SKM 4353 Safety in Petroleum Engineering
Chapter 6: Occupational Health and Diseases

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Health hazards

- Chemicals
- Radiation
- Noise
- Ergonomics (Back pain, Hand, Fingers, Wrist, etc)

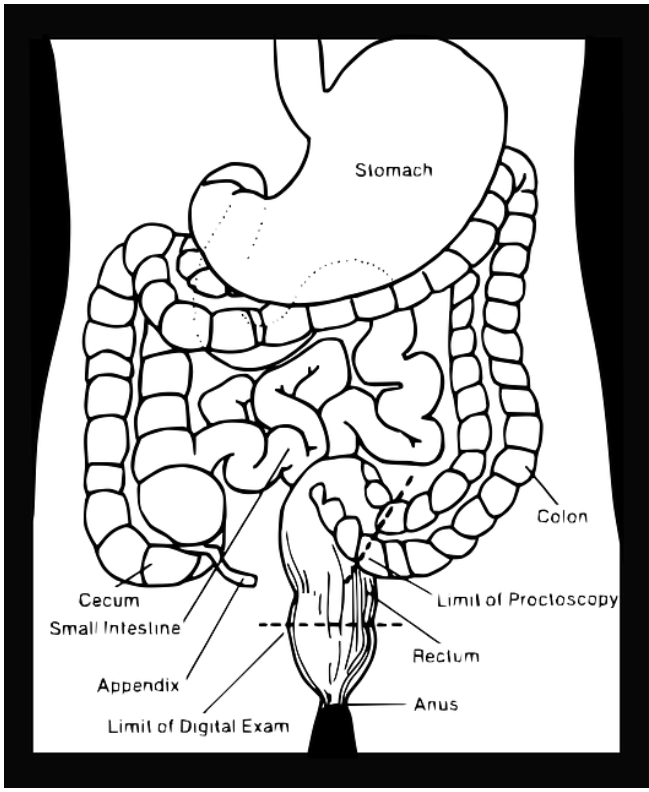
Occupational Health and Diseases

CHEMICALS

Effects of chemicals to health

4 routes of entry into body:

- Lungs – greater capacity for exposure and absorption
- Skin
- Gastrointestinal-tract
- Eyes – danger of local damage



Hazards affecting human body

Hazards	Some health effects
Dusts	Occupational asthma, lung cancer and bronchitis
Mists	Irritation and corrosion of respiratory tract
Fumes	Metal fume fever and central nervous system dysfunction
Gases	Irritation, pulmonary edema and damages to major organs
Vapors	Central nervous system depression, lack of coordination, liver cancer, kidney damage, and infertility

Chemical classification

i. Very toxic
ii. Toxic
iii. Harmful
iv. Very corrosive
v. Corrosive
vi. Irritant
vii. Carcinogenic
viii. Teratogenicity
ix. mutagenic

Effects of chemical to health

- Acute effects
  - Result from short term exposure
  - High concentrations
  - Almost immediate results
  - e.g. swallowing cyanide, irritation
- Chronic effects
  - Results from long term exposure
  - Disease develops slowly
  - Symptoms last longer
  - e.g. cancer, sensitisation

Toxic effects

- Induce cancer, tumors
- Mutation
- Causes defects of the embryo
- Cause death to exposed person
- Produce irritation & sensitisation
- Diminish mental alertness, reduce motivation, alter behavior
- Adversely affect to health & cause bodily injury

Occupational Health and Diseases

RADIATION

Radiation sickness

Radiation sickness is illness and symptoms resulting from excessive exposure to radiation.

Exposure may be accidental or intentional (as in radiation therapy).

The severity of symptoms and illness depends on the type and amount of radiation, how long you were exposed, and which part of the body was exposed. Symptoms of radiation sickness may occur immediately after exposure, or over the next few days, weeks, or months.

Radiation types

- Ionizing
  - radiation that produces immediate chemical effects on human tissue .
  - examples include X-rays, gamma rays, and particle bombardment (neutron beam, electron beam, protons, mesons, and others).
  - This type of radiation can be used for medical testing and treatment, industrial and manufacturing purposes, weapons and weapons development, and more.
- Non-ionizing
  - comes in the form of light, radio waves, microwaves and radar.
  - usually does not cause tissue damage

Exposure type

- Radiation sickness results when humans are exposed to very large doses of ionizing radiation. Radiation exposure can occur as
  - a single large exposure (acute), or
  - a series of small exposures spread over time (chronic).

- Radiation sickness is generally associated with acute exposure and has a characteristic set of symptoms that appear in an orderly fashion.

- Chronic exposure is usually associated with delayed medical problems such as cancer and premature aging, which may happen over a long period of time.

