Any other use of drugs is only a form of internal pollution, and there is no valid evidence that any drug ever improved any athlete's performance. The real difficulty is that many drugs make people feel they are better, but it is an illusion. The myth is perpetuated by the limited testing occasionally done on only the winners. When all of the contestants have been tested, it has been found that more of the losers dabble in the drug area. The use of drugs in sports is not new. It has been stated that the first *recorded* death from drug usage in sports occurred in the 1890's in a British cyclist who was using ephedrine to improve his performance. One real problem with using drugs to psych yourself up is that you do not have the control and timing over yourself that you need. Let us keep in mind that knowledge does not necessarily cause a change in behavior. This seems to be one of the big problems in education on drug abuse. One excellent example is cigarette smoking. The evidence of its detrimental effects on health is overwhelming, and most people are fully aware of it; yet, cigarette sales seem to show that knowledge has not had a great effect on changing behavior. It may be that we need to improve health education programs in our grade schools during the formative years rather than try to educate teen-agers and adults. Let us hope that all who came in contact

with young athletes will do everything in their power to influence these young people to remember that hard work, self-discipline, practice, and sacrifice are necessary for success in athletics. Chemical shortcuts are not a substitute, and many possible adverse results await those trying to improve chemically that which cannot be improved, namely normalcy.

John Wells

"Achilles Tendon Tenosynovitis in Long Distance Runners", Snook, George A.; *Medicine and Science in Sports*, Vol. 4, No. 3, 155-158, Fall, 1972.

The author cited four cases of long distance runners who's careers in intercollegiate running had been cut short due to pain in the heel cord while running. The four all had common aspects of running on hard surfaces, no pain or limping when walking, and failure of conservative treatments to stop the pain. One subject was forced to end his long distance running for his college career.

The other three subjects underwent tenolysis of the achilles tendon. In each case, the tendon sheath was slit longitudinally and fibrous adhesions were found between the tendon and the sheath. The adhesions were cut, the sheath left open, and only skin and subcutaneous tissue closed. After removal of the sutures, each subject was allowed to begin running as soon as they wished. No post operative immobilization or rehabilitation exercises were used. Pain did not recur and all were able to continue competition.

Greg Vergamini

"Anabolic Steroids: The Physiological Effects of Placebos," Ariel, Gideon; and Saville, William, *Medicine and Science in Sports* 4: 124-126, Summer, 1972.

This study is one of three in an investigation of the short and long term effects of an anabolic steroid (Dianabol) upon human performance. In the present study, 15 male varsity athletes were used. All 15 volunteers had experienced two years of hard weight training, five days a week, reduced to twice a week during vacation periods. For a period of four months prior to the actual experimental period all subjects trained for five days and were tested on the following day in the seated, military, and bench presses, in the curl and squats. A standard warm-up procedure was performed after which each test consisted of a maximal lift. Eight subjects were selected randomly from the initial 15 volunteers. After the pre-experimental period the eight selected subjects were tested for maximal strength in the aforementioned exercises. The university health service ran screening tests appropriate for the other two phases of these experiments and excluded two of the subjects. The remaining six subjects were given placebo pills and a protein dietary

supplement daily with the information they contained 10mg Dianabol, an oral anabolic steroid. Data were collected for seven weeks of the pre-placebo period (PP), and for four weeks of the placebo period (P). During the P period no dietary supplements were administered. When the total progress in all four exercises for the two periods was tested, the subjects had a significant improvement (.01 level) during both periods. When these gains were compared, a significant difference was evident in favor of the P period (.01 level). With the exception of the sitting press exercise, greater gains were made during the placebo period and these gains were statistically significant. With this demonstration of psychological enhancement of human performance, investigators must be cautious when assessing the effects of supplemental treatments on performance.

John Wells

"The Effect of Anabolic Steroids on Reflex Components," Ariel, Gideon; and Saville, William, *Medicine and Science in Sports* 4: 120-123, Summer, 1972.

The purpose of this study was to investigate the effect of anabolic steroid upon the nervous system by measuring the various reflex components of the knee jerk reflex. Six male university students, aged 18-22 years, served as subjects. The experiments were conducted weekly on two successive days during an eight week period. All subjects were varsity athletes who had experienced two years of weight training. For four months prior to the beginning of the experimental period all the subjects trained for five days and performed test trials on the sixth and seventh days. This procedure was followed for the eight week study period. During the second, third, and fourth weeks of the study all subjects were given placebo pills daily with the information they contained 10mg Dianabol (Methandrostenolone), an oral anabolic steroid. From the fourth to the eighth week a double blind technique was used. Three of the subjects received 10mg of the oral anabolic steroid and the remaining three subjects continued to receive the placebo. Total patellar reflex latency of 11.21 per cent changed to 19.74 per cent during the anabolic steroid period; the motor time component decreased from 88.79 per cent to 80.26 per cent of the total reflex time during the same period. These changes in the motor time of 108.28 ms was reduced to 66.33 ms for the experimental group. The anabolic steroid had a significant effect upon the reflex components of the knee jerk reflex.

John Wells

"Contribution for Design and Construction of Football Helmets to the Occurrence of Injuries", Robey, James M., *Medicine and Science in Sports* Vol. 4: 170-174, Fall, 1972.

Over a three year period, injuries of high school football players in North Carolina were studied. The focus of the investigation was the relationship of the football helmet to the occurrence of injury. Three different helmet classifications; ie, (1) full suspension; (2) combination padded-suspension; and (3) padded, were compared, with regards to head injuries (grade 2 and 3 concussions). The helmets were classified also as to "fit" and "condition". Comparisons of injury rates were made only within helmet types, and *not between* helmet types. Although only a few significant differences were obtained, it appeared that (1) with regard to condition, more injuries occurred with poor condition helmets for the combination and padded type of helmet than the good condition helmets. For suspension helmets, there appeared to be no differences due to condition of the helmet. (2) With regard to fit, one trend was apparent for the combination and padded helmets - helmets that were too small resulted in more concussions than all other fit classifications.

Additional data was presented concerning injuries to football participants other than the wearer. 29% of all injuries seemed to be caused by helmets (*It seems it would be difficult to truly state that injuries from helmet contact are the result of the helmet, and not just simply the collision*). The average days lost for helmet injuries (6 days) was higher than other injury day loss (3.2 days). The helmet injuries occurred most frequently in the upper extremities and the ribs. It was recommended that helmets be padded to prevent injuries.

G. L. Graham

"The Effect of the Menstrual Cycle on Tests of Physical Fitness." Wearing, Morris P., M. D.; Yuhosz, M. D. Ph. D.; Campbell, Rob, M. D.; and Love, E. J., M. D., *Journal of Sports Medicine and Physical Fitness* March, 1972, pp 38-40.

The purpose of this study was to determine the effect of the menstrual cycle on selected tests on physical fitness. All the subjects (N was not reported) were volunteers and members of either the Intercollegiate basketball or volleyball teams at the University of Western Ontario. After recording their menstrual history for a period of four weeks, each subject was asked to record their body weight and to complete each of seven selected tests of physical fitness twice weekly for a period of six weeks. The tests used were Stationary-Steadiness Total body reaction time, Alternate hand-wall toss, Hip flexibility, Hip strength-flexion, Hip strength-extension, and Standing broad jump. On completion of the tests of physical fitness, each subject was asked to continue her record of menstrual cycles for another four weeks, then the menstrual history was correlated (correlation technique not reported) with the results of the tests. For the purpose of this study, the menstrual

cycle for each subject was divided as follows: 1) Menstruation, 2) Post menstrual phase, 3) Intermenstrual phase, and 4) Premenstrual phase. The mean value for each of the tests of physical fitness was calculated for each subject for each menstrual phase. It was then possible to compare the mean values for each test of physical fitness for each menstrual phase using an analysis of variance (which ANOVA not reported). To determine the effects of learning on the tests of physical fitness, the mean value for each test has been compared from the first day of testing until the last day of testing by analysis of variance (which ANOVA not reported). Although there were statistically significant relationships (level of significance not reported) between test sequence and some of the tests of physical fitness, it seems unlikely that this was sufficient to account for the relationships between menstrual phase and the test of physical fitness. This study indicates that the female athlete could expect her poorest performance during the menstrual period and her best performance during the intermenstrual phase.

John Wells

"The Role of Physical Education in Preventive Medicine," Bosco, James S., *American Corrective Therapy Journal* 25: 97-98, July-August, 1971.

Physical education has shown that it can improve specific physical fitness components such as strength, balance, agility, flexibility, power, muscular and cardiovascular endurance, but this is quite a different matter than proving that physical education has prevented medicine, that is, that somehow by improving these fitnesses, it has mitigated against future medical treatment in an individual. All one needs to do is visit a typical athletic training room and he might conclude that physical education actually contributes to medical treatment rather than preventing. Research findings regarding the relationship of exercise to health have given new dimensions to the work of the physical educator. It has long been suspected that a positive relationship existed between exercise and health, but when pressed for proof, the profession had been unable to produce it. The evidence is now mounting and has increased greatly the possible significance of physical education to the health and welfare of future populations. Medical and health scientists, social economists and physical educators seem strangely unaware of the fact that for years, effective mass prevention has been practiced systematically and successfully on a large scale in such countries as Austria, East and West Germany, and the Soviet Union. These programs send workers to mountain or beach resorts for one to three weeks, under medical supervision, all at the expense of the individual's insurance company. In the United States, prevention through exercise has been practiced largely as the academic level, if at all. The physical education profession, particularly that segment of

it associated with educational institutions continues to devote a tremendous amount of its energies and resources to the production of a few "super beings" that is, champion athletes, rather than the hum-drum concept of physical fitness and development and health maintenance of people in general. Greater emphasis by the physical education profession of the physical fitness of the general public, combined with the medical profession's increasing willingness to include degenerative diseases as well as contagious diseases under the umbrella of preventive medicine, are bound to improve the future functional health of the nation's citizenry and, therefore, truly prevent medicine.

John Wells

"The Effects of Exercise on the Coronary Collateral Circulation," Deneberg, Doralee L., *Journal of Sports Medicine and Physical Fitness* 12: 76-81, June, 1972.

This study was designed to investigate the effects of exercise upon myocardial circulation in the rat. The investigator wished to study the minimum amount of training that would produce an optimal level of stress which would thus evoke a maximum amount of vascularization to the myocardium. Two age groups, adolescents and adults, were used in order to consider normal growth patterns. Finally, how two age groups, when interacting with levels of exercise, exert a combined influence upon the myocardial circulation. Twenty Sprague-Dawley rats in each of two age groups were all progressively pre-trained over a period of two weeks. Just prior to the actual five week experiment, the animals in each group were randomly assigned to groups: six were assigned as controls with no exercise and seven rats to five days a week and seven rats to three days a week exercise groups. The "terminal weight" was determined after the fifth week of exercise. The adolescent rats in the five days a week group did not show any hypertrophy as compared with their controls. However, the ratio of coronary cast weight to heart weight was increased over the control group. In the adolescent group exercised three days a week no hypertrophy was shown. However, the heart to body ratio was slightly higher than was the control value. In the adult three day a week group, the heart weight was less than for the control group, yet because terminal body weight was less than half for the controls, the heart to body ratio was twice as large as that for the controls. A two way analysis of variance was applied for each of the four dependent variables. None gave a significant F ratio at the .05 level. The tests in this study did show a large significant difference of collateral growth relative to heart size between the adults exercising three days a week and their control group.

John Wells ■

for PROTECTION. SUPPORT·COMPRESSION

THE TRAINERS' FIRST CHOICE FOR PRE-GAME AND PRE-PRACTICE STRAPPING
TO HELP AVOID INJURIES TO ATHLETES

Elastoplast® "AT"
THE DEPENDABLE ORIGINAL E-L-A-S-T-I-C ADHESIVE · ATHLETIC TAPE

ELASTOPLAST "AT" Athletic Elastic Adhesive Tape adheres firmly...

Has Superior Stretch—from 3 yards slack to approx. 5½ yards—and unexcelled Contraction...

Assures players freedom of action.

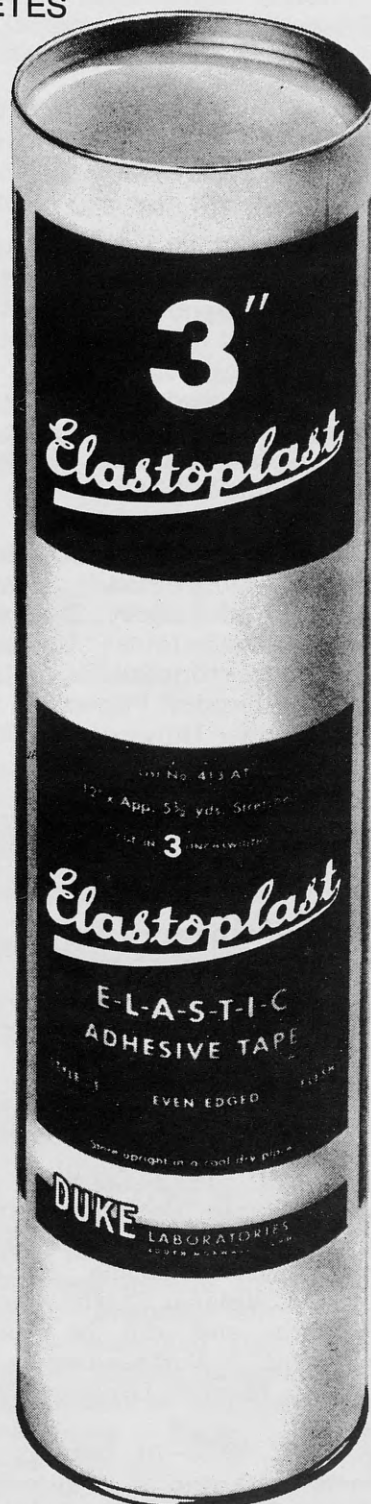
ELASTOPLAST TAPE TUBE PACKING

12" x 5½ yards (stretched)

Order Numbers:

410-AT	12 rolls	1" cut
411-AT	8 rolls	1½" cut
412-AT	6 rolls	2" cut
413-AT	4 rolls	3" cut
414-AT	3 rolls	4" cut

Case lots of 12 tubes of same cut available at institutional discount.



