The Role of Exercise in Pain Management

Pan Am Pain Clinic

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www.panamclinic.org/patients/patient-education/pain-clinic-education

Website for Presentation and Handouts

Outline

- Acute vs. Chronic Pain
- Sensitized Nervous System
- Chronic Pain and Exercise
- Types of Exercise
- Exercise Guidelines
- Pacing
- Posture and Body Mechanics

Pain is Necessary!

As the hand is placed on the stovetop, danger messages are sent up the spinal cord to the brain. The brain then interprets the messages as "dangerous burning pain" and sends a message back down to quickly remove the hand …Pain is therefore good!

Acute vs. Chronic Pain

Acute Pain

- Pain generally caused by an event (surgery/injury) and may be associated with soft tissue damage
- Serves a purpose (warns the body of damage)
- May last for as little as a few minutes or up to 3-6 months and resolves once the cause of pain has healed
- Focus is on treatment (physio, rest, activity modification)

Chronic Pain

- May not be associated with an injury or disease and investigations (x-ray, MRI) may be clear
- Does not serve a purpose
- Persists beyond the normal healing time of an injury/disease, feels more intense than expected, and has no foreseeable end point
- Focus is on self management

How Pain is Produced

- Information from the body is detected by sensors on nerves (touch, pressure, temperature, pain)
- Nerves carry information to the spinal cord.
- The spinal cord takes the information to the brain.
- The brain processes the information along with other relevant information (past experiences, context of the pain, mood, other body systems) to produce the experience of pain.

Effects of Thoughts and Emotions on Pain

Research studies have shown that our emotions influence our pain perception and nerve sensitivity.

Our thoughts, beliefs and emotions influence our physiology (heart rate, blood pressure, breathing rate, digestion, muscle tension and nervous system hypersensitivity).

The brain constantly interprets all pain and evaluates its potential danger based on beliefs, memories and past experiences.
Example: The pain experience from a bee sting will be different for a beekeeper versus someone afraid of bees.

Neurotag: Pattern of activity in our brain that creates the perception of pain

Chronic Pain

- Pain alarm continues to sound although harm has passed or no imminent danger is occurring
- The more the alarm sounds, the easier it is to trigger
  - Malfunction of the pain system itself (nervous system)
  - Nerve fibers easier to stimulate
  - Normal pain threshold drops

"SENSITIZED NERVOUS SYSTEM"

Sensitized Nervous System

- RESULT: More “danger” information is sent to the brain from the tissues/spinal cord and the brain reacts accordingly to produce an increased experience of pain.
- The pain is real, but you are sensitized; the pain does not necessarily mean more tissue damage.
- Chronic Pain is on overprotective, learned response

Sensitized Nervous System

- Persistent Pain is the result of the nervous system changing to become more sensitive:

Tissue changes – increased number of sensors, increased sensitivity of sensors (they are activated easier and for longer).

Spinal cord changes –Enlargement of pain pathways in the spinal cord; receives more "danger" information from tissues; converts normal sensations of movement/touch/pressure to pain

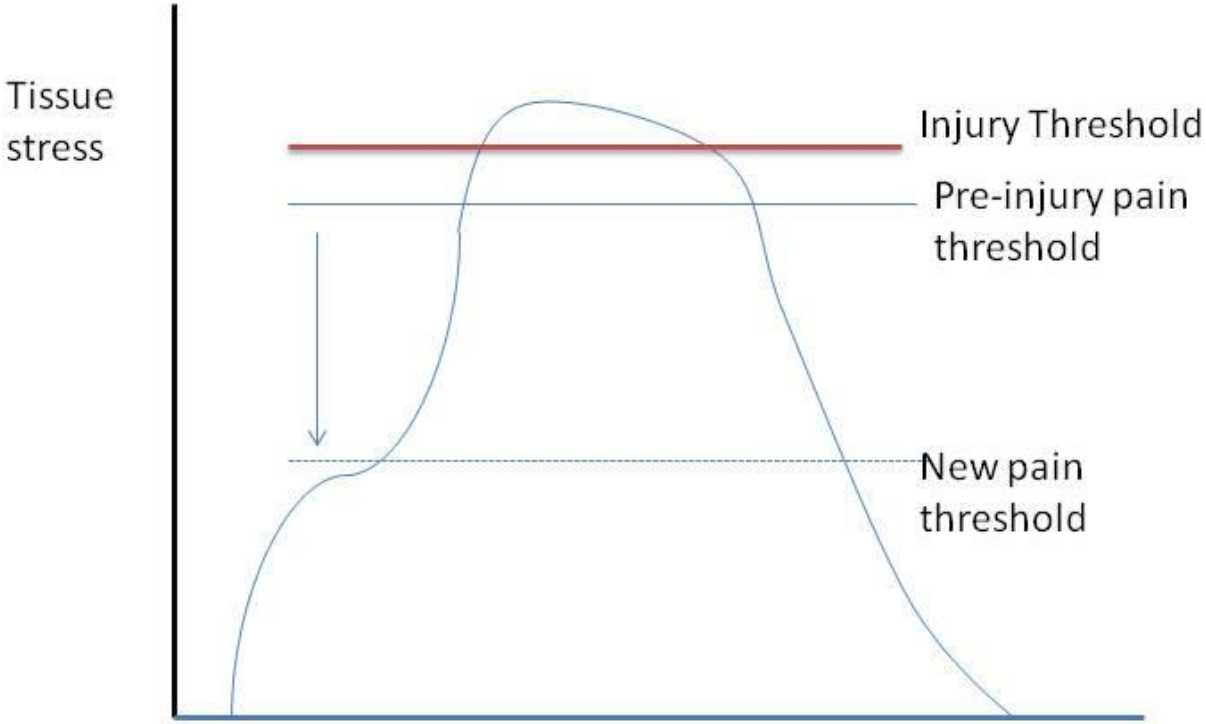
Brain changes – receives more "danger" information from spinal cord and releases chemicals to increase sensor sensitivity

“Is the pain all in my head?”

The answer is “*Yes, since the brain is in your head, and all pain is in the end interpreted in the brain, so it is technically in your head!”.*

“Do you think that my pain is real?”.