Exposure measurement

Exposure from x-rays or gamma rays is measured in units of roentgens;

- Total body exposure of 100 roentgens (or 1 Gy) causes radiation sickness.
- Total body exposure of 400 roentgens (or 4 Gy) causes radiation sickness and death in half the individuals. Without medical treatment, nearly everyone who receives more than this amount of radiation will die within 30 days.
- 100,000 rads causes almost immediate unconsciousness and death within an hour

Severity

- Because it is difficult to determine the amount of radiation exposure from nuclear accidents, the best signs of the severity of the exposure are:
  - the length of time between the exposure and the onset of symptoms
  - the severity of symptoms
  - and severity of changes in white blood cells.

If a person vomits less than an hour after being exposed, that usually means the radiation dose received is very high and death may be expected.

Symptoms

- Bleeding from the nose, mouth, gums, and rectum
- Bloody stool
- Bruising
- Dehydration
- Diarrhea
- Fainting
- Fatigue
- Hair loss
- Inflammation of exposed areas (redness, tenderness, swelling, bleeding)
- Mouth ulcers
- Nausea and vomiting
- Open sores on the skin
- Skin burns (redness, blistering)
- Sloughing of skin
- Ulcers in the esophagus, stomach or intestines
- Vomiting blood
- Weakness

In case of incidents

- Do not remain in the area where exposure occurred
- Do not apply ointments to burned area
- Do not remain in contaminated clothing
- Do not hesitate to seek emergency medical treatment

Prevention

- Avoid unnecessary exposure to radiation.
- Persons working in radiation hazard areas should wear badges to measure their exposure levels.
- Protective shields should always be placed over the parts of the body not being treated or studied during x-ray imaging tests or radiation therapy.

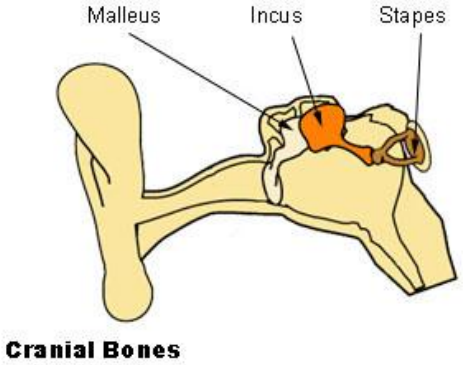
Occupational Health and Diseases

NOISE

NOISE

- Unwanted sound
- Form of energy
- Effects depend on:
  - loudness > 90dB
  - duration of exposure
  - frequency
  - type of noise (impulse, steady)

Effect of Noise



- Acute effects
  - damage to ear drum
  - damage to ear ossicles
- Temporary Threshold Shift (TTS)
  - hearing loss suffered as a result of noise exposure, all or part of which recovers after one is removed from exposure to noise
- Permanent Threshold Shift (PTS) may lead to deafness
  - hearing loss suffered as a result of noise

Effect of Noise (cont'd)

- Tinnitus
  - ringing in ears
  - number of possible causes
  - linked to PTS
- Communication problems
  - loss of hearing
    - loudness (middle ear damage)
    - clarity (inner ear damage) (high frequency)

