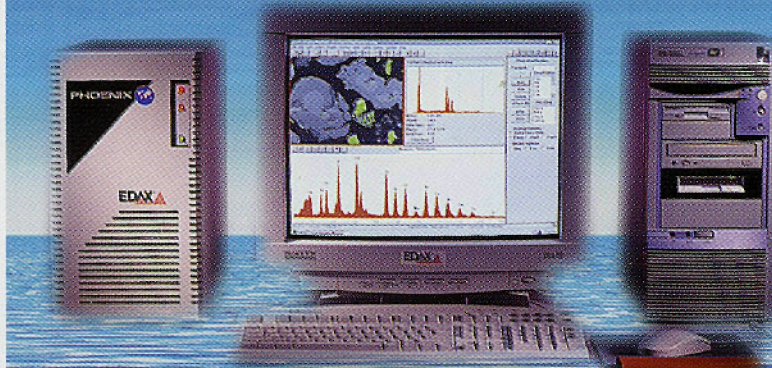


SUPERIOR MICROANALYSIS TECHNOLOGY

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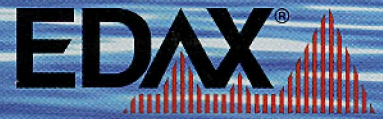
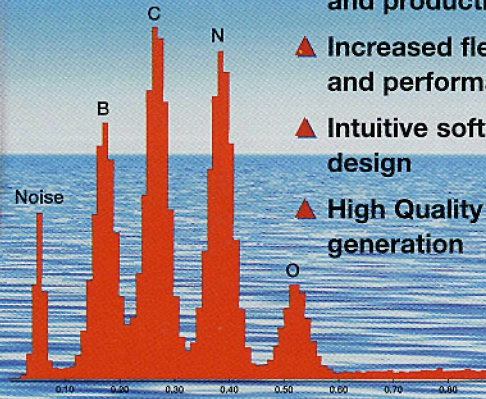
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So What Can be Done to Avoid Getting Cumulative Trauma Disorders?

Jan Minshew, Olympus America, Inc.

The first article reporting the rising incidence of carpal tunnel syndrome in histotechnologists was written by Pearl Gervais and published in the Louisiana Society for Histotechnology newsletter in 1991. Following that article, the growing interest in the number of injuries within the profession prompted a nationwide survey of histotechnologists. The results of that survey appeared in the first part of a three part article published in the *Journal of Histotechnology*, 18:139,1995. The articles were written by a group of professionals from the University of Michigan. Carpal Tunnel Syndrome (CTS) was used as the model for potential Cumulative Trauma Disorder (CTD).

Of the 1,000 randomly distributed questionnaires, 253 were completed and returned. The responses indicated that 157 technologists complained of pain potentially related to CTD. There were 22 respondents having a clinical diagnosis of CTS, 36 with a clinical diagnosis of CTD other than CTS, 27 under a physician's care with no specific diagnosis, and 63 who experienced pain but had not sought medical attention. After evaluating the data, the parameters were determined that correlated with the presence of pain in specific groups.

The data indicated that microtomy and coverslipping were associated with pain, however there was no direct association with microtomy in clinically proven CTS and only a possible correlation with reports of other physician-diagnosed CTD. For technologists reporting clinically diagnosed CTS, coverslipping

and computer data entry were statistically significant. Embedding and computer data entry were significant among respondents with clinically diagnosed CTD.

The third article (*J. Histotech.* 19(1), March 1996) compared the characteristics of manual and motorized microtomes. The authors estimated that approximately 41 revolutions of the handwheel are required for the preparation of a single glass slide. Using 50 blocks a day as an average, a technologist would turn the fine advance handwheel more than half a million revolutions per year. It is not possible to determine the frequency of use of the coarse handwheel, however the motions necessary to trim and exchange the blocks in the block holders have also been linked to CTD.

It was emphasized that improper techniques while manually performing microtomy may improperly distribute mechanical stress to musculoskeletal regions susceptible to trauma and that during the course of years an individual may be at risk for the development of overuse syndrome associated with chronic repetitive trauma. It was also stated that when incorrect body movements are used to compensate for a movement that would cause pain, the disorder can be transferred from one location to the other.

The study demonstrated that the motorized microtomes produced slides that were equal to, if not better than, those prepared by manual microtomes. The acceptance level was high, the training period was relatively short, and the time per block eventually decreased. The number of recuts for poor section quality decreased. Overall, the opinion was that even though the initial purchase expense was higher than that of the manual model, the motorized unit left the technologists with more energy for completing



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other tasks. It also eliminated one source of repetitive motion, thereby reducing the chance for overuse syndromes.