The answer is “*Of course it is real, all pain is real, but the source of some persistent pain is sometimes not from damaged muscles, bones or joints, but a sensitized nervous system.”*


Tissue stress
Injury Threshold
Pre-injury pain threshold
New pain threshold

What does Nerve Sensitization Pain Feel Like?

- Pins and needles
- Burning pain
- Increased pain by small movements *e.g.slight bending*
- Increased pain by sustained postures *e.g.sitting, lying*
- Increased by no particular reason *e.g.unpredictable zaps*
- Trivial incidences cause flare-ups *e.g. getting out of car*
- Pain is increased by stress and anxiety
- Pain gradually spreads, even to opposite side
- Pain may move around the body
- Night pain

What Can You Do?

- **Neuroplasticity** = the ability of the nervous system to change (can increase sensitivity but can also decrease sensitivity).
- **Good news**: you can modify/unlearn these overprotective patterns:
  - Learn to understand the problem
  - Rethink about how you interpret your pain, learn how to pace your life, and retrain/re-expose your body to regain more function
- Gradual stimulation is the key (gradual activity/movement) – slowly teaches the nervous system not to over react

Chronic Pain and Exercise

- Significant research has shown that exercise is an essential aspect in the treatment of chronic pain
- Cleveland Clinic Chronic Pain Rehab Program- Just 10 minutes a day of walking at a moderate pace for 3 weeks can improve measures of pain perception, aerobic capacity, depression, and anxiety in chronic pain patients

Why Exercise?

Studies have shown that patients who learn to actively cope with, and not fear pain, have had better recovery than those who passively cope with pain.

Passive Coping Strategies

Fear of Pain and Flare Ups

Avoidance and Fear of Movements

Avoidance and Fear of Functional Activities

Reliance on Health Care Providers to Find the "Problem and Cure"

Sole Reliance on Medications, Gadgets, Passive modalities

Vicious Cycle of Persistent Pain

Active Coping Strategies

Understanding Pain and Pain Physiology

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No Longer Fearing Pain and Flare Ups

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Setting Goals and Having a Positive Attitude

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Pacing Movements

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Pacing Functional Activities

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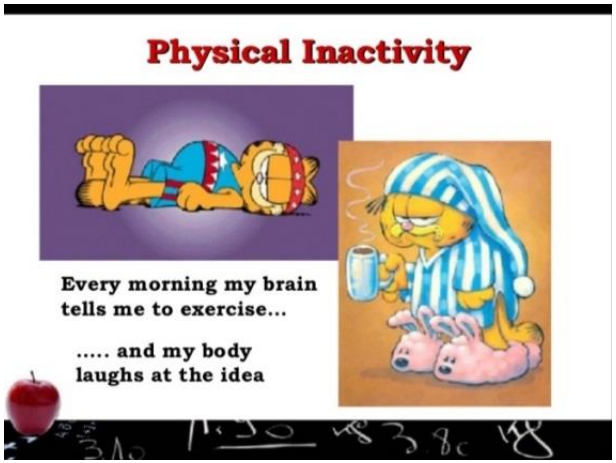
Return to Life

Side Effects of Inactivity



- Loss of bone and muscle mass
- Muscle stiffness, shortening
- Loss of joint flexibility
- Increased pain with movement
- More risk of re-injury
- Loss of activity tolerance, decreased energy
- Impaired sleep

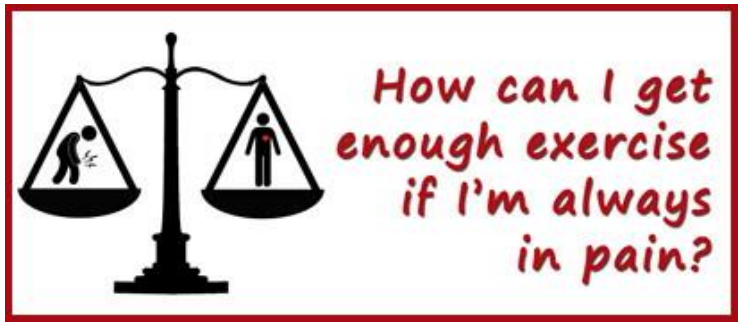
How Can Exercise Help Me?

- "Motion is Lotion"
- Improves cardiovascular system- increases energy levels
- Increases muscle strength and flexibility
- Helps balance and co-ordination
- Increases natural pain killers (endorphins) to help control pain
- Promotes relaxation of the nervous system
- Reduces flare ups
- Improves sleep
- Decreases risk of chronic conditions (DM, Heart Disease, HTN/Stroke, Osteoporosis)
- Reduces anxiety/depression; improves mood

But the last time I exercised….

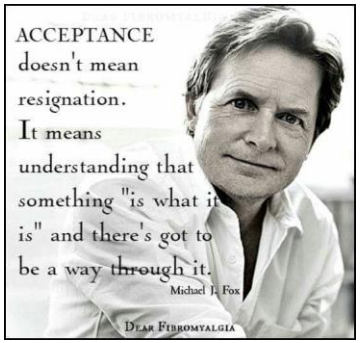
- My pain got worse
- I was too tired to do anything else
- It didn't help

- Balancing Act
- Include ADL's



Fear of Pain/Injury with Activity

- Studies have shown that just the fear of pain or the fear of re-injury powerfully influences pain perception
- **Do Not Ignore Pain**
- **Do Not Always Listen to Your Pain**
- **Do Understand Pain and Do Not Fear Pain**
- Accept that persistent pain is often a result in the physiological changes in the nerves, spinal cord and brain, in order to protect you
- **Slowly Pace Yourself Back to Activity**



Types of Exercise

- Aerobic (cardiovascular exercise)
- Muscular strength and endurance
- Flexibility/Stretching