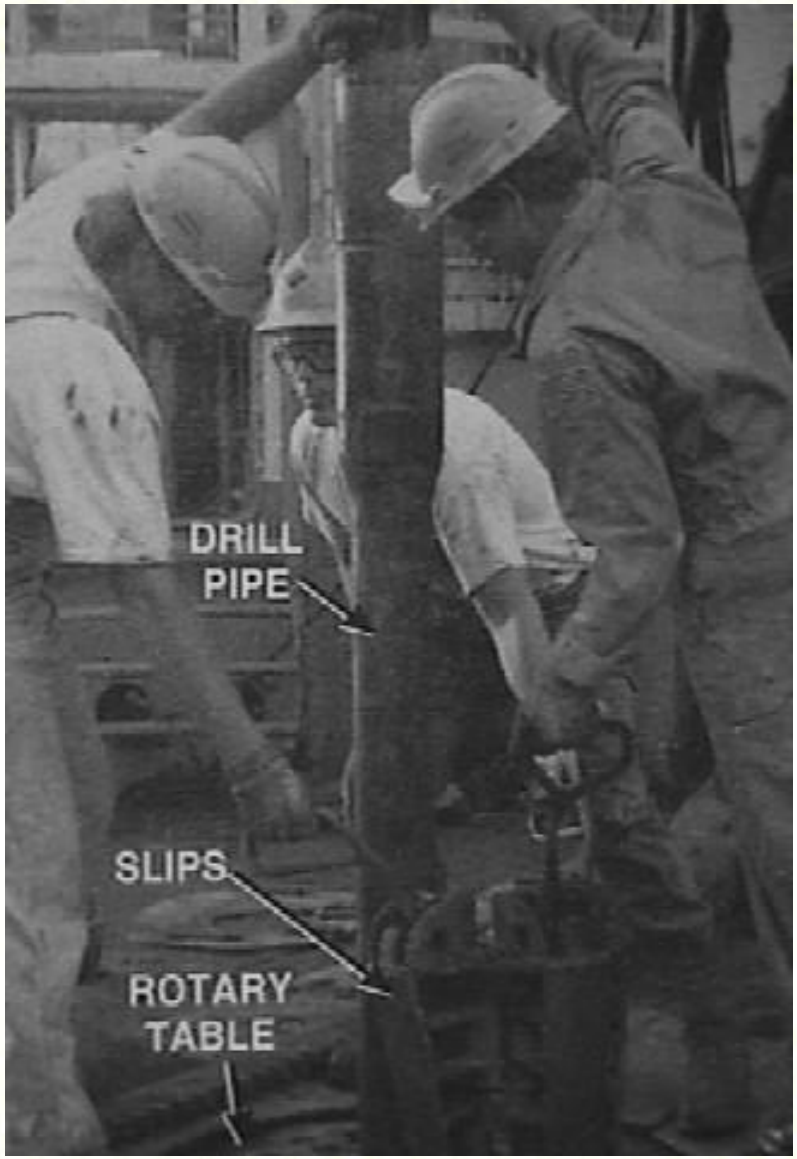
Occupational Health and Diseases

ERGONOMICS

Ergonomics hazard

- Back pain and spinal injury
- Fingers (Trigger finger, Raynaud's syndrome)
- Shoulder (Rotator cuff tendonitis)
- Wrist (Carpal Tunnel syndrome)

Racking Pipe – Strains-Sprains, Caught Between etc….



Ready to set the slips.

Note: 3-people/3-handles

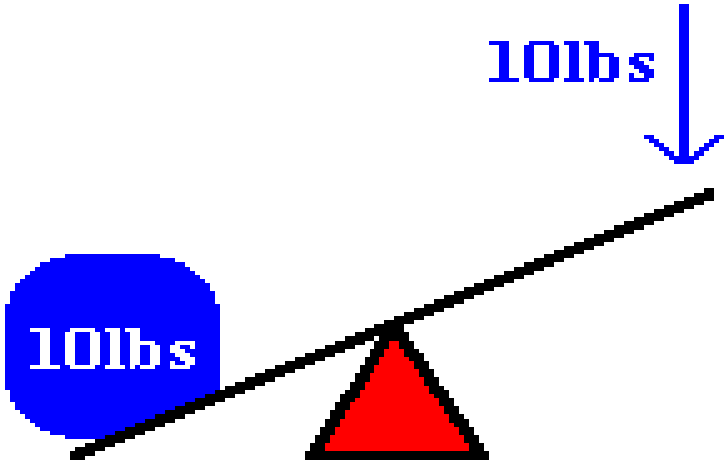
Always set and remove with three (3) people to avoid back strain.

Stabbing a joint, prior to make-up. Note spinning chain, position of arm and hand ??

The Forces Involved

The amount of force you place on your back in lifting may surprise you!

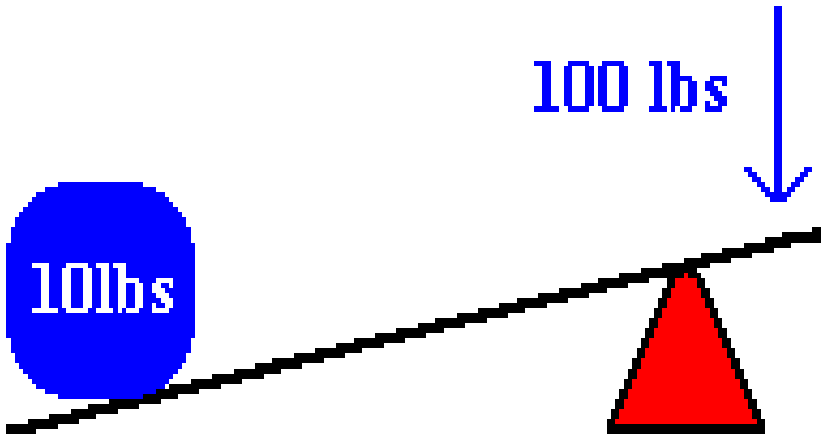
Think of your back as a lever. With the fulcrum in the center, it only takes ten pounds of pressure to lift a ten pound object.



