

**Musculoskeletal Disorders Boot Camp  
Through A  
Sports Medicine Protocol**

**TABLE OF CONTENTS**

- I. Introduction:**
- **Course Description**
  - **Rene Cailliet, M.D.**
  - **Ergonomics Survey**
- II. Hand /Wrist: Pages 1-6**
- III. Elbow Pain: Pages 7-12**
- IV. Shoulder in Distress: Pages 13-16**
- V. Back Injuries: Pages: 17-23**
- VI. Back Therapeutic Exercises: Pages 24-29**
- VII. Knee Anatomy & Pathology: Pages 30-37**
- VIII. Plantar Fasciitis & Foot Pain: Pages 38-39**
- IX. Commitment Contract: Pages 40-41**
- X. Examinations: Pages 42-49**
- XI. Curriculum Vitae: Pages 50-51**

High Tech Sports Therapy Associates, Inc.  
Bruce Madsen, President, AT, CSCS  
(503) 720-3195



# **MUSCULOSKELETAL DISORDERS BLACK BELT BOOTCAMP**

## **REDUCE ERGONOMICS RELATED DISORDERS 50% GUARANTEED**

**Musculoskeletal disorders** are the leading cause of **loss time** injury and disability for working Americans with an annual direct cost of **\$50 billion** in 1999. Medical, time loss, retraining and worker replacement costs push that total **over \$250 billion**.

This thief of profits, production, and quality of life can easily be *cut by 50-75%* with simple "human factors" strategies, not necessarily relying on expensive engineering control solutions.

**Most MSD'S respond to treatment by therapeutic exercise and surgical intervention is usually not effective or required**" Rene Cailliet, M.D. Head of Rehabilitative Medicine U.S.C. Medical School.

### **You will learn the simple root cause / root solutions for:**

- ◆ Plantar fasciitis
- ◆ shin splints
- ◆ shoulder impingement
- ◆ carpal tunnel syndrome
- ◆ trigger finger
- ◆ Pitchers elbow
- ◆ lateral epicondylitis
- ◆ neck/back/knee disorders
- ◆ tendonitis
- ◆ Bursitis

(Individualized consulting will be provided during seminar.)

**How to: Pass a written and practical exam demonstrating an applied mastery of the root causes and root solutions to the body part specific Musculoskeletal disorders.**

How: Joint alignment, lubrication, blood flow, muscular balance, micro breaks and warm up can **eliminate 75% of all musculoskeletal disorders.**

How to: Secure tangible expressions of **management support** and immediately apply what you have learned for financial and human impact.

***Come rested and pack a lunch—you'll need it!***

Bruce Madsen 503-720-3195

# RENE CAILLIET, MD

*Professor Emeritus and Chairman  
Department of Physical Medicine and Rehabilitation*

**U. S. C. SCHOOL OF MEDICINE**  
*Los Angeles, California*

***“Many, if not most, painfully disabling musculoskeletal injuries respond to treatment by mechanical means (therapeutic exercise); and surgical intervention is usually not effective or required.”***

***“Normal use and normal movement places no stress on soft tissues.”***

***“The patient with musculoskeletal pain wanders from physician to physician in quest of relief or at least an explanation of their discomfort. Medications are prescribed to decrease pain and inflammation, while the source of the problem remains unrecognized and therefore goes ..... (untreated)”***

---

# STRAINS & SPRAINS OBSERVATIONS

Date: \_\_\_\_\_ Name (optional): \_\_\_\_\_  
Work Location: \_\_\_\_\_ Job: \_\_\_\_\_  
Shift: \_\_\_\_\_ Supervisor: \_\_\_\_\_

## General Ergonomic Risk Factors:

### Safe / at Risk

- \_\_\_/\_\_\_ Increased weight.
- \_\_\_/\_\_\_ Increased bulkiness.
- \_\_\_/\_\_\_ Accelerated movement speed.
- \_\_\_/\_\_\_ Vibration (general body/body part specific.).
- \_\_\_/\_\_\_ Increased frequency of movement.

### Safe / at Risk

- \_\_\_/\_\_\_ Increased duration of movement.
- \_\_\_/\_\_\_ Contact stress; hard/sharp.
- \_\_\_/\_\_\_ Static loading.
- \_\_\_/\_\_\_ Awkward postures.

---

## Body Part Specific

### Head and Neck:

\_\_\_/\_\_\_ Neck in neutral position 85% of time. **Back:**

### Shoulders:

\_\_\_/\_\_\_ Relaxed not shrugged and tightened.

### Elbows:

- \_\_\_/\_\_\_ No more than 45° away from body.
- \_\_\_/\_\_\_ Excessive reach forward or overhead.
- \_\_\_/\_\_\_ Carry load hugged close to body.

### Hands and Wrists:

- \_\_\_/\_\_\_ Straight and neutral.
- \_\_\_/\_\_\_ Relaxed grip pressure.
- \_\_\_/\_\_\_ Fitted slip-resistant padded gloves.
- \_\_\_/\_\_\_ Adjustable 1-1/2" padded handle.
- \_\_\_/\_\_\_ Work with either or both hands.
- \_\_\_/\_\_\_ No pinch grip.

- \_\_\_/\_\_\_ Not twisted (move feet, toe pivot).
- \_\_\_/\_\_\_ No forward rounding during lift.
- \_\_\_/\_\_\_ Not bent at waist (lift with legs).
- \_\_\_/\_\_\_ Use rocking motion when standing.

### Knees:

- \_\_\_/\_\_\_ Squatting (knees over ankles, rear back).
- \_\_\_/\_\_\_ Erect posture up and down stairs.
- \_\_\_/\_\_\_ Kneeling on hard surface.

### Feet:

- \_\_\_/\_\_\_ Quality, well-padded shoes/no excess heel.
- \_\_\_/\_\_\_ Feet flat, shoulder width apart.
- \_\_\_/\_\_\_ Appropriate padding at workstation.

Here are some simple strategies to successfully deal with ergonomic hazards:

- ✓ Pre-lubrication of the soon-to-be worked body part with 2-3 minutes of joint specific rhythmic therapeutic exercises.
- ✓ Take regular 5-15 second micro breaks as you begin to feel distress in the target body part. A totally fatigued muscle recovers 30% in 3 seconds, 60% in 10 seconds, and 90% in one minute of rest.
- ✓ Don't go all out in the beginning of the task, but allow 2-3 minutes of gradually increasing effort.
- ✓ Use the least amount of force necessary to safely and successfully complete the task.
- ✓ Use the best possible alignment for all joints—use Padding and preferred work method.
- ✓ Stop, engage your brain, and employ any tool necessary to reduce the force to the body.

*High Tech Sports Therapy Associates, Inc. This is a licensed intellectual property. All forms of transcription are prohibited.*



## **Pain Free / Injury Free Examination**

- 1. Why do all injuries occur?**
- 2. Based on this equation name two methods of injury prevention?**
- 3. What are the two primary methods of excessive load?**
- 4. How does PERSONAL PROTECTIVE EQUIPMENT reduce injuries?**
- 5. Name 8 types of PERSONAL PROTECTIVE EQUIPMENT?**
- 6. How do you increase human capacity?**
- 7. Name 8 types of capacity elevators.**
- 8. Name 6 conditions that induce mental errors.**
- 9. Once an injury occurs how does that effect the load to capacity equation?**
- 10. Does the no pain/no gain philosophy apply to therapy on injured body parts?**
- 11. Why not?**
- 12. How does attitude affect safety?**

## ***ERGO II RISK FACTORS***

### ***INTELLECTUAL EXAM***

- 1) ***WEIGHT***: As handled items increase in weight a point is reached where load exceeds capacity. ***Know the load, know your capacity***. Caveat: Do not underestimate lightweight items and use poor lifting technique. The heaviest item most people lift daily is their **torso extended out like a boom crane** creating between 700lbs. to 1000 lbs. of force on the low back depending upon the persons weight distribution and length of the individual torso.
  - 2) ***BULKINESS***: Large bulky items are difficult to grasp and do not allow you to apply your grip strength. Extending your arms to reach the far side of a bulky item **increases the leverage** and force on the body part. It is harder to find the balance point of bulky items creating imbalanced loads. Bulky items obscure vision and increase **contact with unintended items** creating jerk, slip and fall hazards.
  - 3) ***SHOCK LOADING***: AKA accelerated movement speed is the greatest ergonomic risk factor. Self propelled high-speed human movement, (banging on tools) **increases force up to 10X**, greatly increasing the load. Use a longer lever arm or power tools. Many items propelled by **gravity accelerate at 32ft per sec. per sec.** (humans, nuts, bolts, tools) If these accelerating items strike a human the force on contact can be very high depending upon the distance dropped and the shape and weight of the item. Do not jump from elevated platforms, or be in the **line of fire**. Power tools (vehicles, saws, grinders, etc.) can propel items at high speeds into humans where load can exceed capacity. Contact with **electrical current** is astronomical accelerated movement speed and is **our #1 injury risk factor.**
  - 4) ***VIBRATION***: Following the use of a Jack Hammer there is usually a **delayed response** from when the brain tells the hands to open and the fingers unclench from the handle. This delayed response is an indication of **neural and tendon dysfunction**. Vibration from motorcycles, impact wrenches, and other equipment can irritate nerve conduction and tendon function causing tenosynovitis and carpal tunnel syndrome. **Use gel coated gloves or other dampening agents.**
-