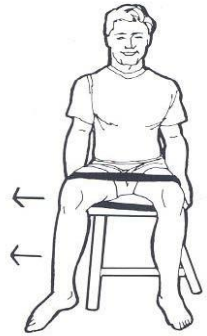
Aerobic (Cardiovascular) Exercise

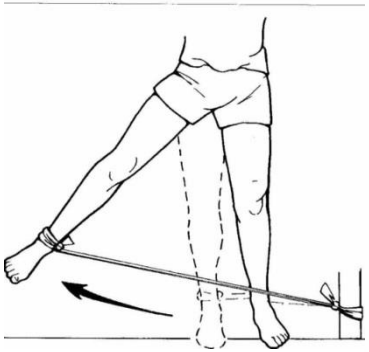
- Activity that helps to improve blood flow and oxygen to all tissues (muscles, bones, and ligaments)
- Exercise for the heart and lungs- improves energy, stamina
- Requires the use of the larger muscle groups (legs, arms) in a continuous, rhythmic motion
- Choose low impact activities such as walking, swimming, cycling, or aquasize

Muscle Strength and Endurance

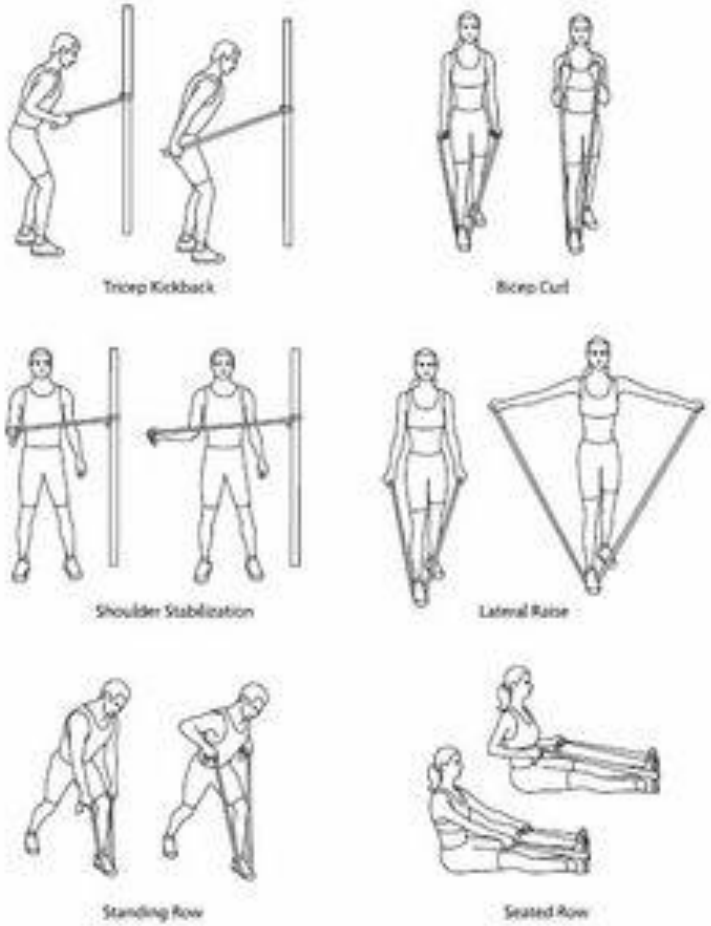
- **Strength**: the ability to do work
- **Endurance**: the ability to do work for long periods of time
- Both increase with resisted exercise
- **BENEFITS**:
- Increases support/protection of joints
- Makes ADL's easier
- Muscles less prone to trauma/injury
- **HOW**:
- Weight/Resistance training- using free weights, machines, resistance bands, household items, or body weight
- Tasks around the home and yard

Resistance Tube Exercises





Stretch Band Exercises



Flexibility

- **Stretching:** Lengthening of muscles in order to increase muscle flexibility and/or joint range of motion

- **Benefits:**
- Decreases pain by relieving pressure throughout the muscle as well as on your joints and nerves
- Increases blood supply to muscles and joints
- Improves balance and coordination, overall flexibility/functioning
- Prevents post exercise muscle soreness; decreases risk of injury
- Relieves stress and calms the nervous system

Flexibility- How to Stretch

- Do gentle warm up first or use heating pad
- Proper stretches are done in a slow controlled fashion , there should be <u>no bouncing!</u>
- Stretch to the point of mild tension, hold 30 seconds; repeat 3 times
- Remember to breathe throughout the stretch!!

Neck stretch

Guidelines for Activity

- Frequency (How many times per week)
- Intensity
- Time (Duration of the activity)
- Type of activity
- Discuss individualized guidelines with a doctor or physiotherapist

Frequency

- **Stretching**: Daily; After exercise or other physically demanding activities
- **Strength**: 2 times/week with at least 1 day of rest between work outs of same muscle group
- **Aerobic Exercise**: Canadian Physical Activity Guidelines- ***150 minutes*** of moderate exercise per week, in bouts of ***10 minutes or more***
- Examples of moderate intensity activities: brisk walking, biking, swimming, mowing the grass, yard work, dancing, exercise machines such as elliptical, stationary bike or treadmill, sports, Tai Chi, Yoga

Intensity

- How hard should you go at it?
  - ***Aerobic Exercise***: low to moderate intensity
  - **Moderate Intensity**: You breathe a little harder, heart beats a little faster, sweat a little
  - *Heart rate max*: 220 – your age (50-70% of HRM)
  - *Rating of Perceived Exertion Scale*
  - *Talk Test*- should be able to carry on a conversation while exercising
  - ***Strengthening***- use a resistance level that allows you to do 8-12 repetitions comfortably

Rating of Perceived Exertion Scale

Rating of Perceived Exertion
Borg RPE Scale

6		How you feel when lying in bed or sitting in a chair relaxed.
7	Very, very light	Little or no effort.
8		
9	Very light	
10		
11	Fairly light	
12		Target range: How you should feel with exercise or activity.
13	Somewhat hard	
14		
15	Hard	
16		
17	Very hard	How you felt with the hardest work you have ever done.
18		
19	Very, very hard	
20	Maximum exertion	Don't work this hard!

Time: How Long?

