from…. ***SmartCare*** ***Physical Therapy***

Work Pain & MSD Prevention in the Office

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***** This is prevention information. If you already have a problem, have your PT approve these for you***

M.S.D. PROBLEMS (low back and neck-arm MSD) :

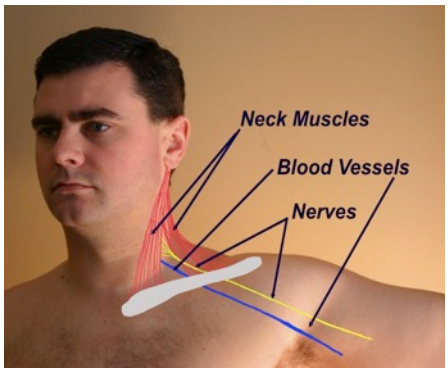
Musculo-Skeletal Disorders (MSD) of the neck, low back, and upper extremity are epidemic in today's workplace, AT 55% of Worker Comp claims and 65% of costs. But they are highly preventable! There is a high risk of these MSD's in office-computer work.

RE-DEFINING THE PROBLEM:

Some call these problems "Repetitive motion injuries." This is not quite correct. Most MSD problems in the office-computer workplace are more the result of SUSTAINED POSTURES at the neck, back, and upper extremities (especially prolonged SITTING)

SUSTAINED POSTURE DISORDERS.. Sustained sitting, rounded-shoulders, hands postured on mouse and keyboard all day: create sustained work posture for long periods, prolonged joint loading, muscle contraction, tendon tension. These cause pressures that block blood supply to these structures, causing irritation that leads to MSD's. It is a BLOOD SUPPLY issue. Sitting leads to rounded-shoulders slouching, tightening muscles on sides of neck, squeezing nerves and blood vessels to arms-hands… risking MSD in arms.

Round-shoulders slouching



squeeze blood vessels-nerves

Rounded-shoulders forward-head slouching stresses neck and upper back; squeezes nerves & blood supply to arms and hands.

PREVENTING MSD requires attention to workstation ergonomics, improving worker posture habits, using a VARIETY of postures and activity, frequent micro-stretches to restore blood supply, and worker self-care education.

SITTING… the top priority issue

Sitting is very damaging to the body. Sitting doubles weight-bearing on spinal discs in the lower back, in a stressed position, bulging and compressing discs, while weakening back muscles. It encourages slouched forward head posture, stressing upper back and neck structures. Overall lack of movement activity ages heart-lungs-blood vessels.

Is there a proper "fit" of the chair? Actually NO. Finding "perfect" posture and staying there all day is not good. There is still weight-bearing loads to key structures. Even proper posture is bad for you IF YOU SUSTAIN that position too long.

What is far BETTER is POSTURE VARIETY ! What is the correct chair? We cannot point one out because chairs are like shows… what feels good to one, feels terrible to another. What is key is to be able to change the adjustment every hour.

The best advice on chair adjustment is to CHANGE the fit every half hour, simply changing seat height and inch or two, or changing seat tilt if that is an available adjustment. Even more important: stand and STRETCH backward 10 seconds every hour to reverse low back disc pressure and bulging that comes with sitting. WALK around a short distance often also helps this.

Many offices now offer STAND-SIT workstations: tall desks where workers can switch between sitting (tall chair) and standing. This has been very effective at reducing fatigue, pain, and other effects of too much sitting. This rotates compression loads among more tissues, for less time exposure of weight-bearing to each structure. It helps restore circulation to working tissues.

sit-stand unit

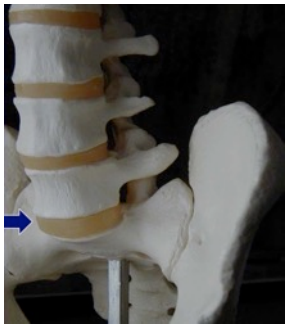
10 second back-bend every hour !!

NECK AND LOW BACK (spine function) :

The spine is a stack of bones (vertebrae) balanced upright. The spine must be MOBILE for movements and STABLE for posture. This is a difficult set of demands on the spine, causing many potential problems, and vulnerable to early aging changes.