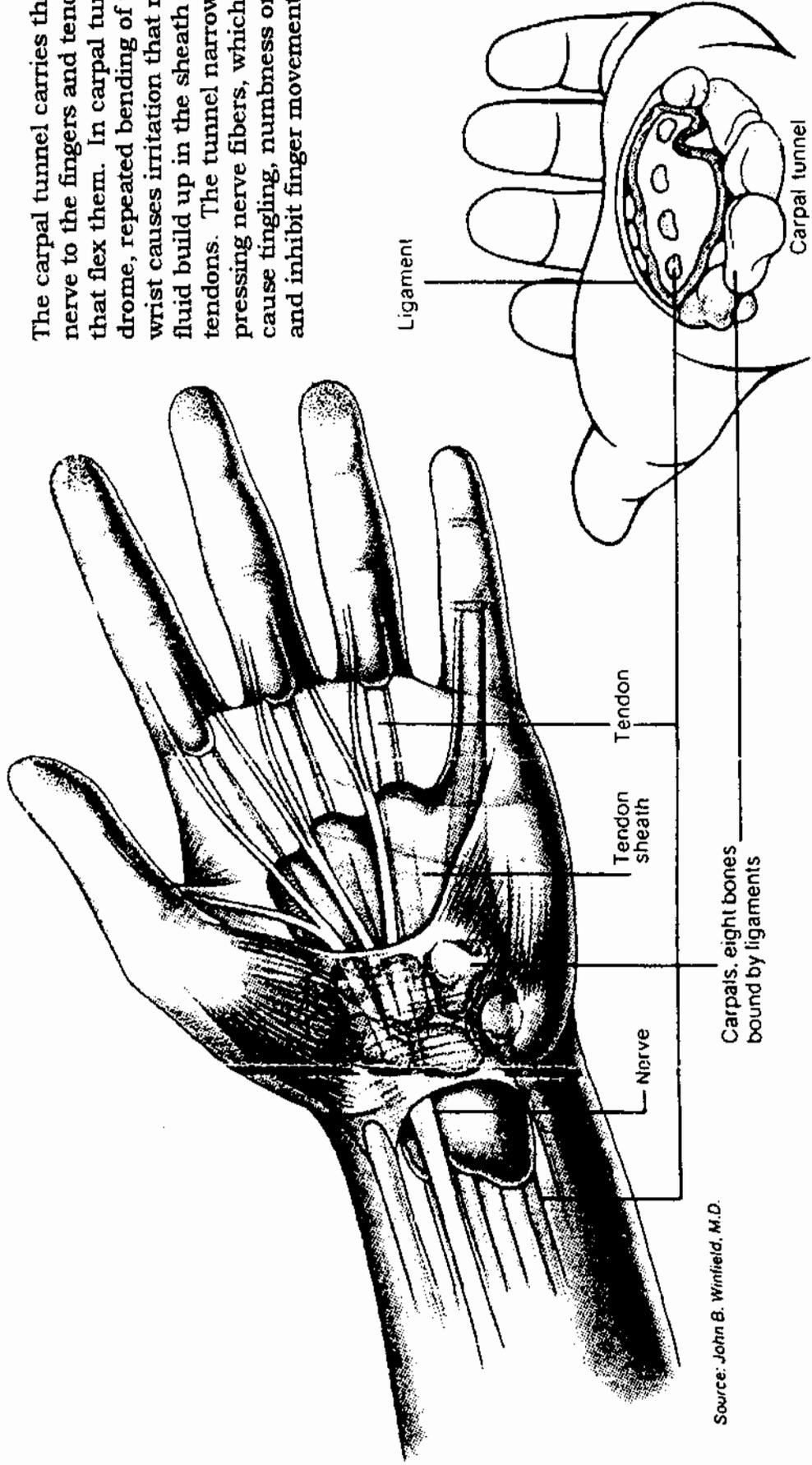
- 5) **FREQUENCY HIGH:** High frequency “red line” RMP movements. High speed activity, (Rapid: typing, walking, wrenching, etc.) begin to fatigue the musculoskeletal system resulting in a *build up of exhaust fumes*, temperature and lubrication reduction causing swelling in the tendons, sheaths, and bursa sacs. Start slow and take frequent micro breaks.
- 6) **DURATION:** The lifecycle of any task is warm-up, comfort, and then fatigue. The longer you perform any task the working body parts begin to reach fatigue resulting in *pain, stiffness* and *musculoskeletal disorders*. Take micro breaks, change tasks, and change body positions.
- 7) **CONTACT STRESS.** Stepping on a nail, kneeling, tight shoes, leaning on your elbows, and standing on a ladder are examples of contact stress. When you distribute a *load over a small surface* area of the body, particularly if the item you contact is *hard* or *sharp*, the contacted item can dent and compress the tissue slowly *cutting off the blood supply causing damage or death to* the tissue. Sharp items can puncture and cut human tissue resulting in severe injury or death. Pre-lubricate with rhythmic activity, take micro-breaks, employ padding, change work methods, and distribute the load over a larger surface area.
- 8) **STATIC LOADING:** Low or no movement body positions (Driving, Mechanic, Standing, Dental Hygienist) held for prolonged times are examples of static loading. Static loading damages tissue in three primary ways. A) When a muscle *contracts and holds* the muscle acts as a *partial tourniquet* raising blood pressure while diminishing blood supply. B) Rhythmic movement causes tendons and bones to gently brush against bursa sacs and tendon sheaths resulting in a weeping release of the lubricant synovial fluid. Static loading applies a non-rhythmic working pressure to the musculoskeletal system *disallowing synovial fluid release*, resulting in friction, heat, swelling, and seizure. Tendonitis, bursitis, arthritis can all result from static loading. C) Static loading places an unrelenting load on specific body parts and does not allow rest in the loaded region by redistributing the load to other muscle bundles. This unrelenting load quickly fatigues target body parts. Move rhythmically, take micro-breaks, pre-lubricate, change tasks and work methods.
-

9) **AWKWARD POSTURES:** The *lowest stress* on joints and their surrounding tissue is when they are *straight*. Passing through each joint are a variety of hoses, cables, and electric wires (Blood vessels, tendons, and nerves). When a joint is bent for a prolonged period of time you diminish the flow through the various structures essentially *kinking the hoses*. The discomforts you feel when flying coach, sleeping on a love seat or working under a cabinet sink are greatly attributed to awkward postures resulting in kinked hoses and diminished flow. *Just as kinked hoses fray and wear out more quickly* kinked human hoses become irritated, swollen, and develop scar tissue. Keep the joints straight, pre-lubricate, micro-breaks, redesign the work, provide ergonomically correct tools.

# HAND IN DISTRESS

## A Hand in Distress

The carpal tunnel carries the main nerve to the fingers and tendons that flex them. In carpal tunnel syndrome, repeated bending of the wrist causes irritation that makes fluid build up in the sheath of the tendons. The tunnel narrows, compressing nerve fibers, which can cause tingling, numbness or pain and inhibit finger movement.



Source: John B. Winfield, M.D.

Illustrations by Michael Reingold

## **CARPAL TUNNEL SYNDROME**

**References: Rene Calliet, M.D., Chair of Rehabilitative Medicine at USC., and  
Kenneth M. Wilson, M.D., Board Certified in Hand and Microvascular Surgery**

- 1.) **How important are your hands?** A relatively large portion of the brain is dedicated to control and operation of the hands, indicating their importance to the body. The hands are considered the most important tool in industry and extremely important to each of us in virtually all our activities.
- 2.) **What would happen if your hand were in a cast?** The hand and fingers cannot survive even brief immobilization.
- 3.) **What is the carpal tunnel?** The carpal tunnel is a narrow space about the diameter of a finger. It runs from the base of the wrist into the hand. The carpal tunnel is the passageway for nine tendons and ligaments and the median nerve. This tunnel space is formed on three sides by the carpal bones of the wrist. A heavy ligament creates the fourth side.
- 4.) **What is the problem?** The fact that so many structures pass through such a small space that relatively minor swelling can create pressure on the median nerve and loss of function in parts of the hand.
- 5.) **What is the origin of the median nerve?** The nerve has its roots coming out of the spinal cord at the sixth cervical vertebrae through the first thoracic vertebrae with four roots in all. The nerve can be pinched or damaged at any place from origin at the spinal cord to the end point in the fingers but the most common pinch point is at the carpal tunnel.

- 6.) **How do you know where the impingement occurs?** A doctor can diagnose this based on where in the extremity the muscles and sensory impairment occurs. The higher up the arm the symptoms, the higher up the nerve impingement.
- 7.) **What are the signs and symptoms of carpal tunnel syndrome?**
- a) A nighttime "pins and needles" feeling in the thumb and the neighboring 2 1/2 fingers.
  - b) Difficulty in thumb movement (clumsiness, dropping things).
  - c) Recreate symptoms by prolonged flexing or extending of hand or manual compression of ulna and radial arteries.
  - d) Relief of symptoms by immobilizing wrist.
  - e) Objective sensory and motor loss on examination.
  - f) Slowed nerve conduction velocity on EMG test.
  - g) Blueness, indicating poor circulation fingers.
- 8.) **What are some common causes of carpal tunnel syndrome?**
- a) Systemic, Non-job related:
    - 1) Diabetes mellitus
    - 2) Hypothyroidism
    - 3) Arthritis
    - 4) Alcoholism
    - 5) Pregnancy
    - 6) Birth control pills
  - b) Work related causes:
    - 1) Repetitive motion (keyboard, cash register, assembly lines).
    - 2) Vibration (driving, pneumatic tools, small engine equipment).
    - 3) Toxins (fumes, chemical reactions, heat).
    - 4) Palmar compression (shoe making, packing).
    - 5) Repetitive power grip (metal fabrication, lumber work).

- 9.) **What causes the inflammation and nerve impairment?**
- a) Flexing wrist increases pressure on median nerve 1x.
  - b) Extending wrist increases pressure on median nerve 3x.
  - c) Grasping more tightly than is needed to perform the task.
  - d) Prolonged hard use without rest.
  - e) Reduced blood supply to the nerves due to cold temperatures or improper wrist position.
  - f) Extended pressure on palm and heel of hand (bent over position while biking).
  - g) General overuse of hands and tendon inflammation.
- 10.) **Can any other problems mimic carpal tunnel syndrome? Yes.**
- a) Dislocated carpal bones.
  - b) Two types of fractures.
  - c) Rheumatoid arthritis.
  - d) Tumor.
- 11.) **How can we prevent carpal tunnel syndrome?**
- a) Be aware of your body and maintain it through proper exercise—stretch your forearms.
  - b) Design your workstations so the wrists can remain in a neutral position and total body posture is ergonomically correct.
  - c) Take brief but frequent interruptions during work to change tasks.
  - d) Use the least amount of hand pressure needed to perform tasks.
  - e) Wear padded gloves to avoid vibration.
  - f) Sleep with wrists straight.
  - g) Change the diameter of tool handles to 1½” to reduce grip pressure.
  - h) Wear properly fitting ‘grippy’ gloves.

## ***FOREARM STRETCHES*** ***CARPAL TUNNEL SYNDROME PREVENTION***

### **PART ONE**

The hand is overused in the closing clamping action, which alone can cause CTS. To counterbalance the excessive closing clamping action sit down and place your hands palm down with your forearms resting on your thighs and your hands dangling off your kneecaps. Slowly spread your fingers and pull your hands back, pause and slowly return to the starting position. Repeat this action 15 repetitions. Rest for one minute and repeat 15 more repetitions. Do not force the positions. Gentle slow movements are essential.

### **PART TWO**

Begin with the elbow straight:

- Arm is raised to shoulder height if able.
- If ones shoulder is involved, the arm can be held at a lower level.
- Turn the hand so the palm is facing the floor,
- Now pull the fingers back towards your face (up and back).
- Grasp the center of the hand with the other hand and gently apply more of a stretch, pulling the fingers more towards the face. Only apply enough tension to feel a slight stretch. If you experience any burning or cramping, you are pulling the hand too far back.
- Move slowly, in and out of the stretch, take 2 – 3 seconds.
- Hold the stretch for 10 – 15 seconds.
- Continue to breathe as you hold the stretch and focus on relaxing the muscle. You should only feel a pull along the under side of the forearm (the side of the forearm closest to the floor).



### **PART THREE**

With the hand still in this same position, relax the stretch.

- Now take the fingers and roll them towards the floor (down and under).
- Grasp back of the hand; gently pull the fingers down and under.
- Again only apply enough pressure to feel a gentle pull along the top of the forearm.
- Remember to move slowly in and out of the stretches, 2 – 3 seconds.
- Hold the stretch for 10 – 15 seconds.
- Continue to breathe.

Repeat Part One and Two, alternating between the two stretches 4 – 5 times whenever you feel tension developing in the forearms or at the wrists. If you experience joint pain, back off the stretch, you may be too aggressive.

# FLEXIBLE SOLUTIONS TRAINING

*Exclusively designed for*

## **HAND THERAPY**

- ◆ *FIRST HEAT MUSCLES THROUGH RHYTHMIC ACTIVITY*
- ◆ *MOVE SLOWLY IN AND OUT OF THE STRETCH, 2 - 3 SECONDS*
- ◆ *HOLD STRETCH WITH GENTLE TENSION FOR 10 - 15 SECONDS*
- ◆ *BREATHE EMPHASIZING RELEASE AND RELAX*
- ◆ *AVOID RUSHING THROUGH THE TRAINING*

Hand Circles. Target. Warm up fore arm muscles. Relax hand and circle at wrist right then left.

Hand Extension. Target. Hand and forearm. Slowly open hand fully with fingers spread. Relax allowing hand to partially close then repeat 4 or 5 times.

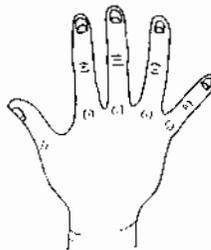
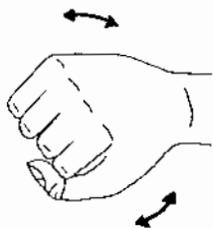
Hand Open-Close. Target hand fingers. Gently slowly open and close hands. Do not use force. If this movement causes discomfort in any finger or joint you may need to use the other hand to guide the painful digit through a pain-free range.

