

# IS THIS SAFE TO LIFT? (BACK PROTECTION)

PRESENTED BY:  
GINGER EDGECOMBE DORSEY, Ph.D.  
APHIS ERGONOMICS PROGRAM MANAGER



APHIS ERGONOMICS  
**Work Healthy**



2012

# Ergonomics- Defined

- Science of fitting workplace conditions and job demands to the capabilities of the working population.
- Planning & adapting of equipment & tasks to promote the comfort & efficiency of workers.
- Fitting the job to the worker.

# 5 Major Goals

- Work in neutral postures.
- Seeks to improve the interaction between humans and the machines & tools they use to perform their work.
- Decrease risk of injury/illness.
- Enhance worker productivity.
- Improve quality of work life.

# Understand

- Different people respond differently to their work environments, particularly after an injury, due to:
  - Hereditary
  - Age
  - Gender
  - Lifestyles

**\*\*There is no such thing as an average person.\*\***

**\*It is NOT NORMAL to be in pain.\***

# Work-Related Musculoskeletal Disorders

- Disorders of the muscles, joints, nerves, tendons, ligaments, cartilage, or spinal discs.
- Mainly occur in the neck, back, arms, and wrists.
- Reflect gradual or chronic development.



# Causes of WMSDs

- **Awkward/Deviated Postures**
  - Twisting the body
  
- **Highly Repetitive Work**
  - Lifting
  
- **Excessive Force**
  - Gripping

# Most Common WMSDs

- **Lower Back Pain**
  - Back Injuries Cost - \$125K per incident
  
- **Carpal Tunnel Syndrome (CTS)**
  - CTS Injuries Cost - \$30K per incident



# Why are WMSDs a Problem?

- Commonly cause lost-time, injuries, and illnesses.
- Among the most costly occupational problems.
- Pain and suffering associated with WMSDs.
- Workers with WMSDs are not able to do quality work due to aches and pains.



# Question?

What functions do you perform  
that require your body  
to be in an uncomfortable position?

# Do you see yourself here?



# What You Will Learn

- Components of Manual Material Handling
- Back Basics
- How to stay in neutral posture to prevent and or minimize risk for back injuries.
- Techniques for safe lifting.
- Stretching techniques to increase flexibility.

# Manual Material Handling

- Manual material handling (MMH) work contributes to a large percentage of the over half a million cases of musculoskeletal disorders reported annually in the United States.
- Musculoskeletal disorders often seen involve strains and sprains to the lower back, shoulders, and upper limbs.

# MMH Defined

- Handling is defined as working with the hand or hands.
  - e.g., seizing, holding, grasping, or turning
  
- Handling also means that the worker's hands move individual packages, containers, or other materials manually.
  - e.g., lifting, lowering, filling, emptying, or carrying

# MMH

- Manual handling may expose workers to physical risk (e.g., force, awkward postures, and repetitive motions) factors that can lead to:
  - injuries
  - wasted energy
  - wasted time
  
- Repeated or continual exposure to one or more risk factors initially may lead to fatigue and discomfort.
  
- Over time, injury to the back, shoulders, hands, wrists, or other parts of the body may occur.

# Our Back

- Back injuries do not have to happen.
- Since we depend on our body for our livelihood, it is important to learn how to protect it.



# Back Basics

- The back/spine has several moving parts.
- Too much bending, twisting, and lifting in awkward positions is suspected to cause pain and injury.

