

Musculo-Skeletal Disorders

Prevention - Ergonomics - Aging



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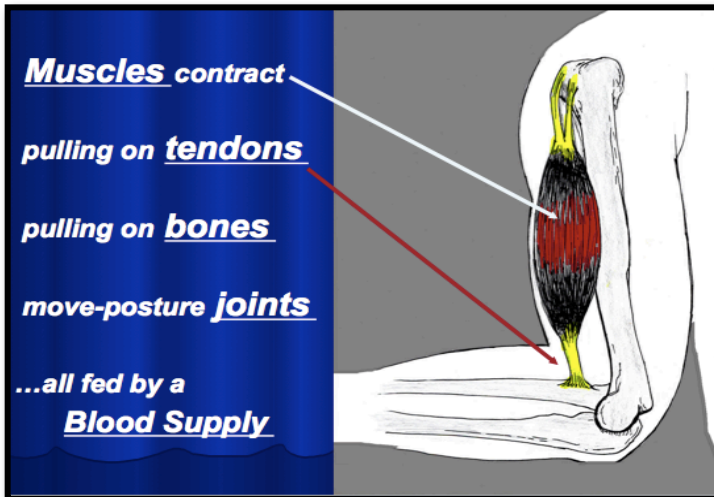
This is PREVENTION advice. If you already have a problem, consult your physical therapist for specific advice

MUSCULO-SKELETAL DISORDERS (M.S.D. of the Neck-Arm & Low Back) :

Musculo-Skeletal Disorders (MSD): tendinitis, tennis elbow, golfer's elbow, rotator cuff, carpal tunnel, neck strain, low back pain. MSD's are epidemic in the workplace, AT 55% of Worker Comp claims and 65% of costs... BUT these are highly preventable !! Understanding how your musculo-skeletal system works, how it breaks down and wears out, and how to avoid and reverse that are key to reducing MSD in the workplace. Understanding musculo-skeletal AGING is also part of this.

YOUR MUSCULO-SKELETAL SYSTEM... How it works... How it breaks down... Over-use MSD:

WORK: Muscles contract... pulling on tendons... pulling on bones... moving or stabilizing joints... cushioned by cartilage... and held together with ligaments. KEY: These are all fed by a blood supply that delivers nutrients and oxygen for the tissues burn as fuel. This produces waste products (acids that become urine). The blood supply must remove the wastes produced by the work. But if blood supply is not good, the acid wastes build up in the tissues causing irritation... over-use tendinitis !



The working-aging musculo-skeletal system

PAIN... Pain nerves react to chemical irritation (a build-up waste products in working tissues), or by mechanical over-load (such as pinching or pulling), or by lack of oxygen that feeds the tissues. In MSD, oxygen is blocked and acid wastes build up from work demands and poor blood flow to absorb acid wastes... or from the mechanical load of posture strain... or from muscle contraction, tendon tension, joint compression that block blood supply, oxygen delivery, and acid wastes cleanup. All these can lead to PAIN.

AGING-1... SCAR TISSUE ... Every day work actions break a few microscopic fibers of muscles, tendons, joints, spinal discs. These heal with scar fibers... which are weaker and more brittle than the fibers they are healing. The build-up of scar fibers over time makes you gradually weaker, stiffer, more likely to be injured. This is aging and it starts about age 25.

Agging-2... DRY & BRITTLE... Water loss in tissues. Musculo-skeletal tissues are mostly water attached to proteins fibers. Water makes these tissues very ELASTIC. Elasticity allows tissues to absorb loading, bending, twisting, weight-bearing with minimal damage. But these tissues gradually lose water over time... which make tissues stiffer and weaker, more easily damaged with regular work. Loss of water and a build-up of scar fibers allows tissues to break down. This is **DEGENERATION. ... AGING.**

But this is PREVENTABLE and REVERSIBLE ! We reverse aging by restoring ELASTICITY and BLOOD SUPPLY.



Aging & Degeneration... loss of tissue water & elasticity... gradual damage... BUT very reversible !

RE-DEFINING M.S.D and PREVENTION.:

MSD comes from musculo-skeletal tissues becoming weak, stiff, brittle, and damaged during work. It often comes from reduced blood supply to support work demands. Blood supply is blocked by sitting, standing, reaching, grip, awkward postures, repetitive motions, and lack of variety of activity. With poor blood supply, repair cannot keep up with damage, causing degeneration.

Some call MSD “repetitive motion injury.” But this is not quite accurate. MSD is more often caused by prolonged static POSTURE (sustained sitting, standing, gripping, or holding any position for too long). Prolonged posture can block blood supply to those working tissues. ** Repetitive motion causes damage when unchanging posture blocks circulation.

We avoid and reverse degeneration and MSD by reducing tissue loads with better posture and more effective work methods. We improve blood supply by changing postures often and by rotating between work tasks so that more tissues take turns doing the work (job task rotation). Providing better posture and easier motion demands is “ERGONOMICS.”

But what also works great is **MICRO-STRETCHING.** Hard-working tissues get a quick burst of blood supply and relaxation with a few specific “micro-stretches” done often through the day. We can improve flexibility to reduce “drag” caused by tight tissues that strains posture and restricts movement. Tissues relax after stretches, allowing blood supply to return and clean out wastes.

Work design (ergonomics) reduces MSD risks by making job tasks less demanding. This can be very effective. BUT in many cases ergonomics cannot be improved enough to avoid MSD. That is when employees must take steps to protect themselves. This includes constant attention to using good upright head-tall posture, safer lifting, changing posture or motion patterns often, and frequently doing brief micro-stretches to working tissues. Also... After-work recovery stretches can stimulate much better healing.