Radial ulnar deviation Target. Wrist. Elbows near sides arms extended forward parallel to floor, hands open palms facing each other. Move hands at wrist so fingers point down then up( max range of motion is about 45 degrees in each direction.

Thumb circles. Target. Thumb. With hands open and relaxed create circles with the thumbs for in each direction

Forearm Stretch. Target: Carpal tunnel prevention, forearm flexors and extensor. Extend right arm with fingers pointing up and use left hand to gently pull hand and fingers back to a comfortable stretch. Hold 10 seconds and relax. Point fingers down, place left hand above top knuckles and pull gently downward. Hold 10 seconds and relax. Repeat full sequence on left side.

If you discover fatigue or discomfort in your shoulders while doing any of these exercises, relax your shoulders and perform the exercises with your arms hanging at your side



## **ELBOW PAIN**

Pain in the elbow that radiates down the forearm towards the wrist is common and often disabling. There are such a large number of potentially damaged nerves and structures in the elbow joint appropriate medical diagnosis and treatment is always advised (a sports medicine physician).

The following muscles act on the elbow: brachialis, long and short heads of biceps and triceps. The muscles that originate directly from the inner elbow (medial epicondyle) are the wrist flexors and from the outer elbow (lateral epicondyle) the wrist extensions.

For the scope of this article, we will discuss only irritations to the tendon attachment points on the inner elbow (medial epicondyle) and outer elbow (lateral epicondyle).

**Why does the elbow and forearm hurt with these conditions?**

*Muscles attach to bones by a connective tissue called tendons. When the tendons partially detach or become irritated they swell and release pain-causing chemicals.*

**What causes the tendons to become irritated or partially detached?**

- 1. Abnormal tension on a normal joint.*
- 2. Normal stress on a normal joint when that joint is neither prepared nor accustomed to the particular activity.*
- 3. When the load placed on the tendon exceeds the current load bearing capacity of the tendon through excessive weight, range of motion, repetition, or static load.*

**Can you provide some everyday examples?**

1. *Baseball pitching.*
2. *Tennis*
3. *Holding a tool with a tight grip for a prolonged period of time: chainsaw, jack hammer, shovel, hammer, knife, weight lifting, kayak oaring, water skiing, mechanic, concrete finishing, etc.*

**Why does just a tight handgrip on an item without moving the elbow cause these problems?**

*You will notice when you squeeze your hand or move your wrist the muscles and tendons around the elbow move and stand out. This is because the forearm muscles that move the wrist attach on the inner and outer elbow (medial and lateral epicondyle). When the forearm muscle tightens during handgrip activities the muscles and tendons are working but without rhythmic movement. This condition is known as static loading. When a muscle moves rhythmically the tendon is greased by the lining that surrounds it allowing the tendon to glide smoothly during the activity. With static loading, the tendon has all the work demands but without the benefit of lubrication from the synovial fluid being released from the tendon sheath. It is the mechanical equivalent of revving up your car engine but without the oil leaving the oil pan. Ouch!*

**How hard or long do I have to squeeze to cause these problems?**

*That depends on the current strength, flexibility, muscular endurance, heat through blood flow, and lubrication through rhythmic movement of the target muscles and tendons.*

*I have seen lateral epicondylitis caused by six hours of holding the top of a 4 ounce paint cup with a finger tip pinch grip while painting—pretty light demand.*

*I have also seen the pinch grip (where the thumb opposes the index and middle finger) used to pick up and hold just six pieces of paper doing filing work for eight weeks, eight hours a day cause lateral epicondylitis.*

**How long does this problem usually last?**

*The average duration is eighteen months.*

**Why so long?**

*The person continues to irritate the tendon before it fully has a chance to self-repair. I call this scab pick behavior.*

**How can I avoid this problem?**

*The wrist has six basic ways of movement. If your work or recreational activities demand challenging hand, wrist, and elbow activities you need to prepare the muscles and tendons for these demands.*

- 1. Before doing the target activity, pre-grease and pre-heat the muscles and tendons. At rest 80% of your blood supply is in the head, rib cage and abdominal organs. Muscles and tendons that have a limited blood supply during inactivity are cool and less elastic and are more prone to injury.*
- 2. Start with slow wrist circles in your pain free range of motion for one minute in each direction.*
- 3. Move the hand up and down twenty times with the back of the hand towards the ceiling (wrist extension) in your pain free range of motion.*
- 4. Do the same move but now in the palms up position (wrist flexion).*
- 5. Do the same move but now in the thumbs up position (ulnar and radial deviation).*
- 6. Now rotate from the palms up to palms down position twenty times in your pain free range of motion (pronation to supination).*

7. *If there will be extreme forces placed on the wrist and elbow progressively, add very gradual increments of weight. The wrist is not equally strong in all the various movements. Palms down position is 1/3-1/2 as strong as palms up (caution). Thumbs up position is 1/5 as strong as palms up (caution).*
  
8. *Start with the weight of a butter knife. When you can comfortably perform twenty-five reps through the full normal range or motion at two seconds up, three seconds down pace for three consecutive workouts every other day and experience no muscle or joint pain or discomfort at any time in the 24-48 hours after exercise, then you can increase the work load by 5-10%. Continue to gradually increase the weight until the training workout is a greater challenge than the real life activity. Maintain the training at that level on a 1-2 times per week basis for maintenance purposes. Caution: joint pain is always a "no" signal. What some people call training is actually an irritant and damage to the tendon and joint can occur. As your strength increases always perform two warm up sets at lightweight and high reps to pre-grease and pre-heat the tendon before full workload is applied to the muscles and tendons.*

**I'm really busy and I know I won't take the time to do your comprehensive program. What will give me the most benefit for the least time?**

*Perform all exercises immediately before at risk activities:*

1. *One minute each of clock and counter clockwise wrist circles.*
2. *15 seconds of each forearm stretch (flexion and extension).*
3. *Begin gradually with the specific work or recreational activity.*
4. *Do not go all out at the start.*

**Do you have any other tips to minimize hand, wrist and elbow problems?**

1. *Proper fitting, slip resistant gloves.*
2. *Ergonomic shaped handles on tools.*
3. *Take micro stretch breaks frequently.*
4. *Switch hands when safe and possible.*
5. *Use the least amount of grip pressure to safely do the task.*
6. *Avoid pinch grip by employing alternative grip methods.*
7. *Hooked fingers are stronger than clamped hands, employ hook grip when possible.*

**Is total rest and immobilization of the wrist and elbow ever appropriate?**

*Yes. When the tendon is so badly injured that basic tasks like holding a coffee cup, brushing your teeth, carrying a briefcase, opening a door, etc. are irritating.*

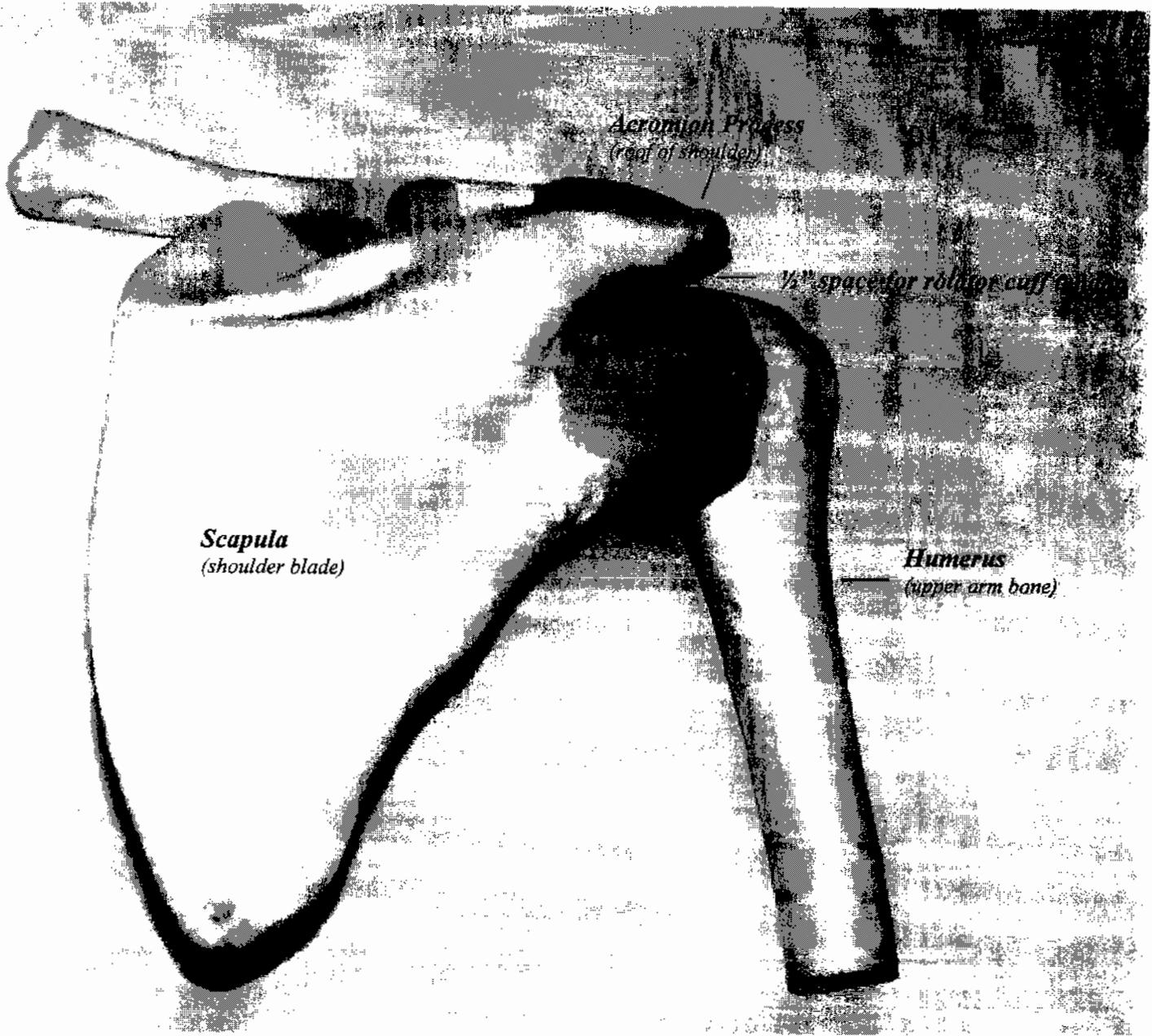
**What should I do?**

*Perform tasks of everyday living with the non-injured arm. Many people say that is not possible, I must use my dominant hand for work, play and daily living. However, when the tendon and elbow become so damaged and painful that your physician says surgery is the only option, guess what? You will be resting it for 2-3 weeks post surgery. Pay now or pay later, but you're going to pay. Problem: total immobilization will result in the tendon starting to glue or adhere to it's lining. To avoid this problem: one time per day move the wrist slow and controlled through its limited pain free range of motion. This will lubricate the tendon sheath connection and avoid the adhesions. To further reduce inflammation, apply 7-10 minutes of ice to the injury one or two times per day for two to three weeks. The tendon will gradually repair itself, the inflammation will subside and you can gradually reacquire the temporary losses in strength, flexibility and muscular endurance. Use the progressive gradual steps of reconditioning outlined previously in this article.*

**Any final comments?**

*Yes. Lack of use of any body part results in losses in strength, flexibility, muscular endurance, bone density, muscle coordination, and general load bearing capacity (atrophy—if you don't use it, you lose it). Remember all injuries occur when load placed on body part exceeds current load bearing capacity of that body part.*

*At the other end of the spectrum, working any body part more aggressively than it's current capacity will tolerate always results in an injury. Match your warm up, work and training programs with the existing capabilities of the body part. Listen to the signals coming from your body. Stimulate but don't irritate.*



# ***SHOULDER JOINT***

## ***ROTATOR CUFF SHOULDER IMPINGEMENT***

High Tech Sports Therapy Associates, Inc.