# Back Basics

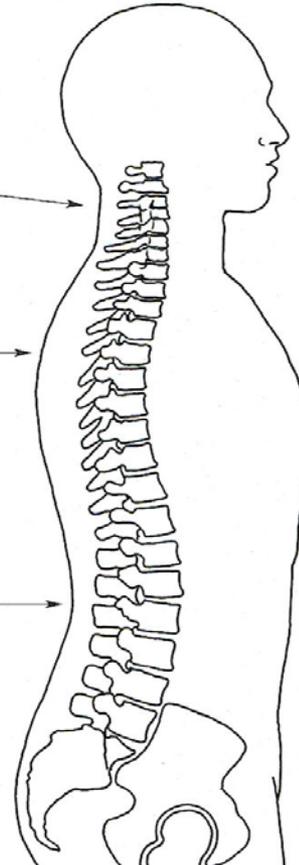
## THE SPINAL COLUMN

### Three Areas of the Spine

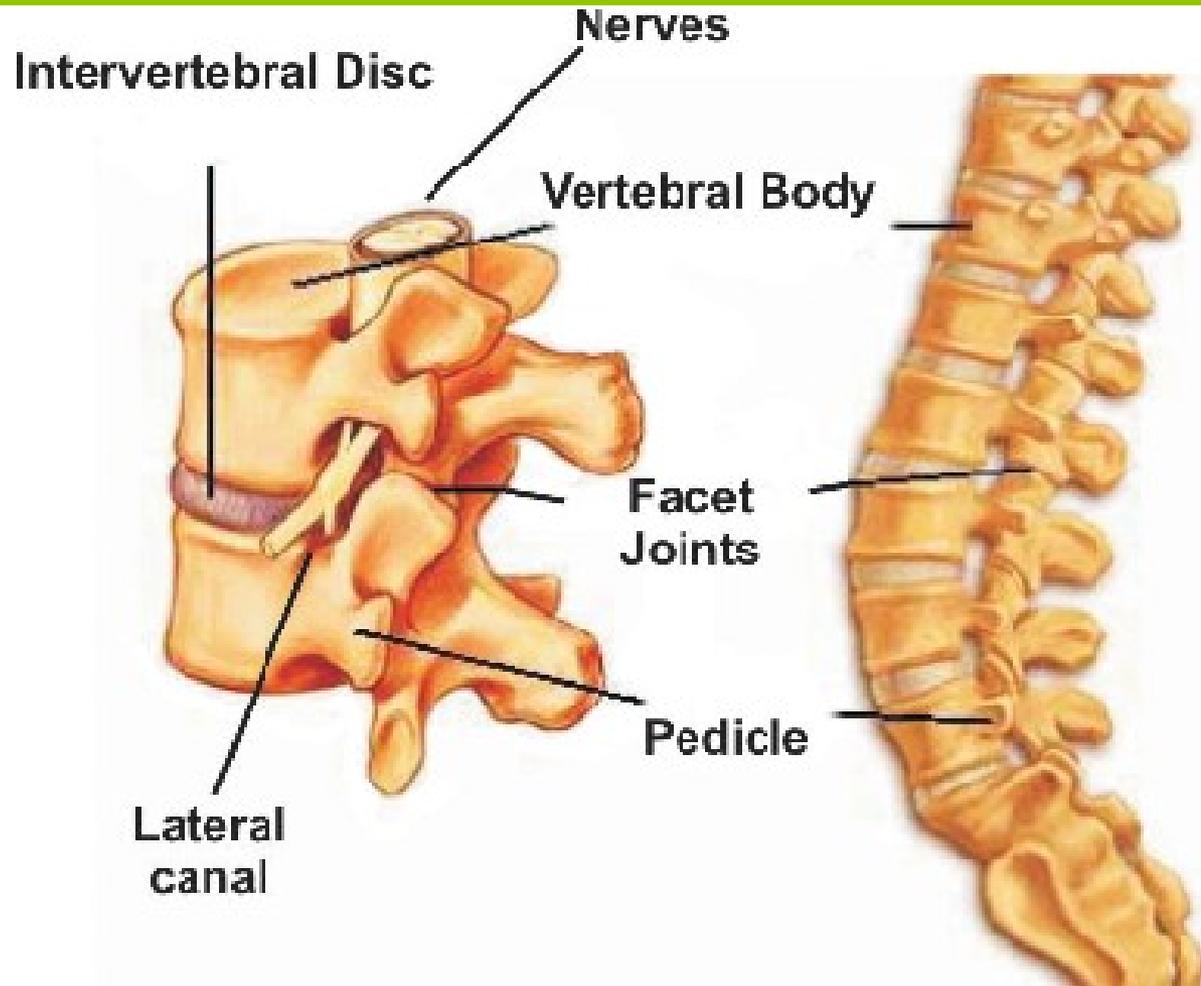
Neck or Cervical Spine