The bones are connected at facet joints, forming a pivot point for movement and posture. These joints run up the back of the spine, on left and right sides. They have very sensitive nerves to control balance, posture, and motion. But that sensitivity can create 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 postures, overhead work, and twisting. Degenerated discs can also stress these joints.

Rear view; facet joints

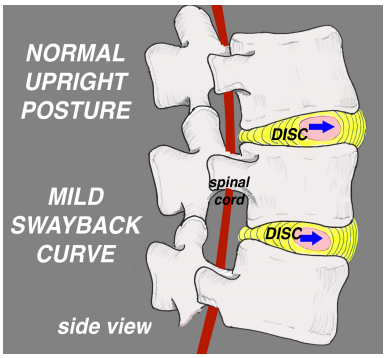


Front view; discs

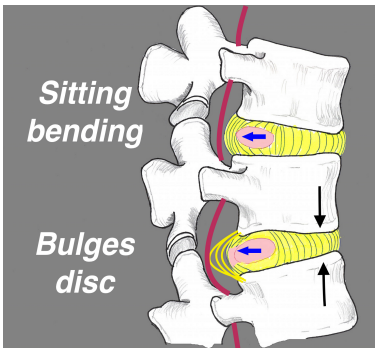
The Discs: Lots of problems come from the discs, directly and indirectly. The discs are cushion pads between vertebrae, at the front ¾ of the vertebrae. They are shock absorbers. They also act as ball bearings for vertebrae to pivot on during bending.

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. They cannot absorb loads or bend as well as before. They get thin from water loss, shifting more load to nearby joints, causing strains and arthritis. As discs thin, bones sit closer together. This can squeeze nerves passing nearby. This is degenerative disc disease. This is VERY common with years of SITTING at a desk or in a vehicle.

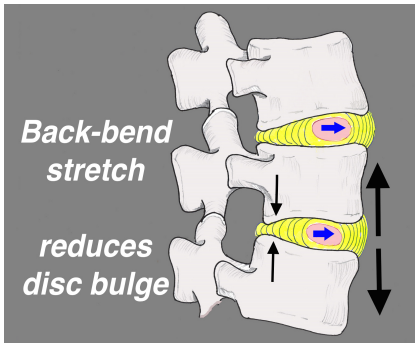
SITTING squeezes water out of discs and encourages bulging. Sitting is a major risk for degenerated discs in low back and neck. In the center of the disc is a wet gel contained in tough fibrous outer rings. Bending forward (or sitting) squeezes the front of the disc, pushing that gel back against the back wall of the disc. This wall is weak and tends to balloon out, causing a bulging disc. It can eventually burst, tear or leak, causing a ruptured disc. But this is very reversible. Bending backward tends to reverse this, pulling the gel back to the center of the disc. Frequent standing back-bend stretches tend to reverse disc damage from sitting.



Normal posture has slight swayback



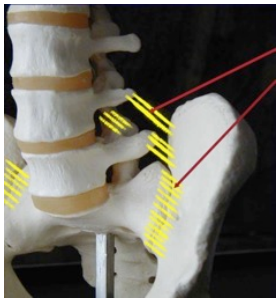
Forward-bend or sit bulges & degenerates discs



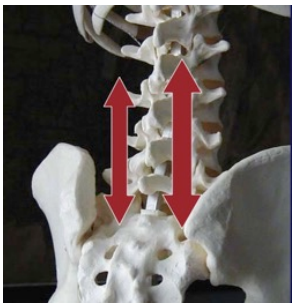
Back-bend stretch corrects disc mechanics

Ligaments; Ligaments are elastic straps that allow reasonable movement while tying all the bones and joints together. Sitting with a slouched posture causes an all-day stretch to upper back ligaments, weakening this part of the spine.

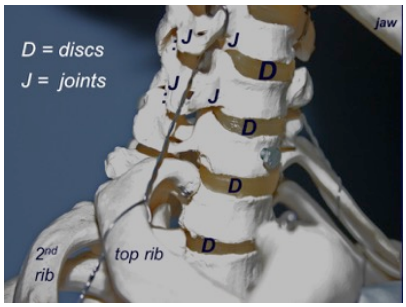
Muscles… Muscles have two jobs: move the spine, and hold the spine upright (posture). Pain develops from either of these. Repeated motions, heavy loading, sustaining a posture too long can all overwork muscle, causing buildup of waste products and tissue damage. BUT the primary problem on office jobs is prolonged sitting causing posture muscles to become very weak… setting you up for a back strain outside of office work, such as lifting something at home. This is overstretch weakness-instability.



