Stress on a worker's body can be internal or external. Internal stress includes the forces necessary to maintain posture as well as those needed to perform work. External forces are those from outside the body which the body must overcome to perform work, e.g., lifting an object. You can identify these stressors by observing and interviewing workers and by reviewing injury records.

To actually measure the stress on a muscle you can use surface electromyography (EMG). You place a stick-on electrode over the belly of the muscle you want to study and connect it to a special mini-computer which can be worn by the person you are testing. The mini-computer amplifies and records electrical activity within the muscle. The mini-computer can be programmed for different muscles, cycle time, duration, and number of cycles to be studied. The collected data can be transferred to a host computer which can print out charts and stress levels for analysis. EMG is used extensively at the NIOSH research laboratory in Cincinnati.

The University of Southern Maine is using EMG at a local metal manufacturing company. We found certain jobs where workers were exposed to excessive awkward postures, force and repetition. These three factors are considered major contributors to the development of cumulative trauma disorders (CTDs). Generally if two or more of them occur the job should be changed.

The selected task involved moving the quill on a vertical milling machine up and down using the dominant hand/arm. The cycle required the hand/arm to rotate 180 degrees in a 20 inch diameter arc. This took the hand from above the head to mid-chest level. At the bottom of the arc a milling operation required the application of force.

We collected EMG from a group of workers to establish baseline stress levels. We found high levels of stress among these workers, which indicated the need for ergonomic intervention. In the first stage of the change we redesigned the ball handle to a pivoting "T". This change significantly reduced stress on the wrist by repositioning the wrist to a neutral position, but stress on the shoulder was not significantly reduced.

We changed the quill activation system from a manual to an air activation system, which is operated by a lever air valve. The lever is by the worker's side. This change cost approximately $500.00 in equipment and materials. Preliminary EMG data shows significant reduction in both wrist and shoulder stresses.

Surface electromyography equipment is a valuable tool that can be acquired at a reasonable cost. The equipment can quantify ergonomic problems and measure the results of ergonomic interventions.

Dr. Moore is a Professor of Ergonomics at the University of Southern Maine, School of Applied Science. He has performed ergonomic research and has been responsible for ergonomic course offerings for the past seven years.

For more information on EMG, call Bill Moore at 780-5445, Jonathan Lepoff of the Bureau of Labor Standards at 624-6464 or The Computerist Inc., the product manufacturer at 1-800-362-9466.
Summary of Key Provisions of the OSHA Draft Ergonomic Standard

OSHA has released a summary of its long-awaited Draft Ergonomic Standard. The purpose of the standard is to prevent work-related musculoskeletal disorders, educate employees, encourage new technology, and ensure ongoing management leadership and employee involvement. The rule applies to musculoskeletal disorders in backs and upper and lower extremities. It emphasizes continuous improvement in working conditions.

According to the summary, employers must:

- Implement a procedure for employees to report hazards or disorders.
- Provide employees information about musculoskeletal disorders, and evaluate the effectiveness of the training.
- Determine whether any musculoskeletal disorders have occurred in their workplace during the past two years and evaluate those jobs.
- Evaluate which jobs require the following:
  - The same motion or motion pattern every few seconds for more than two hours at a time.
  - Fixed or awkward postures for more than a total of two hours during the workshift.
  - Use of vibrating or impact tools or equipment for more than a total of two hours.
  - Material handling of objects weighing more than 25 pounds more than once in each workshift.
- Fix jobs with risk factors for musculoskeletal disorders.
- Ensure that employees with musculoskeletal disorders are promptly evaluated by a medical care provider and receive appropriate treatment and follow-up.
- Reimburse employees who work at video display units more than four hours a day for eye examinations and special corrective lenses.
- Involve employees in all steps of the ergonomic process.

Summary of Recommendations on Workplace Use of Back Belts

Published by the National Institute for Occupational Safety and Health (NIOSH), July, 1994

A work group from NIOSH was formed to look at the use of back belts in the workplace. Below are their conclusions:

It has not been proven whether back belts lessen the risk of back injury.

Back belts were not recommended to prevent injuries among uninjured workers and are not considered to be personal protective equipment.

Back belts do not lessen hazards to workers due to repeated lifting, pushing, pulling, twisting, or bending.

There is not enough data to show that typical industrial back belts significantly reduce the biomechanical loading of the trunk during manual lifting.

There is not enough scientific evidence to conclude that wearing back belts reduces risk of injury to the back based on changes in intra-abdominal pressure (IAP) and trunk muscle electromyography (EMG).