Upper Back or Thoracic Spine

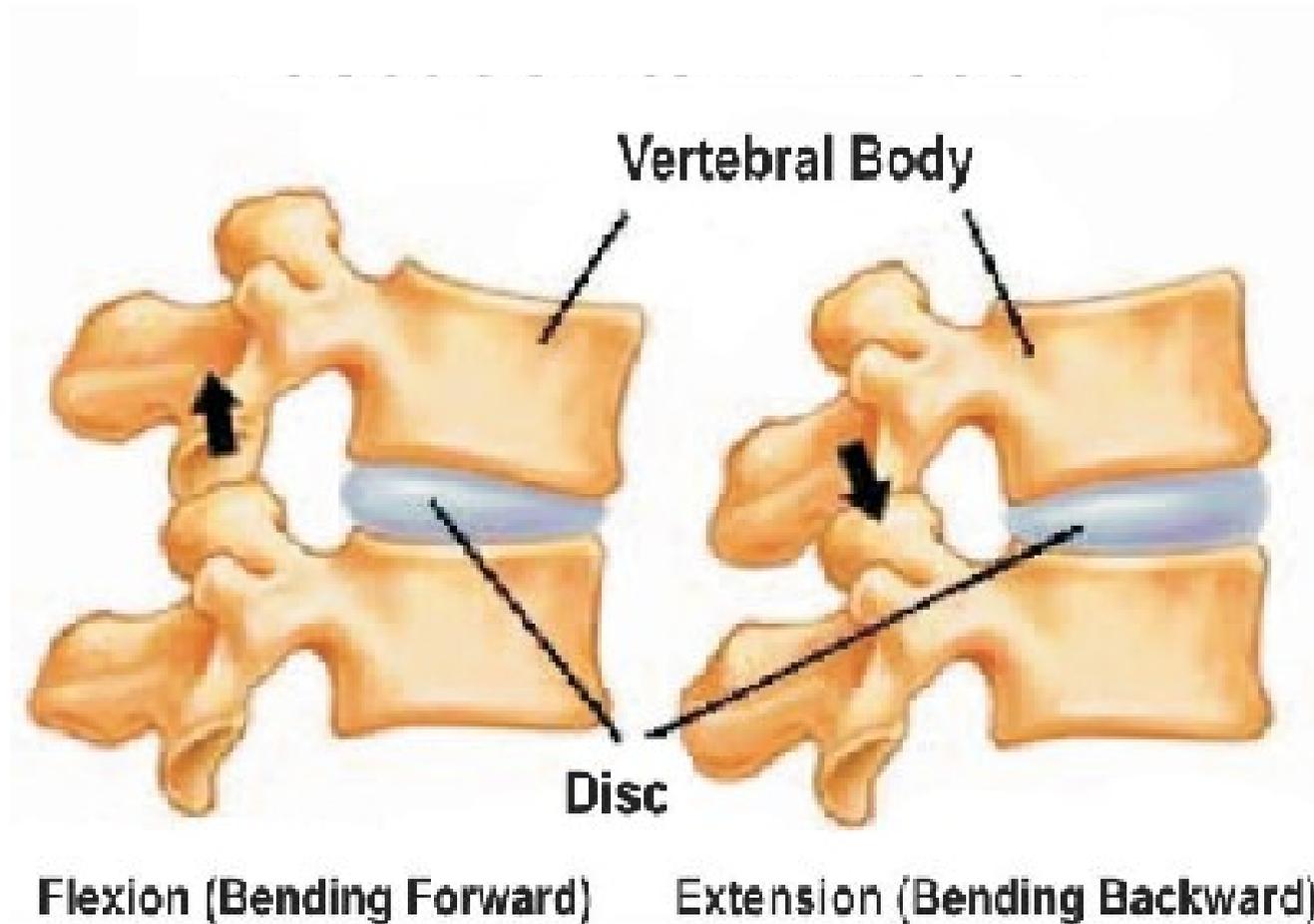
Lower Back or Lumbar Spine



# Back Basics



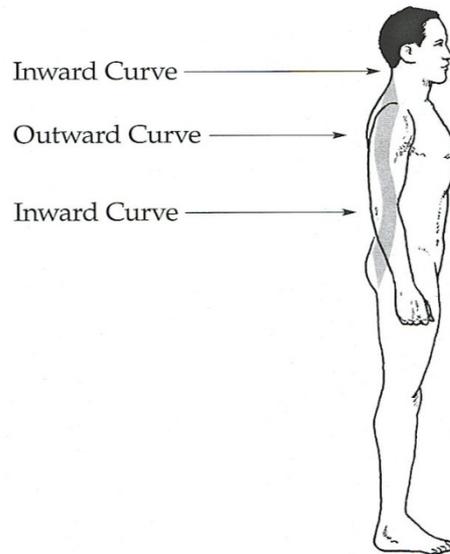