The Forces Involved

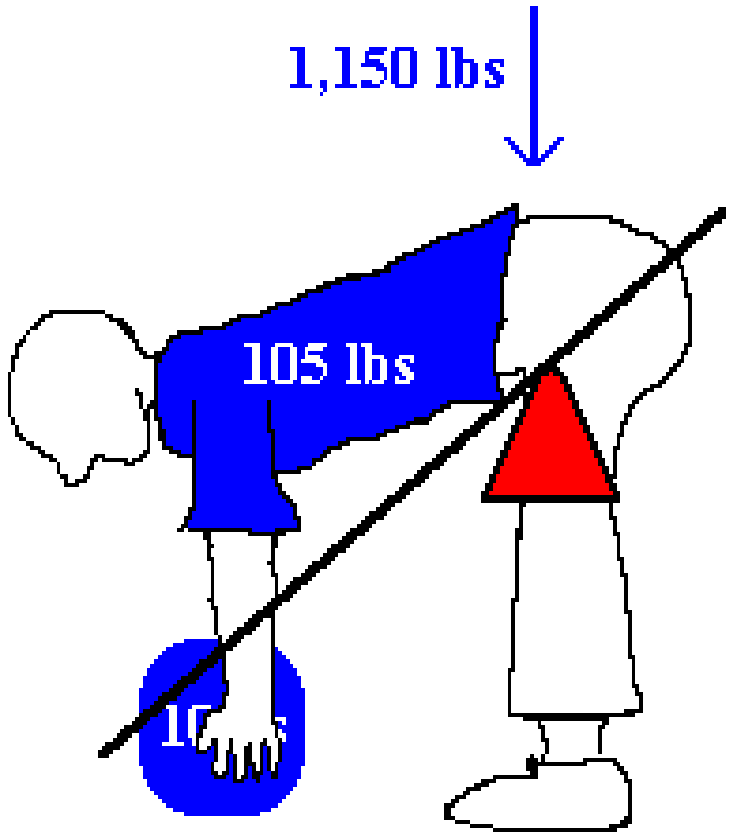
If you shift the fulcrum to one side, it takes much more force to lift the same object. Your waist acts like the fulcrum in a lever system, on a 10:1 ratio.

Lifting a ten pound object puts 100 pounds of pressure on your lower back.



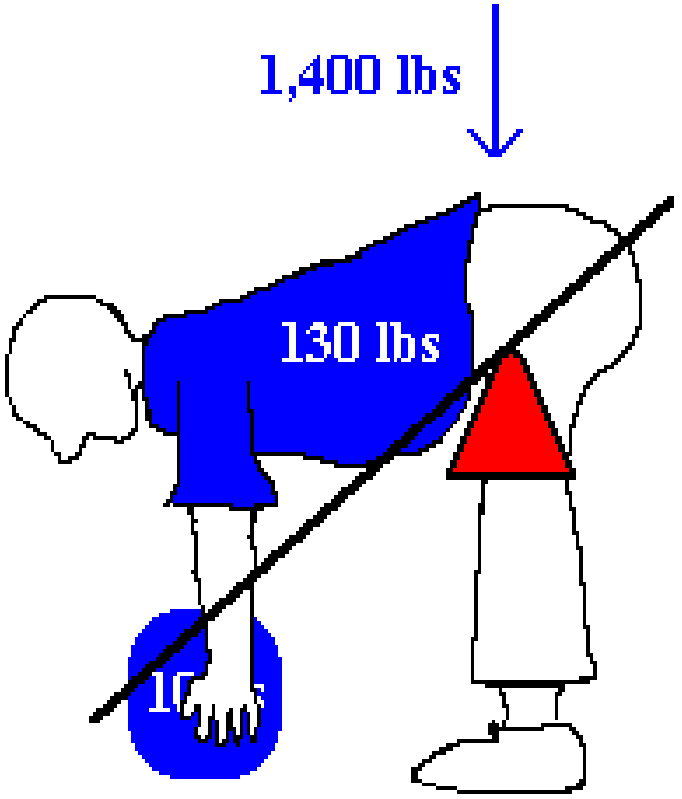
The Forces Involved

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.



The Forces Involved

If you were 25 pounds overweight, it would add an additional 250 pounds of pressure on your back every time you bend over.



Causes of Back Injuries

Common Causes of Back Injuries

Anytime you find yourself doing one of these things, you should think:

DANGER! ***My back is at risk!***

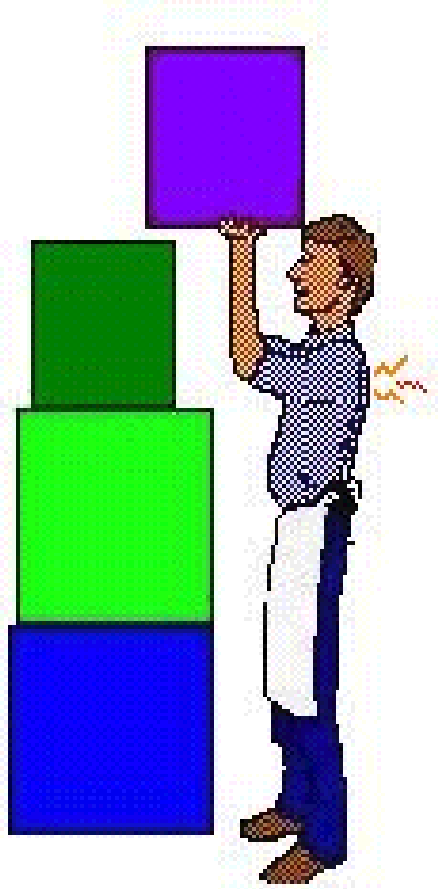
Try to avoid heavy lifting, especially repetitive lifting over a long period of time

Common Causes of Back Injuries

Twisting at the waist while lifting or holding a heavy load . . . this frequently happens when using a shovel.