DUKE

LABORATORIES, INC.
SOUTH NORWALK, CONN., U. S. A.

ELASTOPLAST—MADE IN U.S.A.—THE ORIGINAL E-L-A-S-T-I-C ADHESIVE TAPE AND UNIT DRESSINGS

MAY 1973						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

CALENDAR OF COMING EVENTS

AUGUST 1973						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

May 4-5, 1973—The Third Annual East Carolina University Sports Medicine Conference will be held in Minges Coliseum and Allied Health Building at East Carolina University, Greenville, North Carolina. The Conference is for high school coaches and student trainers. Details can be obtained from Rod Compton, Sports Medicine Division, East Carolina University, Greenville, North Carolina 27834.

May 4-5, 1973—The Fourth Annual Sports Medicine Symposium, sponsored by the Department of Surgery, Division of Orthopaedic Surgery, Georgetown University School of Medicine, in cooperation with the President's Council on Physical Fitness and Sports will be held at Georgetown University, 3900 Reservoir Road, Washington, D. C.

For further information or registration brochures, call 703-893-3232 or write P.M. Palumbo, Jr., M.D., Chairman, 8027 Leesburg Pike, McLean, Virginia 22101.

June 24-30, 1973—The Annual Conference of the American Physical Therapy Association will be held this year at the Shamrock-Hilton Hotel in Houston, Texas. For more information contact Royce P. Noland, American Physical Therapy Association, 1156 15th Street Northwest, Washington, D.C. 20005.

June 24-27, 1973—Cramers and Northeastern Louisiana State University are co-sponsoring a Student Trainers Workshop at the campus of Northeastern Louisiana State University in Monroe, Louisiana. Charlie Martin is in charge of the course and can be reached at Athletic Department, Northeastern Louisiana State University, Monroe, Louisiana 71201.

July 8-10, 1973—Al Hart is giving a Student Trainers Workshop in conjunction with Cramer's Chemical Co. For further information contact Al

Hart, Ohio State University, Columbus, Ohio 43210.

May 7-9, 1973—The Olympic Hotel in Seattle, Washington, will be the scene of the Annual Meeting of the American College of Sports Medicine. For further information contact Donald E. Herrmann, Executive Secretary, American College of Sports Medicine, 1440 Monroe Street, Madison, Wisconsin 53706.

May 25-27, 1973—"Water Sports Injuries" is the name of an American Academy of Orthopaedic Surgeons sponsored clinic in Miami Beach, Florida. The course chairman is Newton C. McCollough, III, M.D., P.O. Box 875, Biscayne Annex, Miami Beach, Florida 33152.

June 4-6, 1973—The University of Michigan Extension Service Conference Department is holding its Eighth Annual Conference on Initial Management of the Acutely Ill or Injured Patient at Towsley Center on the University campus in Ann Arbor. More information can be gotten from the Extension Service at 412 Maybaird Street, Ann Arbor, Michigan 48104.

June 10-13, 1973—The 24th Annual Meeting of the National Athletic Trainers Association will be held at the Sheraton-Biltmore Hotel, Atlanta, Georgia. Complete details can be secured from Otho Davis, Executive Director N.A.T.A., 3315 South Street, Lafayette, Indiana.

June 11-14, 1973—Bemidji State College is putting on an Athletic Training Clinic. For registration and information contact Ms. Betsy McDowell, Women's Physical Education, Bemidji State College, Bemidji, Minnesota 56601.

June 24-29, 1973—The Fourth Annual Miami University Student Trainer Workshop will be held in Oxford, Ohio. For details write Ken Wolfert, Millet Hall, Miami University, Oxford, Ohio 45056.

July 8-11, 1973—West Texas State University and Cramers are sponsoring a student trainers workshop in Canyon, Texas. For further information contact Lynn Laird, Athletic Department, West Texas State University, Canyon, Texas 75090.

July 9-25, 1973—Eastern Kentucky University is offering an athletic training workshop to junior, senior and graduate students. For details write The Physical Education Department, Eastern Kentucky University, Richmond, Kentucky.

July 15-18, 1973—Cramer's and San Jose State University are holding a Student Trainers Workshop. For further information contact Jim Welsh, San Jose State University, San Jose, Calif. 94114.

July 15-18, 1973—Cramer - Kansas State Teachers College will be holding a Student Trainers Workshop. For more information contact John Baxter, Kansas State Teachers College, Emporia, Kansas 66801.

July 16-20, 1973—The American Corrective Therapy Association Conference will be held in the Edgewater Hyatt House in Long Beach, California. The theme of the session is "Corrective Therapy in Action". For further information contact Bernard H. Weber, 7631 Willis Avenue, Van Nuys, California 91405.

July 22-28, 1973—The Piedmont Student Trainers Camp will be held at Camp Hanes YMCA Camp near Winston-Salem, N.C. It is held in co-ordination with the Piedmont Football Camp. For details contact Rod Compton, Sports Medicine Division, East Carolina University, Greenville, N.C. 27834.

July 22-25, 1973—A Student Trainers Workshop will be given by San Diego State and Cramer's. For more information contact Bob Moore, San Diego State, San Diego, Calif. 92115.

July 23-25, 1973—The American Academy of Orthopaedic Surgeons will have a seminar on the "Knee in Sports" in Eugene, Oregon. For further information contact Robert L. Larson, M.D., 750 East 11th Avenue, Eugene, Oregon 97401.

July 27-28, 1973—The University of Rhode Island in Kingston, Rhode Island, is hosting a conference on "Medical Aspects of Sports". For further information contact A. A. Savastano, M.D., 205 Waterman Street, Providence, Rhode Island 02906.

July 29-Aug. 1, 1973—Cramer's and Northeastern University will hold a Student Trainers Workshop. For further information contact KoKo Kassabian, Northeastern University, Boston, Mass. 02115.

August 3-4, 1973—A Student Trainers Clinic will be held at the College of William and Mary. For further information contact Ken Chatham, Clinic Director, Student Trainers Clinic, College of William and Mary, P.O. Box 399, Williamsburg, Virginia 23185.

August 5-8, 1973—A Student Trainers Workshop to be held at West Chester, Pennsylvania. It is co-sponsored by Cramers and West Chester State College. For further information contact Phil Donley, Athletic Department, West Chester State College, West Chester, Pennsylvania 19380.

August 7-11, 1973—A student trainers workshop sponsored by Mankato State College and Cramers will be held at Mankato, Minnesota. For further information contact Gordon Graham, Athletic Department, Mankato State College, Mankato, Minnesota 56001.

August 9-10, 1973—The 7th Annual Symposium on Sports Medicine will be held at Germantown Academy, Fort Washington, Pennsylvania. For further information contact David G. Moyer, M.D., Germantown Academy, Fort Washington, Pennsylvania 19034.

August 18-19, 1973—The 2nd Annual Sports Injury Clinic sponsored by the Southern California Athletic Trainers Association will be held at the Royal Inn in Anaheim, California. For further information contact Roger D. Dennis, Athletic Department, Chapman College, Orange, California 92666.

September 22, 1973—The Southwest District of the Indiana Association for Health, Physical Education and Recreation is sponsoring the DGWS Mini-Clinic on Athletic Training for Women at Indiana State University. For details write Mrs. Barbara Passmore, W.P.E., Indiana State University, Terre Haute, Indiana.

September 17-19, 1973—The American Academy of Orthopaedic Surgeons will sponsor "General Sports Medicine" in New York Cit. For further information contact James A. Nicholas, M.D., 150 East 77th Street, New York, New York 10021.

Athletic Training will be happy to list events of interest to persons involved in sports medicine, providing we receive the information concerning the event at least two months in advance of publication. Please include all pertinent information and the name and address of the person to contact for further information. This information should be sent to Jeff Fair, Athletic Department, Oklahoma State University, Stillwater, Oklahoma 74074.

BOOK REVIEWS



Ken Murray received an AA degree from Schreiner Junior College in 1965. Three years later he graduated from the University of Texas with a BS in Health and Physical Education. Ken also earned his MA from Eastern Kentucky University in 1969. He is now in his fourth year at EKV and working on his doctorate.

ELEMENTS OF EMERGENCY HEALTH CARE AND PRINCIPLES OF TORT LIABILITY FOR EDUCATORS

by W. Thomas Hurt
University of Nebraska
List Price \$5.50

Kendall/Hunt Publishing Company 288 pages
Dubuque, Iowa Illustrated

This book is written primarily for an educator so that one may function at a "reasonable level of competence in an emergency health situation", as well as explaining the legal implications that are involved in an emergency situation. With increasing number of liability cases being presented in all areas of life, this book is extremely valuable to the trainer in two ways. It is first extremely valuable as a teaching aid in the classroom. Being a self-instructional text, the student can do the work in the book without using the teacher. The second value to the trainer would be in the areas of re-enforcing safety and first aid as well as showing where the trainer may be liable.

Section One of the text is concerned with principals of tort liability for educators. Such subjects are presented as doctrines of immunity, torts, reasonable man, negligence, attractive nuisance, assumption of risk, and many other topics.

Section Two deals with a concept of emergency care for the educator. Included in this section are emergency care vs. definitive care, "basic" concepts, In Loco Parentis, and other subjects.

SCIENTIFIC BASIS OF ATHLETIC CONDITIONING

by Clayne R. Jensen
A. Garth Fisher
List Price \$10.00
257 Pages
Illustrated

Lea and Febiger
Philadelphia
June 1972

Like the title, this book is written in a very scientific but easy-to-understand manner. The authors of the book brought together many widespread sources to give the reader justification for different conditioning methods. For a trainer wishing to write up a conditioning program for a specific sport, this book not only gives specific ideas but also references for additional information.

Part I is a review of the physiological basis of conditioning as applied to the various body systems--muscular, nervous, cardio-respiratory, and metabolism.

Part II deals with practical suggestions on how to develop characteristics such as speed, strength, power, endurance, and agility.

Part III deals with conditioning and performance and the things that influence conditioning and performance such as psychology, altitude, diet, warm-up, and drugs.

Part IV outlines conditioning methods best suited for specific athletic activities.

CONDITIONING EXERCISES

by Vernon S. Barney
Cynthia C. Hirst
Clayne R. Jensen
List Price \$5.50
140 Pages
Illustrated

3rd Edition
C. V. Mosby Company
11830 Westline Industrial Drive
St. Louis, Missouri 63141

This is a book written on conditioning that is aimed toward the general individual and not specifically toward the athlete. The book is well-illustrated to show the individual how to do the exercises. The following information is included in this book:

1. Sufficient scientific information about the effects of exercise on the human body.
2. Well planned, progressive exercises for all parts of the body
3. Materials on the modern approach to posture.
4. Basic principles of body mechanics.
5. Techniques of relaxation
6. An outline program to be followed by an individual

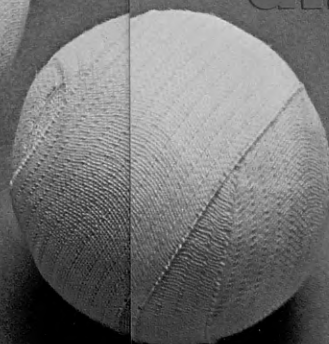
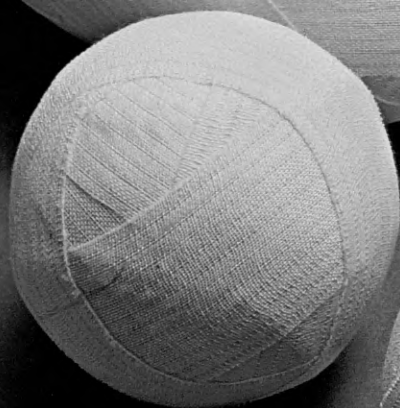
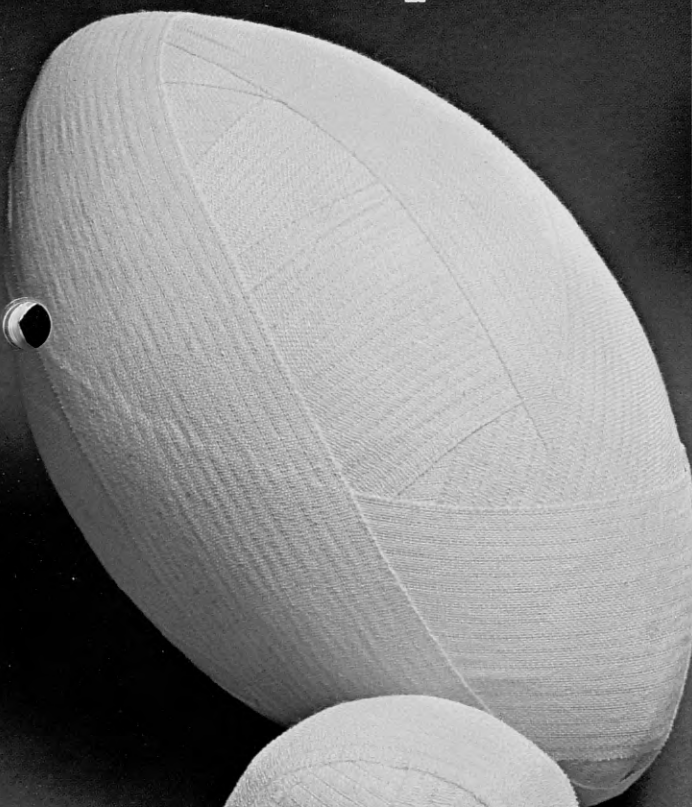
Specific exercises out of this book are good for injury rehabilitation, but the book is more practical for someone starting out on a general conditioning program.