# Back Basics



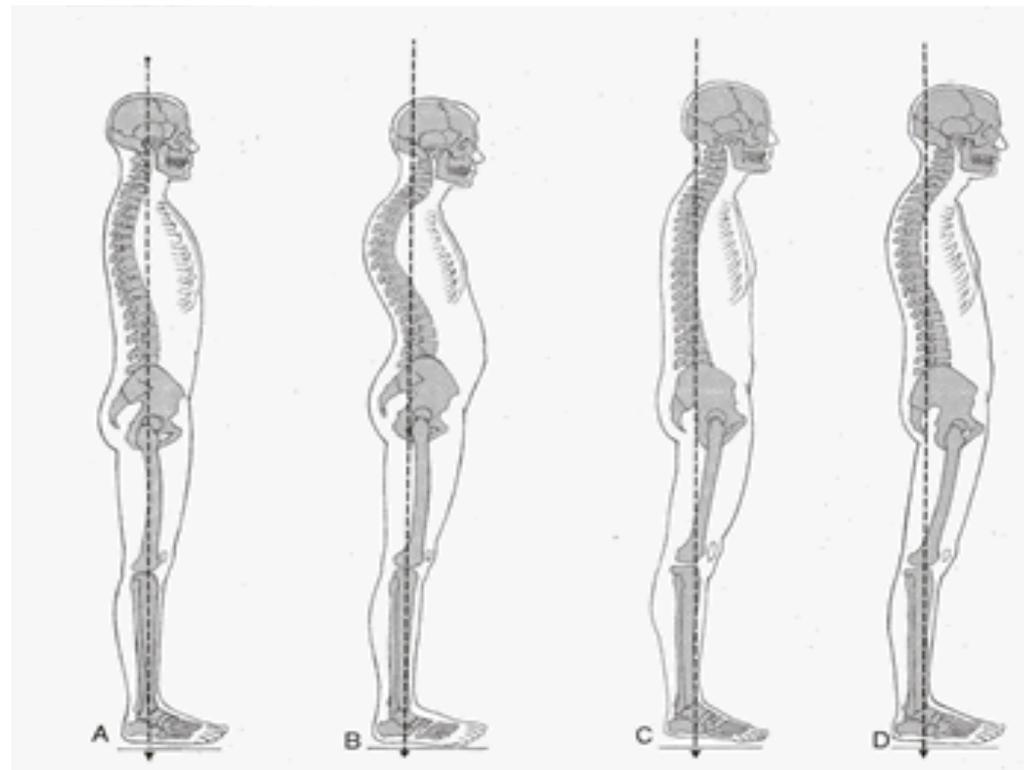
# Staying in Neutral

To prevent injury, it is important to return to neutral posture as often as possible.