Common Causes of Back Injuries

Reaching and lifting
over your head,
across a table,
or out the back
of a truck . . . .



Common Causes of Back Injuries

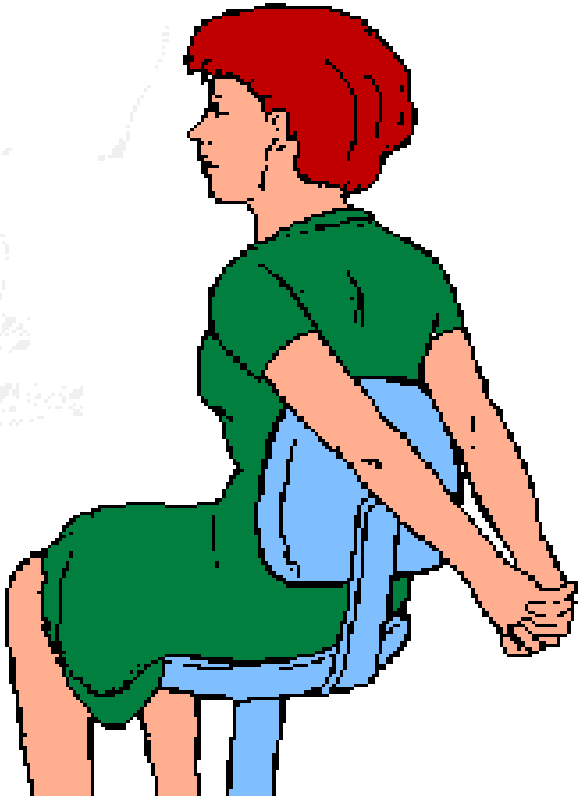
Lifting or carrying objects with awkward or odd shapes . . . .

Common Causes of Back Injuries

Working in awkward, uncomfortable positions . .

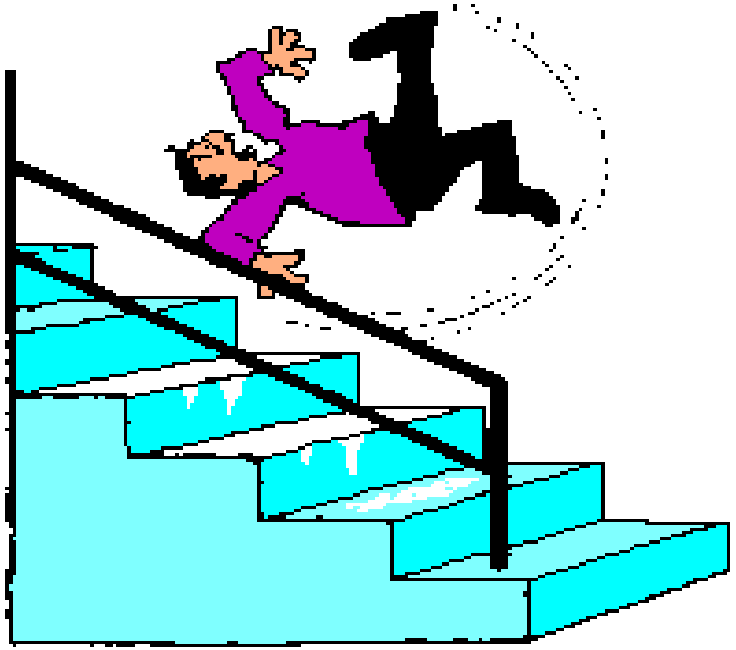
Common Causes of Back Injuries

Sitting or standing too long in one position ... Sitting can be very hard on the lower back ...



Common Causes of Back Injuries

It is also possible to injure your back slipping on a wet floor or ice . . .



Prevent Back Injuries

- Avoid lifting and bending whenever you can.
- Place objects up off the floor.
- Raise/lower shelves.
- Use carts and dollies.
- Use cranes, hoists, lift tables, and other lift-assist devices whenever you can.
- Test the weight of an object before lifting by picking up a corner.
- Get help if it’s too heavy for you to lift it alone.

Prevent Back Injuries

- Use proper lift procedures . . . Follow these steps when lifting . . . .
  - Take a balanced stance, feet shoulder-width apart
  - Squat down to lift, get as close as you can.

Prevent Back Injuries

- Get a secure grip, hug the load.