LOW BACK MECHANICS and PROBLEMS :

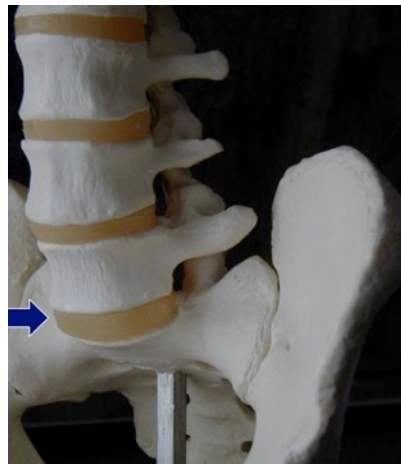
The spine is a stack of bones (vertebrae) connected at joints, cushioned by discs, strapped together by ligaments, moved and stabilized by muscles. The spine must be MOBILE for movement... and STABLE for posture... a difficult challenge, vulnerable to injury and AGING changes that cause stiffness and weakness.

Lower back problems come from prolonged sitting, prolonged or repeated bending, twisting, awkward lifting (lifting that is heavy or frequent or low or high or combined with reach)... and AGING changes to spine tissues. “Lifting injury?” Most back injury is the result of multiple issues that accumulate over time, gradually stiffening and weakening the spine over time, allowing injury to occur during lifting a seemingly minor load. There are many different back structures that become worn out, stressed, and degenerated.

The bones are connected at **FACET JOINTS,** as pivot points for movement and posture. Facet joints run up the back of the spine, left and right sides. They have very sensitive nerves to monitor balance, posture, and motion. But that sensitivity risks lots of pain with even minor injury. These small joints can become arthritic over time, growing bone spurs that can pinch nerves. Facet joints are stressed by prolonged STANDING, working OVERHEAD, and TWISTING. Degenerated discs also stress joints (later).



Rear view; FACET JOINTS



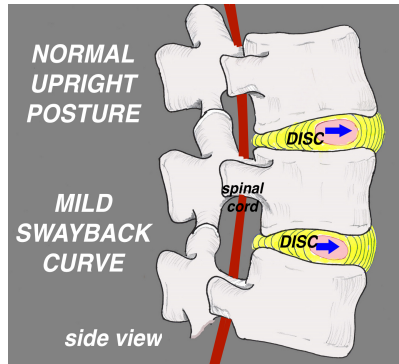
Front view; DISCS

SPINAL DISCS:

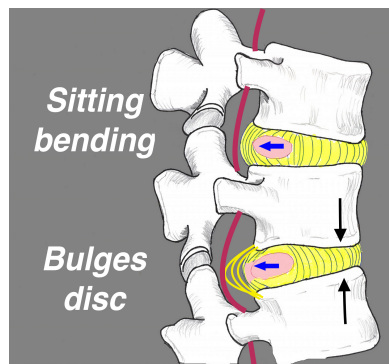
Lots of problems come from the discs. Discs are cushion pads between vertebrae, placed at the front $\frac{3}{4}$ of the vertebrae. They act as shock absorbers. They also act as ball bearings for the vertebrae to pivot on during bending motions.

When we are young, the discs are 80% water, to allow shock absorption and easy pivoting during bending. But as we get older (even by age 35) discs lose water and elasticity, and cannot absorb loads or bend as well. They get thin from water loss, shifting loads to facet joints, causing strains and arthritis. As discs thin, bones sit closer together, making them unstable. This can pinch nearby nerves. This is a DEGENERATED DISC. This can be improved with reduced posture stress and certain STRETCHES.

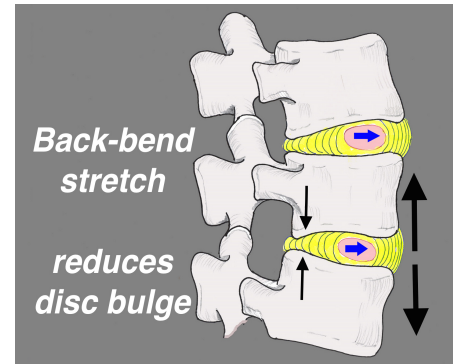
In the center of the disc is a wet jelly (nucleus), surrounded by a tough outer ring. BENDING or SITTING squeezes the front of the disc, pushing that jelly against the back wall of the disc. This back wall is weak and tends to balloon out... a BULGING DISC. The jelly can eventually break through, causing a RUPTURED DISC. But this is usually quite reversible. Stretching backward tends to push the jelly back to the center of the disc. The front of the disc is very strong and usually does not bulge. Bending forward bulges the disc. BUT stretching backward can correct and reverse that bulging, draw in fluids, and prevent-reverse disc damage.