FLEX

TRADEMARK

Elastic Tape...



the
all sport,
all purpose
tape...



Elastic Tape...

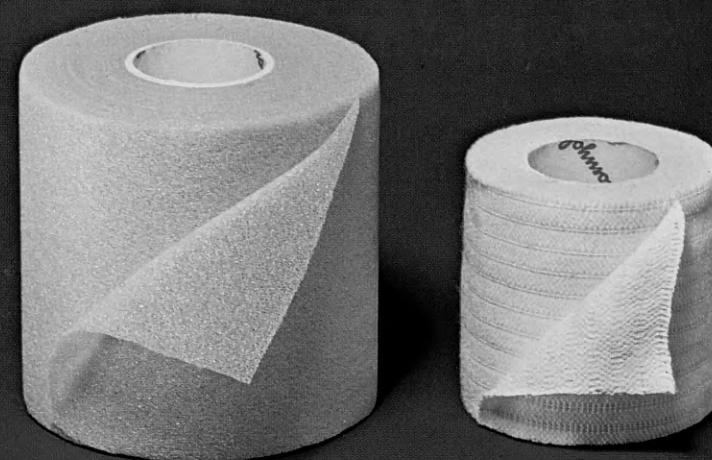
**Speeds difficult
taping jobs with
ease.**



**J-FLEX* Elastic Tape
provides the trainer with
product benefits he's asked for.**

- **High Tensile Strength**—provides protection and strength for **any** taping need—even knees and shoulders.
- **Lightweight...Less Bulk**—new lightweight backcloth provides a tape which adheres smoothly...comfortably.
- **Preferred Length**—a real time-saver, the 5-yard stretched roll is the ideal length for one ankle...so no tearing is required in most situations.
- **SPEED-PACK* Packaging**—for economy and speed...delivers stacked rolls in convenient trays.

the 1-2 combination



- 1. J-WRAP* Pre-Taping Underwrap**
protects skin—provides painless tape removal.
- 2. J-FLEX* Elastic Tape**
for player protection with easy taping action.



Start right...before taping, use J-WRAP Pre-Taping Underwrap. Porous J-WRAP Underwrap conforms like a second skin and makes tape removal quick and painless.



- 1 J-WRAP Pre-Taping Underwrap is applied before strapping.
- 2 Normal strapping procedure.
- 3 Cut under J-WRAP for easy, painless removal.



Pre-Taping Underwrap
code 5185



the
all sport,
all purpose
tape...



Lightweight, minimal bulk, 5-yard stretched length, ideal for ankle taping.



High tensile strength strong enough for knees.

Maximum support with flexibility.



Adheres smoothly, contours comfortably to difficult taping areas.

The injury-prevention combination...

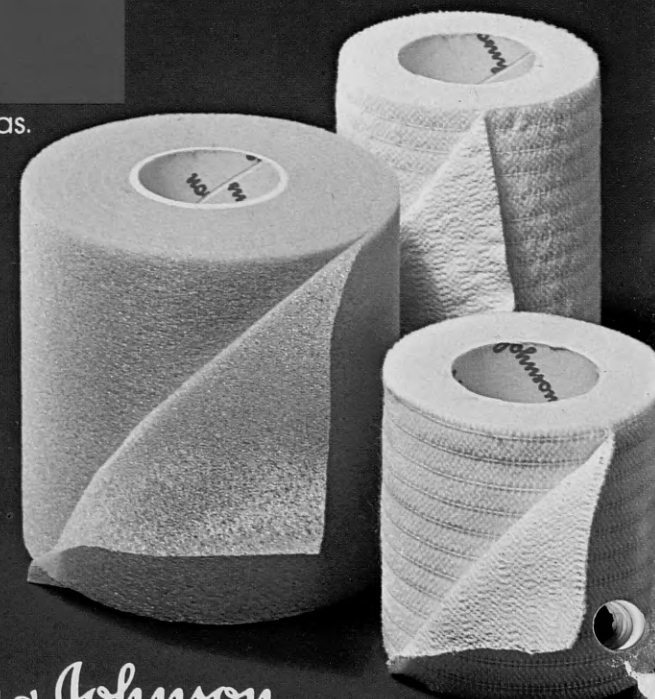
J-WRAP* Pre-Taping Underwrap

Code #5185 Case pack—
48 rolls/case, cut 2 3/4" x 30 yds.

J-FLEX* Elastic Tape

Code #5156 Case pack—
48 rolls/case,
2" x 5 yds. stretched

Code #5157 Case pack—
32 rolls/case,
3" x 5 yds. stretched



ATHLETIC DIVISION

*Trademark

© Johnson & Johnson '73 AD 1



Lightweight, minimal bulk, 5-yard stretched length, ideal for ankle taping.



High tensile strength strong enough for knees.

Maximum support with flexibility.



Adheres smoothly, contours comfortably to difficult taping areas.

The injury-prevention combination...

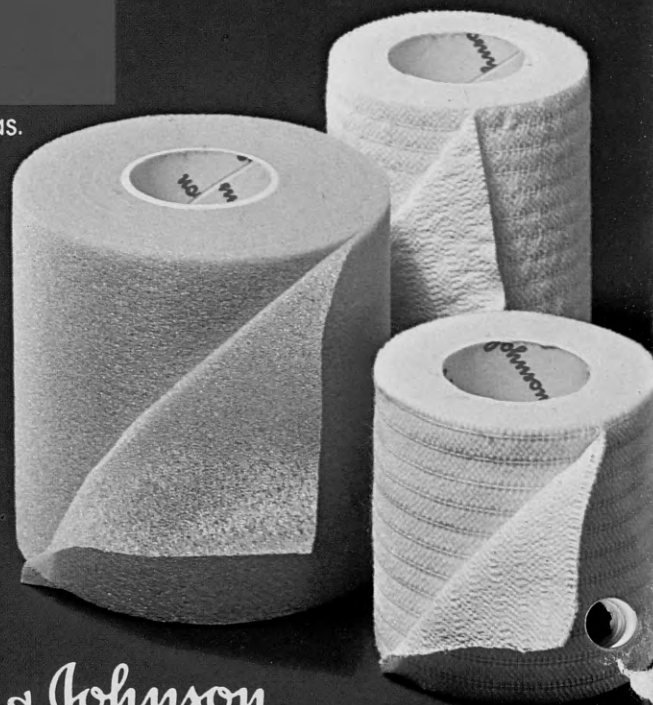
J-WRAP* Pre-Taping Underwrap

Code # 5185 Case pack —
48 rolls/case, cut 2 3/4" x 30 yds.

J-FLEX* Elastic Tape

Code # 5156 Case pack —
48 rolls/case,
2" x 5 yds. stretched

Code # 5157 Case pack —
32 rolls/case,
3" x 5 yds. stretched



*Trademark

© Johnson & Johnson '73

AD 4



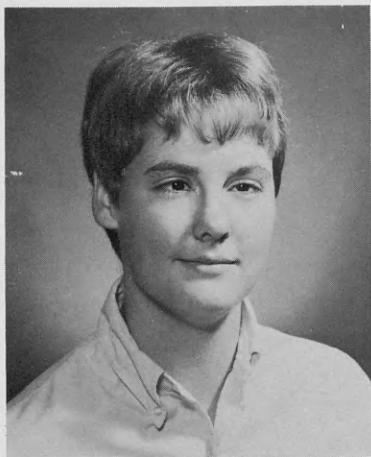
Before and after the contact ...“Balmex” Ointment soothes and heals

Quick, soothing and effective treatment for bumps, bruises, chafing, simple skin abrasions and at ankles and elbows results from the use of protective “Balmex” Ointment. The simple, economical solution to preventing discomfort from football, soccer, lacrosse, basketball and wrestling ...or from any contact sports where padding is used.



“Balmex” is a Trade Mark of Macsil, Inc.
“A” St. & Lehigh Avenue, Philadelphia, Pa. 19125

NOT FOR MEN ONLY



Holly Wilson is an instructor and athletic trainer for the Women's Physical Education Department at Indiana State University. Holly received both her BS (1969) and MS (1970) degrees from ISU.

Alpha...a beginning for women

Sports, by their very nature, invite injury. The all-out effort required, the speed of movement, the rapid change of direction are a few of the hazards inherent in sports activities. These are the hazards that are responsible for the various injuries suffered by athletes. Administrators of every sports program are morally obligated to do everything within their power to prevent injury whenever possible and to minimize the severity of the injury, by treating each injury promptly and properly with total rehabilitation as the goal. The athletic trainer has become a means by which this obligation has been met.

The entry of women into the field of athletic training is a long overdue necessity, for we too have a moral obligation to our sports programs. Although presently there are few jobs available for women trainers, the need definitely exists and it will certainly be a growing field as it becomes increasingly accepted and understood by women physical educators. The great rise in women's competition will certainly warrant the need for trained professional athletic trainers to properly care for the athletes.

Presently there are fifteen schools in the United States that offer undergraduate athletic training curricula which have been approved by the N.A.T.A. Only five schools accept women in their programs. They are Ball State University, Indiana State University, University of Montana, Westchester State College, and Western Illinois University. Indiana State has approved curricula at both the undergraduate and graduate levels and the Women's Physical Education Department offers a

Graduate Assistantship in athletic training. Information about the assistantship may be obtained by writing to Dr. Eleanor St. John, Chairman, W.P.E.

Since there is some skepticism among women physical educators as to the need for athletic trainers in their programs, it is necessary that the position of an athletic trainer be introduced gradually, with diplomacy and patience. A program cannot be successful without support and understanding and it may take some time before the role as a woman athletic trainer is fully understood by administrators and colleagues. As the level and intensity of women's competition increases however, acceptance of this role seems inevitable.

Addresses of Schools that Accept Women:

Ball State University
Department of Men's Physical Education
Muncie, Indiana 47306
(Ronald Sendre)

Indiana State University
School of Health, Physical Education and Recreation
Terre Haute, Indiana
(Mel Blickenstaff - MPE; Holly Wilson - WPE)

University of Montana
Department of Health, Physical Education and Recreation
West Chester, Pennsylvania 19380
(Philip Donley)

Western Illinois University
College of Health, Physical Education and Recreation
Macomb, Illinois 61455
(Ronald E. LaRue)

Athletic Training Workshops for Women

Summer:

June 11 - 14, 1973: Bemidji State College, Bemidji, Minn.

Undergraduate physical education majors, high school and college physical education instructors and anyone interested in obtaining knowledge in athletic training is eligible to attend.

The registration fee is \$45.00 which includes tuition.

Two credit hours are offered, either graduate or undergraduate. Each class session will run from 9:00 a.m. to 3:30 p.m. with a break for lunch.

Dormitory housing is available (\$13.00 for a double room for the four day session).

The registration deadline is May 25; however,
(con't. on page 86)

ATLANTA



THE EDITORIAL STAFF OF THIS
PUBLICATION AND THE OFFICERS
OF N.A.T.A. ARE LOOKING FOR-
WARD TO SEEING YOU IN ATLANTA!



CURRENT LITERATURE



Tom Waugh received a BS in Biology from St. John's University, Minnesota, in 1964. He earned a Certificate in Physical Therapy in 1965 from the University of Iowa. From 1965-1967 Tom served as Head Athletic Trainer for Case Institute of Technology, Cleveland, Ohio. He then took the position of Head Athletic Trainer at the University of North Dakota. In 1968-70 Tom was a U. S. Army Hospital Therapist. Upon completion of his term of duty, in 1970, he returned to his position at North Dakota.