The Spine's "S" Curves



# Body Postures - Common Postures



A Ideal

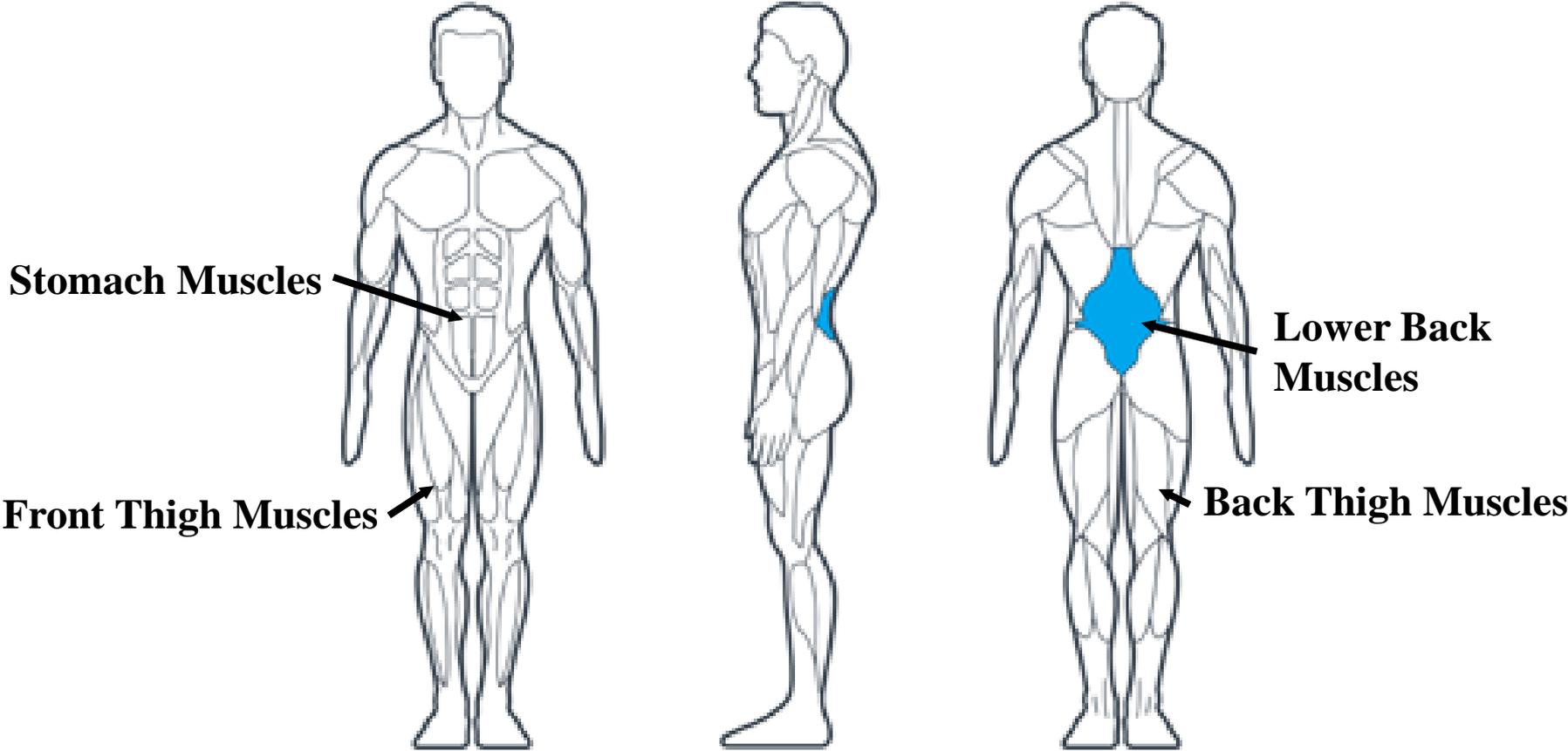
B Kyphosis-Lordosis

C Flat-Back

D Sway-Back

# Back Basics - Back Support Muscles

(i.e., core muscles group)



# MMH Risk Factors

- Awkward postures (e.g., bending, twisting)
- Repetitive motions (e.g., frequent reaching, lifting, carrying)
- Forceful exertions (e.g., carrying or lifting heavy loads)
- Pressure points (e.g., grasping [or contact from] loads, leaning against parts or surfaces that are hard or have sharp edges)
- Static postures (e.g., maintaining fixed positions for a long time)

# Control Methods for Reducing Risks

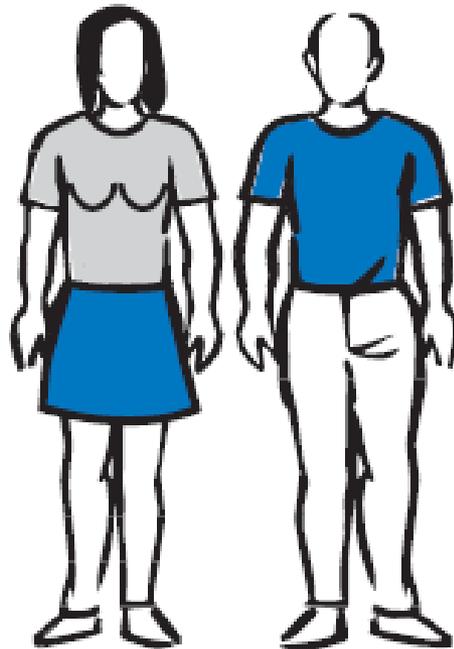
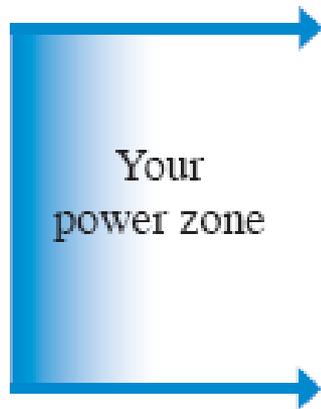
- **Engineering:**
  - Preferred method of control.
  - This involves a change in the physical features of the workplace.
  