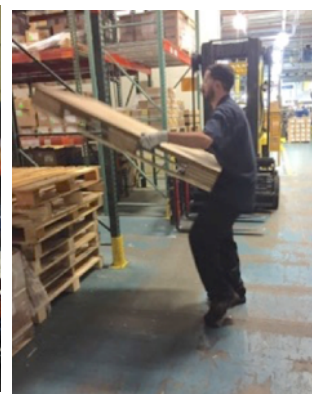
Normal posture has slight swayback



Forward-bend or sit bulges & degenerates discs



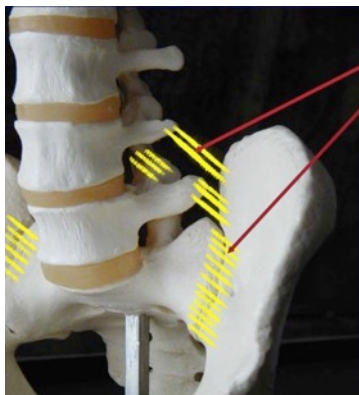
Back-bend stretch corrects disc mechanics



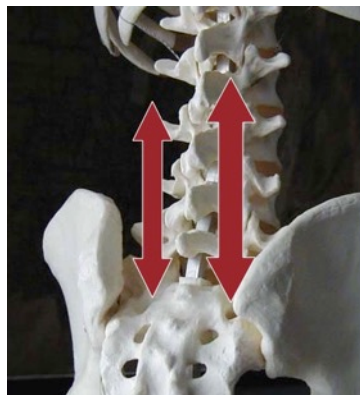
Disc damage from too much BENDING... prolonged SITTING... demanding LIFTING... ...but, reversed with BACK-BEND stretch

Ligaments; Ligaments are elastic bands that allow reasonable movement while holding bones and joints together. You can sprain ligaments by forcing movement or posture beyond what the ligaments allow. This hurts (a lot) but heals quickly. But it heals with scar tissue that is weaker and stiffer than the original ligaments. That allows them to be more easily sprained again.

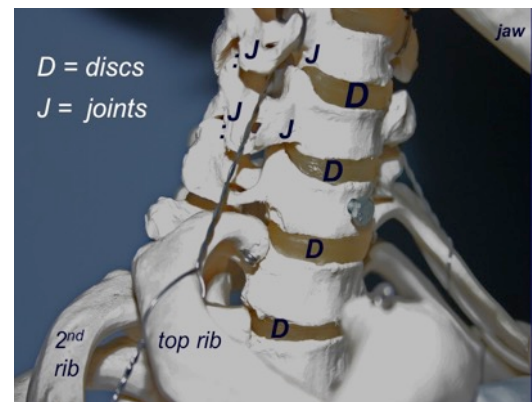
Muscles... Muscles have two jobs: move the spine, and hold the spine upright (posture). Repeated motions, heavy loading, holding a posture too long can all overwork muscle, causing buildup of irritating waste products and tissue damage. Many other problems can cause muscles to go into painful spasms. Muscle spasm is usually caused by other tissues that are being strained.



Ligament bind bones & joints



Back muscles move & stabilize spine



Neck vertebrae, discs, joints (front right view)

NECK WORK :

The neck also has facet joints, discs, ligaments, muscles. It is much more mobile than the low back. A heavy head puts a load on the neck, especially with rounded-shoulders slouching forward-head posture (a very common posture habit, especially when sitting). The arms are suspended from the neck by neck-shoulder muscles, adding more neck load. Working with arms adds posture load to neck, especially when the arms are not resting on a desk surface or are reaching out too much. These loads are on a very mobile and somewhat unstable sensitive neck, straining neck muscles. Smaller neck joints and discs are easily damaged. Wear damage and degeneration are common... and can irritate nearby nerves to the arms.

NECK & BACK PROBLEMS:

By the time you feel pain, there are often several structures that hurt. Disc issues can stress joints, which can stress ligaments, that can strain muscles. Also, you can LOTS of damage, but NO pain. The level of pain often does not match the damage.

X-RAYS & MRI's are often **WRONG**... bulging or degenerated disc or arthritis on MRI... may NOT be the source of your pain ! X-rays & MRI can make people believe they are disabled. But these are often wrong. MOST adults over with **NO** BACK PAIN have degenerated discs, bulging discs, and-or arthritis on x-ray or MRI... but NO pain. So... x-rays and MRI findings for these are not valid unless you also have worsening neurological symptoms in the legs. Most back pain is mechanical and can be corrected with simple exercises and habit changes. The pain goes away (while the x-ray & MRI still shows disc findings & arthritis).

Do NOT let the x-ray & MRI falsely disable you !! They are not valid unless you have worsening neurological leg symptoms.

Degenerated Discs... Discs are 80% water when you are 25, but can drop to 40% water by age 50. The discs get thinner. This increases loads on facet joints and lead to arthritis and easier sprains. This is at least partially reversible with certain stretches, described later. This is caused by aging, inactivity, years of prolonged sitting, years of repeated or sustained bending.

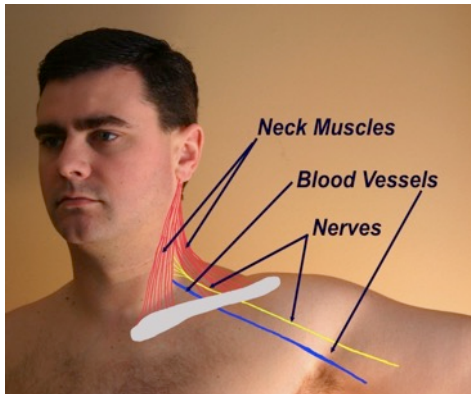
Bulging or Ruptured Discs... The gel in center of disc (nucleus) pushes out back wall of disc, or leaks through back wall. This can press on nearby nerves, causing pain down arm (neck disc) or leg (low back disc). This sometimes requires surgery ...but rarely. Most will resolve with certain stretches. Caused by repeated or sustained bending, awkward lifting, and excessive sitting,

Soft Tissue Sprain (ligament or muscle)... Sprained tissues caused by loading in an awkward or extreme or prolonged position. Heals with rest, followed by stretches, then strengthening. In some cases, pain nerves can get overstimulated and out of control.