## **A SHOULDER IN DISTRESS**

### ***Rotator Cuff Shoulder Impingement***

#### **THE PROBLEMS:**

- 1) The upper arm bone (humerus) fits loosely in a shallow depression (glenoid-fossa) against the shoulder blade (scapula).
- 2) This loose fit allows for maximum range of movement in the shoulder but presents the possibility of misalignment and dislocation.
- 3) The rotator cuff tendon runs in a small 1/4-1/2" space between the top of the upper arm (head of humerus) and the roof of the shoulder bone (acromion process).
- 4) After years of general work or sports activities that involve throwing, pushing or pulling movements, the upper arm bone slowly creeps up and rubs on the rotator cuff tendon. A one time trauma can also cause this problem. The chest and lats are employed during push/pull activities and both of those muscles exert an upward pulling force on the humeral head.
- 5) The posterior rotator cuff muscles (supraspinatus, infraspinatus, teres minor), which pull the humeral head down and in are only employed during external rotation of the humerus (the action as when opening both flaps of a trench coat). These muscles are rarely employed in everyday activities leaving the muscles that pull the humeral head down weak and imbalanced compared to the chest, lats, and subscapularis.

#### **THE POSSIBLE TREATMENTS:**

- 1) Oral anti-inflammatory. Drawback: abdominal pain, tissue damage, masking of symptoms, doesn't pull humeral head down.
- 2) Injected steroids. Drawback: three injections in 12 months begins to destroy the cartilage and soft tissue in the joint, does not pull humeral head down.
- 3) Shoulder surgery. Drawback: infection, arm paralysis, long rehabilitation.

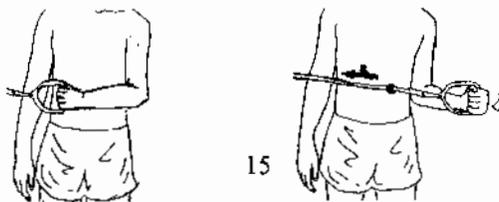
#### **SPORTS MEDICINE SOLUTION:**

Perform therapeutic exercises that strengthen the posterior rotator cuff muscles (supraspinatus, infraspinatus, teres minor) which gradually pull the bone down out of the roof of the shoulder eliminating the tendon rub. Root cause of pain eliminated. Drawback: Requires precise skill and patience. No pain no gain training does not apply to damaged tissue. Any excess in range of motion, repetitions, weight, sets, or speed will result in more tendon irritation and internal scab pick. Avoid all activities that cause shoulder discomfort. No pain during activity, an hour later, or the next day. The fastest path for recovery is when you experience no setbacks. The patience of Job and the precision of a Brain Surgeon are required when performing your therapeutic exercises.

# A SHOULDER IN DISTRESS

## *Prevention and Treatment of Rotator Cuff Shoulder Impingement*

1. Most people with shoulder pain should start with no resistance and gradually increase their range of motion every 3<sup>rd</sup> day as tolerated. Once full range of motion is reached (90 degrees) then you can add one repetition every 3<sup>rd</sup> day increasing from 8 to 20. Then you can graduate to using the band. Caution, any overdose of therapy exercise picks at the internal scab on the tendon and causes a setback. More work does not equal faster results.
2. Begin with the band securely attached to waist high fixed object.
3. Stand with your elbow at your side and the elbow bent to 90 degrees with the tubing in the hand to be exercised and the palm of that hand touching your stomach.
4. Your working shoulder will be farthest away from the fixed object and grasp the handle with hooked, rather than clamped fingers insuring blood flow.
5. Stand at such a distance to just take the slack out of the tubing (it should not be sagging, and it should not be stretched tight).
6. Keeping the elbow tight to your side slowly begin to move the hand out away from the stomach. Some portion of your forearm should always contact your abdomen. Place a kitchen towel between forearm and abdomen to insure constant contact.
7. Stay in the pain free range of motion, full range of motion is the hand straight out in front of you, 90 degrees from the starting position.
8. You will find that beginning this exercise you may only be able to move in an arch that is only 2 inches. This is fine, stay in your pain free range of motion for 8 – 10 repetitions for 3 days and then test the range to see if you can go farther without pain. If you can, stay at the new range for another 3 days of 8 – 10 repetitions until you are to the target range of motion, pain free for 3 days.
9. Once you have attained full range of motion pain free, you may add one repetition every three days if no pain is experienced, up to 20 – 25 repetitions.
10. You should only feel a slight warm sensation in the upper shoulder, around your shoulder blade. If you experience any discomfort in the front of the shoulder, or down the arm this is joint pain and you have over done the strengthening.
11. There should be NO PAIN, during exercise, one hour after exercise or the next day. If such pain occurs, stop the exercise and back down to the original 8 repetitions in the pain free range of motion the next day.
12. Upon reaching 25 full range repetitions you can now increase the weight by moving six inches farther away from the fixed object. You must reduce your reps back down to 10 and gradually increase reps one every other day, back up to 20-25. At this point a second set of 10 reps can be added. Increase reps and weight following previous pattern. **Caution:** *the best throwing athletes do not exceed 5 lbs. on this exercise even with a healthy shoulder. The rotator cuff muscles are tiny joint stabilizing muscles 1/15<sup>th</sup> the size of your biceps. I tore my rotator cuff on this exercise being too aggressive with the weight. Yellow or green tubing can be purchased by calling 1-800-421-1791.*

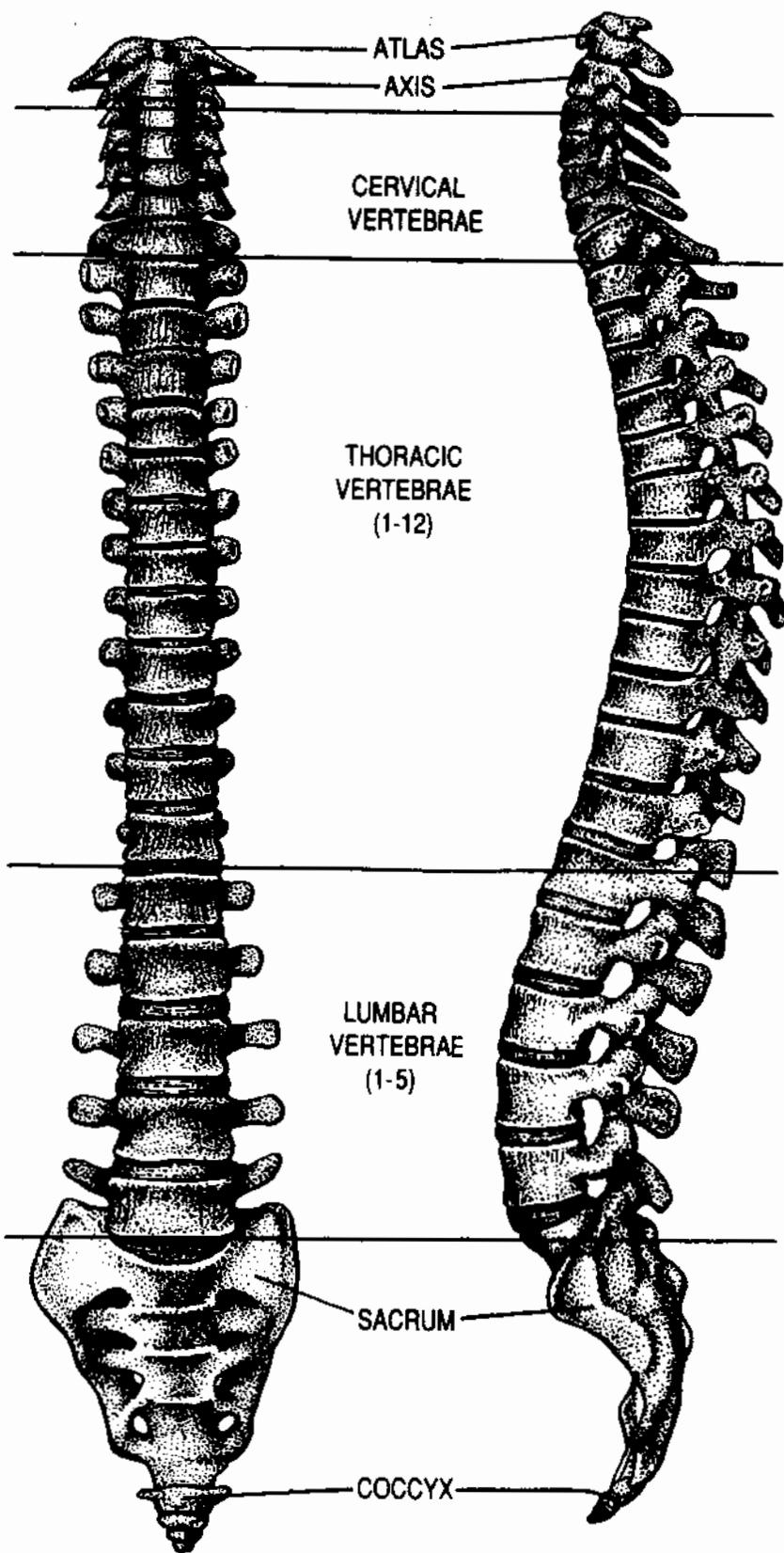


## **A SHOULDER IN DISTRESS**

### ***Surgery Cancelled / Pain Gone***

I injured my shoulder at work, and I know I aggravated the injury because I thought time would heal it, but after a couple of months I went to the doctor. He told me I had bone spurs. He gave me a shot of cortisone and sent me to Sports Therapy. Well, the shot made me feel better right away and I started doing the exercises at therapy. I felt no pain so I'm sure I overdid it and the pain started worse than ever. Went back to the doctor for another Cortisone, repeat scenario—this happened three times over about three months. I told the therapist it wasn't working and I was worse. He sent me back to the doctor. He told me I needed an operation. I said no thanks and goodbye. Then I went to Bruce's seminar and heard about Dr. Jobes exercise and after six weeks of using it, I felt fine! No more pain!!