Ligament bind together bones & joints



Low back muscles protect other tissues



Neck vertebrae, discs, joints

NECK & BACK MSD PROBLEMS:

X-RAYs & MRI: are usually not accurate !! MOST adults with NO PAIN show bulging discs, ruptured discs, degenerated discs, significant arthritis on an MRI… but NO pain. Don't decide you are disabled by what is on your MRI… It is often WRONG !
MOST adults with NO BACK or NECK PAIN have degenerated discs, bulging discs, arthritis on x-ray or MRI… but NO pain.
So, x-rays and MRI findings for these are not considered valid unless the patient has worsening neurological symptoms down their legs or arms. Most back-neck pain is mechanical and can be corrected with simple exercises and habit changes. Pain goes away, while the x-ray and MRI still shows disc and arthritis findings… but no pain. Do NOT let the x-ray and MRI falsely disable you !! Most problems are mechanical… weakness, stiffness, instability, posture strain.

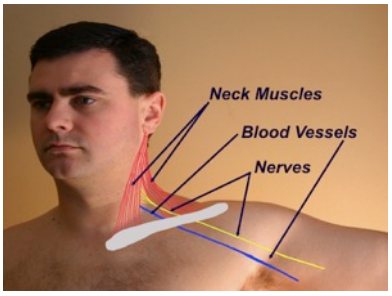
Degenerated Discs… Discs are 80% water when you are 25, but can drop to 40% water by age 50. The discs get much thinner. This increases loads on facet joints and lead to arthritis and sprains. This is reversible with certain stretches, described later. Caused by aging, inactivity, years of prolonged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

Bulging or Ruptured Discs… Caused by repeated or sustained bending, lifting loads, and EXCESSIVE SITTING. Gel in center of disc pushes out back wall of disc, or leaks through back wall. This can press on nearby nerves, causing pain down arm or leg. These sometimes require surgery, but that is rare. Most will resolve with stretches, discussed later.

Soft Tissue Sprain (ligament or muscle)… Torn tissues caused by loading in an awkward or extreme or prolonged position. Heals with rest, followed by stretches, then strengthening. Also caused by prolonged posture loading (sitting, holding mouse, keyboard use)

Stress… Stress may (sometimes) show up as pain. It may not cause your pain, but it can make it LOTS worse. Pain and lost work causes stress, which causing spasm, causing more pain, causing more stress. Being aware of this can help recovery.

NECK-SHOULDER PAIN… Many "shoulder strains" are actually coming from the neck. Pain in shoulder blade, upper shoulder between neck and shoulder joint are usually neck issues. Shoulder and neck easily irritate each other. Many arm-hand pain problems also have inputs from neck due to pinched nerves and postures that can reduce blood supply down the arm.



Nerves & blood vessels to arm pass through neck muscles. Can be squeezed by poor posture.

OVERUSE, TENDINITIS: important new definition!

WORK: Muscle contract, pulling on tendons, pulling on bones, to move joints, or hold a sustained position (such as gripping).
This is work to produce motion… or to sustain a posture. Damage may come with too much motion, or prolonged posture.
These actions produce pressures in muscles, tendons, and joints… pressure that often exceeds blood pressure.., this pressure blocks blood supply-oxygen to these tissues. Reduced oxygen causes increased waste products that build up in tissues.
These wastes irritate tissues: inflammation: tendinitis, and other damage. IT IS A BLOOD SUPPLY_OXYGEN PROBLEM.
We prevent MSD by boosting blood supply to these working tissues. It is easy. It is effective, with everal tactics available.

ROUND-SHOULDERS, SLOUCHING, FORWARD HEAD POSTURE: Very common posture habit, placing head well ahead of spine. This compresses joints in upper neck, discs in middle neck, weakens muscles and ligaments in upper back. Muscles on side of neck tighten, compressing nerves and blood vessels passing through to arm structures. All this greatly adds to stress down the arm.