- Lift gradually using your legs, keep load close to you, keep back and neck straight.

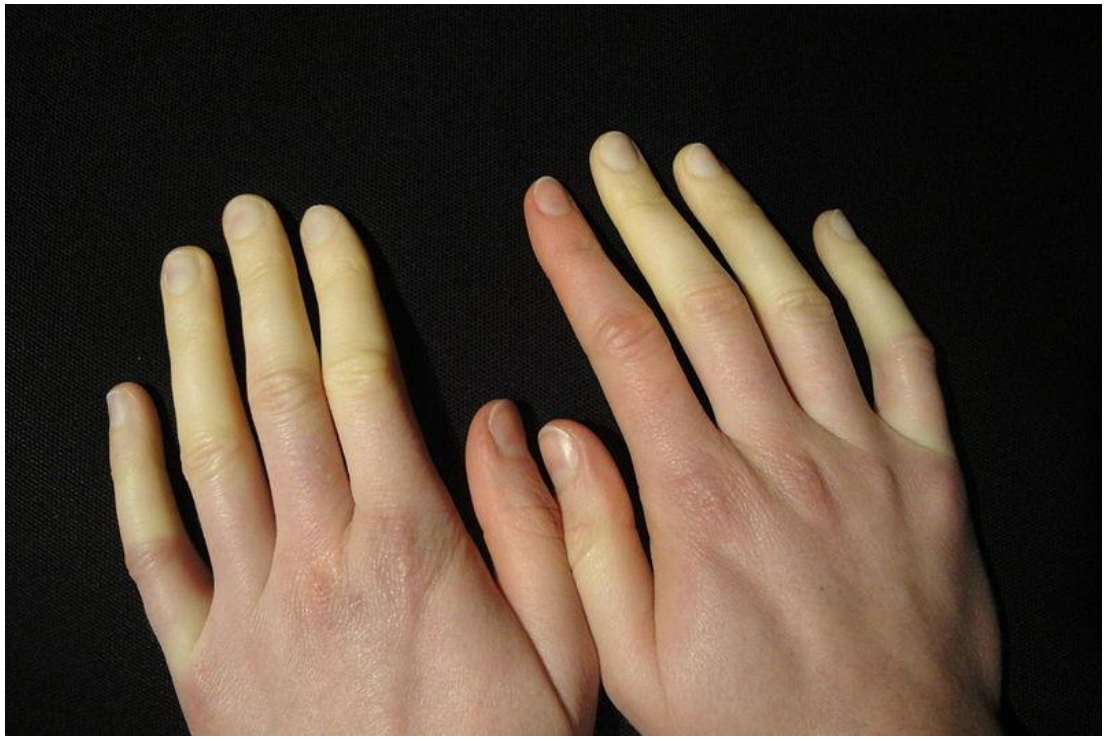
Prevent Back Injuries

- **Once standing, change directions by pointing your feet and turn your whole body. Avoid twisting at your waist.**