Sony Swift  
1999



## EXAMINATION FOR BACK SCHOOL

- 1) **What is the number of vertebrae in the human spine?** 24
- 2) **What is a disc and what is its purpose?** *A disc is a high tech bone spacing shock absorber made from multiple layers of fibrocartilage on the exterior and the clear liquid component of blood on the interior, called plasma. If the cartilage wears so thin that the bones touch the body views this as a broken bone and natural fusion begins in the form of arthritic spurring.*
- 3) **What is a herniated disc?** *All the outside layers of fibrocartilage have torn and the jelly-like plasma has escaped, usually hitting the electric wiring that exits the spine. **BIG PAIN!***
- 4) **What level of the spine is a herniation most likely to occur?** *75% of all ruptured discs occur in the lower back between L3, 4, and 5.*
- 5) **Name the three regions of the spine and the number of vertebrae in each region.** *Neck (cervical), 7; mid back (thoracic), 12; and low back (lumbar), 5. (Breakfast at 7, lunch at 12, dinner at 5)*
- 6) **What is degenerative disc disease and what causes it?** *It is not a disease. It is the thinning of the discs due to internal and external wear and a reduction in the fluid volume. Causes are a) twisting and lifting and excessive compression, b) lack of spine-moving aerobic exercise reducing the volume of fluid in the back muscles which act at night as a disc refilling reservoir, and c) nicotine use resulting in vasoconstriction, which reduces or stops fluid flow into the disc through the small arterioles on the edge of the disc.*
- 7) **What is hyper-lumbar lordosis? Why is it dangerous?** *An excessive c-shaped curve in lower back (swayback). It pinches the posterior portion of the disc and reduces the size of the hole where the wiring exits the spinal cord. It also puts undue stress on back muscles. Causes are a) weight gain in mid-section, b) pregnancy, c) lying leg lifts, d) sleeping face down on a soft mattress, and e) weak abdominal muscles.*

- 8) **What is scoliosis?** *Scoliosis is a lateral s-shaped curve in the spine usually genetic and much more prevalent in women than in men. Stretching and therapeutic exercise can usually help it. Sometimes bracing and surgery are required.*
- 9) **What is kyphosis?** *The Hunchback of Notre Dame has kyphosis. It is usually caused by a forward rounded work posture, under-developed mid back muscles and loss of bone density in the neck and mid spine. Rhythmic weight bearing exercise of the traps and rhomboids by pulling the shoulder blades back and together will prevent and remedy virtually all of these problems; drugs and surgery are unnecessary.*
- 10) **What is osteoporosis? Name three methods of avoiding it.** *Osteoporosis is the loss of bone density resulting in 1.5 million fractures in American women and 40 thousand deaths due to pelvic hip fracture in 1998. (All U.S. auto accidents resulted in 37 thousand deaths in 1997.) Avoid hollow bones by a) consuming 3-4 8 oz. servings of non-fat dairy products or the calcium equivalent daily (1,000 – 1,200 mg.), b) calcium will not be deposited in the bones without the stimulating effects of weight bearing exercise (walking, weightlifting etc.), and c) the hormones testosterone and estrogen assist in bone density and with a woman's natural drop in estrogen at menopause they have an increased risk factor that requires medical counseling concerning the appropriateness of estrogen replacement therapy.*
- 11) **Fully describe how exercise reduces the risk of osteoporosis.** *Adequate pressure on the skeleton through weight bearing exercise stimulates the body to deposit more calcium in the bones so they don't break under the increased demand. Astronauts left in the non-weight-bearing atmosphere of space for 20 weeks will return to earth with up to 11% of their calcium found as a waste product in their urine and feces. If you don't use it you lose it.*
- 12) **What are the roles of the abdominal muscles in a healthy back? Describe fully.** *The back is similar to a multi-segment radio tower that requires the additional external support of guy wires to remain stable and upright. Unlike a stationary radio tower the human spine is required to bend in various directions while maintaining correct alignment and stability. The various abdominal muscles are the front guy wire cables that both support and create the movement of the vertebral column. Weak deconditioned abdominal muscles cause the spine to bend in unnatural positions creating damage to discs, spinal nerves, muscles, ligaments and tendons. Human movement requires flexibility, strength and muscular endurance; inadequate capacities in any of these areas due to lack of conditioning will result in injury because the load placed on the structure exceeded the current load bearing capacity of that structure. There needs to be a balanced capacity in all cables. Don't overdo it in one area.*

- 13) **What is the role of the hamstrings in a healthy back? Describe fully.** *The hamstring muscles are a collection of three winch cables that run from behind the knee to the back of leg and the pelvic girdle. Because the low back muscles also connect to the pelvic girdle tightness and lack of flexibility in either set of cables adversely effects the natural movement of the spine. A correct squat requires the rear to project back during the lowering phase. Tight hamstrings pull the rear down and forward rounding the low back, compressing discs and spinal nerves. As the rear moves forward the knees jut past the toes damaging cartilage in the knee. **WEAK ABS + TIGHT HAMSTRINGS = BACK PAIN***
- 14) **What is the role of the paraspinal muscles in a healthy back? Describe fully.** *The low back muscles are the support and movement creating guy wires that provide structural stability for the spine.*
- 15) **Give the origin, insertion and action of the following muscles:**
- Rectus abdominis** *O=pubic bone, I=sternum and lower ribs, A=pull ribcage toward pubic bone, stabilize pelvis during walking and lifting.*
  - Transverse abdominis** *O=inguinal ligament, I=linea alba, pubic crest, A=compress abdominal contents.*
  - Internal oblique** *O=iliac crest, inguinal ligament, I=linea alba, pubic crest, the last three ribs, A=trunk rotation, lateral flexion.*
  - External oblique** *O=lower eight ribs, I=linea alba, pubic crest, iliac crest, A=trunk rotation, lateral flexion.*
  - Erector spinae** *O=iliac crest, I=ribs, A=extend vertebral column, maintain upright posture, pull spine to one side when only one set is firing.*
  - Gluteus maximus** *O=posterior portion of hip and low back, I=back of femur, A=pull leg back during stair climbing.*
  - Hamstrings--biceps femoris, semitendinosus, semimembranosus** *O=lower part of posterior pelvic girdle, I=just below back of knee, A=flex lower leg.*
  - Iliopsoas** *O=lumbar spine, I=upper thigh, A=hip flexion and lateral flexion of lumbar spine.*  
**Trapezius** *O=base of skull and cervical and thoracic vertebrae, I=shoulder blade and clavicle, A=shoulder shrug and pulls shoulder blades together and down.*
  - Rhomboids** *O=cervical and thoracic vertebrae, I=shoulder blade, A=pull shoulder blades back and together.*
- 16) **Explain the biomechanics of bending over and lifting and how it effects the back.** *From head to tailbone, the average man weighs 95 lbs. When he bends forward so that the head is even with the navel the pressure on the low back muscles approaches 950 lbs. When any weight is extended it increases the pulling force through a principle called leverage. The front portion of the discs in the low back are pinched forcing some of the jelly like material towards the back causing a bulging or ruptured disc, possibly pressing against the spinal nerves.*

- 17) **Explain the biomechanics of twisting and lifting and how it effects the back.** *A normal healthy disc will take over 2,000 lbs. of direct downward pressure before it ruptures; the vertebrae will actually break before the disc explodes. However, the design of the outside rings on the disc makes it much more vulnerable to twisting pressures. Light downward pressure combined with rotation or twisting can instantly tear through all the sidewalls of the disc allowing the inner jelly-like core to rupture out causing excruciating pain through contact with the spinal nerves. Twisting and lifting can also gradually damage the cartilage rings with no apparent effect. The discs posses no pain sensors to alert the brain that the cartilage is being eroded. You're lulled into believing that twisting and lifting is harmless until the cataclysmic eruption of disc fluid onto the spinal nerve.*
- 18) **Describe proper lifting and carrying technique.** *Get as close as possible to the load. Visually access its dimensions and weight. Secure feet at least shoulder width apart with entire foot flat on the floor (including the heel). Slowly squat down with the hips protruding back and a slight forward bend in the spine, but not rounded. Be sure that the knees do not jut forward past the shoelaces. Securely grab the item, corner to corner, pulling the load as close as possible to the body. Tighten the abdominal wall and the low back muscles and smoothly return to an upright posture, maintaining a straight spine. Keep eyes on task and path as you move and if a change in direction is required move the feet, do not twist the spine.*
- 19) **Should you warm muscles before stretching? If so, how? What is the benefit? Explain fully.** *Yes. Large muscle, rhythmic activity for at least 5 minutes. 80% of the blood during inactivity pools in the brain, ribcage organs, and abdomen. The cool muscles, through diminished blood supply, lose flexibility and elastic properties. Just as a steel smith heats iron before reshaping, so athletes heat muscles before stretching.*
- 20) **Fully describe all aspects of how stretching reduces the risk of injury.** *Stretching reestablishes joint spacing that was lost through the compression of weight bearing and gravity and reduces pressure on tissues that were not designed to bear load. It is a pre-flight safety check that uncovers hidden injuries by slowly and safely testing the movement capacity prior to at-risk, weight bearing or high-speed work. During times of relative inactivity 80% of the bodies heating agent, blood, is not in the muscle tissue; warm-up movements and stretching promote joint lubrication and muscular heat through friction and blood flow which increases the maximum tolerable stretch point of soft tissue. Tight muscles can force the body to move in biomechanically incorrect ways, stretching reestablishes the natural movement capacity. Stretching creates a central nervous system relaxation response, reducing pulse, blood pressure, and neuromuscular tension. Most accidents have as a prime contributing factor the distracting or anger producing reality of stress. The biggest period for industrial injuries and suicides is the stressful holiday season.*

- 21) **What speed should you move into a stretch? Give two reasons why.** *Slowly, taking 3-5 seconds. Slow movement produces a relaxation response making muscles more flexible. The slow movement insures that you won't overshoot the maximum limit point of the stretch, preventing injury from excess stretching.*
- 22) **How far should you stretch? Describe the sensations.** *Stretching should be held at the point of mild tension in the target muscle, that tension should subside after holding the stretch for 5 seconds. There should be no joint pain, shaking, or tug of war feeling.*
- 23) **Where should you feel the stretch?** *In the muscle belly, not the joint.*
- 24) **How long should you hold the stretch? Why?** *At least 15 seconds so the muscle remembers and retains the new length.*
- 25) **What speed should you move out of a stretch? Why?** *Slowly (3-5 seconds). Slow movement reduces electric flow from the brain, which helps relax the central nervous system and the muscle tissue.*
- 26) **Describe the role of the brain in muscular tension control.** *The brain is the power plant sending electricity to the muscles. Real or imagined problems that produce a **fight or flight** response will increase muscular tension.*
- 27) **Name three methods of reducing neuromuscular tension.** *Deep consistent breathing. Refocus your thoughts on a non-emotionally charged topic. Slow rhythmic movement.*
- 28) **Give a simple analogy of the spine, the supporting muscles & ligaments and the interrelationship.** *A radio tower with supporting guy wires.*
- 29) **How much pressure is on the low back when a 170-lb. person is bent over at 90 degrees lifting a 100-lb. item?** *Depending upon weight distribution and length of spine the pressure is close to 2000 lbs.*
- 30) **How much money is spent annually on back injuries by U.S. industry?** *In 1996 the American soft drink industry sold 65 billion dollars worth of pop. The medical, time loss, and injured worker replacement costs of back injuries in that same year were estimated to be 100 billion dollars. There is a whole lot a hurt'n goin' on.*

- 31) **Describe to a worker how a back injury might impact his life.** *Excruciating pain, reduction in movement and recreational choices, major sleep loss, edgy personality resulting in professional and family strife, divorce, loss of income, potential loss of home and vehicle due to bankruptcy, low self esteem due to reduced activity level and lack of social support, time consuming medical appointments, surgery, legal and illegal drug use and addiction for pain management, and thoughts of suicide to relieve prolonged suffering. Possible financial settlement which will not address the root cause of your trouble. Do everything within your power to avoid back injuries.*
- 32) **Give a brief history of stretching. Who uses it and its positive impact?** *In the mid 1960's professional sports teams began using stretching as a warm up and injury prevention tool to protect the investment of their high priced athletes. The positive results were so dramatic that every college and professional sports team now employs stretching as one of their prime injury prevention tools in the sports medicine arsenal. Corporations, seeing a dramatic rise in on-the-job injuries, have slowly adopted the idea of workers as industrial athletes and have begun to reap the injury reducing benefits provided through a pre-work stretching protocol.*
- 33) **What is the role of the legs in lifting?** *This is the "20-2" rule of lifting. When a person bends at the waist using the spine to roll down as the primary lifting tool, two long narrow muscles in the low back become the prime movers to raise and lower the weight. In contrast, when an individual squats at the knee, using correct technique, the 20 large leg muscles are employed as the bull worker calling upon 60% of the total body's available muscle tissue to perform the task of lifting the item. The horsepower of those 20 muscles, compared with the 2 back muscles is dramatically greater, not to mention the increased risk of injury due to spine extension and leverage with the bend at the waist method. Lift correctly with your legs, not your back.*

#### TECHNICAL RESOURCES

CAILLIET, RENE, M.D.  
PROFESSOR AND CHAIRMAN  
DEPARTMENT OF REHABILITATIVE MEDICINE  
UNIVERSITY OF SOUTHERN CALIFORNIA  
SCHOOL OF MEDICINE, L A, CALIFORNIA  
SOFT TISSUE PAIN AND DISABILITY

MARIEB, ELAINE, R.N., Phd.  
HUMAN ANATOMY AND PHYSIOLOGY

Hickson, James, Ph.D., R.D.  
Wolinsky, Ira, Ph.D.  
NUTRITION IN EXERCISE AND SPORT

# ***INDUSTRIAL ATHLETE VIDEO STRETCHES***

## **STRETCHING FOR INJURY PREVENTION**

By Bruce A. Madsen, AT, CSCS

After 6-8 weeks of exercising, review the progress of the program. The optional exercises are listed after the initial exercise program. They are to be substituted for variety on a weekly basis to maintain the interest of the employees.