Forward head slouching

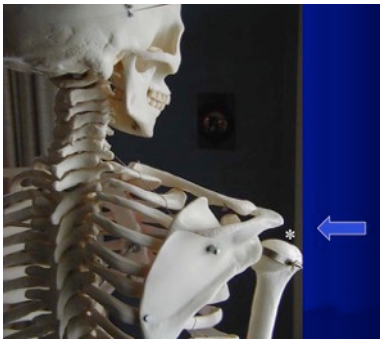

Chin-tuck: be an inch taller!

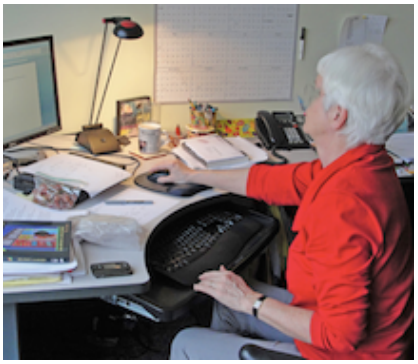

Lateral neck stretch

hourly micro-stretches at neck

CORRECTIONS: Position work higher. Switch between sitting-standing. Job task rotation. Neck micro-stretches (described later)

ROTATOR CUFF: Overuse tendinitis at shoulder tendons located between bones of shoulder in tightly-confined space. Irritation causes swelling, blocking blood supply. Very painful, disabling, costly, often difficult to treat! Caused by reaching (too high, too far, too often, too prolonged, or with load in hand. In the office, it is usually reaching for calculator or a mouse or other materials placed too far.


cuff tendons pinched between bones


Reaching high, far or often

CORRECTIONS: Make reach lower, closer, less often, less prolonged, lighter. Job task rotation. Shoulder micro-stretches.

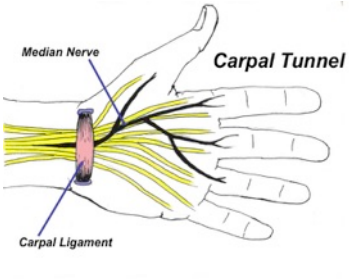
TENNIS ELBOW: This is actually a tendinitis of WRIST muscles where they originate on outside of elbow. Caused by loading the wrist-hand, where wrist muscles-tendons are supporting the load, hurting up at elbow where wrist muscles start. Causes may be heavy loads lifted or light loads held for hours (such computer mouse work). CORRECTIONS: Reduce load or holding time; change work postures (switch between mouse and trackball hourly); task rotation; wrist-arm micro-stretches.

GOLFER'S ELBOW: Similar to tennis elbow except on inside of elbow. Actually problem at muscle of grip-pinch, or pronator muscle (turns forearm over): prolonged, repeated, forceful grip; turning or prolonged holding palm-up position. Lots of mouse work may risk this

Tennis elbow wrist load


Golfer's elbow grip & twist

WRIST-HAND-CARPAL TUNNEL: Wrist and thumb overuse comes from grip, pinch, wrist bent, vibration, thumb actions. These are sensitive structures 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). CORRECTIONS: Reduce time spent in grip-pinch, padded pen-pencil; change keyboard legs in-out often for variety, improve neck posture, rotate job tasks, switch between mouse & trackball often; micro-stretches at wrist.




elbow straight, palm-up, stretch wrist back


palm down, fist closed, curl wrist down

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.

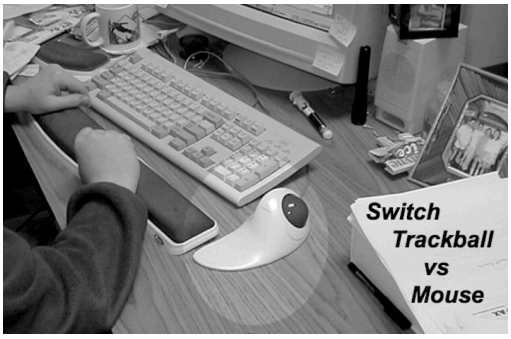
One may need to improve the ergonomics of their job (see upcoming page on Computer Ergonomics, as an example).
Minimize grip force or duration. Grip diameter should be about 2 inches. Try to increasing the variety of work tasks, because doing the same task all day increases risks. Frequently switch between 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