- "Complications of Jogging", Corigan AB et. al. *Medical Journal of Australia* 2:363-8 August 12, 1972.
- "The Little League Again", Allman, P. *Pediatrics* 50:824-5 November 1972.
- "Effect of Swimming in Cold Water on Body Temperatures of Children", Neatinze, W.R., et. al. *Journal of Physiology* 226:55 P-56P, October 1972.
- "Mouthguards in Australian Sport" Dennis, G.G. et. al. *Australian Dental Journal* 17:228-35, January 1972.
- "The Greatest Athlete I Have Known", Moore, G.A. *American Corrective Therapy Journal* 26:148 Sept. - Oct. 1972.
- "Anabolic Steroids in Athletics", Freed, D. et. al. *British Medical Journal* 3:761 September 23, 1972.
- "Athletic Activity and Longevity", Sheehan, G.A. *Lancel* 2:974, November 4, 1972.
- "It's Only a Sprained Ankle", Buck, R.L. *American Family Physician*, 6:68-75 October, 1972.
- "High School Football Injuries: A Pilot Comparison of Playing Surfaces". Bramwell, S.T. et. al. *Medicine and Science in Sports*. 4:166-9 Fall 1972.
- "Analysis of an Extensive Athletic Knee Injury". Bowers, KD Jr. *West Virginia Medical Journal*, 68:259-62 Fall 1972.
- "Medical Aspects of College Football", Reid, S.E. *Illinois Medical Journal* 142: 191-4 September 1972.
- "Contribution of Design and Construction of Football Helmets to the Occurence of Injuries", Robey, J.M. *Medicine and Science in Sports* 4:100-4 Fall 1972.
- "Injuries of Knee in Athletics", Sim F.H. et. al. *Minnesota Medicine* 55:881-5. October 1972.
- "Longevity and Cardiovascular Mortality Among Former College Athletes". Polednah, A.P. *Cuculition* 46:649-54 October 1972.
- "The Physiologic Basis of Training and Conditioning of Athletes", Novich, Max *Journal of Medical Society of New Jersey* 69:841-5 October 1972.
- "Achilles Tendon Tenosynovitis in Long-distance Runners", Snook G.A. *Medicine and Science in Sports* 4:155-8 Fall 1972.

"On With the Games", Brennan
K.S. *Nursing Times*
68:1049-52 August 24,
1972.

"Olympia Games, 1972:
Preliminary Report". *JAMA*
222:484-5 October 1972.

"The Medical Problems of Mass
Participation in Athletic
Competition, The
City-to-Surf Race", Sutton,
J. et. al. *Medical Journal of
Australia* 2:127-33 July 15,
1972.

"Toward Better Prescribing
--Smoking and Sport-A
Committee on Privacy."
Lister, J. *New England
Journal of Medicine*
287:654-6 September 28,
1972.

"High Level of Strength is Not
Equally Important for All
Athletes", Berger, R.A.
Athletes Journal 53:15
January 1973.

"Cardiorespiratory and Body
Composition Measurements
of a Select Group of High
School Football Players".
Kollias, J. et. al. *Research
Quarterly of AAHPER*
43:472-8 December 1972.

"Overload Effect On Throwing
Velocity and Accuracy",
Litwhden, D. & Hamm, L.,
Athletic Journal 53:74
January 1973.

"Training Under Stress", Bolton,
C.A. *Athletic Journal* 53:48
January 1973.

"More Careful Treatment for
Hand Injuries, Wickstrom,
R.L. *Athletic Journal* 53:42
January 1972.

"Conditioning and Agility
Drills", Riley, D. *Athletic
Journal* 53:23-4 December
1972.

"Pre-Training and Training",
Powell, J.T. *Phys. Ed.*
29:207-8 December 1972.

concerned
about
foot care?

this
is the
place
to start

Foot care starts with *preventing trouble!*
Wool socks aid in preventing trouble be-
cause natural wool fibers: absorb and dissi-
pate perspiration, thus reducing blisters and
abrasions; keep feet and shoes drier, there-
by inhibiting fungus growth; cushion the foot
against shock; prevent foot fatigue.

Wigwams
OF
WOOL

Wigwam Mills, Inc., Sheboygan, Wis. 53081



632

612

Developmental Asymmetry (con't. from page 69)

Statistical study of 37 male subjects", *J. Assoc. Phy. and Mental Rehab.*, 21:2:40. 1967.

5. Klein, K.K., *The Knees, Growth, Development and Activity Influences*, All American Productions and Publications, Greeley, Colo., ch.3, 1967, 2nd. Edition, The Pemberton Press, Austin, Texas 1971.
6. Klein, K.K., *The Knee in Athletics*, Am. Assoc. Health, Physical Education and Recreation, Washington D.C. ch. 2, 1963.
7. Klein, K.K. and F.J. Allman, Jr., *The Knee in Sports Conditioning Injury Prevention and Rehabilitation*, The Pemberton Press, Austin, Texas, ch. 3, 1969.
8. Pearson, W.M., "Early and High Incidence of Mechanical Faults", *J. of Osteo.*, XLI:5. 1954.
9. Redler, I., "Clinical Significance of Minor Inequalities of Leg Length", *New Orleans Med. and Surg. J.*, 104:8:308, 1952.
10. Strachan, W.F., "Lateral Imbalance and the Use of Lifts", *J. Am. Osteo. Assoc.*, 41:190. Dec. 1941.
11. Rose, K.D., "Congenital Anomalies of the Low Back", *Nat. Athletic Tr. Assoc.*, April 1962, p. 2 (Reprint from Medical Times, Oct. 1961)

Student Trainer Corner (con't. from page 66)

this does create a hardship in some cases but feel protection of the validity of the product is of more importance. There is no reason why an individual district might not give the examination regionally on the campus of an approved curriculum since the Board of Directors allow each district this flexibility. Should one institution have a number of candidates qualified for examination, it is entirely logical that this might be done.

Lindsy McLean
Certified Athletic Trainer
Chairman
NATA Certification Committee

Not for Men Only (con't. from Page 82)

applications will be accepted until the first of June. Register with Ms. Betsy McDowell, Women's Physical Education, Bemidji State College, Bemidji, Minnesota 56601.

July 9 - 25, 1973: Eastern Kentucky University, Richmond, Kentucky.

The workshop is open to junior, senior and graduate students.

For undergraduates the registration fee is \$15.00 per credit in-state or \$37.00 per credit out-of-state. The in-state fee for graduate students is \$22.00 per credit and out-of-state \$50.00 per credit.

Two credit hours are offered, either graduate or undergraduate. The class will meet from 2:15 p.m. to 4:30 p.m. Monday - Friday.

Dormitory housing is available and inquiries should be addressed to the director of housing.

Students may enroll during the regular registration time on June 11 or at anytime thereafter including the first day of the workshop.

Fall:

September 22, 1973: Indiana State University, Terre Haute, Indiana.

DGWS Mini-Clinic on Athletic Training for Women sponsored by the Southwest District of the Indiana Association for Health, Physical Education and Recreation.

Anyone interested in obtaining a background in athletic training may attend.

Contact Mrs. Barbara Passmore at Indiana State University (WPE) for more information.

FILM AVAILABLE

A film "Facial Injuries in Football" has been produced by Dr. Wilson and Doctors Eugene and Michael Rontal of the University of Minnesota. It is available for your use at no charge. Approximately fifteen minutes in length it depicts through excellent color shots under game conditions and with diagrams the injury potential related to the various types of face masks. Also brought to attention is the necessity for use of the four-point padded chin strap and proper fitting of headgear. The film was produced as an introduction to facial injury for physicians, medical students, coaches, trainers, and athletes.

To obtain this film contact:

Dr. Kent Wilson
Department of Otolaryngology
A-605 Mayo Memorial Building
Minneapolis, Minnesota 55455

Why sweat it!

**... holds ankles in while it
lets sweat out**

New Orthaletic Porous Tape protects 64 ankles per team-pack carton. And it upholds our traditional dependable support while this new porous innovation lets the skin

New ORTHALETIC® Adhesive Trainer's Tape, Porous

"breathe." The diagonal vents formed by a series of unbroken diagonal lines in the adhesive mass provide the porosity. From start to finish, this tape unwinds neatly and easily. It's available in tubes, as well as in team packs. No sweat!

Available through surgical supply dealers. Write for name of your nearest dealer.

*Medical-Surgical Products Division
PARKE, DAVIS & COMPANY
Detroit, Michigan 48232*

PARKE-DAVIS



Medical-Surgical Products Division
Parke, Davis & Company, Detroit, Mich 48232

Please send me complete information about
new Orthaletic Adhesive Trainer's Tape, Porous.

Name _____

Title _____

Address _____

City _____

State _____

Zip _____

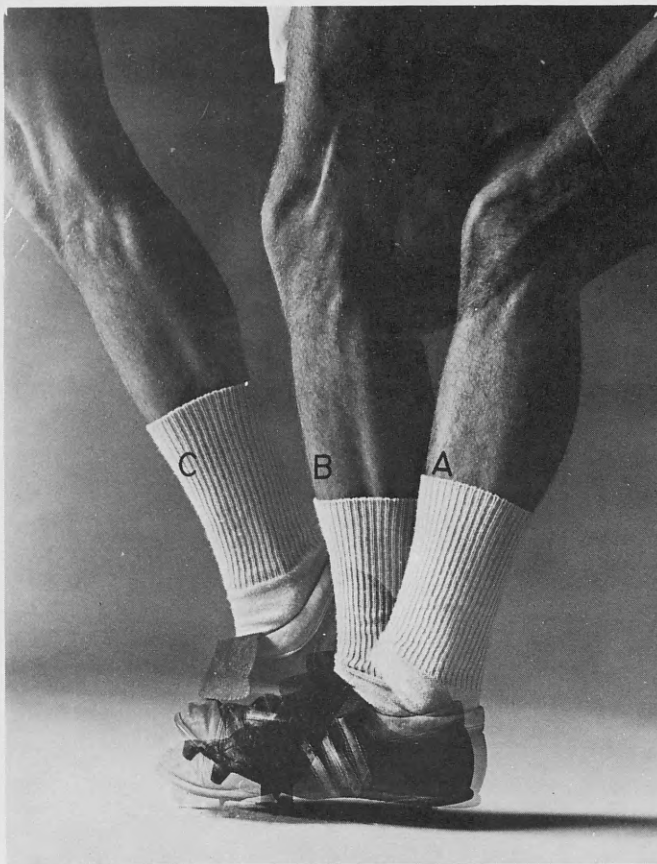


FIGURE 3 — At foot-strike, the knee is semiflexed (A) and remains semiflexed throughout all of support (B) and loft (D). Even in sprinting, the heel is firmly planted. Only at the instant of take-off (C) is the knee extended, and it is completely flexed only in the forward-swing phase of recovery (B).

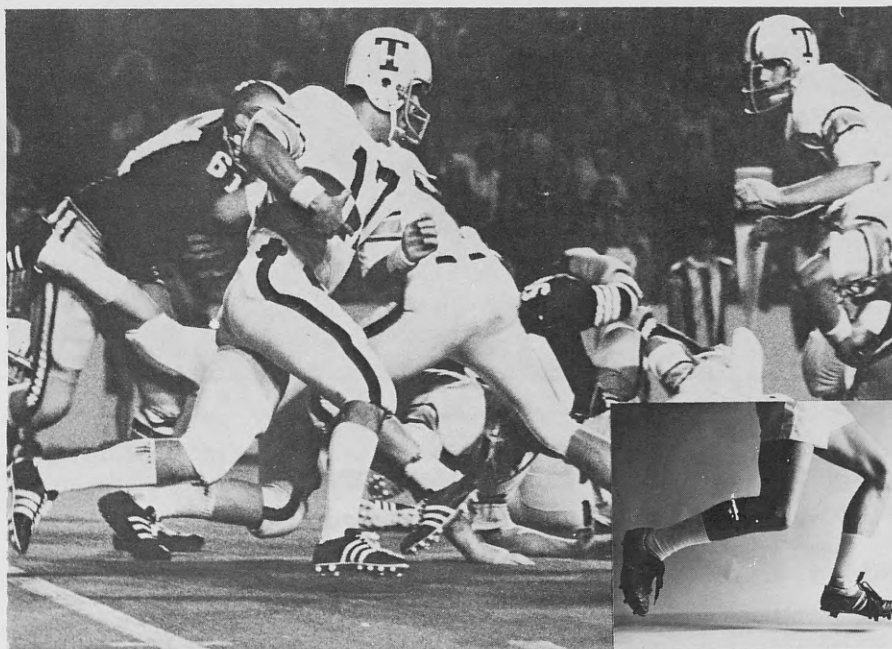
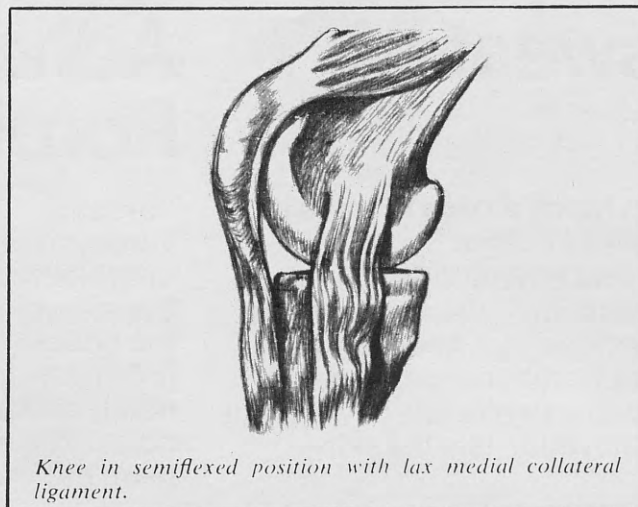


FIGURE 4 — During loft, both feet are airborne. Note the position of rotation of the ballcarrier's shoulders, torso, and arms: away from the left (take-off) foot and toward the right (foot-strike) foot.