### **Content for Core Stretching Exercises**

1. **Warm Up.** Heat muscles through large muscle group rhythmic activity.
  - a. Stepping side to side, 8 times.
  - b. Add shoulder shrug motion, stepping side to side, 8 times.
  - c. Bench press motion, stepping side to side, 8 times.
  - d. Incline press motion, stepping side to side, 8 times.
  - e. Overhead press motion, stepping side to side, 8 times.
  - f. Back stroke motion, stepping side to side, 8 times.
  - g. Golf pivot, shotput motion, stepping side to side, 8 times.
  - h. Half squats, emphasize proper lifting technique, 8 times.
  
2. **Stretching Principles.**
  - a. Point to target muscles.
  - b. Move slowly in and out of stretch, 2-3 seconds.
  - c. Hold 8-10 seconds at gentle stretch.
  - d. Keep them breathing.
  - e. Emphasize relaxation.
  - f. Move same direction the group does.

3. Standing Stretches.

- a. Skyward Reach. Target: Biceps, lats, forearms, muscles that line the spine. Reach to the sky and hold. Flex the wrist and turn the hands in, then out. Relax.
- b. Chest Stretch. Target: Chest, biceps, forearms. Arms are at full extension in front of the body, parallel to the ground. Keep the arms extended, slowly pressing the arms back until they are straight out to the sides of the body (arms remain parallel to the ground). Hold 10 seconds. Relax.
- c. Neck Stretch. Target: Neck muscles. Slowly tilt head forward, back and to the sides. One side head tilt, press opposite open palm and straight arm downwards.
- d. Triceps Stretch. Target: Triceps. Right hand between shoulder blades, palm on back. Place left hand on triceps and gently pull up and back. Abdominals tight, knees slightly bent, back neutral. Hold 10 seconds. Relax. Repeat with left arm back.

4. Floor Exercises.

- a. Single Knee to Chest. Target: Glutes, lower back. Lying on back, draw right knee to chest, hands clasped behind knee. Hold for 5 seconds, then use abdominals to pull upper back and head off the mat. Hold 3 seconds and relax. Repeat for left side.
- b. Two Knees to Chest. Target: Lumbar region, glutes. Lying on back, bend knees and draw both knees towards the chest, hands behind the knees. Hold 5 seconds. Using abdominals, pull upper back and head off the mat. Hold 3 seconds and relax.
- c. Pelvic Tilts. Target: Lower back relaxation and strengthen lower abdominals. Lying on back, place thumbs under low back. Tighten abdominals and glutes, pressing lower back into the mat. Hold 3 seconds, relax. Repeat 5 times.

- d. Abdominal Crunches. Target: Strengthen rectus abdominous. Lying on back, knees bent, feet flat on floor, use abdominal muscles to pull ribcage forward towards thighs (like a closing accordion). Hold for 1 second, descend to floor in 2-3 seconds. Keep lower back pressed into mat. Repeat 10-15 times.
- e. Abdominal-Torso Stretch. Lying on back, fully extend arms and legs in opposite horizontal directions. Push ribcage towards the sky. Hold 10 seconds and release.
- f. Hamstring Stretch. Target: Hamstring, calf, shin. Lying on back, knees bent, feet flat on floor, slowly extend right leg up until a comfortable stretch is felt in back of right leg. Pull toes towards face and move foot side to side (calf emphasized). Push toes to sky and move foot side to side (shin emphasized). Relax. Repeat for left leg.
- g. Finish. Stand up, breathe deeply and reach to the sky. Relax.

5. Content for Optional Stretching Exercises.

These exercises can be added to the existing routine for variety (wait 6-8 weeks). As the instructor becomes more precise in their transitions and verbal cuing, there may be time to add one to two new stretches and still not exceed the ten minutes time limit. When no additional time is available as a new optional stretch is rotated into the routine, an existing stretch will have to be deleted to stay within the ten minute class length. When deleting an upper body stretch, replace it with an upper body stretch. Same on lower body.

- a. Shoulder Stretch. Target: Shoulder and upper back. Place right hand on left shoulder, left hand on triceps and pull right arm across body, turning the head to the right. Keep hips and shoulders straight ahead. Relax. Repeat for left side.
- b. Forearm Stretch. Target: Carpal tunnel syndrome prevention, forearm flexor and extensor. Extend right arm with fingers pointing up and use left hand to gently pull hand and fingers back to a comfortable stretch. Hold 10 seconds and relax.
- c. Two Knees to the Side. Target: Side of hips, low back, chest. Lying on back with knees bent, slowly lower both knees to the right. Turn head to the left, extend left arm up and out with palm towards the sky. Place right hand on left thigh and gently press in line with the spine. Hold 10 seconds and relax.

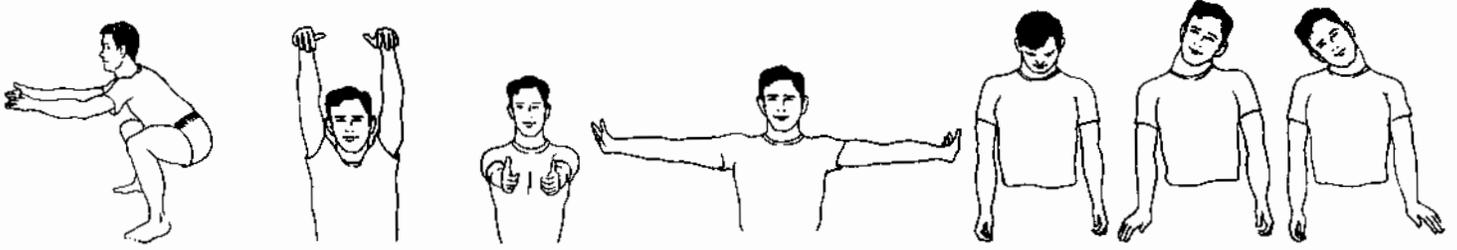
**Repeat on left side.**

- d. Groin Stretch. Target: Inner thighs, adductor. Sitting on mat with knees bent, place soles of shoes together and allow knees to gently open to the ground. Hold 10 seconds and relax.
- e. Hip Stretch. Target: Glutes and lower back. Sitting on mat, left leg straight, bend right leg so the right foot is just outside the left knee. Gently cradle right angle and knee with both hands and pull right leg across and into the chest. Hold 10 seconds, relax. Repeat with left leg.
- f. Cat and Camel Stretch. Target: Mid and lower back. Kneel with palms on floor in a direct line with the shoulders, knees in a direct line with the hips. Slowly lower head and squeeze lower abdominals, pulling hips and pelvis towards the head. The back arches up. Hold 5 seconds and allow the back to relax to a normal position. Repeat 5 times.
- g. Low Back Lat Stretch. Target: Lower back, lats. Kneeling on mat, reach both arms as far in front as possible while keeping the hips up and back. The chest should be low to the mat. Reach both hands to the right side of the mat while pushing the hips back and to the left. Use the right hand to pin the left hand down on the floor. Hold 10 seconds and relax. Repeat to the left side.

# FLEXIBLE SOLUTIONS TRAINING

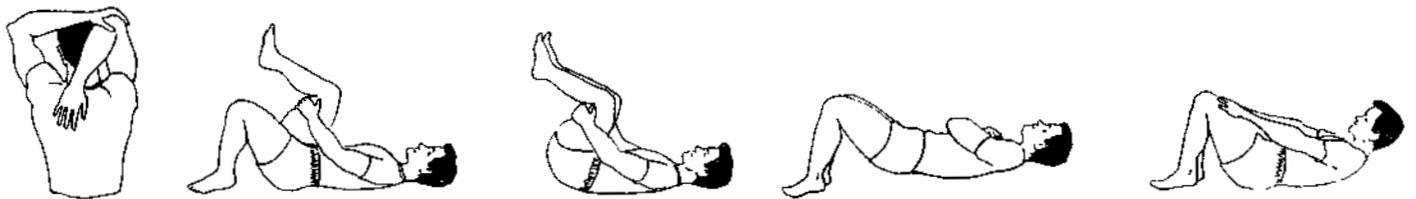
- ◆ FIRST HEAT MUSCLES THROUGH RHYTHMIC ACTIVITY.
- ◆ MOVE SLOWLY IN AND OUT OF THE STRETCH, 2-3 SECONDS
- ◆ HOLD THE STRETCH FOR 10 - 15 SECONDS
- ◆ BREATHE EMPHASIZING RELEASE AND RELAX

## STANDING EXERCISES



1 SQUAT	2 SKYWARD REACH	3 CHEST BEGIN	4 CHEST END	5 THREE WAY NECK
---------	-----------------	---------------	-------------	------------------

## FLOOR EXERCISES



6 TRICEP	7 SINGLE KNEE	8 DOUBLE KNEE	9 PELVIC TILT	10 ABDOMINAL CRUNCH
----------	---------------	---------------	---------------	---------------------

## OPTIONAL STRETCHES



11 ABDOMINAL TORSO	12 HAMSTRING	13 SHOULDER	14 FOREARM
--------------------	--------------	-------------	------------



15 TWO KNEE TO THE SIDE	16 GROIN	17 HIP	18 CAT AND CAMEL	19 LOW BACK LAT
-------------------------	----------	--------	------------------	-----------------

*All material contained in this document is subject to copyright laws and any form of transcription is prohibited.*

## The benefits of therapeutic exercise.

**OBIE HOODMAN  
5429 S.W. SPRING HILL ROAD  
GASTON, OREGON 97119  
(503) 357-4448**

July 25, 1997

I have been with Portland General Electric for 28 years total, working as a lineman for 38 year including other companies. I'm 56 years old.