- **Administrative:**
  - Controls include changing work practices or the way work is organized.
  - Improvements require continual monitoring by management and employee feedback to make sure the improvements are effective.
  - Training - should be used in combination with workplace changes.
  
- **Personal Protective Equipment:**
  - Least effective control methods as the worker is still exposed to the risk factor.
  - Examples include providing knee pads for workers laying carpet, or anti-vibration gloves for workers using powered hand tools.

# Engineering Controls

- ***Rearranging, modifying, redesigning, providing or replacing:***
  - Tools
  - Equipment
  - Workstations
  - Packaging
  - Parts
  - Processes
  - Products
  - Materials



# Administrative Controls



- Alternate heavy tasks with light tasks.
- Provide variety in jobs to eliminate or reduce repetition (i.e., overuse of the same muscle groups).
- Adjust work schedules, work pace, or work practices.
- Provide recovery time (e.g., short rest breaks).
- Modify work practices so that workers perform work within their power zone (i.e., above the knees, below the shoulders, and close to the body).
- Rotate workers through jobs that use different muscles, body parts, or postures.

# Improvements to Manually Lift, Lower, Fill, or Empty Packages

- Reduce reaching and bending.
- Reduce the stress on your back and shoulders.
- Reduce the effort and force needed to perform work tasks.

# Guidelines to Safer Lifting

- Check for tags on loads.
- Before lifting, always test the load for stability and weight.
- For loads that are unstable and/or heavy, follow management guidelines for:
  - Equipment use
  - Reducing the weight of the load
  - Repacking containers to increase stability
- Plan the lift:
  - Wear appropriate shoes to avoid slips, trips, or falls.
  - If you wear gloves, choose the size that fits properly. Depending on the material the gloves are made of and the number of pairs worn at once, more force may be needed to grasp and hold objects.
  - Lift only as much as you can safely handle by yourself.
  - Keep the lifts in your power zone (i.e., above the knees, below the shoulders, and close to the body), if possible.
  - Use extra caution when lifting loads that may be unstable.

# Guidelines to Safer Lifting

## Lifting with Proper Posture

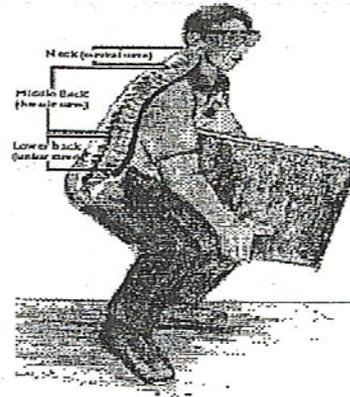
Lifting is strenuous—it requires proper training and technique. By lifting with your large, strong leg muscles instead of the small muscles of the back, you can prevent back injuries and reduce low back pain. There are five steps to follow when lifting an object:

**1. GET CLOSE TO THE LOAD.** Get as close to the load as possible— as if you're hugging the object. Having the object close to your body put less force on your low back.

**2. MAINTAIN YOUR CURVES.** Keep yourself in an upright position while squatting to pick up the object.

**3. TIGHTEN YOUR STOMACH MUSCLES.**

Tightening the stomach helps support the spine. *Don't hold your breath while tightening the muscles.*



**4. LIFT WITH YOUR LEGS.** Your legs are the strongest muscles in your body— so use them.

**5. PIVOT DON'T TWIST.** Turn with your feet, not your back. It isn't built for twisting from side to side.

# Improvement Options

- Avoid lifting from the floor whenever possible. If you must lift from the floor, do not bend at the waist.
- The techniques shown below help the worker to keep the spine in a safer position while lifting from the floor.



*Keep the load close to your body and lift by pushing up with your legs.*

# Improvement Options

- Use team lifting as a temporary measure until a more permanent improvement can be found.
- If possible, try to find a co-worker of similar height to help with the lift.



# Improvement Options

- Use a scissors lift, load lifter, or pneumatic lifter to raise or lower the load so that it is level with the work surface.
- Then slide the load instead of lifting.



# Improvement Options

- Raise the worker so that the container is grasped 30''– 40'' from the surface the worker is standing on.



# Improvement Options

- Work within your power zone.
- Raise or lower the work surface.



# Improvement Options

- Store heavier or bulkier containers so that they can be handled within your power zone where you have the greatest strength and most comfort.



# Improvement Options

- Use angled shelving or tilt the container.



# Improvement Options

- Add extra handles for better grip and control.
- For easier access, remove or lower the sides of the receptacle.