Noncontact injury without cleat fixation

Pathological acceleration or deceleration of one portion of a joint without a similar motion of the adjoining portion, i.e., abnormal or nonaxial movement of only one bone of a joint, such as a twisting of the femur over the fixed tibia or the tibia over the fixed foot, constitutes the mechanism of noncontact injuries in which the player injures himself with self-generated, internal forces.

Because these accidents occur with a sudden change of direction and are torque related, a closer look at the physiological method of directional change while running is necessary. During the phase from foot-strike to loft, the stance hip acts as a fulcrum over which the pelvis rotates. At the instant of foot-strike, the stance hip is anterior to the unsupported hip. The unsupported hip then swings forward from its posterior position at foot-strike to a neutral position at mid-stance to an anterior one at toe-off. This anterior position is main-

tained during loft, and the cycle is repeated at the subsequent foot-strike. This rotary motion of the pelvis is known as the *pelvic step*.

During the pelvic step, the torso and shoulder rotate in the opposite direction. The shoulder over the unsupported hip follows the stance foot: anterior at foot-strike, neutral at mid-stance, and posterior at take-off. Hence, the torso is pointed toward the stance foot at foot-strike, is neutral at midstance, and is pointed away from the stance foot at take-off.

The swinging motion of the arms is used as an aid to rotate and balance the torso. (Probably this rotary function is more important than its propulsive function; during the latter, one arm works against the other, whereas during rotation they work together.) At foot-strike, the forward thrust of the arm on the unsupported side, coupled with the posterior thrust of the arm on the stance side, aids in rotating the torso toward the stance foot (Figure 4). Between foot-strike and midstance, the arm on the unsupported side thrusts backwards, while that over the stance side continues its forward thrust, rotating the torso away from the stance foot until, at take-off, the torso is rotated away from the stance foot and toward the unsupported side.

Additionally, the center of gravity of the body is behind the stance foot from foot-strike to midsupport (the position of braking), over it at midstance, and in front of it between midstance and take-off (the position of propulsion). Thus, acceleration is at a maximum at toe-off; deceleration is at a maximum at foot-strike.

If angulation is to continue without directional change, the pelvis and torso rotate as described and deliver the swing leg into the same, continuing direction, causing the foot to strike slightly to the lateral side of the center of gravity of the body. If direction is to be changed, the rotating pelvis and body are planted in the new direction and the swing leg is delivered into the new line of motion.

There are three directional changes: (1) away from the line of progression, (2) across the line of progression, and (3) the hopscotch maneuver.

1. The most natural and common directional change is from the support leg toward the swing leg, away from the

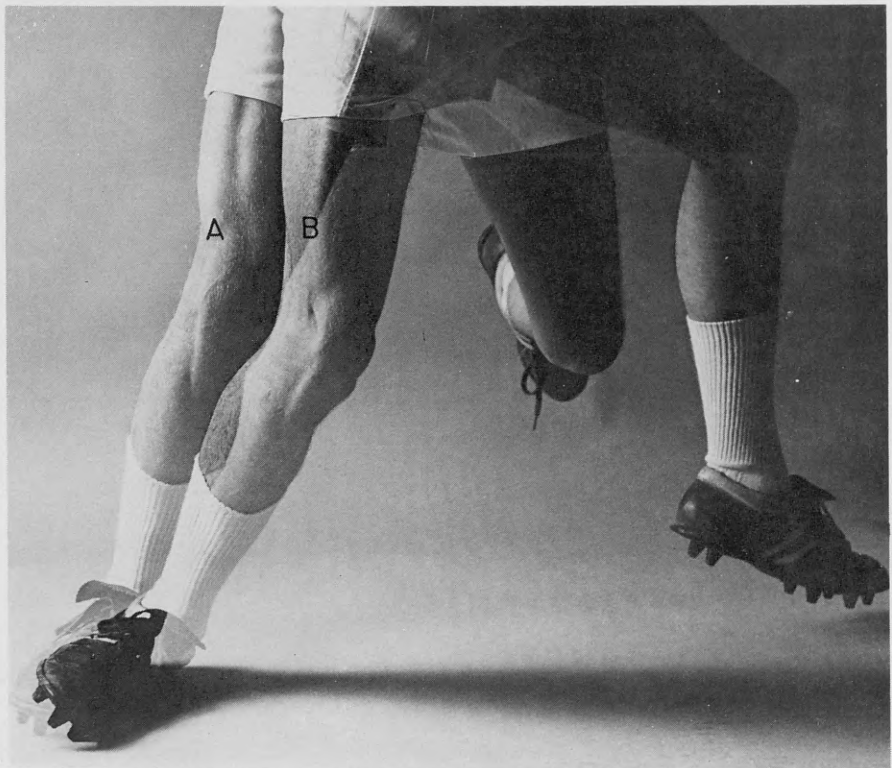


FIGURE 5 — The common directional change in conventional shoes. The player plants the right foot (decelerates) laterally (A), arrests the pelvic step, and delivers the swing leg in the next direction (B). The stance foot has been completely decelerated and placed laterally for balance so that the first stride in the new direction is slow and short. Note protective muscular action.

line of progression, i.e., from the right leg toward the left and vice versa. However, the instant of initiation of the turn is critical as far as safety is concerned. If the turn is started after foot-strike and before midstance, the body is in the position of braking with the center of gravity in back of the stance foot; the torso is rotated away from the new intended direction, the stance hip is in external rotation, and the arms are thrust in the position of mechanical disadvantage for the new direction. To turn, the player must first cause his center of gravity to be placed in front of the new thrust (he may have to decelerate completely), next derotate his torso and then rotate it toward the new line of progression, and then reverse the thrust of his arms to aid in torso rotation and balance. Thus, at the initiation of this turn, the torso and pelvis are in a position of disadvantage because the body is turned away from the new intended direction and the stance hip is rotated externally. The body must rotate externally (up to 180°) over an already externally rotated hip. The margin of safety is dangerously low, and it is easy for the

momentum of the rotating torso to drag the stance femur into internal rotation, which, in turn, drags against the tibia and foot (Figure 5). If the foot is fixed, serious torsional injury can occur, since the tibia cannot fully trail the femur and therefore remains externally rotated below the internally rotated femur, and, likewise, the foot cannot trail the tibia and remains relatively externally rotated below it. This is the position of danger, the position in which most knee and ankle injuries occur: *flexion of the knee with external rotation of the foot*.

If the foot fixation and the superimposed forces are excessive, the knee and ankle can be forced to assume abnormal axes from which there is no escape and because of which damage can occur if the forces—from a simple meniscal tear to an "unhappy triad" or a sprained to a fractured ankle—exceed the margins of safety of the ligaments. On the other hand, during this directional change, if the foot is free to rotate, the femur drags the tibia and the tibia drags the foot, harmlessly. No malrotation, fixation, or consequent injury occurs (Figure 6), and the position of danger is avoided.

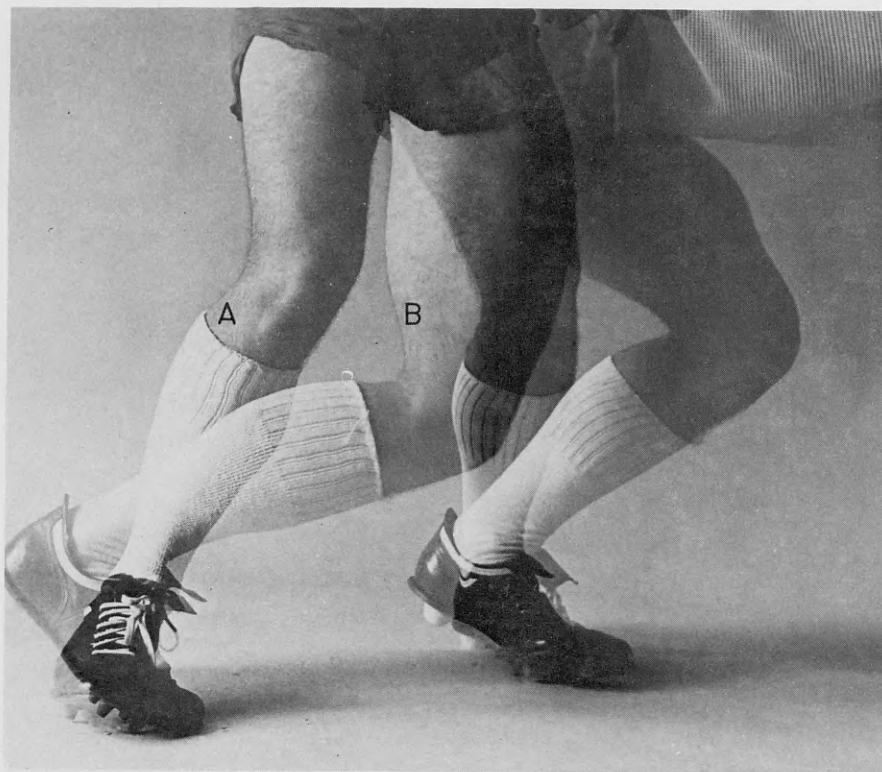


FIGURE 6 — During the common directional change in swivel shoes, the stance foot (A) can rotate with the pelvis, allowing the foot and tibia to trail the femur (B), thus avoiding torque at the ankle and knee. Lift-off is from the forefoot, not the side of the foot, and it is more mechanically efficient in producing a quicker, longer, more forceful first stride out of the turn. There is less deceleration of the stance foot, so there is less lateral placement of the stance leg and the first stride in the new direction is longer. Note less locking and protective muscular strain.

But, if this change of direction occurs between midstance and the instant of take-off, the torso is rotating *toward* the new line of direction and less body torque is required in the already-turned torso. The longer the change of direction is delayed after the shoulder and pelvis pass midstance, the less body torque is required because, at take-off, the body is pointed maximally *toward* the new intended direction. Additionally, a maximum amount of external rotation is available to the pelvis and hip because the latter is an internal rotation. At the take-off, this type of change of direction is safest because 90° of hip turn is permissible before any ligamentous tightness will constrict movement. It might also be noted that the turn past midstance is an accelerating, low-torque turn; before midstance, it is a decelerating, high-torque turn, definitely more dangerous than the former.

2. If the change of direction is to the same side (i.e., from right to farther right), then the internal rotators of the

support hip deliver the pelvis into excessive internal rotation and the opposite leg is delivered *across* the center of gravity (across the line of progression) of the body, external to the support foot. This directional change occurs only after midstance and always produces marked posterior rotation of the shoulder opposite the stance foot and extreme anterior rotation of the pelvis over the support hip, which remains in internal rotation. The motion of the torso, pelvis, and leg is the same as in the turn past midstance, as previously described. With foot fixation, injury is very probable, most commonly an isolated tear of the anterior cruciate ligament (Figure 7). This occurs because the advancing lateral edge of the medial condyle of the femur simply snips the ligament. However, more serious injury is possible. If the foot is free to rotate, allowing the tibia to trail the femur, such injury can be prevented (Figure 8).

Both of these directional changes are

faster, safer, and more forcible if a player is wearing swivel shoes (Figures 6 and 8). There is less sudden deceleration of the stance foot, and the momentum of the body and arm is used freely in each turn. Rotary deceleration of the support leg is an important consideration in terms of safety and performance. In the usual turn in conventional shoes, the stance foot is decelerated suddenly (the deceleration is directly related to the abruptness of the turn) and is thrust laterally to avoid a loss of balance. As a result, the following step in the new direction is shortened by the length of the lateral thrust taken to preserve balance and to decelerate the foot. A swiveler, on the other hand, has less rotary deceleration of his foot (and any slowing of acceleration or deceleration is safer); as a result, he does not thrust the stance leg as far laterally because the foot continues to rotate with the torso (Figures 6 and 8) without binding the hip, knee, or ankle. He is quicker in the turn, and the first stride in the new direction is longer and stronger because it originates not from the side of the foot but from toe-off (safer and stronger). There is no loss of distance from lateral displacement. In the cross-over, again the conventional cleat suddenly decelerates the stance foot and limits the turn (Figure 7), whereas, with the swivel shoe, there is less rotary foot deceleration and no limitation of turning, and the new stride originates from toe-off, not from the side of the stance foot (Figure 8) (safer and stronger). A toe-off thrust is more natural and effective and less fatiguing (a point to be documented in a later study).

3. The third type of directional change is lateral, in which the player continues in a forward direction but in a different line: a hopscotching move. Usually he is in a power-running, broad-based stance, thrusting his body away from one line of progression and continuing in another line of progression in this same general direction. It is important in this situation that the shoe and heel not slip on thrust, which may be at mid-support from a heel-toe stance. No rotation is involved here.

Rotation of the knee

Rotary motion of the knee has been under study. Several opinions exist; however, most authorities agree that, in complete extension, both collaterals

and cruciates and the posterior capsule are tight, and that these, added to the anatomic configuration of the condyles and menisci, allow no rotary motion of the femur on the tibia or vice versa.

However, when the popliteal unlocks the knee by rotating the femur externally, an increasing range of rotation is permissible: 6° to 30° from a few degrees to 90° of flexion respectively. This motion is permissible because the lateral collateral ligament becomes lax and allows the lateral condyle of the femur to glide anteriorly or posteriorly. Thus, in flexion, the knee is less secure because the anatomic condylar-menisci coupling is lacking, and one collateral is loose.