Facet joint sprain... Caused by overhead work, twisting, sideways loading. Hurts lots; heals with rest, followed by activity.

Degenerative Arthritis... Degeneration of facet joints, which can squeeze nerves to arms. Caused by slouched posture, aging, years of prolonged standing or sitting, overhead work, twisting, inactivity. Improved by proper posture, stretching, and stability exercises.

STRESS... Stress often adds to pain. It may not be the cause of your pain, but it can make MSD pain lots worse. Pain, poor sleep, lost work causes stress, which causes spasm, causing more pain, causing more stress. Just being aware of this can help recovery.



Lateral neck muscles can squeeze nerves & blood vessels to arm-hand.

This increases risk of tendinitis and carpal tunnel syndrome due to posture strain and tight muscles at neck (known as thoracic outlet compression). Rounded-shoulder forward head posture allows these muscles to tighten, risking "thoracic outlet compression" as well as stressing neck, shoulders, and upper back.



Supporting arms on padded work surface reduces posture load at neck.

Padded arm rests eases neck work and allows less stressed neck, thoracic outlet, upper back, and blood supply to arms. Frequently switching between sitting and standing also greatly helps this.

OVERUSE and TENDINITIS (tendinosis, tendinopathy, tendon degeneration) :

WORK: Muscle contract, pull on tendons, move joints, or hold a sustained position (such as sitting or gripping). This reduces blood supply, trapping acid wastes, causing inflammation, scarring and degeneration while reducing repair. MSD is a blood supply issue. We prevent MSD by boosting blood supply to these working tissues. It is easy. It is effective. Several tactics are available.

UPPER EXTREMITY ERGONOMICS RISKS:

SLOUCHING... ROUND-SHOULDERS... FORWARD HEAD POSTURE: A common posture habit of holding head ahead of neck and shoulders. This strains upper back muscles, pinches joints in upper neck, compresses discs in middle neck, and squeezes shoulder rotator cuff tendons. This also causes muscles on side of neck to tighten, squeezing nerves and blood vessels passing through to arm structures. This is "thoracic outlet compression" risking arm MSD such as tendinitis and carpal tunnel syndrome.



Forward head posture



Sitting; slouching; forward head; made worse with BIFOCAL EYEGASSES

PREVENTION: Position work for more upright head posture. Frequently switch between sitting and standing. Frequent job task rotation. Rest arms on work surface during hand tasks. Do neck micro-stretches. Reminder self to **"BE AN INCH TALLER."**

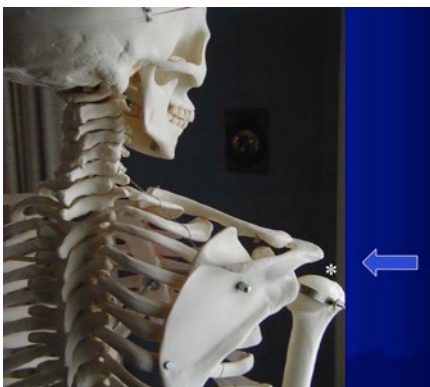


Arm support during neck-hand work



ROTATOR CUFF: This is overuse tendinitis at shoulder tendons located between bones of shoulder in a tightly-confined space. Irritation causes swelling and pinching that blocks blood supply. Very painful, disabling, costly, and difficult to treat!

**Caused by REACHING that is: too high... too far... too often... too prolonged... or with a load in your hand (tools, etc.).



cuff tendons pinched between bones



Reaching

PREVENTION: Position work or worker to make reach lower, closer, less often, less prolonged, and lighter. Even slight improvements can help. Also, rotate work tasks to minimize time spent reaching... and frequently do shoulder micro-stretches

See the **Micro-Stretches**, upcoming

TENNIS ELBOW: This is actually a tendinitis of WRIST muscles where they originate on outside of elbow. Caused by loading the wrist-hand. Loads are held by wrist muscles-tendons that become strained up at elbow where wrist muscles start. Causes may be heavy loads lifted or light loads held for long periods (such a computer mouse work). **PREVENTION:** Reduce hand load or holding time; change work postures (switch between mouse and trackball hourly); work task rotation; wrist-arm Micro-Stretches.

GOLFER'S ELBOW: Similar to tennis elbow, except on inside of elbow. Caused by loading muscles of grip, or at pronator muscle (turns forearm over); prolonged, repeated, forceful grip or pinch; turning or prolonged holding palm-up position (pulls on pronator).



Tennis elbow from wrist-hand loads.

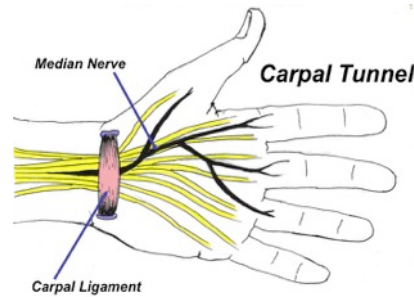


Golfer's elbow: grip & forearm twist loads

WRIST-HAND-THUMB-CARPAL TUNNEL: Wrist and thumb overuse comes from grip, pinch, wrist bent, vibration, thumb actions. These sensitive structures are easily irritated. Swelling at wrist or base of thumb can compress nerves entering hand (carpal tunnel) causing pinched nerve that (sometimes) requires surgery. Several medical issues add to this risk (pregnancy, diabetes, smoking, thyroid problems, obesity, wrist or thumb arthritis). **PREVENTION:** Reduce force or time spent in grip or pinch; use tools that allow wrist to be in neutral position during grip; reduce vibration; improve neck posture; rotate job tasks; micro-stretches at wrist.