- Find your "easy activity" level (level that won't increase your pain, should still be able to breathe calmly)
- Do as often as possible without flaring pain (eg. 5 min, 3-4 times/day)
- Gradually increase time – few minutes or 5% more per week
- Keep a daily log of exercises and chart the progress

Sample Progressive Program

Day 1- Walk 3 minutes (easy activity)

Day 2- Walk 3 minutes and climb up/down 2 steps

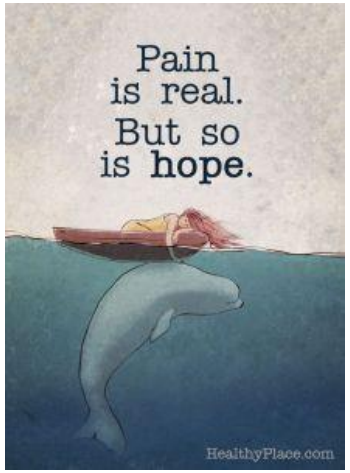
Day 3- Walk 4 minutes and climb up/down 3 steps

Day 4- Walk 5 minutes and climb up/down 4 steps

Day 5 -Walk 5 minutes and climb up/down 5 steps

Day 30- Walk 30 min. and climb up/down 30 steps

Consensus



- Symptoms vary day to day
- Low to moderate intensity exercise is better tolerated than exercise of higher intensity
- Brief exercise is better tolerated than prolonged durations
- Intermittent sessions are better than continuous bouts

When I stopped
telling myself
"I will never...."
and started
focusing on
doing something
for
"just 5 minutes,"
little by little
things began
to change.

strength/flexibility/health/EDS

Exercise is Medicine

- Important daily strategy used to assist in the management of pain conditions as well as our overall health
- **VIDEO: 23 ½ Hours**

Pain with Exercise

- Increased activity will often increase aches and pains but this is temporary and will improve with continued activity- Delayed Onset Muscle Soreness
- Don't ignore pain…appreciate that the pain exists, but that it is a false alarm
- **2 Hour Pain Rule**
- Use 0-10 Pain scale to monitor pain while exercising
- Modify your exercise program by reducing the frequency (days per week) or duration (amount of time each session) until pain improves.
- Change the type of exercise to reduce impact on the joints – for example switch from walking to water aerobics.
- Do proper warm-up and cool-down before and after exercise.
- Exercise at a comfortable pace

Exercise Tips

- It doesn't have to be a formal exercise program. Just fitting more activity into your daily routine can provide many benefits (e.g. walk/ride a bike instead of driving).
- It is helpful to have a variety of activities/exercises that use various muscle groups, which prevents overuse injuries.
- Use positive self-talk to stay on schedule.
- Start slow and take it one step at a time; add components of exercise program as tolerated
- Do not panic if you flare up, it will pass. Simply continue with progressing your easy activity level.

Exercise Tips

- Make exercise a part of your day – Routine is important
- Join a club or team; exercise in a group or with a friend
- Set short and long term goals
- Every step counts!

Exercise Resources

- **Canada's Physical Activity Guidelines**

http://www.csep.ca/guidelines

- **Winnipeg in Motion**

www.winnipeginmotion.ca

- **Winnipeg Leisure Guide**

www.winnipeg.ca/leisureonline

https://winnipeg.ca/cms/recreation/leisure/feesubsidy.stm

Exercise Resources (cont'd)

- **The Arthritis Society**
  www.arthritis.ca/manitoba

- **Get Better Together**
  www.wellnessinstitute.ca/gbt

- **Active Living Coalition for Older Adults**
  http://www.alcoamb.org

Pacing

- Determine your baseline:

  -How long/how much can you do before discomfort starts or increases?

- Stop ***before*** you become exhausted
- Set a schedule:

  -How important is the job?

  -Schedule most important jobs first

  -Plan at least one enjoyable activity each day

- Include a plan for good and bad days based on pain levels (0-10):

  0-4 exercise as planned; 5-7 decrease amount/intensity; 8-9 gentle stretches/short walk; 10 don't exercise

Pacing (continued)

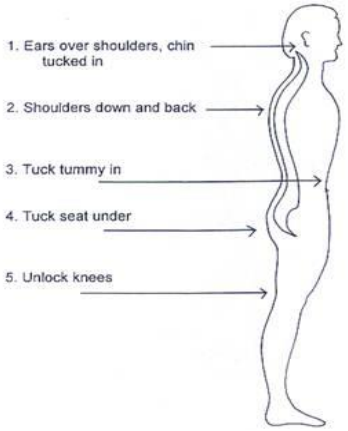
- BREATHE throughout activities
- Plan rest periods throughout the day
- Plan work/exercise for times when you feel better
- Alternate between light and heavy tasks; break tasks into smaller parts
- Change positions regularly
- Listen to your body

Posture

- Posture is defined as the position in which you hold your body upright against gravity while standing, sitting, or lying down.
- Holding your body in positions where the least strain is placed on the supporting muscles and ligaments.

Importance of Proper Posture

- Keeps bones and joints in correct alignment so that muscles are used properly.
- Decreases stress on the ligaments supporting your joints and also prevents abnormal wearing of joint surfaces that leads to arthritis.
- Prevents the spine from being fixed in abnormal positions.
- Prevents fatigue.
- Prevents backache and muscle pain.
- Contributes to a good appearance.