- **To put load down, use these guidelines in reverse.**

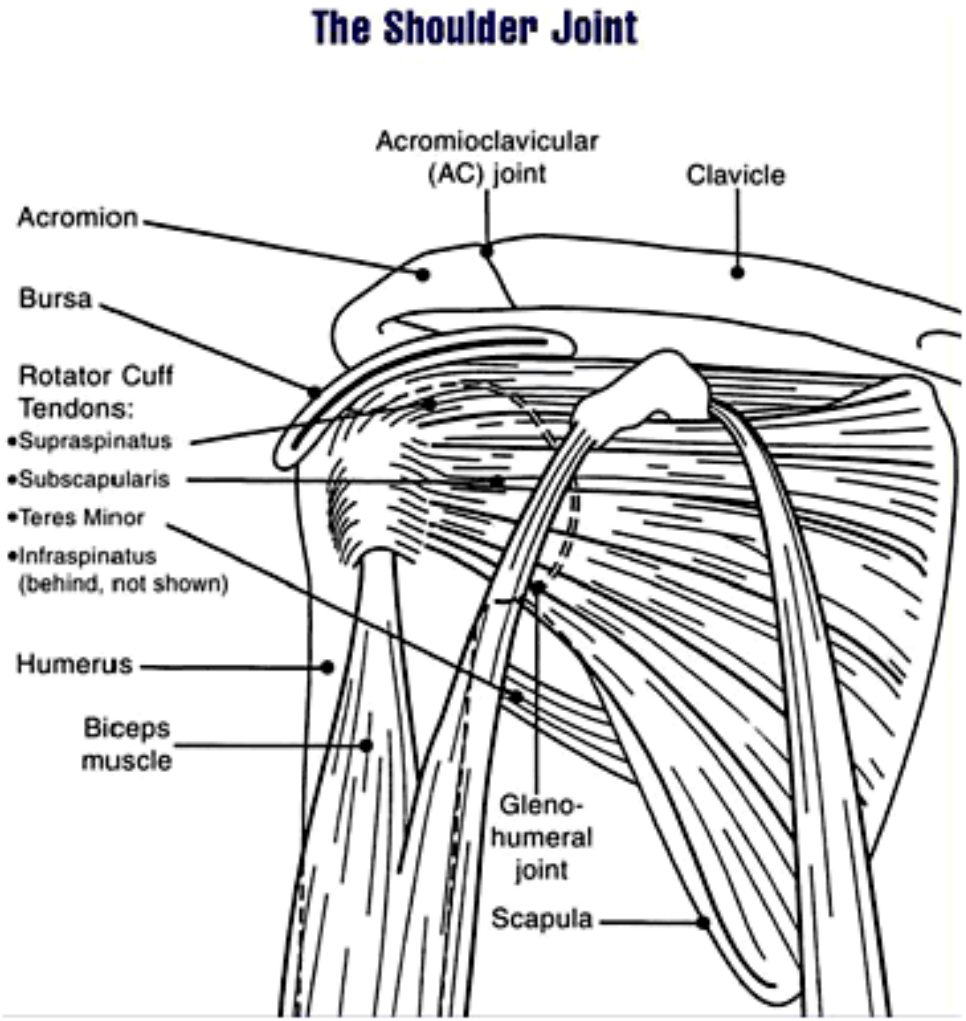
Musculoskeletal Disorders

Trigger finger

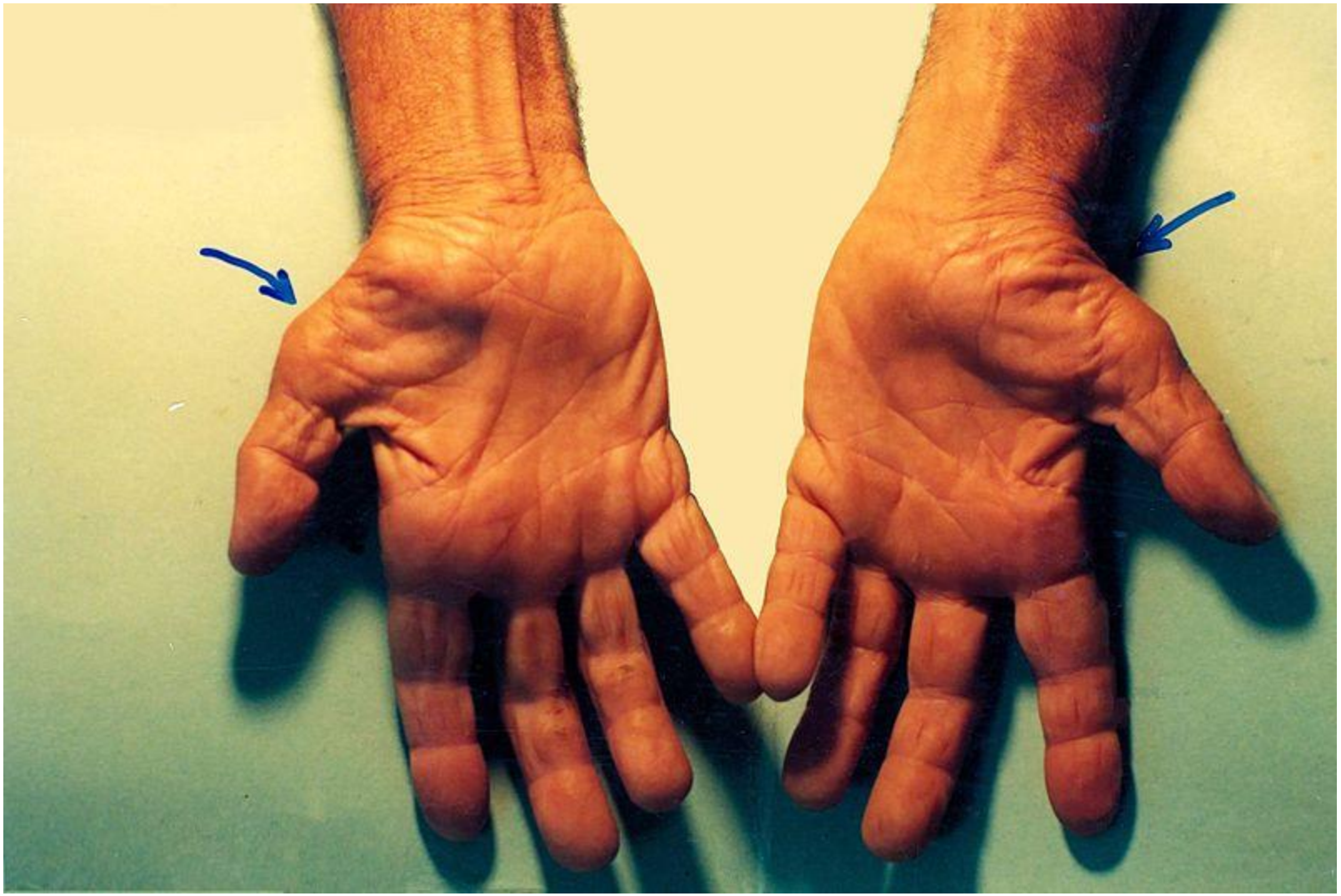


Raynaud Syndrome

Rotator Cuff Tendonitis

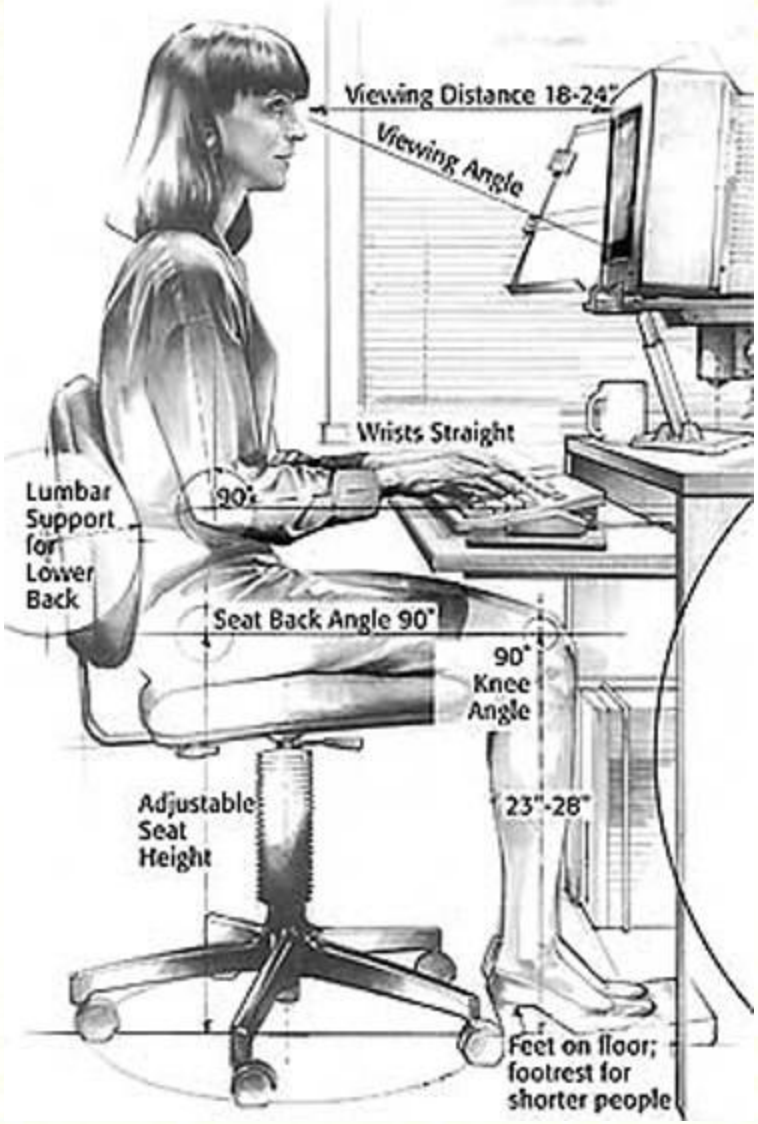