Grip-pinch muscles originate at inner elbow... run through carpal tunnel to fingers



Pinch or Grip that is forceful, prolonged, repeated, wide

SEATING... "Correct" or "perfect" posture is NOT what we seek. Instead, we recommend VARIETY of posture by changing seat height or other adjustments every 30 min. PLUS, frequently do standing back-bend stretch 10 sec... and walk about often.



CHANGE seat height 2" every 30 min



Computer in corner of adjacent desks for arm support, switch between mouse & trackball

ERGO RISKS LIST (summary) : Forward Head-Slouching... Shoulder Reach... Wrist Loading... Grip... Pinch... Bent Wrist... (prolonged, repeated, forceful) Vibration in hand... Prolonged Sitting... Prolonged Standing... Limited variety of tasks

PREVENTION.... Reduce one or two of these risks (a little improvement can really help)... Speak up with suggestions... Job task rotation... Switch between sit & stand often... Micro-Stretching !!... After-work at-home recovery stretches... Report pain early !

ERGONOMICS Risks for C.T.S. ...

Work risks are... pinch or grip that is too forceful, too often, or too prolonged.... bent wrist positioning during grip or pinch makes this worse. Vibration is also a strong risk (power tools, for example). Forward head posture adds to CTS risks.

One may need to improve the ergonomics of their job (see upcoming page on Computer Ergonomics, as an example). Minimize grip force or duration. Grip diameter should be about 2 inches. Try to increasing the variety of work tasks, because doing the same task all day increases risks. Frequently switch between sitting and standing, if appropriate. Resting arms on work surface reduces neck loading, reducing arm stress. Frequently stretch during workday (see our page of workplace stretches).

Self-care for the wrist includes reasonable rest periods, maybe with a splint (especially worn at night), frequent stretching at wrist and neck, plus maintaining more upright and tall neck posture.



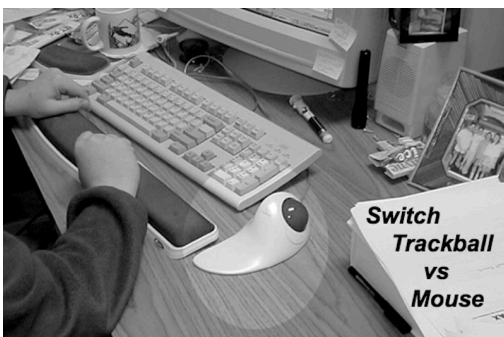
grip, pinch, wrist bent



Grip size too small



Grip size good



Switch between mouse vs trackball for work variety
Resting arms on work surface reduces neck load



micro-stretching



Night splint

Good neck posture and flexibility helps maintain good blood supply and healthy nerves to arm-hand (be an inch taller!).



Correct slouching: be an inch taller



Lateral neck side stretch



Switch between sitting and standing, easing neck strain, reducing arm stress

QUICK TIPS (a snapshot of key MSD control tactics) ...

SECRET WEAPONS FOR PREVENTING WORKPLACE MSDs...

1. One of the MOST common and important MSD risk factors is PROLONGED POSTURE, such as sustained sitting, sustained standing, sustained grip, sustained reach. Sustaining a posture, any posture, creates pressure loading (muscle contraction, tendon tension, joint compression) at pressures exceeding the blood pressure that feeds those working tissues. This forces them to burn their nutrient fuel without oxygen, causing large increases in acid waste products, which are trapped in those tissues due to blocked blood supply. The acids can reach a critical concentration that triggers inflammation (e.g. tendinitis).
2. GOOD POSTURE, even PERFECT POSTURE, is potentially BAD for you if it is SUSTAINED. Even good posture (whatever that is; we cannot agree) will still undergo prolonged tissue loading that blocks blood supply, as described above.
3. The key to reducing POSTURE RISKS for MSD is to seek POSTURE VARIETY; switching frequently between slightly different postures, so as to rotate which tissues are being loaded. This reduces the TIME tissues are being loaded, allowing better blood supply, minimizing damage and maximizing repair. Examples include frequently adjusting chair or vehicle seat a few inches in any direction to alter loading, switching between sitting versus standing, switching between a computer mouse versus trackball, flipping keyboard legs in versus out to alter wrist position slightly... often. This simple, no-cost ergonomics tactic can be very effective at reducing MSD.
4. Many-most people with upper extremity MSD have NECK issues contributing to their MSD. This is especially true if they have MSD issue in both arms. Correcting hazards at arm-hand will likely be more effective if they also find improve neck posture stresses.
5. FORWARD HEAD POSTURE, rounded-shoulders, slouching is the key neck posture risk. Posturing the head forward with rounded shoulders greatly increases posture stresses at upper neck, upper back, rotator cuff of shoulders, plus compresses nerves and blood vessels passing through neck muscles on their way to arms-hands. Attention to the posture correction tactic of "BE AN INCH TALLER" is a very simple but effective prevention tactic.
6. LIFTING, by itself, is usually NOT the primary back injury hazard. The spine is designed to tolerate lifting demands... until the spine becomes stiff and weak from other stresses. Sitting, bending, sitting, inactivity, and aging changes lead to gradual weakening and stiffening of the spine, making it vulnerable to "lifting injury" with just a lightweight and otherwise-safe load. Many back problems develop slowly with no symptoms, until that final minor event.
7. SITTING is a terrible risk factor for so many body health issues. It greatly magnifies degenerative changes at neck, lower back, middle back, shoulder, and other physiologic systems.
8. Workplace STRETCHING programs very often FAIL... but not because workplace stretching is ineffective. Most stretching programs fail because most workplaces are doing the WRONG STRETCHES, and employees are not professionally training in how and why and which ones to select. Many workplaces have seen excellent reductions in pain issues from MICRO-STRETCHES specifically designed to restore blood supply to specific at-risk structures. STRETCHING WORKS if it is done right. And it is most valuable where MSD risks cannot be otherwise reduced through ergonomic re-design of jobs. It offers employees one more effective means of self-protection.
8. We cannot separate workplace MSD ergonomics hazards from NORMAL AGING. All of us undergo aging changes. Musculo-skeletal tissues are made to be elastic, to absorb loading with minimal wear damage. They are elastic because they are 80 percent water, when we are 20 years old. But they lose about half of that water content by age 40, greatly reducing their elasticity, allowing more damage from less workload. Plus as we experience everyday normal wear to these tissues, they repair that daily wear damage with scar tissue, which is weaker and stiffer and dryer than the normal tissue, causing us further weakness and stiffness.
9. Musculo-skeletal AGING is highly REVERSIBLE ! Simple targeted stretching that improves flexibility just a little bit in certain structure can greatly improve musculo-skeletal work tolerance and comfort. Too many people assume the pains of aging cannot be reversed. That is wrong.
10. Employees need to view themselves as professional WORKPLACE ATHLETES who need to maintain flexibility and strength lost to aging and certain work demands. A simple 3-to-5 minute after-work recovery exercise program (so very simple, quick, and easy to do) can preserve an recover musculo-skeletal function and comfort. It is not much more time than brushing you teeth, and with similar prevention value.
11. Workplaces can reduce their Worker Comp claims and costs, plus build employee wellness and performance, by contacting their local Physical Therapist who is specifically skilled at managing workplace MSD... for a quick and simply MSD risk assessment and propose an on-site seminar on this.