Flexion and extension take place above the menisci, and rotation below them. During this rotation, the medial meniscus is subject to distortion, because its horns are fastened securely to the tibia and the midportion is secured to the middle third of the deep portion of the medial collateral ligament. Hence, all rotary motion imparted to this meniscus is passive, without any active, protective muscular escape-realignment mechanism.

The lateral meniscus, on the other hand, although fastened by its horns to the tibia, contains an insertion of the popliteal tendon into the margin, which actively realigns and provides escape from the crushing of the two condyles. This, probably more than any other factor, is responsible for the frequent injury of the medial, and infrequent injury of the lateral, meniscus.

However, most discussions of rotation of the knee describe tibial rotation. This seems incongruous in football injuries, because the foot and tibia are cleated and held fixed in the majority of cases. Even when the foot is on its side, the tibia is fixed, and torque is imparted from forces generated by the superimposed body, with or without force from another player's body. Thus, it would seem more reasonable to consider not rotation of the tibia under the femur (which occurs only with a loft of dangling knee injury), but rotation of the moving femur over the fixed tibia. This is vital to the understanding of football injuries because, as stated, in football, the knees, semiflexed, are subject to rotary stress.

If the foot is rigidly cleated and a conventional turn is executed, the



FIGURE 7 — Cross-over change to the same side in a conventional shoe. The player plants the stance leg (A) and rotates the pelvis internally past the original line of direction. The swing leg is delivered in the new direction (B). If the movement of the body and cleat fixation are excessive, then excessive internal rotation of the femur may occur over the tibia, and there will be a tendency for the subastragalar joint to invert because of the lateral thrust of the tibia over the ankle. The foot is decelerated suddenly, and the speed and turning force generated by the player's body momentum as well as the degree of the turn are limited by the small turning arc permitted by the fixed foot. The support foot must be released before damage occurs or before more turning can be obtained. Note the protective muscular action.

femur rotates medially over the tibia. The medial femoral condyle moves backward over the medial tibial condyle. If a tear occurs with this motion, the knee demonstrates rotary instability, probably the basis of the majority of unstable knees. If the stress is too great and exceeds the normal rotation permitted by the knee, tear of the deep portion of the medial collateral ligament occurs first. The posterior portion tears if the knee is nearly straight; the midportion, if the knee is flexed between 30° and 90° ; and the anterior portion, if the knee is flexed 90° or more. It should be recalled that the medial ligament tears first because some portion of it is taut throughout flexion, whereas the lateral collateral is lax throughout all of this motion. If the rotation continues, the anterior cruciate may be injured. It simply unwinds itself from the posterior cruciate with the first 15° to 20° of internal femoral rotation, but it may become taut and torn over the advancing medial edge of the lateral femoral condyle (rare unless the knee is

flexed 90°). Additionally, if rotation continues (and the longitudinal axis of rotation has now been displaced laterally because of the torn medial collateral ligament), the medial condyle of the femur may crush, tear, or distort the posterior horn of the medial meniscus. In this way a triad consisting of a fixed foot and tibia under a rotating femur is produced. This could have been prevented if the foot and tibia were rotatable and absorbing torque.

Again, if the tibia is fixed, it is possible that swivel shoes could aid in prevention of lateral dislocation of the patella, seen frequently in football players. In essence, the foot is planted, the tibia is held rigidly, and the femur rotates medially beneath the patella, leaving it dislocated laterally. The etiology of recurrent football patellar dislocation is too well known to require discussion here, and it is not claimed that the swivel shoe will allow the tibial tubercle to migrate medially in a conventional turn, thus preventing the pathological lateral pull of the quadri-



FIGURE 8 — Cross-over change to the same side in a swivel shoe (the classic swiveler's turn). The swiveler plants the support leg (A) and freely allows the momentum of the body to drive him into the turn as the shoe swivels (B). There is no limit to the degree of the turn, and he does not have to "step around" as a wearer of conventional shoes must. There is less deceleration of the stance foot (the foot rotates to a stop) in this swivel turn than in the other turn. Less muscular action is required.

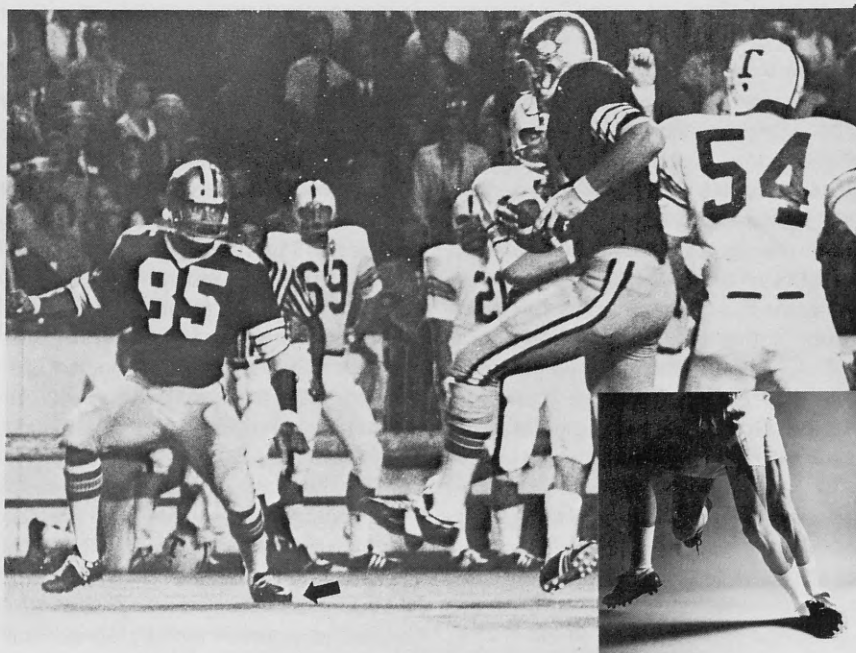


FIGURE 9 — In a conventional cleated turn, the foot is forced into valgus by the internal torsion of the femur and tibia. If the force and cleating are excessive, the foot becomes extremely everted and fixed on its medial surface. Player No. 85 has started his turn near or before midstance and must, therefore, rotate his torso excessively.

ceps through the patellar tendon. The patella probably never dislocates laterally in a cross-over turn.

An accomplished swiveler limits the sagittal movement in the conventional turn (because there is less foot deceleration), swivels, and lofts in the new direction from toe-off. This pull from the os calcis gives the forefoot its most mechanically advantageous position. In the cross-over, the swiveler is not limited but utilizes the momentum of his superimposed body to aid in toe-off. Foot function is not hampered. As a consequence, swivel turns are crisper, faster, and safer, and the first stride in the new direction is longer and more forceful. In both turns, the positions of danger are avoided.

Fatigue

Athletic injuries and fatigue have been well correlated. It has been noted that players, particularly soccer players, feel less fatigued in swivel shoes than in conventional shoes. A soccer player makes approximately 450 turns per game, and it is perfectly logical that it requires less muscular effort to turn over a low-friction torsion joint as compared to tearing seven to ten cleats through the turf. This is being studied further for documentary proof, but the premise is intriguing: less effort on the turn, less fatigue; less fatigue, less injury.

The foot in swivel shoe

The foot is designed to be quite stable with inversion and adduction: the position of varus. During this phase, the intrinsic muscles are activated and the bones of the feet are compressed to produce a rigid lever so that support and thrust are mechanically more efficient. On the other hand, the position of valgus—eversion and forefoot abduction—is one of relaxation: more unstable and less rigid. Valgus is the position that the nonweightbearing or limited weightbearing foot assumes during recovery, swing-through, foot-strike, and take-off.

At foot-strike, the foot is everted and abducted: after 15%+ of support, this reverses to varus (inversion and adduction), and, at take-off, it again reverts to valgus.

During a conventional turn in conventional cleats, there is a tendency for the posterior rotation of the pelvis and the internal rotation of the femur and tibia to "unlock" the foot—force it into

valgus, which renders it less stable and a less rigid bony lever for thrust and support. In addition, if the rotation continues, the foot may be everted so that it lies on its medial surface and is fixed (Figure 9) in the extreme position of danger.

During a cross-over turn in conventional shoes, the rotation over the cleated foot may increase the varus position so that the foot rolls into extreme inversion and rests on the lateral margin, fixed and potentially dangerous (Figure 10).

The swivel shoe allows the foot, during support while either turn is being made, to remain secure in varus (Figure 11). Rotation is free, and the natural bony rigidity of the foot, held by the intrinsic musculature and the anatomic configuration, remains undisturbed and mechanically efficient. There is little tendency either to invert or evert, because the heel is free to swing around the rotating forefoot in a most natural manner and without the required sudden deceleration of the conventional shoe. Lift-off is from the natural toe-off position.

If these statements referable to knee-joint rotatability are correct, then it is seen how vital the preservation of foot rotation is to the safety of the knee. If there exists a limited protective rotatable capacity in the knee, much of this torque-absorbing capacity must rest within the foot. If the latter is fixed, then the mechanism is grossly hampered.

The notched heel

The majority of forces which drive the knee into valgus or varus (blocking, tackling, and other contact) are applied from the lateral, external surface, producing the valgus knee; the remainder are applied from the medial side, producing the varus knee. But again the stated principles apply: injury occurs if the joints assume abnormal axes and cannot be extricated from harm. The external forces produce the malalignment; the cleated foot prevents the escape. Here, the notched heel becomes important. If the characteristics of the notch are carefully noted, it will be seen that it is perpendicular on the inner margin and slanted 45° on the lateral side (Figure 1). This permits the player to have a modified platform, a cleatless heel which will prevent rigid cleating in



FIGURE 10 — In the cleated-shoe cross-over turn, the superimposed torque rolls the foot into inversion and on to lateral sole margin fixation.

all stages of support. However, it will allow the player to have a crisp "cut"; but this will not fix the heel if forces are excessive. If a player is accustomed to "cutting" in a conventional manner, it is occasionally difficult for him to learn to be a true swiveler: one who spins on his forefoot with the heel elevated. To be most effective, he should be taught to lean on his toes and become conscious that he can turn more effectively and with less energy from his forefoot than he can from the side of his foot. This can be accomplished in about one week of training. During the hopscotching turn, he pushes right foot to left and the perpendicular on the heel will hold him, but not excessively (it will slip to pre-

vent a noncontact rotating injury). However, if he is struck from the lateral side, there is nothing to hold the heel, which will rotate medially (Figure 12) and prevent malalignment of the ankle and knee and avoid the position of danger. This will allow mobility of the foot which, in turn, allows escape from the pathological forces applied either to the medial or the lateral side of the knee (Figure 13).

Although it is not as effective in the prevention of blocking and tackling injuries as it is in the prevention of rotation or noncontact injuries, the combination of the rotating cleat and skidding heel appears to reduce the incidence of these types of injuries.

CONCLUSIONS

In football, injury to the knee and ankle occurs when the joints are forced outside of their normal anatomic axes or beyond the limits of joint motion and corrective alignment, or when extrication from the pathological forces is not possible.

Fixation of the foot is of primary importance in the production of injuries to the knee and ankle; therefore, a mobile foot is vital to the prevention of malalignment of the joints and to the activation of escape from the abnormal forces. Although the foot can be fixed in many different situations, regardless of footwear, the most common cause of fixation is rigid cleating.

The most common position of danger is that of external rotation of the foot and tibia and internal rotation of the femur. In most instances, the foot and tibia are fixed (with the exception of loft), and the femur is moving in a pathological manner. To date, the most effective method of preventing rigid cleating and this resulting dangerous position is by wearing a shoe combining a cleatless heel and swivel cleats. This in no way hampers performance, and it may improve running and turning. In addition, there is reason to believe that fatigue is lessened in a swiveler, which further reduces the potential for injury.

Ⓢ



FIGURE 12 — In a swivel shoe, a lateral force can be mitigated because it is possible for the foot to trail the tibia and femur (insert). A conventional shoe may become fixed.

TABLE I Population of Safety Study

Control Group		Swivel Group		Total	
Number	Per cent	Number	Per cent	Number	Per cent
2373	83.59	466	16.41	2839	100.00



FIGURE 11 — The swivel shoe allows the foot to remain secure in support-varus in either turn. Lift-off is normal.

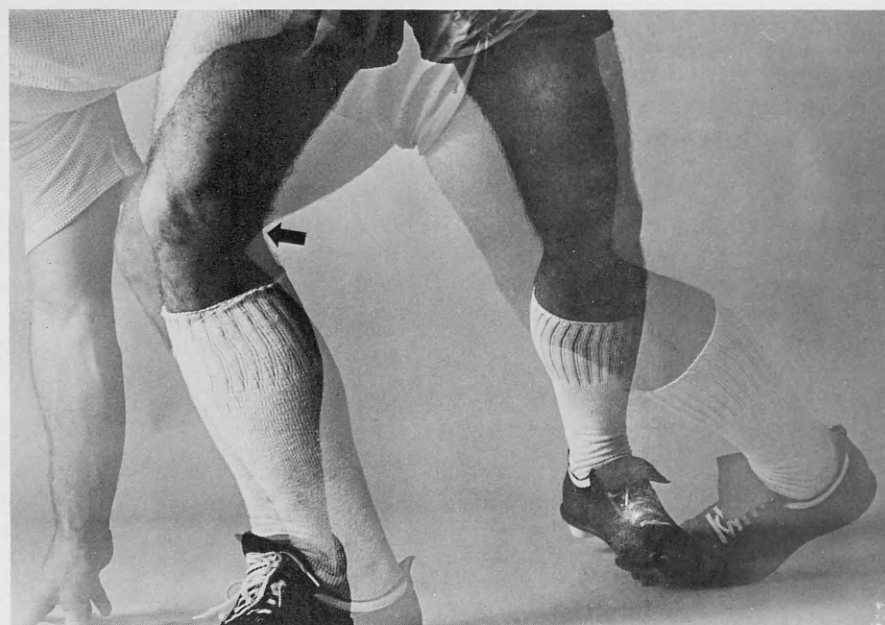


FIGURE 13 — With medial thrust, the same action occurs as noted in Figure 12.