The use of back belts may produce temporary strain on the cardiovascular system.

There is not enough data to show a relationship between the prevalence of back injury in healthy workers and the discontinuation of back belt use.

Recommendations:

The work group feels the most effective way to minimize back injury is to develop and implement a comprehensive ergonomics program. This program should include ergonomic assessments of jobs and workstations to make sure that work can be done without exceeding the physical capabilities of workers; ongoing comprehensive training for all workers on lifting mechanics and techniques; a surveillance program to identify potential work-related musculoskeletal problems; and a medical management program.

For a copy of the entire publication (Number 94-122) call 1-800-35-NIOSH.
Statistical Data Available

Occupational Injuries and Illnesses in Maine, 1992. This publication contains incidence rates (the number of cases or the number of days lost per 100 full-time workers) for various industries. Data is collected in the Annual Survey of Occupational Injuries and Illnesses. If you would like to receive the publication or have questions about the survey or how to calculate incidence rates, call Bob Leighton at 624-6444 or Steve Laundrie at 624-6453.

Census of Fatal Occupational Injuries, 1993. This publication contains information on the industries and occupations of fatally injured workers and gives information on what the injuries were and how they happened. If you would like to receive this publication or have questions about the program, call Janet Callahan at 624-6447.

Tell Us What You Think

The Safety and Health Monitor has increased to nearly 600 readers! This is our fifth issue, and we would like your feedback. What we do well, we would like to continue. Where we need improvement, we would like to change. We welcome your comments; please take the time to respond. What topics would you like to see us cover? Which issue(s) have you liked the best and why? Which section(s) do you like the best and why? How is the layout? What changes would you make to the newsletter? Mail your comments to: Brad Brown, Maine Bureau of Labor Standards, Division of Research & Statistics, State House Station #45, Augusta, Maine 04333-0045.

What You Know May Help Others

Have you considered sending in an article? We are looking for articles related to Occupational Safety and Health. All pieces will be edited and possibly printed in an upcoming issue. If you have knowledge to share and a little time, please consider writing. Your efforts will make the newsletter better! Please call Brad Brown at 624-6443 or Jonathan Lepoff at 624-6464 if you have any questions. The topic for our next issue is Effective Safety and Health Training.

Taking Steps Against CTD

By Jonathan Lepoff

After study, the National Institute of Occupational Safety and Health concluded that surgery does not guarantee recovery from carpal tunnel syndrome. Prevention is the most effective way of dealing with cumulative trauma disorders. Surgery should primarily be considered in severe cases which have not responded to non surgical interventions such as rest and medications.

Conservative treatment with surgery as a last resort is also a requirement of OSHA's Ergonomic Program Management Guidelines for Meatpacking Plants, and may be part of OSHA's long awaited Ergonomic Standard.

The first line of defense against cumulative trauma disorders should be a medical management program which concentrates on the elimination or reduction of risk factors such as repetitious movements, static muscle loads, awkward postures and forceful exertions.

The program should seek to limit the severity of illness once symptoms appear. This can be accomplished by encouraging early reporting of symptoms, redesigning jobs and making other accommodations to reduce job related risk factors.

The Job Accomodation Network, a group formed 10 years ago to help employers accomodate disabled workers, has found that government mandated job changes don't necessarily cost very much and potentially have offsetting savings. Since October of 1992 the average cost of accomodation has been $1,052 with a median cost of $250 (some higher cost changes drove the average cost up).

Mr. Lepoff is the Staff Development Coordinator with the Maine Bureau of Labor Standards and a member of the Medical Ergonomics Society, Inc..
Did You Know?

Ergonomics: The Study of Work (OSHA booklet 3125) looks at work patterns that may cause CTDs and at methods employers can use to control or prevent them. Send $1.00 to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The order number is 029-016-00124-7.

Ergofacts, are one page news sheets that provide a brief summary of ergonomic hazards and the need for workplace safety and health assistance. Call OSHA at (202)-219-8151 to be placed on the mailing list.

The Applications Manual for the Revised NIOSH Lifting Equation is now available. The revised lifting equation provides a method for evaluating a variety of manual lifting tasks. Call 1-800-35-NIOSH.

Maine State Law requires training for employees who work four or more hours a day at video display terminals. For more information, call the Safety Division of the Bureau of Labor Standards at 624-6460.

CTD News Inc. and the Center for Workplace Health Information publish CTDNEWS, a monthly newsletter. Call (215)-896-2770 to inquire.