Proper Computer Work-station Set-up

Monitor... placed squarely in front; not off to one side; top edge of screen at eye level

NOTE... Wearing BIFOCAL eyeglasses for computer work can cause severe posture strain.
Consider single vision reading glasses with slightly longer focus distance, for better posture.

Keyboard... 4-6 inches free space in front of keyboard... place gel pad here for arm support

NOTE... placing computer in CORNER DESK provides full weightbearing surface for both forearms

Keyboard tray... these are usually too low; but switching every hour between keyboard placed in tray
versus placed on desk provides work posture variety

Mouse... gel pad placed in front for hand-wrist rest... ALSO, switch between MOUSE versus TRACKBALL every
1-2 hours to provide hand-wrist work movement-posture VARIETY

Document-holder... papers held upright on document holder placed near the monitor; switch this hourly
from left of monitor to right of monitor, for head posture variety.

Telephone... do NOT hold telephone handset between head and shoulder; use HEAD SET

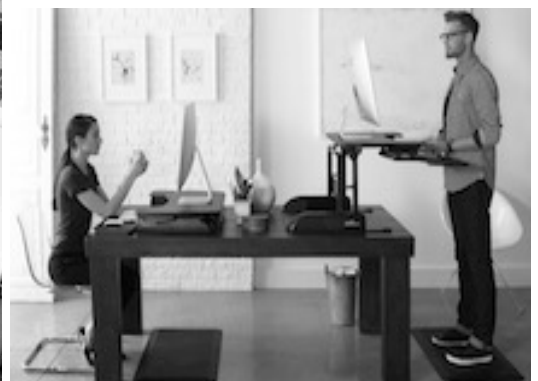
Pens-pencils... place padded SLEEVE over pinch surface for padding

Stapler... use electric stapler if stapling often

Chair... Most important to be height-adjustable, THEN try to change that height about 2 inches up or
down every hour for posture variety, PLUS do a standing back-bend stretch every hour.

Stand-up option... Many office employ STANDING DESKS with tall chairs to allow switch between sitting work and
standing work. This has been very well received by workers; much better work comfort. Another option is the
VARI-DESK platform placed on conventional desk, which allows worker to raise computer to standing height.

Micro-stretching... Perform SmartCare's micro-stretches every hour, to maintain blood flow to working
tissues throughout the work day. These work !!



MICRO-STRETCHES (part one... Neck-Arm) (Do NOT start these without instruction by a Physical Therapist)

1. Tuck chin in and bring head tall, 10 sec. (corrects damage from slouching, forward head posture)
2. Hold down shoulder, tip head away, keep face squarely forward, 10 sec. (relaxes tight lateral neck muscles from slouching)



Chin-tuck... be an inch taller



Stretch squarely sideways

3. Rotator cuff: Dangle arm, relaxed, swirl around 10x. (relaxes and restores circulation-recovery to shoulder-cuff)
4. Tennis elbow strain-degeneration: elbow straight, palm-down, curl fist down & turn it outward slightly, 10 sec.



dangle & swirl



Elbow straight, palm down, curl fist down & turn out

5. Golfer's elbow & carpal tunnel: Elbow straight, palm up, hand open, stretch hand back & down 10 sec.
6. Relaxation of work tension: Clench, shrug, inhale 3 sec... then relax & exhale 5 sec. Do twice.