TABLE II Incidence of Injury

Joint Injured	Cleated Shoe 2055		Heel Plate 52		Soccer Shoe 266		Total 2373		Swivel Shoe 466	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Knee	162	7.88	3	5.77	14	5.27	179	7.54	10	2.14
Ankle	174	8.46	4	7.69	15	5.64	193	8.14	14	3.00
Total	336	16.34	7	13.46	29	10.91	372	15.68	24	5.14

TABLE III Safety Factors

Joint	Control Injuries		Swivel Injuries		Safety Factor of Swivel
	Number	Per cent	Number	Per cent	
Knee	179	7.54	10	2.14	3.52
Ankle	193	8.14	14	3.00	2.71
Total	372	15.68	24	5.14	3.05

References

- Hanley DF: Personal communication.
- Rowe ML: Varsity football knee and ankle injury. *NY J Med* 69:3000-3003, 1969.
- Torg JS and Quedenfeld T: The effect of shoe type and cleat length on incidence and severity of knee injuries among high school football players. *Res Quart* 42:203-211, 1971.
- Nicholas JA: Injuries to knee ligaments. Relationship of looseness and tightness in football players. *JAMA*, 212:2236-2239, 1970.
- Nicholas JA: **Internal Derangement of the Knee: Diagnosis and Management.** American Association of Orthopedic Surgeons Symposium on Sports Medicine. St. Louis, C.V. Mosby, 1971, pp. 152-161.

Bibliography

- Abbott LC et al: Injuries to the ligaments of the knee joint. *J Bone Joint Surg* 27:503-521, 1944.
- Ahstrom JP: Osteochondral fractures in the knee joint associated with hypermobility and dislocation of the patella. Report of eighteen cases. *J Bone Joint Surg (Am)* 47:1491-1502, 1965.
- Brantigan OC, Voshell AF: The mechanics of the ligaments and menisci of the knee joint. *J Bone Joint Surg* 23:41-66, 1941.
- Brantigan OC, Voshell AF: The tibial collateral ligament. Its function, its bursae, and its relation to the medial meniscus. *J Bone Joint Surg* 25:121-131, 1943.
- Brantigan OC, Voshell AF: Ligaments of the knee joint. The relationship of the ligament of Humphrey to the ligament of Wrisberg. *J Bone Joint Surg* 28:66-67, 1946.
- Cameron BM: **Shaft Fractures and Pseudoarthroses.** Springfield, Ill, Charles C Thomas Co, 1966.
- Cameron BM, Davis O: The Swivel Football Shoe: A Controlled Study. Exhibit, American Academy of Orthopedic Surgeons Annual Meeting, Chicago, 1970.
- Ducroquet R, Ducroquet J, Ducroquet P: **Walking and Limping. A Study of**

Normal and Pathological Walking. Philadelphia and Toronto, JB Lippincott Co, 1965.

- Ghromley RK: Late changes as a result of internal derangements of the knee. *Am J Surg* 76:496-501, 1948.
- Harrison MHM: The results of a realignment operation for recurrent dislocation of the patella. *J Bone Joint Surg (Br)* 37:559-567, 1955.
- Harmon PH: Intra-articular osteochondral fractures as a cause of internal derangement of the knee in adolescents. *J Bone Joint Surg* 27:703-705, 1945.
- Hardy JH, Duncan WL, Anderson LD: Vascular insufficiency with football injuries about the knee. Report of three cases. *The American Surgeon* 32:155-160, 1965.
- Helfet AJ: Mechanism of derangements of the medial semi-lunar cartilage and their management. *J Bone Joint Surg (Br)* 41:319-336, 1959.
- Holliday M: A preliminary investigation into the effects of spin sole boots on soccer performance. Written communication, 1970.
- House of Representatives, Subcommittee on Commerce and Finance of the Committee of Interstate and Foreign Commerce: H.R. 8110, H.R. 8157, and similar bills regarding synthetic turf. Washington, DC, Nov 1971.
- Hughston JC: Acute knee injuries in athletics. *Clin Orthop* 23:114-133, 1962.
- Hughston JC, Stone MM: Recurring dislocation of the patella in athletes. *Southern Med J* 57:623-628, 1964.
- Hughston JC: Subluxation of the patella. *J Bone Joint Surg (Am)* 50:1003-1026, 1968.
- Hughston JC: Subluxation of the Patella in Athletes. **American Academy of Orthopedic Surgeons Symposium on Sports Medicine.** St Louis, CV Mosby Co, 1971, pp 162-177.
- Jack EA: Experimental rupture of the medial collateral ligament of the knee. *J Bone Joint Surg (Br)* 32:396-402, 1950.
- Kaplan EB: Some aspects of functional anatomy of the human knee joint. *Clin Orthop* 23:18-29, 1962.

- Kennedy JC, Fowler PJ: Medial and anterior instability of the knee. An anatomical and clinical study using stress machines. *J Bone Joint Surg (Am)* 53:1257-1270, 1971.
- Klein KK: An instrument for testing the medial and lateral collateral ligament stability of the knee. *Am J Surg* 104:768-772, 1962.
- Last RJ: The popliteus muscle and the lateral meniscus. With a note on the attachment of the medial meniscus. *J Bone Joint Surg (Br)* 32:93-99, 1950.
- Mee B: Personal communication, London.
- O'Donoghue DH: Surgical treatment of injuries to the knee. *Clin Orthop* 18:11-36, 1960.
- O'Donoghue DH: **Treatment of Injuries to Athletes.** Philadelphia, WB Saunders Co, 1962.
- Petersen TR: The cross-body block, the major cause in knee injuries. *JAMA* 211:449-452, 1970.
- Quigley TB: Knee injuries incurred in sports. *JAMA* 171:142-146, 1959.
- Rall KL, McElroy GL, Keats TE: A study of long term effects of football injury to the knee. *Missouri Med* 61:435-438, 1964.
- Reynolds FC: Injuries of the knee. *Clin Orthop* 50:137-146, 1967.
- Reynolds FC: Diagnosis of Ligamentous Injuries of the Knee. **American Academy of Orthopedic Surgeons Symposium on Sports Medicine.** St Louis, CV Mosby Co, 1971, pp. 178-184.
- Rich JM: **Artificial Turf: An In-Depth Analysis.** thesis. London, Ontario, The University of Western Ontario, 1971.
- Slocum DB: Mechanics of common football injuries. *JAMA* 170:1640-1646, 1959.
- Slocum DB, Bowerman W: Biomechanics of running. *Clin Orthop* 23:39-45, 1962.
- Slocum DB, Larson RL: Indirect injuries to the extensor mechanism of the knee in athletes. *Am J Orthop* 6:248-259, 1964.
- Slocum DB, Larson RL: Rotary instability of the knee. *J Bone Joint Surg (Am)* 50:226-242, 1968.

your library could be providing



ATHLETIC TRAINING

for your students

THE JOURNAL OF THE
NATIONAL ATHLETIC
TRAINERS ASSOCIATION

gives them the largest single source of athletic training literature available. Simply request your library to return this order form, or the necessary information, and payment

(Make all checks payable to: The Journal of the National Athletic Association.)

Thank you.

The Journal of the National Athletic Trainers Association
3315 South Street
Lafayette, Indiana 47904
Gentlemen:
Please enter our subscription for *Athletic Training, The Journal of the National Athletic Trainers Association*, immediately. Enclosed is \$6.00 for a one year subscription to your publication. Our address is:

LETTERS TO THE EDITOR

This section of *Athletic Training* is provided to give interested persons an opportunity to express their suggestions, helpful ideas, and constructive criticisms for the improvement of the NATA Journal. The Editor reserves the right to edit the letters and/or publish such letters or respond to them with a personal reply.

Dear Editor:

This letter comes in regards to the article entitled "Low Back Problems in Athletics", by Francis J. Welk, Volume VIII, No. 1, March, 1973, Page 16.

I am sure it is a typographical and editing error that in the last paragraph on Page 16, he indicates that factors of cause (lordosis) are tightness of the hamstring muscles and weakness of the abdominal muscles. These obviously are factors that decrease lumbar lordosis and do not increase it. I think this is a serious error, and it should be pointed out to your readers. The other three factors that he lists are contributors to increase lumbar lordosis.

Sincerely,
Bernard R. Cahill, M.D.
Peoria School of Medicine
University of Illinois

Dear Dr. Cahill:

The above mentioned article by Francis Welk was printed exactly as it was written by the author. There was no typographical error in the statements you mentioned.

We do not necessarily agree (with the author) that (1) tightness of hamstrings is a contributing factor of lordosis but we do feel that (2) weakness of stomach muscles does contribute to lordosis. In this respect perhaps an editorial error was made in not having the author offer citations to back up that part of his article.

If, in fact, his observations are based only on empirical judgement then we (the editorial board of *Athletic Training*) are guilty of an oversight.

Sincerely,
Editor

Editor's Comments

ATLANTA, HERE WE COME!

In several weeks, many of us will be headed for our 24th Annual Meetings in Atlanta. That grand ole city of the deep south will be the site of the N.A.T.A. Convention, June 10-13, 1973.

Along with the usual fine meetings, exhibits, Awards Banquet, social gatherings and family entertainment, our Association is offering two courses for the trainers.

Early birds to the Convention can take advantage of both courses. The anatomy and physiology course will be held Sunday morning at the Georgia Tech Campus. Then, Sunday afternoon, the Cardio-Pulmonary Resuscitation course will be conducted by the Georgia Heart Association.

It looks like another great convention with something of value for everyone. So, do your best to be a part of the number one professional meeting for trainers.

I CAN'T HEAR YOU

A professional organization is only as strong as its members. They must all help develop their group and its activities in order for it to be as dynamic as possible. Also, the members must be provided with avenues for expression to start the cycle of communication.

With this in mind, ATHLETIC TRAINING is starting three new sections in this issue. "Not For Men Only" will give the women an opportunity to share their ideas. "The Student Trainers Corner" will show the youths' point of view. Of course, "Letters to the Editor" will give all others the chance to help expand the horizons of the Journal and the N.A.T.A.

So, take advantage of the opportunities and let the membership hear from you.

RECRUITING

It is encouraging to note the fantastic growth of our "Calendar of Events" in the last year. More and more people are holding camps, clinics and workshops, especially in the summer months. Those who are involved in such events should use them to expose students to the N.A.T.A.

Discuss the profession with them. Show them the curriculum and certification programs. Explain how they can become student members.

The need for trainers, especially on the secondary level, may bound to fantastic proportions in the near future. We need to recruit tomorrow's trainers today.

See y'all in Atlanta,
Rod Compton

Guide to Contributors

The editor of *Athletic Training*, the *Journal of the National Athletic Trainers Association* welcomes the submission of articles which may be of interest to persons engaged in or concerned with the progress of the athletic training profession. The following recommendations are offered to those submitting articles:

1. All manuscripts should be typewritten on one side of 8½ X 11 inch typing paper, triple spaced with 1 inch margins.

2. Photographs should be glossy black and white prints. Graphs, charts or figures should be clearly drawn on white paper, in a form which will be readable when

reduced for publication.

3. The list of references should be in the following order: a) books: author, title publisher with city and state of publication, year, page; b) articles: family names and initials of all authors, title of articles, the full journal title.

4. It is the understanding of the *Athletic Training* editor that manuscripts submitted will not have been published previously; and that the author accepts responsibility for any major corrections or alterations of the manuscript.

5. It is requested that each submitting

author include with the manuscript a brief biographical sketch and photograph of himself.

6. For reprints, authors are authorized to reproduce their material for their own use.

Unused manuscripts will be returned when accompanied by a stamped, self-addressed envelope.

Address all manuscripts to:

Clinton Thompson
Department of Athletics
Colorado State University
Fort Collins, Colorado 80521

ISOMETRIC AND ISOTONICS: NO COMPARISON

A Comment by the National Federation of State High School Associations and the Committee on the Medical Aspects of Sports of the American Medical Association.

In 1953, Muller of Germany published observations on isometric exercises, arousing great interest in this form of exercise. Many saw it as an easy way to gain strength.

Isometric exercise is a static contraction in which no movement of the body part occurs. Muller revealed that static contractions held for six seconds at two-thirds maximum effort once daily yielded strength gains of five per cent a week. Subsequent studies have shown that the gains in strength are not that dramatic, although strength does improve with this form of exercise.