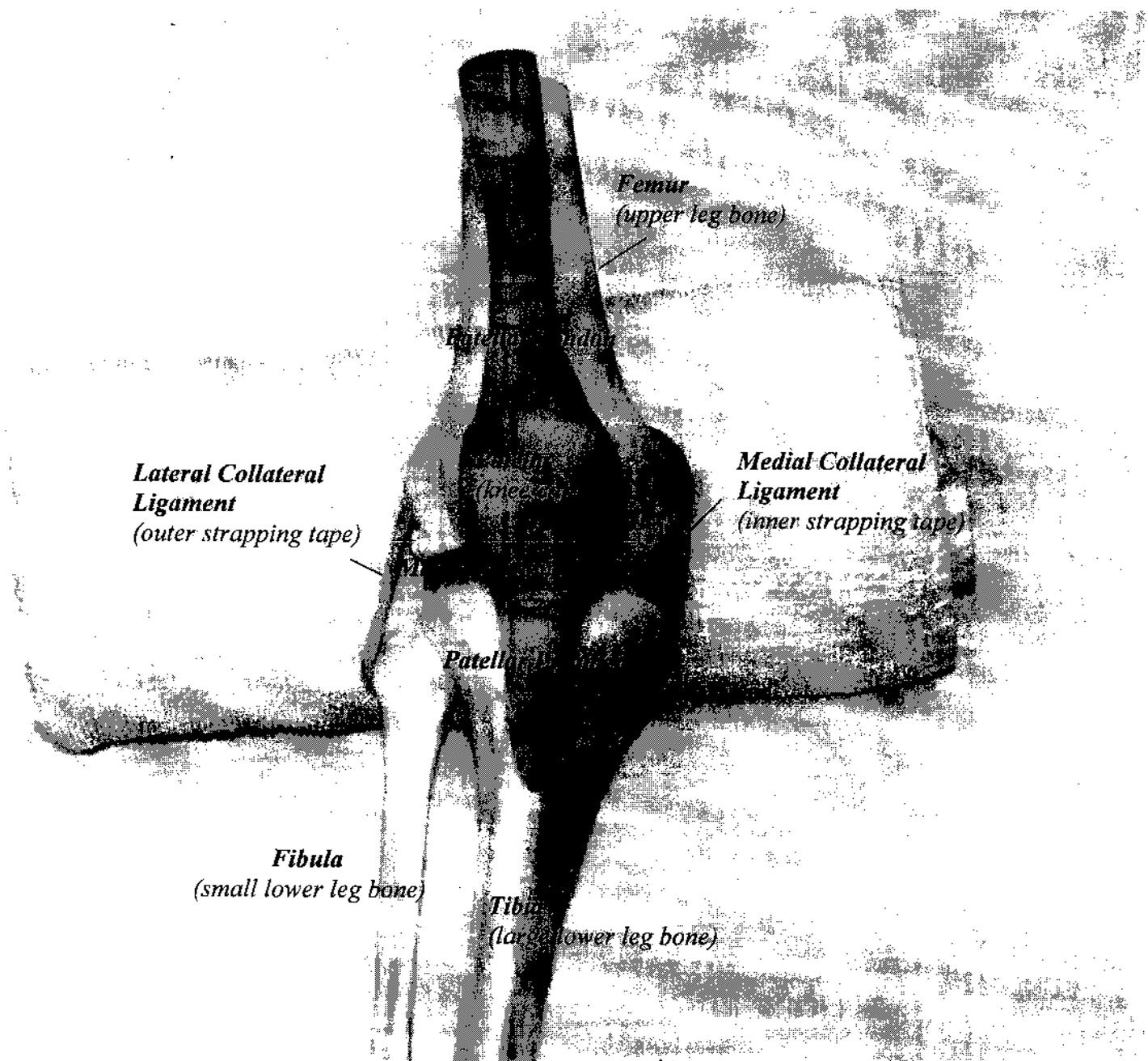
Prior to January, 1997, I had been experiencing difficulty getting up off the toilet and bending over to tie my shoes. Everyday living tasks were difficult. I was very worried about my quality of life. I had consulted with Dr. Pattee for back surgery.

I started following an exercise video, "The Industrial Athlete". Within the first three months I noted a little improvement, but it was taking time. I used to experience great pain while riding in a vehicle, the pain began to diminish and I can now sit 50% longer and pain free. My legs used to fall asleep, now they don't.

Since beginning the exercises with a leader, I have taken 10 strokes off my golf game (in only three months time), I can bend over with NO PAIN. I can do 75 squats now, before I was able to do only five.

I spent three weeks in Hawaii and worked out everyday. I used to be tired all the time and in pain, now I have lots of energy and live PAIN FREE. My only regret is that I should have started ten years sooner.

***Surgery Cancelled  
Pain Gone***



# ***KNEE JOINT***

High Tech Sports Therapy Associates, Inc.

# KNEE

## ***KNEE JOINT STRUCTURE AND FUNCTION***

### **Type of Joint:**

It is a hinge joint designed primarily to bend front to back.

### **Bones that Comprise the Joint:**

Formed by the upper thigh bone (femur) and the larger of the two lower leg bones (tibia). The kneecap (patella) also glides around the front of the femur.

### **Grease and Lubrication:**

Throughout the knee there are 12 strategically placed pads (bursae sacs) filled with joint WD-40 (synovial fluid). The grease (synovial fluid) is released from the bursae sacs during rhythmical knee movements that stimulate the fluids secretion. During periods of inactivity the joint dries and cools and comfortable full range movement declines. After prolonged years of rhythmical movement during exercise the body can manufacture additional bursae sacs called false bursae sacs. A secondary role of synovial fluid beyond lubrication is the absorption and breakdown of debris within the joint to ensure smooth unrestricted movements.

### **Cartilage:**

Between the upper and lower leg bones are two very thick cushions called the meniscus cartilage.

**Functions:** To keep the bones separated and provide shock absorption during movement. To act as storage sponge for synovial fluid and to release the synovial fluid during weight bearing activities.

Problem: Torn cartilage from incorrect knee movements frequently results in a loose flap of the cartilage catching in the joint and temporarily but repeatedly locking up all knee movements.

Solution: 1) Allow the bones over time to grind up the loose flap of cartilage. Caution—could cause a greater tear. 2) Through arthroscopic surgery (small holes strategically poked into the knee) a tool is inserted to trim away the loose flap. Caution—180,000 Americans were killed by medical accidents in 1998, according to the AMA.

Problem: Torn cartilage may allow bone on bone contact. The body interprets this contact as a broken bone and begins to fuse the bones together with random bone growths called osteophytes. This is osteoarthritis.

Solution: 1) Don't get overweight. 2) Avoid high-speed directional change activities. 3) Keep the joint well lubricated with smooth rhythmical non-pounding knee activities (water exercise, biking, light resistance training). 4) Keep the muscles around the joint strong to support and bear load (correct resistance training in the 20-25 reps range). 5) Drink plenty of liquids (eight 8 oz. glasses of water per day) to restore synovial fluid. 6) Eat a balanced diet and supplement with glucosamine chondriten.

Problem: The strong, glassy, slick cartilage under the kneecap has become rough and makes a grinding sound upon bending (chondromalacia patella).

Solution: 1) Keep feet flat and knees directly over ankles when squatting. Avoid forward knee-jut squatting positions. 2) Keep all the front thigh muscles (quadriceps) strong but particularly the lower inner one called the vastus medialis. Leg extension, squats, side step ups. Remember light weight and good form.

### Ligaments:

Ligaments are the tough semi-elastic strapping tape that runs from one bone to its neighbor offering strength and stability to the joint. Ligaments are more flexible than tendons and can stretch to about 6% beyond their normal

resting length before the fibers are permanently stretched and the ligament won't recoil to its normal position. If the ligament is stretched even farther it will partially or completely tear. A partially torn ligament will self-repair given an adequate blood supply and avoidance of excessive irritation that retards the healing process.

#### **Side to Side Knee Stability:**

The medial or inside portion of the knee has a 4" long strapping band called the medial collateral ligament. The outside or lateral portion of the knee is supported by a narrower 2" long strapping tape called the lateral collateral ligament.

**Problem:** A direct hit to the lateral or outer aspect of the knee can stretch and/or tear the medial collateral ligament.

**Solution:** keep all the leg muscles strong. Avoid football.

#### **Front to Back Knee Stability:**

Inside the actual knee joint are two  $\frac{1}{2}$ -1" long ligaments known as the cruciate ligaments. They form a cross inside the knee that looks like a crucifix thus the name, the cruciate ligaments. The front one is referred to as the anterior cruciate ligament and the one in back is referred to as the posterior cruciate ligament.

The anterior cruciate ligament keeps the knee from hyperextending. The posterior cruciate ligament restricts a forward glide or shearing movement of the femur. Together they act to restrict knee rotation.

#### **Muscles and Tendons:**

The muscles that surround the knee joint provide the primary stability of the knee. For the knee to remain strong and healthy it is essential that all the supporting muscles be consistently trained for strength, flexibility, endurance, and coordinated balanced movement. Adequate leg strength has been achieved when you can squat 75 times without interruption to a normal toilet seat height and you experience no delayed onset muscle soreness in any body part.

Tendons are the non-contracting attachment ends that secure the muscles to the bones.

**Problem:** Repeated ballistic knee movements (basketball) have caused inflammation and pain in the tendon directly above the kneecap (quadriceps tendon).

**Solution:** Allow 5-10 minutes of warm-up with slow speed non-ballistic rhythmic knee movements followed by gentle static stretching. Gradually increase the strength in the supporting leg muscles through movement specific exercises that mimic the actual task. Always move the joint in its design pathway. Avoid all forward knee jut squatting.

**Final Considerations:**

Direct pressure on the knee joint from kneeling on a hard surface is a prime source of injury to all connective tissue. Avoid this position whenever possible and use adequate padding between the knee and the hard surface when it is not possible.

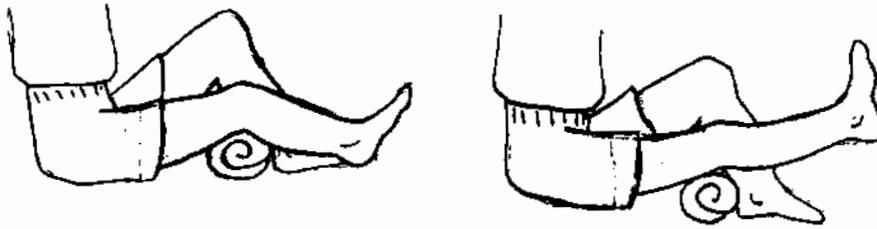
The human body possesses the ability for self-repair in partially torn muscles, tendons, ligaments and even portions of the meniscus cartilage. However, this self-repair process requires an adequate blood supply and the avoidance of any activity that exceeds the current load limit of the damaged tissue causing an internal scab pick reirritate scenario. The research is clear that rhythmical knee movements performed in the pain free range of motion will provide grease and heat to the joint and surrounding soft tissue. This strategically applied grease and heat is all that is required in most soft tissue injuries to restore complete pain free function to the injured body part.

## LOWER EXTREMITY EXERCISES

### SHORT ARC QUAD SETS

Sitting with your back supported against a wall (back straight) and your legs straight out in front. Your non-working knee should now be bent with your foot flat on the floor to protect your lower back. Roll a pillow up, and place it under the working knee. The working heel should be on the ground. You are ready to begin.

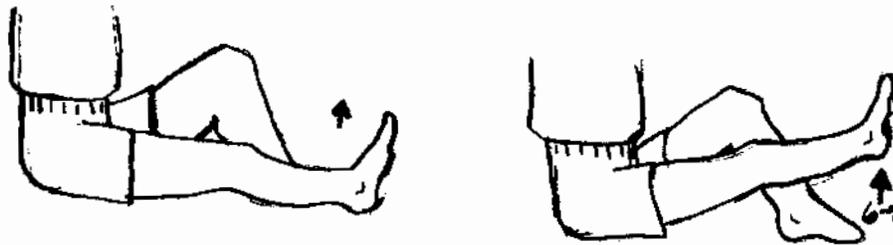
- Keeping the knee resting on the pillow,
- Slowly raise the heel off the ground until the knee is straight, 2 seconds
- Hold for 5 seconds,
- Slowly lower the heel back to the ground in 4 seconds
- Repeat this 15 times
- as strength increases increase to 25 repetitions, then add an ankle weight to the ankle and go back down to 15 repetitions, add no more than 3 pounds



### STRAIGHT LEG RAISE

Again sitting, with your back supported and the non-working leg bent. Now tighten your thigh, keeping the knee straight; raise the heel off the ground 6 – 8 inches.