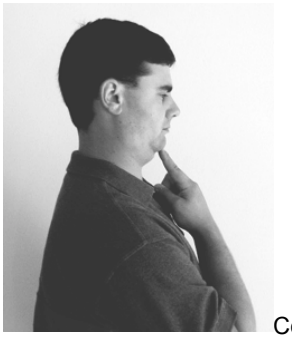


Switch between mouse vs trackball for work variety
Resting arms on work surface reduces neck load


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

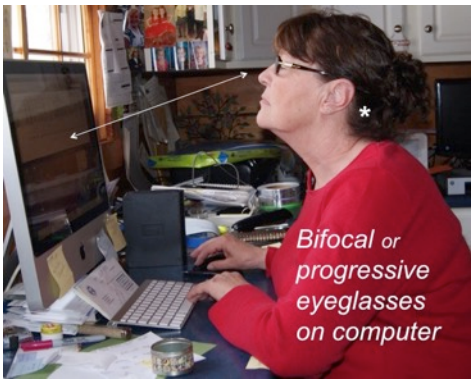

Lateral neck side stretch


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

THE COMPUTER WORKSTATION :

YOU NEED… Symmetrical posture… Head centered…Eyes slightly down… Arms rest on surface… posture variety… motion variety.

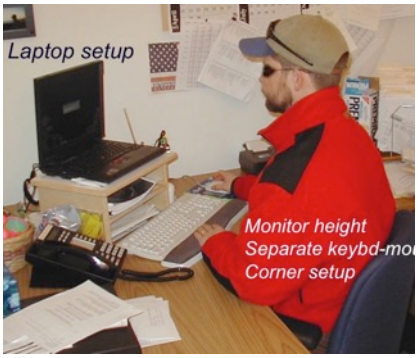
MONITOR… Position squarely in front (NOT off to one side). Height places top of screen at eye level so eyes track from zero to about 30 degrees down. BUT… all this changes if you wear BIFOCALS or PROGRESSIVE lenses. These are made for reading a book (lower & closer than a computer monitor). These cause you to lean forward and tip head backward to look through reader part of eyeglasses. This is very damaging to upper neck, a common source of headache and neck arthritis. It is best to get separate single-vision medium focus-distance reading glasses that allow you to better posture your head-neck more upright, less awkward.



bifocals: NO


Upright, arm-supported posture

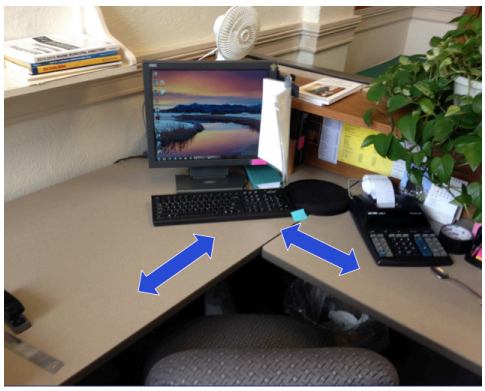
KEYBOARD… Pushed in enough to provide some surface to rest forearms (NEW TACTIC). Place gel pad in front of these to cushion forearms resting. (Old rules said to do not rest arms, but new research suggests this is wrong.) One of the best setups for this is to place keyboard and monitor in CORNER of a right-angle desk so arms have lots of rest surface on either side. Keyboard trays tend to position arms too low, causing slouching. But the best use of these is to use tray for an hour, then move keyboard to desk for an hour, switching back and forth to create good posture VARIETY.

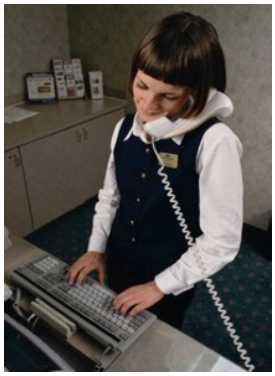


KEYBOARD LEGS… Work with rear legs flipped out for slight wrist extension for an hour, then fold legs in for slight wrist flexion for an hour. The key is to give wrists some variety of posture and movement patterns. Variety reduces MSD risks.