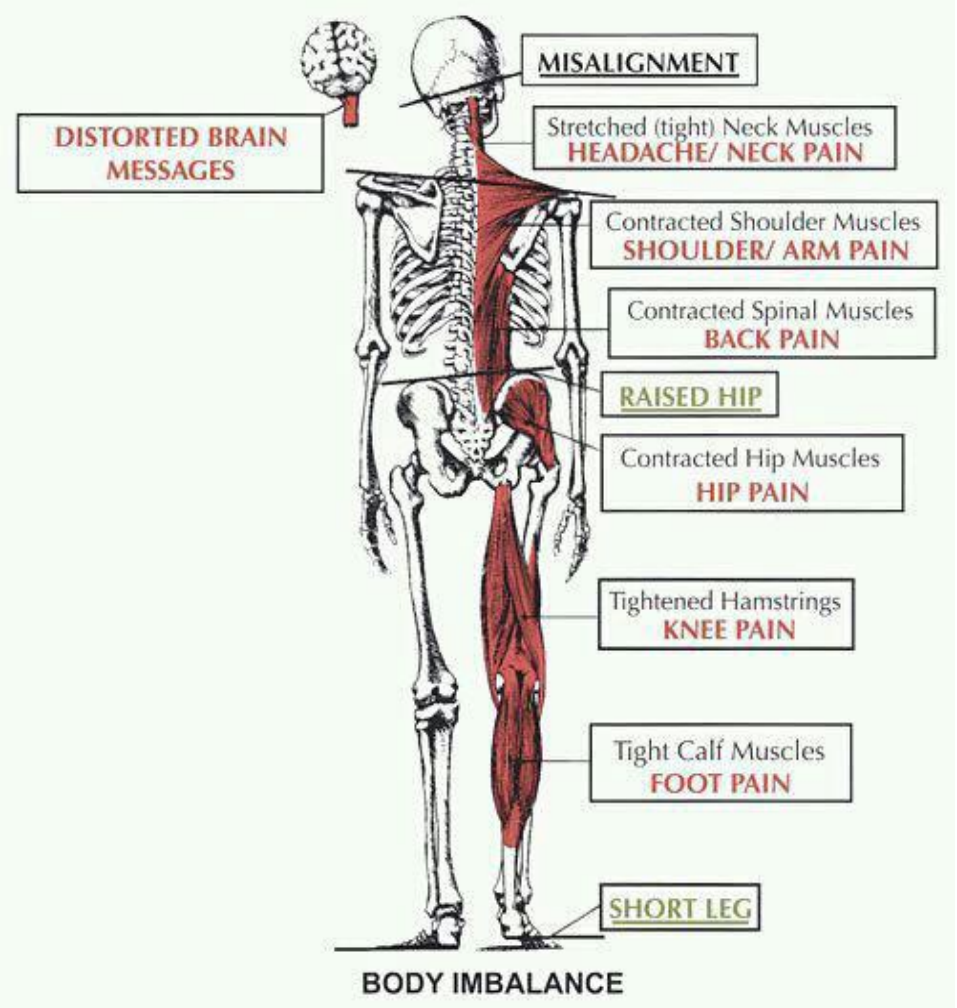


Poor Posture

If one body part is out of alignment,

others move out of alignment

to balance it.



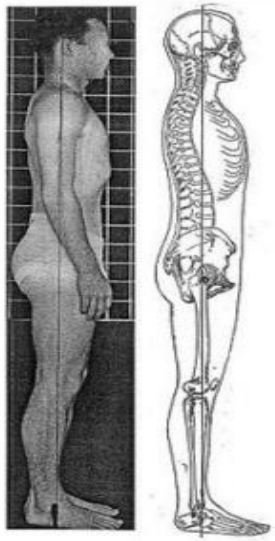


Figure A: Good Posture

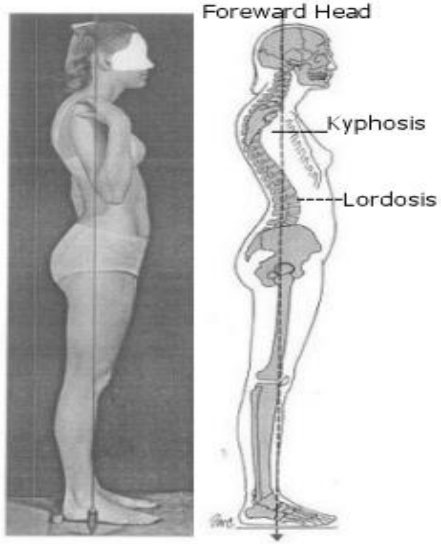
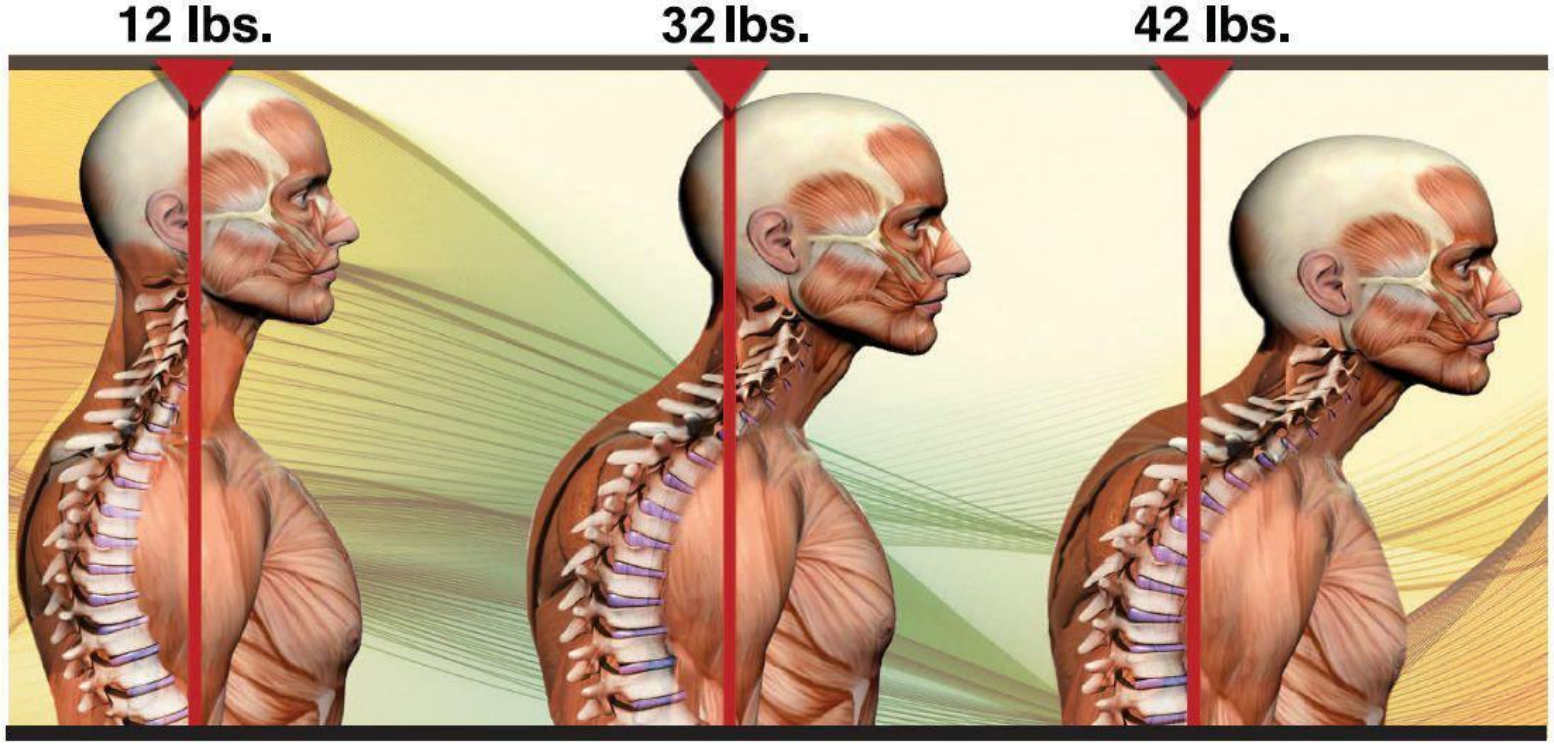