Soon, there was a desire to compare the effects of isometric exercise with isotonic exercise. Isotonics literally means "same tension". This is a misnomer. Obviously, if the muscle contracts during a dynamic motion, the muscle shortens, and the tension of the muscle increases as it shortens. Thus, the tension of the muscle does not stay the same. Therefore, dynamic exercise is a more suitable term than isotonics. A direct comparison of the strength development from isometric and dynamic exercise is not possible, since the measurement technique would be specific to each form of exercise. However, the advantages and disadvantages of each can be scrutinized.

The advantages for isometrics that make it appealing are mainly administrative:

- No specially designed equipment necessary.

- Limited space necessary.

- Can be done anywhere.

However, the advantages of dynamic exercise are

attractive because of the effect they give.

Contractions move the limb through a range of motion and therefore increase flexibility and strengthen development at all points within the range of motion.

Submaximal exertions increase the strength of a muscle and endurance as well.

The really decisive factors that influence the appropriateness of isometrics for a given athlete depend on the state of his health and the type of muscle strength he wants to achieve.

Isometrics are simply not feasible for many athletes because of the disadvantages entailed in its use:

- Isometrics cause a momentary increase in blood pressure.

- Isometric contraction can be applied at any point of a movement but only at one site at a time.

- Strength gains are specific to the angle at which the static contraction is done.

- Isometrics increase the strength of a muscle but not endurance.

The Valsalva maneuver (whereby pressure within the chest cavity increases because air pressure is exerted against a closed glottis) usually accompanies isometrics. This technique is medically ill-advised for heart patients, athletes with defective heart valves, impaired arterial blood vessels, aneurysms or a compromised heart condition.

Implications for Athletes

If Isometrics are done at 15% or below the maximal contraction possible, the blood pressure rise will be minimal and the exercise can be continued for some time.

Isometrics are very specific to the angle at which they are performed. Therefore, strength gains are specific to the contraction at that same angle.

Since isometrics are so specific, they have very little value as strength developers useful for sports situation with the possible exception of neck muscles.

All athletes with heart or lung (cardiovascular) limitation should refrain from this type of exercise.

Isometrics are useful to prevent muscle atrophy when dynamic exercise is not possible. For example, a player with a limb in a cast is able to undertake a program of isometric exercise and thus rehabilitate himself sooner.

Even after the limb is out of the cast, it might be difficult to perform dynamic exercise right away. Once again rehabilitation might begin with isometric exercise, under the guidance of a physician.

Dynamic exercise has more built in protective features and at the same time offers a more practical strength development program. ■

ATTENTION

all members of N.A.T.A.

we look forward to serving you

write or call us collect



American General
LIFE INSURANCE COMPANY

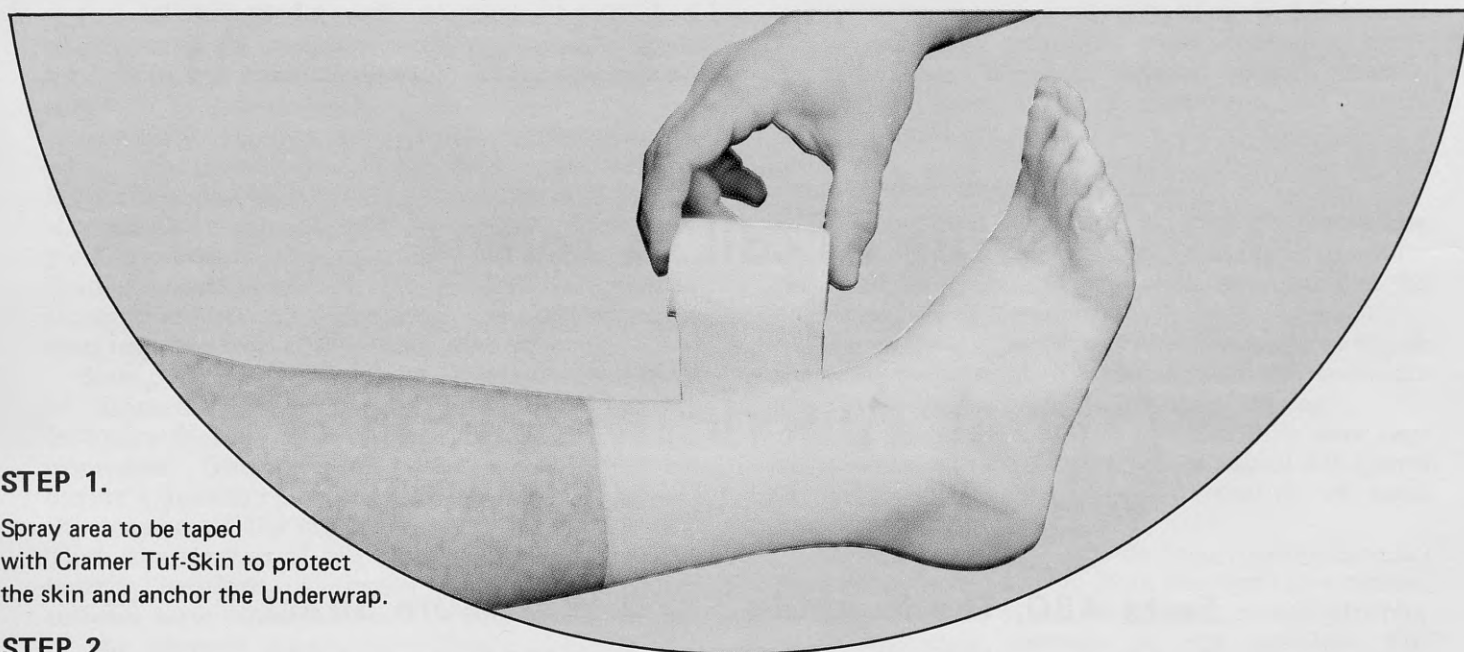
Suite 430, The Rotunda 711 West 40th Street
Baltimore, Maryland 21211 (301) 366-8881

Herbert A. Hedges, Jr., C.L.U.

General Manager



CRAMER TAPE UNDERWRAP



STEP 1.

Spray area to be taped with Cramer Tuf-Skin to protect the skin and anchor the Underwrap.

STEP 2.

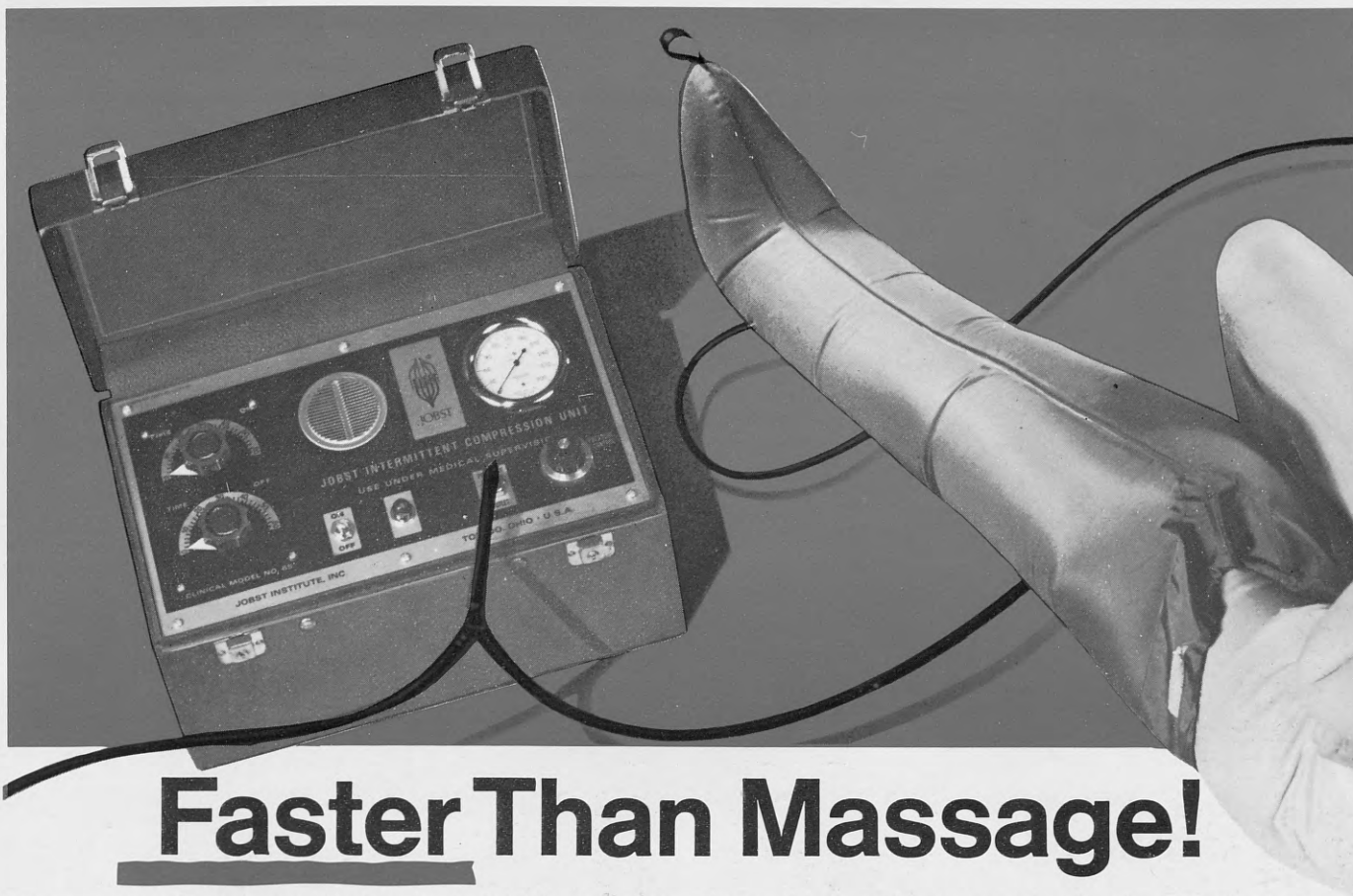
Cover area to be taped with Cramer Tape Underwrap. (The Tuf-Skin film helps secure any pre-tape underwrap which otherwise will slip when skin perspires).

Cramer Tape Underwrap (3" x 30 yd. roll). A tissue thin porous foam that combines perfect conformability with protection.

cramer products, inc.

GARDNER, KANSAS U.S.A. 66030





Faster Than Massage!

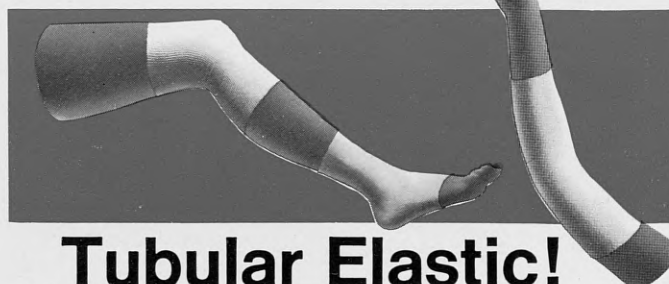
Venous congestion caused by trauma is quickly reduced through use of Jobst Intermittent Compression Unit therapy, often in half the time normally needed for hand massage! And these units won't get tired or traumatize the skin. Their use will prevent venous stasis and edema; will promote circulation and healing.

Many athletic trainers at professional and collegiate levels are finding these units tremendous time-savers. The Jobst Intermittent Compression Unit is offered in four models with ten nylon pneumatic appliances available. For full information and medical references, just fill out and mail the coupon below.



Instant Air Splints!

The Jobst-Jet™ Air Splint offers *instant* control of fractures and injuries. Applied in seconds, gives immediate, even splinting pressure and stops venous bleeding. Transparent, allows observation of injury. Excellent hemostasis and edema control. X-ray transparent, washable and reusable. Offered in seven sizes.



Tubular Elastic!

Jobst Elasto-Net™ Stockinet Tubular Elastic Bandage is made of quality ring-spun cotton and pure natural rubber. It has a one-way stretch in the circumferential direction only. Its mild pressure will help prevent or relieve swelling. Washable or sterilizable by autoclave. Multiple layers may be used to increase pressure.



Jobst Institute

Box 653, Dept. 83, Toledo 43601

Please send full information and medical references on ☐ Intermittent Compression Units ☐ Air Splints ☐ Tubular Elastic Bandage.

Name _____

Institution _____

Address _____

City, State, Zip _____

EQUIPPED.



Give their bodies what they're thirsty for. Gatorade® thirst quencher.

It's more than just another mouth-refresher. Quenches the body's thirst, too.

During heavy workouts, about 2% of total body weight can be lost through sweating away water and salts. With this fluid loss, the thirsty player is likely to slow down. The formula for Gatorade was developed to help replace salts and help overcome the major cause of an athlete's thirst . . . depletion of body fluids.

Make sure your players are "well-equipped," by making sure Gatorade thirst quencher is in your budget.

Details of economical new program available direct or through your team dealer. Write for 10 Point Fluid Replacement Guide and Weight Charts—free. Mail this coupon today.

NEW LOWER PRICE!

WELL-EQUIPPED.



Gatorade® Thirst Quencher
Stokely-Van Camp, Inc., P.O. Box 1113
Indianapolis, Indiana 46206

Yes, please send me full details on your economical new program. Also send a free 10 Point Fluid Replacement Guide and Weight Charts.

Name_____

Position_____

School or
Team_____

Address_____

City_____

State_____ Zip_____