MOUSE OR TRACKBALL? Mouse risks golfer's elbow, but trackball risks tennis elbow. Answer? Use BOTH, switching between them hourly. This rotates work between two sets of muscles, reducing exposure to each muscle. Work task variety is key.

TELEPHONE… Do NOT jam phone between neck and shoulder. Very damaging! Use a headset or speaker-phone.


Corner desk setup great to rest arms


NO ! Use headset !

PREVENT MSD with WORK VARIETY…

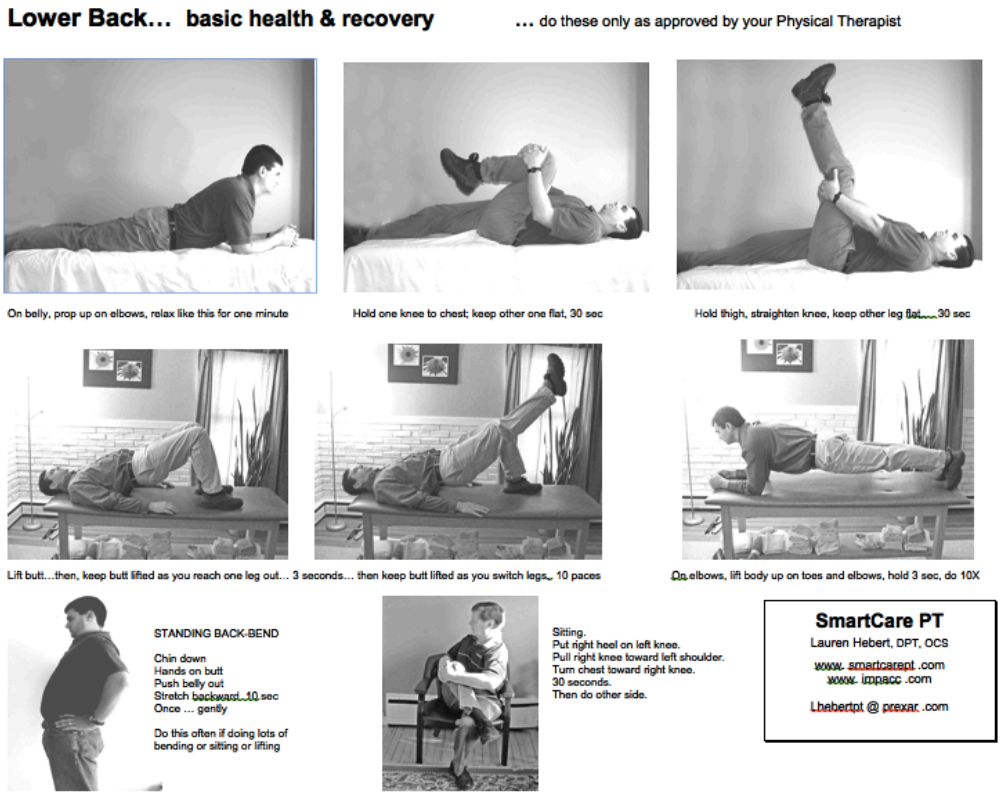
Change seat fit-height every hour. Switch between sitting and standing often. Switch between mouse and track-ball often.
Switch keyboard between tray and desktop. Flip keyboard legs in, then out often. Change tasks often (filing, etc.) for work VARIETY.

MICRO-STRETCHING ? …

We used to say workplace stretching is not effective. But newer studies and our experience at several hundred workplaces show this can work very well IF it is done CORRECTLY ! We also see some workplaces doing incorrect stretches. Micro-stretches are set of 6-8 stretches done only 10 seconds each, several time per day… specifically designed by a physical therapist to fit risks, professionally taught by a physical therapist… and adequately enforced by management. IT WORKS… if done RIGHT !

Workplace Micro-stretching for the office… see handout

WORKER EDUCATION: Workers respond well to properly presented motivational training on how to take care of the aches and pains they of daily life. Physical therapists are trained to present these programs on personal ergonomics skills, workplace micro-stretching, after-work recovery stretches. Workers hunger for this information because they do Not want to hurt. And they want to tolerate life after work. Ergonomics does not work without workplace education… teaching works not 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.