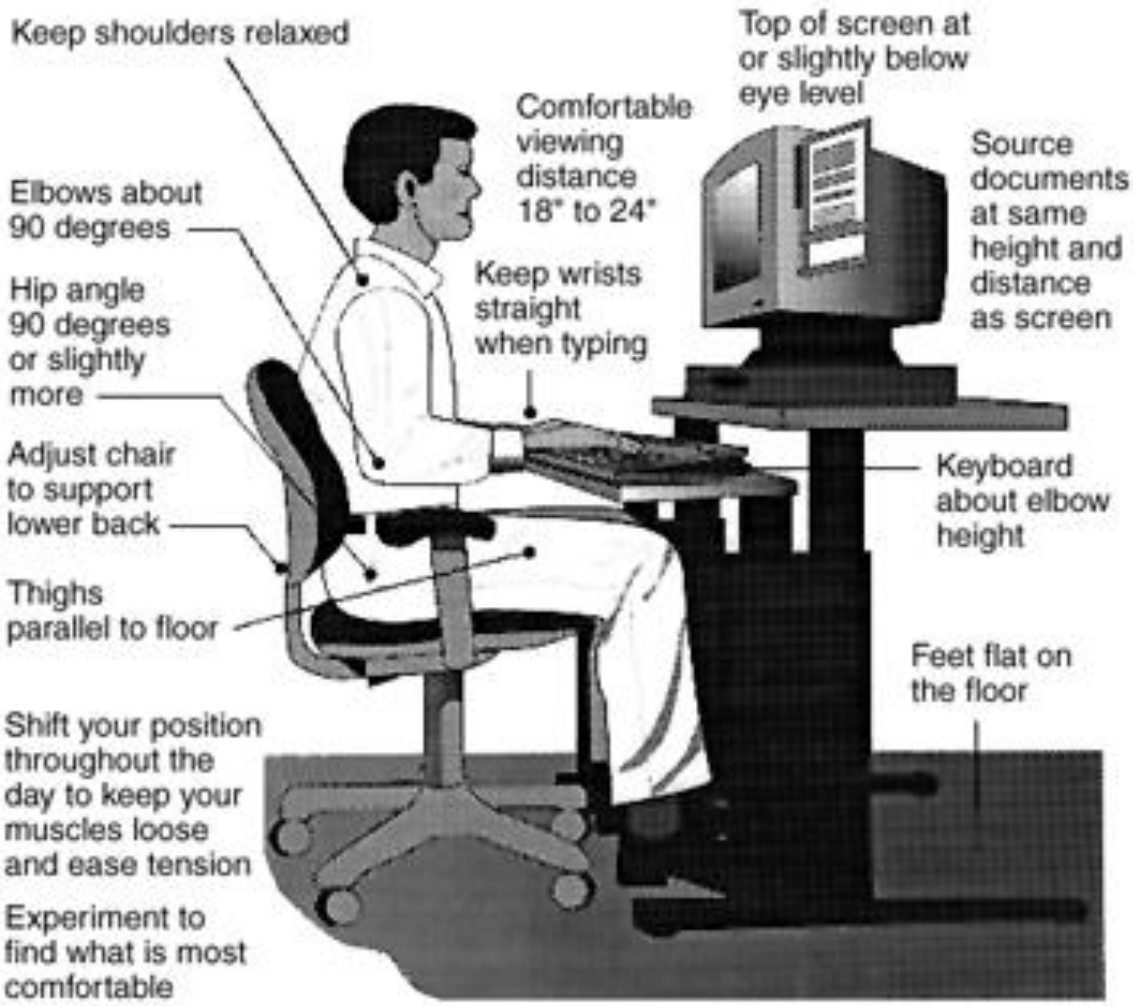
Figure B: Poor Posture

How Heavy is Your Head?

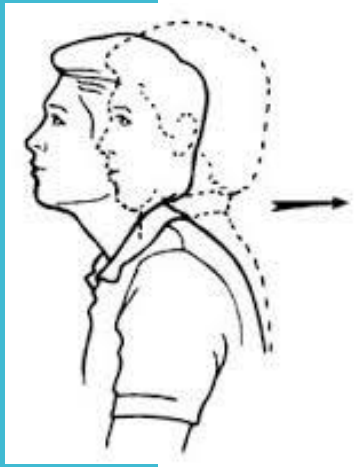


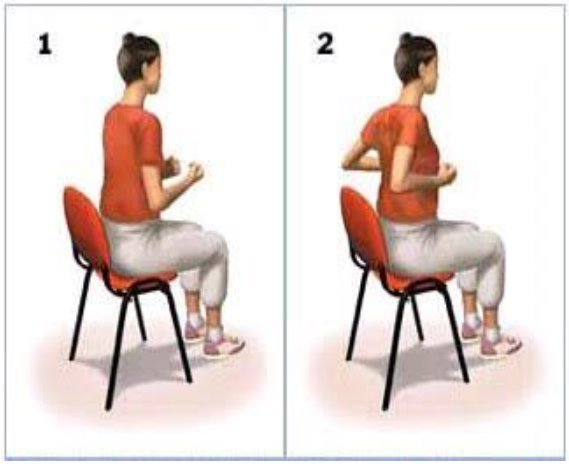
NORMAL POSTURE *2 INCHES FORWARD* *3 INCHES FORWARD*