- hold this position for 5 seconds
- slowly lower the leg in 4 seconds
- repeat this 15 times
- as strength increases up repetitions to 25 then add weight to the ankle, no more than 3 pounds



## HAMSTRING CURLS

Lie on your stomach with the foot off the end of the bed or table.

- raise the heel toward the butt, stopping just past 90 degrees, in 2 seconds hold the contraction for 5 seconds (you should feel this behind your thigh, above the knee in the hamstring)
- slowly lower the leg in 4 seconds
- repeat 15 times, increasing to 25 then add weight and go back down to 15 reps



## SQUATS

Feet shoulder width apart, knees must stay behind the toes. This means your butt must go back first, using your arms out in front for a counter-balance. Start going about half way down and staying in your pain free range. If you experience any knee joint pain you are doing the exercise wrong. I suggest that you start with a bench or chair behind you so if you lose your balance, you just sit down on the chair. You may do an assisted squat using a bar or knob to hold onto as you lower yourself, keeping knee behind the toes.

- start with sets of 10
- Progress to sets of 25 – 50, again, you should not have joint pain, only muscular fatigue in the thighs.



## LEG EXTENSIONS AND LEG CURLS

These are done on a machine, using very low weight (10 – 20 pounds) and high repetitions (25 – 50). Use the 2-second contraction, hold for 5 seconds, and lower in 4 seconds. Do one set for the first 2 weeks and then progress to 2 sets. These two exercises should be started 1 – 2 weeks after the above exercises have been done.

## **A KNEE IN DISTRESS**

### ***Surgery Cancelled / Pain Gone***

November 19, 1998

I've been a jogger for approximately the last 14 years. Two years ago I strained a tendon in the area of my right knee, it was very painful and prevented me from jogging and walking. I went to an orthopedic surgeon and he placed me on anti-inflammatories and sent me to physical therapy. At the end of this I attempted walking and running but my tendon continued to bother me and I did not resume my running. I received a one-on-one session with Leigh Madsen and he introduced me to several exercises I could do at home and on my job site. I did these exercises for approximately 6 to 8 weeks and I felt tremendous improvement. I was able to walk without the pain and I was at a point of trying to jog. Before actually going out on a run I joined Sta-Fit (August 15) and engaged in more extensive weight training on my lower body and legs. All of the above exercises and weight training has enabled me to resume by running. I am jogging on a treadmill now for 30 minutes, 3-4 times per week.

Woody Bryan

HHT A Crew

## Heel/Arch Pain

### **Plantar Fasciitis**

#### Basic Rules:

1. Tight calf Achilles tendon is pulling up on heel bone. This excessive upward pulling force, tightening the pressure on the soft tissue in the arch of the foot is pulling the soft tissue (plantar fascia) away from its attachment points on the heel bone. Thus the pain and inflammation. Root causes. Wearing heels, which shorten the Achilles tendon. Walking or running up hill which over stretches the foot and ankle tendons. Tight foot and ankle tendons from the factory. Improper footwear. Not maintaining adequate ankle and foot flexibility with regular stretching. Exercising without adequate warm-up and stretching.
2. Since the calf and Achilles tendon are at least twenty times stronger than the plantar fascia, and both tissues pull in opposing directions on the same bone, the calf muscles win the tug of war.
3. The solution is to very slowly and gently warm and stretch the Achilles tendon/calf, because the plantar fascia is already tight, irritated and inflamed. If you stretch it too vigorously you will pull the plantar fascia farther away from its heel attachment and make the problem worse instead of better. Dosage of exercise is as important as exercise itself.
4. This set of exercises is a finesse game. Gentle—subtle—slow—no discomfort at all while you do them or after the exercises.

#### Exercises:

1. During inactivity, 85% of human blood rests in the core organs (head, torso, stomach) of the body. That leaves the muscles cool, stiff and lacking elasticity. After bed rest or prolonged sitting blood flow and lubrication has drastically declined, that is why the pain is worse upon first movements. Slow gentle rhythmic movement sends blood and lubrication to the area raising its temperature and elasticity.
2. Ankle circles, 30 seconds each direction, sitting on kitchen counter. Let legs dangle naturally. Small slow comfortable size of circles, no discomfort. Increases blood flow, lubrication and elastic properties.
3. Use the foot as a writing instrument and draw the alphabet—A to Z—slow, easy, and gentle.

4. Take a normal 20 oz. bottle of drinking water. Fill it with warm water and lay it on the floor and slowly roll the bottle across the entire arch of the foot, heel to toes. No pain, gentle easy, 20-30 rolls.
5. Time to stretch—sit in normal kitchen chair with the entire foot flat on the floor, bare foot or socks. Start with feet 18” in front of chair. Slowly move heels back, 3-4 inches, and then stop. Hold 15 seconds. If muscle in calf is totally relaxed, move heels back again, 1-2 inches. Hold 10-15 seconds. Breathe deeply. Keep moving back until you get a gentle calf stretch and hold 30 seconds while breathing. Do this whole process two times per day and gradually increase as is tolerated.
6. Aggressive stretching with towels, or standing and pushing the heel to the ground, or hanging your heels off a stair step will be an overdose of stretching and will result in further tissue damage in the plantar fascia. Be gentle and patient. Depending upon the severity of your condition and your compliance with the treatment plan recovery should be substantial in 3 to six weeks.

## ***COMMITMENT CONTRACT FOR PHYSICAL EXCELLENCE***

Welcome! You have just joined a winning team. The principles of physical development that you will learn and apply are the same as those used with elite professional athletes. This system accelerates the development process for them - and it can do the same for you. Your exercise prescription will be designed for you and your current levels of strength and fitness.

While our desire is to help you, you must decide if you want to be the leader of your **PEAK PERFORMANCE** team. **Fat loss** and **physical development** are natural processes, however, success depends on your motivation and regular attendance in the exercise program.

For you to progress without any setbacks, the following procedures need to be followed.

### **YOUR RESPONSIBILITIES**

- **LISTEN** to your body. Take responsibility for it. You have the final authority on all procedures.
- **LEARN** the names of the muscles and bones involved in your routine and apply the principles of proper human motion.
- **STRETCH** daily at home after an active or passive warm-up.
- **ATTEND** all training sessions and arrive on time.
- **RECORD** accurately all your exercises and note your progress.
- **WORK** gradually to increase your capacity in strength, flexibility (ROM), and endurance, as your body gives its approval. Humans can increase their natural strength by 300%.
- **CONSULT** your physician and exercise specialist before engaging in any physical activity outside this program that might exceed the limits of your current condition.
- **MAXIMIZE** your training. Eat nutritious foods, get plenty of rest, and follow your exercise program. Exercise only stimulates results; the actual development occurs when you sleep, while foods act as the building blocks repairing damaged tissue.
- **CHALLENGE** yourself to enjoy the hard work and not dwell on any setbacks.

**OUR RESPONSIBILITIES**

- **UNDERSTAND** why your body became deconditioned.
- **TEACH** you the proper way to move and exercise to maximize your results.
- **APPLY** state of the art exercise techniques and modalities to stimulate your body to improve and adapt.
- **REALIZE** we don't make you improve, we teach you how to make yourself improve.
- **RETURN** you to health and peak performance as quickly and safely as possible.

I have read the above agreement and will adhere to the letter and spirit of the **EXERCISE PRESCRIPTION** designed for me.

I want to improve and will strive towards that goal.

**TRUTH.** You have come to us for improvement. If we appear more motivated on a **REGULAR BASIS** than you do, you have not passed the **LITMUS TEST.** The **wasting** of your money will not be tolerated. **TOGETHER WE CAN EXCEL!**

**I am committed to a consistent investment in my health account on a 3 X per week basis!**

Client Signature \_\_\_\_\_ Date \_\_\_\_\_

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Days of week. partner.	Time of day.	Minutes per day.	Accountability
---------------------------	--------------	------------------	----------------

# ***CARPAL TUNNEL***

## ***EXAMINATION***

1)

2)

3)

4)

6)

7)

8)

9)

***ELBOW***  
***EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***SHOULDER  
EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***BACK***  
***EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***KNEE***  
***EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***FOOT/ARCH  
EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***ERGONOMICS***  
***EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

***GENERAL HEALTH***

***EXAMINATION***

1)

2)

3)

4)

5)

6)

7)

8)

**BRUCE A. MADSEN, A.T., C.S.C.S.**

(503) 720-3195

*bruce@sportstherapy.net*

**PROFESSIONAL BACKGROUND:**

*Founder/President of a Peak Performance Risk Management Consulting Firm established in 1981; High Tech Sports Therapy Associates, Inc.*

**OFFICES:**

**PORTLAND**

**LOS ANGELES**

**WAHA**

**Scope: Musculoskeletal Disorders, Prevention and Treatment Systemic corporate cultural change delivered through a *sports medicine protocol* to over 170 International companies. *World-class competencies.***

**Sports Medicine Services: *Work hardening/therapeutic exercise*; physical capacity evaluations; pre-employment screening; ergonomic/biomechanical analysis; **BACK SCHOOLS**; cumulative trauma disorders;**

Causes of and sports medicine solutions to *soft tissue pain and disability.*

**Clients:**

N.B.A. Franchise  
Microelectronics  
Silicon Chip Manufacturing  
Athletic Footwear/Apparel  
Professional Athletes  
**AC GREEN NBA**  
**CLINT DIDIER NFL**  
**TOM ANSBERRY USA 10K CHAMPION**  
Government: All Levels  
Publishing  
Pulp/Paper

Higher Education  
Transportation  
Health Care  
Public Utilities  
Distribution  
Private Utilities  
Metals/Mining  
Light/ Heavy Manufacturing  
Timber  
Heavy Construction

**PROFESSIONAL EXPERTISE:**

**Corporate Safety Culture: Human *Behavior/Safe* and Sustained. Specializing in systemic corporate safety culture implementation strategies.**

**Sports Medicine Videos: Technical producer and on-screen talent for a three segment Back Injury Prevention Video shot at Fox Studios and released at 60 distribution centers nationwide. Two videos on preferred work methods for the **TRUCKING AND DISTRIBUTION** industries. (61 Corporations) **THREE ergonomics videos.****

**Media Consultant: Over 15 years experience as a technical advisor and talent**

for TV, RADIO, NEWSPAPER, VIDEO, and *electronic multimedia* presentations.

National Speaker:

***MOTIVATIONAL*** lecturer specializing in Internal strategic alignment, ***ERGONOMICS, STRESS*** /cardiovascular disease ***Risk Factors***, and **TEAM BUILDING** retreats.

Exceeding **1,100** Key Note speaking engagements with an anonymous survey rating of **9.6** average on a 1-10 scale. \* *References available upon request.*

RESEARCH:

AUTHORED AND PUBLISHED

"The Effects of Caffeinated vs. Decaffeinated Coffee on Reaction Time", Oregon State/Washington State Psychological Association Convention, 1976.

"Physical Attractiveness and Helping Behavior", Michigan Academy of Arts and Sciences, 1978.

Prepared literature review for university litigation "The Mechanisms of Spinal Cord Injuries in Football", 1983.

BOOK:

***"A COMPREHENSIVE GUIDE TO HEALTH AND FITNESS FROM A SCRIPTURAL AND SCIENTIFIC POINT OF VIEW"***

EDUCATION:

B.S. Psychology, ***Emphasis on Sports Psychology.***  
**Athletic Trainer** Certified. P.S.U.

Certified Strength and Conditioning Specialist, **N.S.C.A.**

Post Graduate Studies:

***The Biomechanics of Human Movements***  
***THE PHYSIOLOGICAL RESPONSES TO PROGRESSIVE OVERLOAD***