# Improvement Options

- Use a screen over the opening to support the sack. Pour the contents through the screen.
- Support the container on or against a fixed object, rack, or stand while pouring the contents.



# Improvement Options

- Use a cutout work surface so that you can get closer to the container.



- Use a pail tipper.



# Easier Ways to Manually Carry Containers

- Improve your grip.
- Reduce stress on your back and shoulders.
- Reduce contact pressure on your shoulders and hands.
- Reduce the effort and force needed to perform work tasks.

# Guidelines for Safer Carrying

- Check for tags on loads.
- Before carrying, always test the load for stability and weight.
- For long trips or loads that are unstable and/or heavy, follow management guidelines for:
  - Equipment use.
  - Reducing the weight of the load.
  - Repacking containers to increase stability.
- Plan before carrying:
  - Wear appropriate shoes to avoid slips, trips or falls.
  - If you wear gloves choose the size that fits properly. Depending on the material the gloves are made of and the number of pairs worn at once, more force may be needed to grasp and hold objects.
  - Avoid carrying large or bulky loads that limit or obstruct your vision.
  - Slide, push, or roll instead of carrying when appropriate.
  - When there is a choice, push instead of pull.
  - Carry only as much as you can safely handle by yourself.
  - Try to avoid slopes, stairs, or other obstacles that make carrying materials more difficult.
  - Beware of and try to avoid slippery floors (e.g., liquids, ice, oil, and fine powders).
  - Use extra caution when moving loads that may be unstable.

# Guidelines for Safer Carrying

- When carrying:
  - Keep loads close to your body.
  - Make sure you have a clear view of the path.
  - When carrying containers with one hand, alternate hands.
  - Whenever appropriate, use two hands to carry containers.
  - Alternate heavy or forceful exertion tasks with less physically demanding tasks.
  - Take rest breaks.

# Improvement Options

- Hold the container close to the body.



- Don't carry more than you can handle.
- To reduce the weight of the load, use a smaller container.



# Improvement Options

- Wear proper size gloves that fit.
- Gloves with rubber dots on the surface can increase grip stability on slippery surfaces.



# Improvement Options

- Increase the size of the bucket or pail handle with padding or a clamp-on handle.



# Improvement Options

- Pad the shoulder.
- Support the container on one shoulder and alternate between shoulders.



- Use a tool.



*These pot lifters make carrying pots and other cylindrical containers easier. They replace a pinch grip with a power grip and a straight wrist. They also allow for an upright posture.*

# Improvement Options

- Pinch grips involve grasping items with the thumb and the tips of the other fingers.
- Power grips involve grasping items by wrapping all the fingers around an object.



# Alternatives to Manual Handling of Individual Containers

- Change the container.
- Use a tool.
- Use non-powered equipment.
- Use powered equipment.

# Guidelines for Equipment Use

## Equipment

- Know your load and buy equipment of appropriate capacity. Remember, lighter-weight equipment is easier to move.
- Choose equipment appropriate for the material(s) being handled, the layout and design of your workplace, and the work tasks being performed.
- Consider using powered equipment—rather than non-powered—when pushing and pulling forces are excessive.
- If available, select equipment with vertical handles so workers' hands can be in their power zone.
- Choose wheeled equipment which minimizes start forces (inertia) and reduces rolling resistance. The amount of force required to move loads with wheeled equipment depends on a number of factors including the:
  - Weight and shape of the load.
  - Type and condition of the floor surface (e.g., smoothness, density, and other factors).
  - Route taken (e.g., slopes, obstacles, and other factors).
  - Type of wheels (i.e., the materials they are made of).
  - Size of wheels (larger wheels a minimum of 6 inches in diameter move more easily over holes, bumps, and floor irregularities).
  - Maintenance of wheels; it is important to clean, lubricate, and/or replace wheels on a regular basis.

# Guidelines for Equipment Use

## Work Environment

- ❑ Clear the aisles and doorways for safe passage and maneuvering of equipment.
- ❑ Set barriers that prevent employees from coming close to or beneath supported or moving loads.
- ❑ In tight spaces, use equipment with four swivel casters or wheels. Loads are easier to turn and control.

# Guidelines for Equipment Use

## Work Practices

- Train employees on proper equipment use and appropriate work practices.
- Push and pull equipment with the entire body instead of with just the arms and shoulders.
- When pushing or pulling use both hands when feasible.
- To move heavy loads over long distances, either reduce the load or use powered equipment.
- Inspect pallets before loading or moving them.