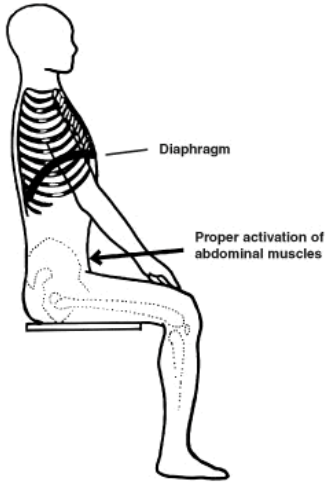
Proper Sitting Posture



Postural Exercises



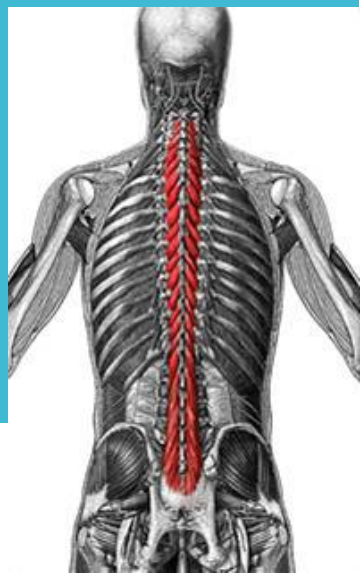




Body Mechanics

- Performing activities correctly in a way that uses the least amount of energy/effort e.g. lifting, pushing, or moving objects.
- Maintaining proper body positioning during movement
- Using muscles efficiently to prevent muscle pain & joint

Keep your curves!

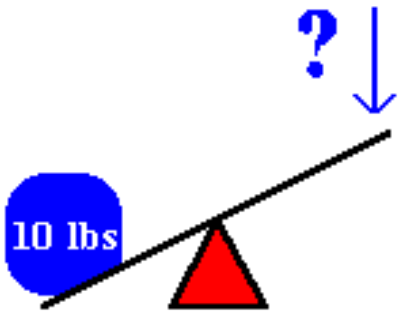


- The back muscles located along the spine are in their strongest position when the three curves are maintained.
- When you work without keeping the curves (due to poor posture or awkward movements), your muscles can't support the spine as well and the compression on the discs is uneven.
- This increases your risk of back injury, so be sure to maintain the curves in your back, especially when lifting or lowering an object!

Proper Body Mechanics

- Minimize bending and twisting from the waist
- Avoid reaching out over an obstruction to lift, hold or lower an object
- Change positions, walk and stretch

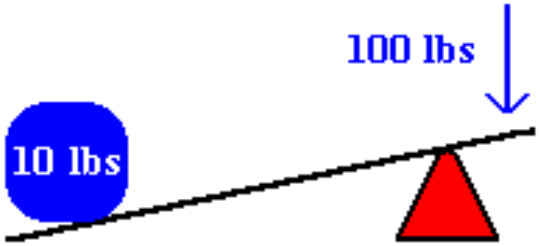
Incorrect vs. Correct Lifting

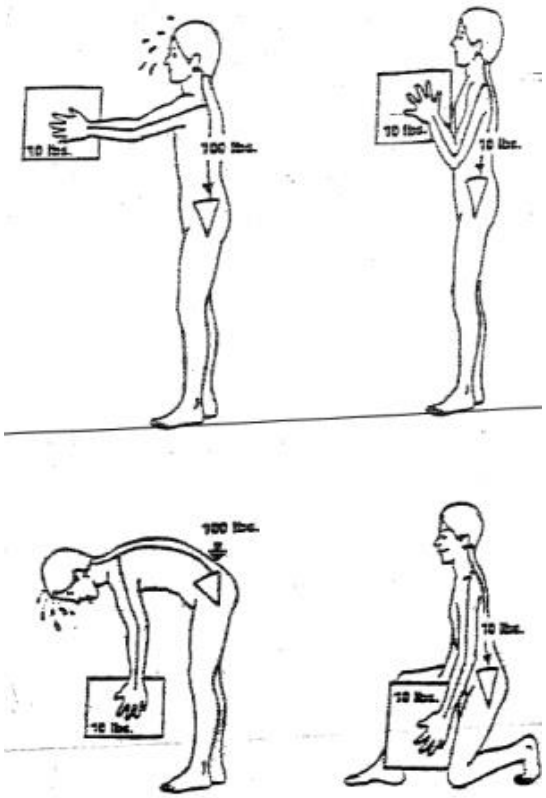


To demonstrate this, think of your back as a lever.

With the fulcrum (hinge) in **the center** of your back, how many pounds would it take to lift a ten pound object?

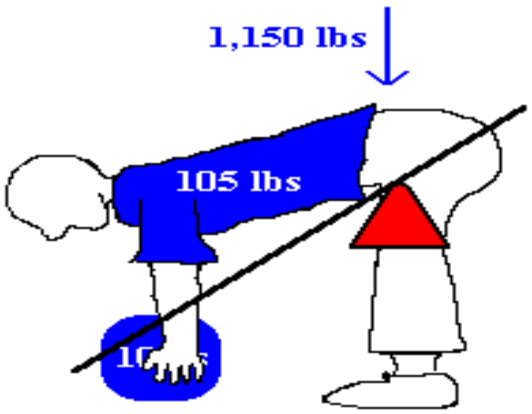
With the fulcrum in the center, it takes 10 pounds to lift the 10-pound object. However, if you shift the fulcrum to one side, it will change… If you think about it, when you bend over to pick something up, your waist acts as the fulcrum point in a lever system; and it is certainly not centered.