Palm-up, stretch hand back



Shrug-clench-inhale 3 sec... then...



Relax & exhale

Micro-stretches can be very effective... IF properly selected and employees properly instructed by a physical therapist familiar with the work demands of these jobs. Employees should be down at the beginning of the work day and after any break period. They should also be encouraged to perform specific stretches to reverse discomfort they encounter during work. These are strictly prevention stretches. **Anyone with an existing condition should consult their own physical therapist for any necessary modifications.**

LOW BACK ERGONOMICS ...

Ergo Risks: Prolonged Sitting or standing; poor chair design; bending; twist; LIFTING that is low, high, far, often, awkward, heavy.

Lifting... Reduce (even only a little) how heavy is the load, how low it is lifted, how high it is lifted, how much you twist, how far away load is held, and how often you lift. Using lift-tables, turntable, rollers, hoists can reduce lifting demands. If lifting is excessive, then redesign job to automate or mechanize or eliminate human lifting. Be creative.

Sitting... Sitting is a major risk to spine. Even perfect posture is bad if it is prolonged and unchanging. Instead, change your posture frequently. Adjust seat up or down a few inches every half hour. Better yet, try to switch between sitting and standing often.



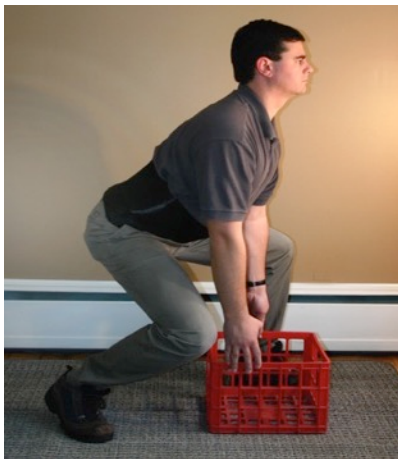
lift table reduces bending



Sit-stand desk

BODY MECHANICS... Lift properly !

Choose NOT to be injured. It is your choice. Lift correctly. Feet wide and pre-positioned to minimize twisting.. Get close to load and hold load close to body.. Tuck chin in, pull shoulders back, arch low back in create mild swayback as you squat at knees. Pull load close, tighten your gut and butt as you lift. Then put load down in the same manner. If very heavy: get help or use a device !



Wide stance; load close; squat; arch back in slightly



Back-bend stretch 10 sec to reverse strain of bending or sitting

POSTURE RISKS... Change awkward postures often !

Many strains occur from holding awkward position too long. Listen to your body. When you feel discomfort, stop, get out of that position, stretch in the opposite direction 10 seconds, then resume the work task. Very simple but very effective self-protection !



Frequently stretch out of your awkward or sustained work postures



SEATING... "Correct" or "perfect" posture is NOT what we seek. Instead, we recommend VARIETY of posture by changing seat height or other adjustments every 30 min. PLUS, frequently do standing back-bend stretch 10 sec... and walk about often.

MICRO-STRETCHES (part two... low back) (Do NOT start these without instruction by a Physical Therapist !)

These first two are basic standard stretches for low back strain avoidance...

1. Standing back-bend: Done often at bending and sitting jobs. Stretch backward 10 sec, once, gently, head bent forward.
(This is for jobs with bending, sitting and low-height lifting) (reduces disc bulging and degeneration risks)
2. Hamstring stretch: Sitting, grasp & hold thigh as you stretch leg straight at knee 30 sec each leg.
(Tight hamstrings can distort and strain bending tasks at lower back. Standing, sitting, and lifting can tighten hamstrings)



Standing back-bend 10 sec



Seated hamstring stretch 30 sec each

These are optional stretches, recommended for jobs that are more vigorous or awkward in positioning...

2. For standing jobs, which stress facet joints: Sitting, bend to fully stretch forward at lower back, 10 sec.
3. Stretch sideways, arm overhead, to stretch muscles at side of torso, 10 sec, to reduce strain risk.
4. Seated torsion-twist. Sitting knees straight ahead; turn and stretch torso into full twist, 10-15 sec.



Seated flexion stretch (for standing jobs, not for sitting jobs)



Sideways stretch



Seated torsion stretch

Other optional specialty stretches...

5. Calf stretch to address heel pain issues. Lean on wall with one leg reached back to stretch calf, 30 sec each side.
(Standing jobs often see heel pain-spurs. Tight calf is a risk factor) (often used for heel pain, plantar fasciitis)
6. Hip rotator stretch. Sitting, right heel on left knee; grasp right knee, pull it across toward left shoulder, twist right 30 sec.
(Standing jobs often see hip-buttock pain. This is tight hip rotator cuff-piriformis)



Calf stretch for heel pain



Piriformis stretch for hip-butt pain

** Have your Physical Therapist adapt these for your problems

GENERAL PREVENTION STRATEGIES...

ERGONOMICS... Your best experts are the employees doing the work! They are the best source of ideas on how to make the work easier (less stress and damage). Give them basic ergonomics EDUCATION, then empower them to make and implement their suggestions. Be aware not all ergonomics risks can be fixed. That requires alternatives to ergonomics... such as...

EXPOSURE REDUCTION... This can be very effective alternative when ergonomic changes are not an option. Reduce MSD risk exposure time by: switch between sit & stand often... job rotation... rotate how job is done (example: switch between mouse & trackball hourly)... alter sitting position by changing chair height often. WORK VARIETY greatly reduce MSD risks.