# Improvement Options

- Instead of lifting and pouring from the drum, insert a siphon or a pump.



# Improvement Options

- Use a drum dolly.



- Use a cart or platform truck.



# Improvement Options

- Use a hand truck.



- Use a conveyor, slide, or chute.



# Improvement Options

- Use a hand pallet truck.



- Use a forklift.



# Improvement Options

□ Use a pallet truck.

□ Use a lifter.



# Improvement Options

□ Use a carousel.



□ Use a tilter.



# Other Improvement Options

- Anti-Fatigue Matting



- Footwear



- Foot Support



# Exercises / Stretches

You can perform the following exercises and stretches at work throughout your day. These exercises can help energize your body and relieve muscle tension.

# Back Stretches

- Lean forward to stretch.
- Keep your head down and your neck relaxed.
- Hold 10 - 20 seconds.
- Use your hands to push yourself upright.



# Back Stretches



- Stand with hands on your hips.
- Gently turn your torso at the waist and look over your shoulder until you feel the stretch.
- Hold 8 - 10 seconds.
- Repeat other side.
- Keep your knees slightly flexed.
- Do not hold your breath.

# Warming Up for Work

- Just as an athlete prepares before playing a sport, you too should prepare before work to help prevent back injuries.
- These slow stretches help prevent back injuries and make your muscles more flexible.
- Hold each position for 20 seconds and repeat 3 times before work.



# Partial Sit-ups - Core

- This exercise strengthens your stomach muscles.
  - Lie on your back with both knees bent and your feet flat on the floor.
  - Slowly raise your head and shoulders off the floor, keeping your hands across your chest.
  - Work up to 30 repetitions.



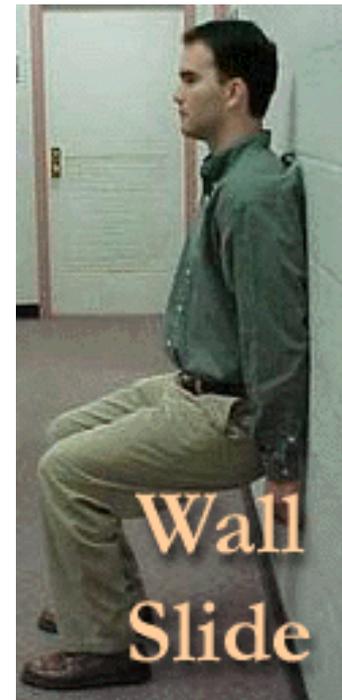
# Bridges – Low Back

- Lie on your back with both knees bent and your feet flat on the floor.
- With arms lying at your sides, tighten stomach muscles, squeeze buttocks, and slowly raise your hips into the air.
- Hold for 5 seconds and then slowly bring the buttocks back to the floor.
- Repeat 20 times.



# Wall Slides – Back & Legs

- Stand with your back against a wall and your feet slightly apart.
- Slide into a half-sit.
- Hold as long as you can; slide back up.
- Repeat 5 times.



# Aerobic Exercise & Rest

## **Aerobic Exercise:**

Aerobic exercise also stretches and strengthens the muscles that support your low back, which combined with healthy eating can also help you maintain your ideal weight. If you're overweight, the extra pounds add to the strain on your low back. Aerobic exercise like walking, can help you lose weight.

## **Proper Rest:**

The best position for resting the back muscles is lying on your back on your living room floor with a pillow under your knees and a rolled up towel under your neck. You can also lie on your side in the fetal position— bend the knees to reduce strain on the low back and put a pillow between your knees, and under your head and neck to keep them level.

# Successful Ergonomics

- **Understand:** causes of WMSDs & ways you can prevent them.
- **Respect:** potential hazards caused by poor posture(s) & an unhealthy environment.
- **Communicate:** ways to eliminate stress factors & report symptoms early.
- **Commitment:** eliminate WMSDs in your working environment.

# Questions



# ***APHIS Ergonomics Program***

USDA APHIS

4700 River Road, Unit 124

Riverdale, MD 20737

301.436.3175

Email:

[aphis.ergonomics.program@aphis.usda.gov](mailto:aphis.ergonomics.program@aphis.usda.gov)

Website:

<http://www.aphis.usda.gov/mrpbs/emssd/ergonomics.shtml>