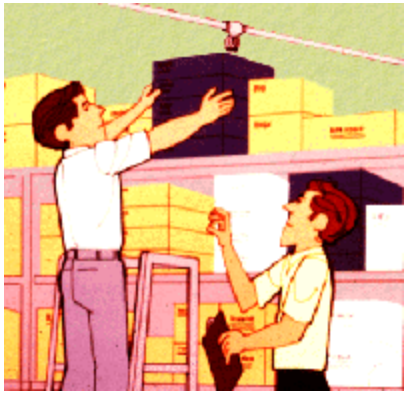
When the object is shifted away from the fulcrum, it takes more force to lift the object. In fact, the human back operates on a **10:1 ratio.**

Bending over to lift a ten pound object actually puts **100 pounds of pressure on your lower back.**



When you add in the 105 pounds of the average human upper torso, you see that lifting a ten pound object actually puts 1,150 pounds of pressure on the lower back.

Is the load height located inside your "safe lifting zone"?

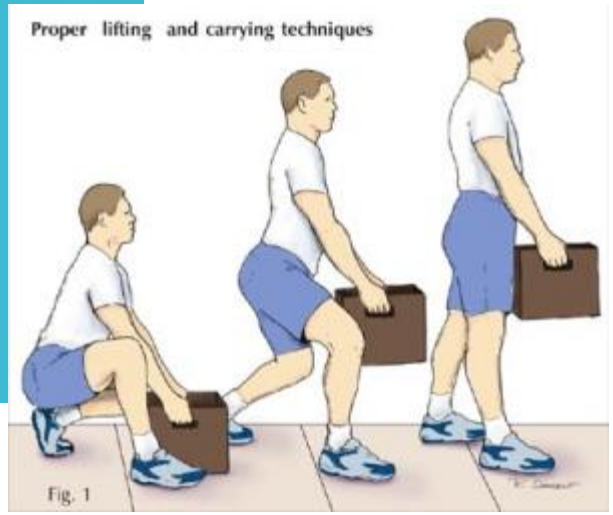


The safe lifting zone is between knees and shoulders.

If the load is below knee level - bend your knees and lift with your legs.

If the load is above your shoulders - use a stool or ladder. Better yet, rearrange the contents on the shelves so that heavier and more frequently needed items are placed on the mid-level shelves. If it is heavy - get help.

Proper Lifting Techniques

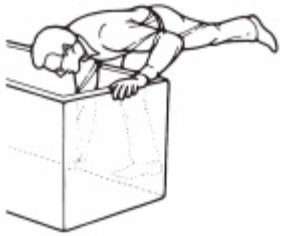


- Keep a wide base of support
- Bend at the hips and knees instead of the waist. You can also use a half kneeling position if more comfortable (one knee on floor and other bent in front of you).
- Tighten your stomach muscles
- Keep good posture-look straight ahead, back straight, chest out, shoulders back
- Straighten knees and hips to lift, keeping back straight.
- Hold load close to body at level of waist.
- Use feet to change direction (no twisting).
- Bend knees/hips to lower object.

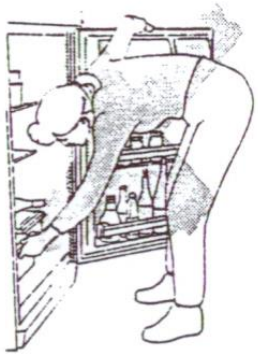
Proper Lifting Techniques

- For lifting something with a handle, such as a suitcase or grocery bags, try a supported lift. Grab the handle and while lifting, support your weight using the other hand on your thigh.

- Lighter items like a small grocery bag or even a stray sock, you can use a golfer's lift.

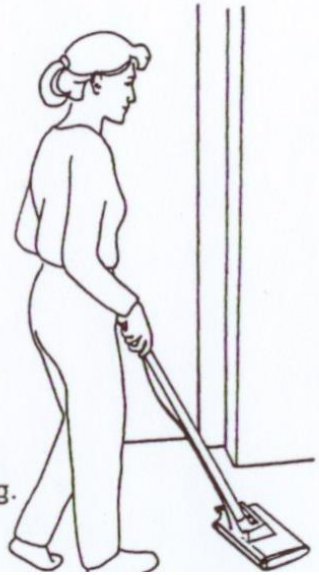


Refrigerator



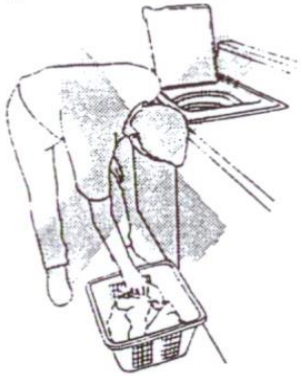
Squat with knees apart
to reach lower shelves and drawers.

Housework - Vacuuming

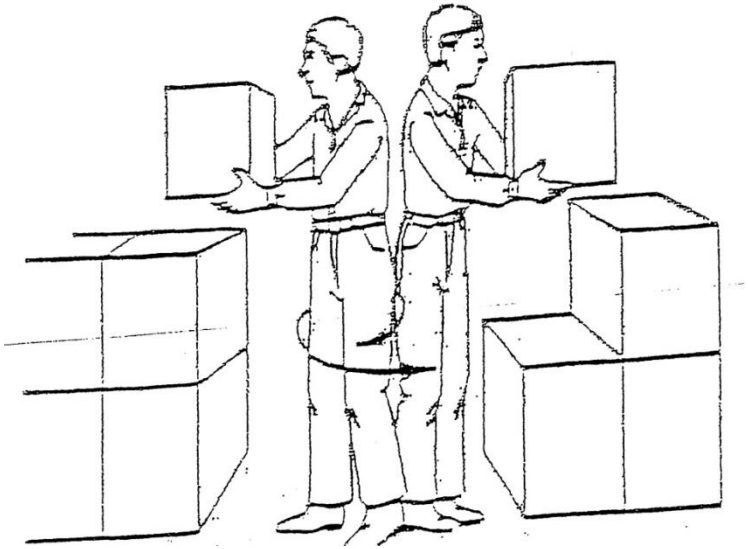


Hold the vacuum
with arm held at side.
Step back and forth to move it,
keeping head up. Avoid twisting.

Laundry - Loading Wash



Place laundry basket so that
bending and twisting
can be avoided.



Thank You!
Questions?

'What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"