MICRO-STRETCHES?... Some say workplace stretching is not effective. But that opinion is based on old poorly-designed studies. Newer studies and our experience shows micro-stretching can work very well... IF done correctly !! Also, some workplaces do incorrect stretches. Micro-stretches are set of 6-8 stretches done only 10 seconds each... specifically selected per job risks, and professionally taught by a physical therapist... IT WORKS, if done RIGHT ! New research and our experience at 500 workplaces strongly support this. BUT if you already have a problem, make sure your physical therapist approves these are correct for YOU.

Office-based NO-LOST-TIME Micro-Stretches... (Do NOT implement these without proper instruction)



Do these every 1-2 hours
They should be done very gently.
These are prevention stretches,
not intended to treat active problems.
See your PT or MD if you have active problems.
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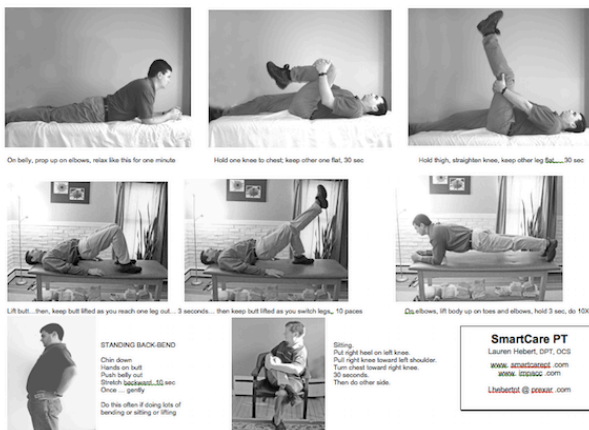
SmartCare Physical Therapy
NO-LOST-TIME Micro-Stretch Injury Prevention
207-562-8048 www.smartcarept.com

These work... but only if properly selected & professionally taught !!

WORKER EDUCATION: Go beyond ergonomics, to include worker self-care education. Workers respond very well to properly presented motivational training on how to take care of the aches and pains they live with daily. Physical therapists are trained to present programs teaching personal ergonomics skills, workplace micro-stretching, and after-work recovery stretches. Workers hunger for this information because they do NOT want to hurt. They want to have a life after work. Ergonomics does not succeed without workplace education... teaching workers not just what to do, but WHY to do it. Once they understand WHY they hurt and WHY to do certain prevention tactics... then they willing follow our advice.

This includes attention to **WORKER FITNESS & WELLNESS.** Flexibility, strength, and endurance are required if we are to tolerate work. As we age, many parts wear out. We are all aging. But degeneration of the musculo-skeletal system can be slowed and even somewhat reversed. But workers must be educated and motivated to take those very few minutes each day to rebuild the flexibility strength, endurance that we all lose each day from aging and degeneration. This is the teaching role of your physical therapist. What is the easiest and most effective? Three minutes of stretching at the start and end of each day... and go for a 20-minute walk.

Lower Back... basic health & recovery ... do these only as approved by your Physical Therapist



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After work low back recovery exercises... Consult your Physical Therapist for yours

LOWER EXTREMITY, HIP-KNEE-ANKLE MSD RISKS

Common lower extremity MSD's include...

HIP BURSITIS (TROCHANTER)

KNEE SPRAIN, DEGENERATIVE ARTHRITIS, MENISCUS INJURY

ACHILLES TENDINOSIS

PLANTAR FACIITIS (HEEL SPURS)

HIP BURSITIS (TROCHANTERIC BURSITIS): This is usually caused by a tight hip rotator cuff muscle (piriformis). It is u=often the end of a chain of problems that start with a degenerated disc in the lower back, causing bones to sit closer, causing ligaments that hold pelvis to spine to slacken slightly, allowing pelvis to be a bit unstable, causing hip rotator (piriformis) to tighten, pulling on hip bursa. Cortisone injections are usually tried, and usually fail. Effective treatment usually calls for flexibility exercises at low back and hip, then strengthening exercises at low back and hip, to normalize mechanical function between hip and back... set up by a physical therapist.

Common workplace risk factors are operating footswitch (uneven weight-bearing shared between legs), sitting with twisting (operating a forklift, requiring lots of backing up), and climbing. One preventive workplace stretch is the seated piriformis stretch



Hip rotator-piriformis stretch: Right ankle on left knee, pull right knee toward left shoulder, twist chest to right 30 sec.

KNEE DYSFUNCTIONS: Knees wear out over time, leading to degenerative arthritis. This is irritated by stairs, ladders, cement floors, prolonged standing, driving vibrating equipment. Knee meniscus can be worn, then torn, particularly by twisting, especially holding a load. Various ligaments can be sprained with various loading forces. Good calf and hamstrings flexibility, plus good footwear can help.

ACHILLES TENDINOSIS: Degenerated heel cord tendon tying calf to heel. Tight calf muscle, poor footwear, arch problems in feet are risks. Good footwear with proper arch support, plus stretching calf often are important.

PLANTAR FASCIITIS (HEEL SPURS): This is like a tendinitis at soft tissues that support arch, hurting at bottom of heel toward inside of arch. The heel spur does NOT cause the pain... the pain causes a spur to develop. So, removing the spur usually doesn't help. See a good PT for tricks that can help such as stretch calf and arch ligaments; arch support; ankle stability strength and morning scar massage are several tactics.



Hamstring stretch



Calf stretch



Plantar fascia cylinder roll, in morning before any steps

Lower extremity MSD issues are diverse, with specific individual issues. See your physical therapist for evaluation and customized advice of managing these problems,