Carpal Tunnel Syndrome- Repetitive work using excessive forces without sufficient resting time

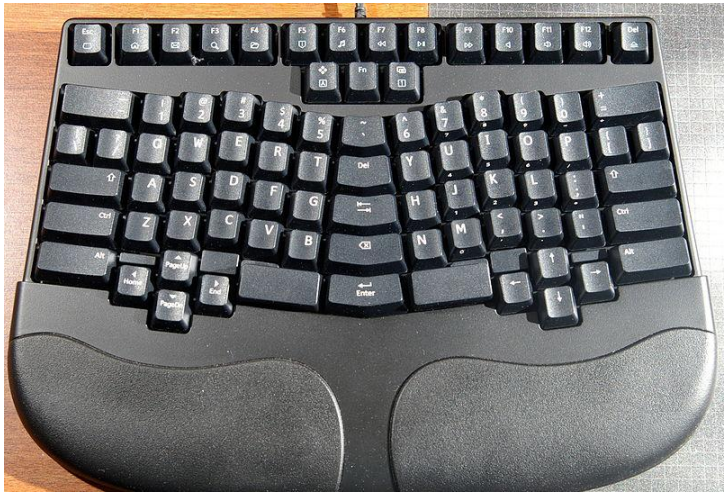


Ergonomics at office

- Mostly regarding on your posture when you are working at your workstation.



Use an ergonomic tools



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