After-work low back recovery exercises

THE AGING WORKER… One cannot separate work-related MSD from the effects of AGING. Age changes start to show up around age 30. Older workers are often your most skilled essential people with good work ethic: too valuable to lose. AGING changes to the musculo-skeletal system are REVERSIBLE ! This is especially true for office jobs where days of sitting speeds and worsens aging. Off-work activity, walking, specific gentle stretches can restore lost function, reduce pain, reverse age changes. Not difficult !

COMPUTER WORK-STATION Set-up… one-page summary

New ergonomics tactics

Bifocal eyeglasses cause neck posture strain-headache

Place MONITOR squarely in front, NOT off to one side… top edge of screen at eye-level.

NOTE… Wearing BIFOCAL-progressive eyeglasses for computer work risks serious neck-headache problems because you lean forward and tip head back to see screen. Use single-vision reading glasses here !

Push KEYBOARD in 4-6 inches from edge of desk, then place gel pad here for arm support. Rest arms to type.

NOTE… Best: place computer in CORNER to allow full surface support for forearms. See pic below

KEYBOARD TRAY is often too low… but switching every hour between keyboard in tray versus placed on desk does provide work posture VARIETY, which can be good for posture work relief.

MOUSE should also be pushed in to allow forearm support, with gel pad placed in front for hand-wrist rest. Also, switch between using MOUSE versus TRACKBALL every 1-2 hours for wrist posture VARIETY.

Use a DOCUMENT HOLDER to hold papers upright, and move this setup often for posture work variety.

TELEPHONE… do NOT EVER hold telephone handset between head and shoulder. Use HEAD SET !!

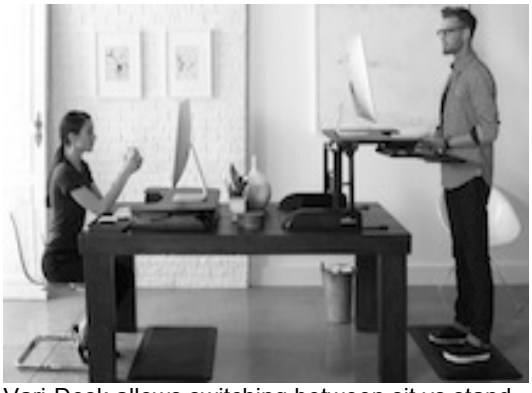
PEN-PENCIL… place padded SLEEVE over pinch surface to reduce pinch risks.

CHAIR… Most important to be height-adjustable. The KEY is to CHANGE height often, 2 inches up or down every hour for posture variety, PLUS do a standing back-bend stretch every hour.

STANDUP OPTION… Many offices employ STANDING DESKS with tall chairs to allow switch between sitting work and standing work. This has been very well received by workers, for improved work comfort.

Another option is the VARI-DESK platform placed on conventional desk, which allows worker to raise computer to standing height, for work posture VARIETY… much cheaper-easier option than standing desk-chair.

Do our MICRO-STRETCHES hourly to keep circulation to working tissues !!



Vari-Desk allows switching between sit vs stand

Corner desk setup allows best arm support

Workplace Micro-Stretches…

We set up have set up microstretcing program for more than 500 workplaces, customized to the types of jobs and work risks for each workplace. This is the typical program we recommend for the office setting or other sitting jobs (such as driving jobs).

It is very important that employees be educated by the Physical Therapist on how and why to do each of these, to make sure people are trainined… motivated… expert at these.
Without that training, employees will not comply, or be safe with these.

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

Chin tuck, gently 10 sec.

Stretch neck sideways 10 sec
Exhale… Do not turn head

Shrug & inhale 3 sec, then… Relax & exhale 5 sec.

Dangle & swirl arm around 10x

Palm up, stretch wrist back 10 sec.

Palms down, elbows straight,
Curl fists down & out, 10 sec

Hands on butt, push belly out
stretching back gently 5 sec

Grasp thigh, straighten knee
to stretch back of thigh 30 sec.

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.

SmartCare Physical Therapy
NO-LOST-TIME Work Injury Prevention
207-562-8048 www.smartcarept.com

Do NOT start these until you have received professional instruction

If you already have a problem, have your Physical Therapist approve-modify these for you

Email at Lhebertpt @ prexar .com