The bottom line is that the survey verified that many routine histology job functions contribute to the potential for overuse syndrome, and that automation and proper ergonomics would reduce the risk. *Non-ergonomic work methods are extremely hazardous, and very common.* It is imperative that good work habits be taught to students, and that trained professionals evaluate and possibly alter their techniques. Fears that automated equipment will replace the work force need to be put aside. Develop a dialog with manufacturers and offer suggestions if a task or specific piece of equipment is causing a problem. Request to try equipment and furniture before it is purchased. If a problem exists, consult with the manufacturer to see if there is another version or if modifications can be made. Be receptive to new ideas. It may take a little longer to get used to the new methodology, but it will certainly be well worth the time and effort if it prevents even one repetitive strain injury. Working smarter is a shared responsibility that must be given top priority by employers and employees.

Information can be obtained from the following sources:

National Institute of Occupational Safety and Health (NIOSH)
 4676 Columbia Parkway
 Cincinnati, OH 45223
 (800)356-4674
 Or call (404) 33204565 and request document 705001

American Physical Therapy Association
 P.O. Box 37257
 Washington, D.C. 20013

Request the booklet and exercise program. Send a self-stamped, self-addressed envelop marked "Carpal Tunnel Syndrome" on the outside.

On-line services: The (ID's Network Electronic Newsletter is available on the Internet, CompuServe, and America Online.

Specific steps to take to avoid CTDs:

Computer keyboard work:

- 1) Maintain correct sitting posture.
- 2) Keep the wrists in a neutral position, floating above the keyboard. Rest them on a cushioned surface only when not actively typing
- 3) Use a gentle touch on the keys. Do not bang the keys or press hard when scrolling.
- 4) If you hunt-and-peck to type, keep your fingers curled.
- 5) Do not hold the thumb or pinkie in the air.
- 6) Be careful when using a mouse because the burden in on one finger of the hand.
- 7) Do not cradle the phone on your shoulder while using the computer. It throws the spine out of alignment.
- 8) Bifocals and progressive lenses are not generally recommended for use. it is better to get glasses that are made specifically for viewing at a distance of 20 to 28 inches.
- 9) Light sources should be adjusted to eliminate reflections and glare from the monitor screen and from the background.

Changing the solutions on an automatic processor:

- 1) Use proper lifting and bending techniques. Squat down in-

Continued on following page

So What Can be Done to Avoid Getting Cumulative Trauma Disorders

Continued from preceding page

stead of leaning over when removing or replacing heavy containers.

- 2) Use a power grip when carrying containers, *i.e.*, use the whole hand or both hands.
- 3) Get a stool with safe footing to reach above chest height.
- 4) Use caution when moving stock storage containers.
- 5) Investigate a processor that has been designed to assist with the transfer of fluids.

Embedding:

- 1) Evaluate the types of forceps being used. Try changing to reverse grip forceps that remain closed unless pressure is applied. Pad the grip area with foam to increase the grip's size. If a large pair of forceps is used that has a wide distance between the tips, wrap a rubber band around the top to decrease this distance and reduce the force needed to hold a small object.
- 2) Try not to use the same motion repeatedly to open tissue-cassette or other sample lids.
- 3) Keep as many things as possible within your reach area.
- 4) Do not lean your arms on the edges of the countertop or equipment.
- 5) Be aware of how long hands are in dorsiflexion: take breaks and exercise the wrists and fingers.
- 6) Maintain good posture.
- 7) Get up periodically and walk around when embedding for

long periods.

- 8) Alternate tasks.

Sectioning:

- 1) Use the arm to make complete revolutions of the microtome's handwheel, not just the wrist. *Do not rock the handwheel!*
- 2) Increase the size of the microtome's fine advance handle size to 1.5 cm diameter. Cover the handle with something slightly compressible and smooth in texture.
- 3) Keep arms close to the body and do not bend out the elbows.
- 4) Keep arms off of the edges of countertops or other hard, sharp surfaces.
- 5) Keep shoulders in a neutral position while sectioning and do not raise them. Keep the neck muscles relaxed. Tense muscles in the neck area cut off the blood circulation and create pressure on the nerves.
- 6) Evaluate your reach envelope. Side motions should be within 14 to 18 inches. Try positioning the section waterbath on an L-shaped extension from the microtome area so that it can be reached by swiveling the body and chair instead of leaning over.
- 7) Adjust the chair so that the equipment can be comfortably reached and the specimen alignment seen without compromising leg room.
- 8) Use a footrest, especially if your feet do not reach the floor.
- 9) Maintain lumbar lordosis.
- 10) Take mini-breaks often. Do exercises and self-massage to restore circulation and relieve tension.
- 11) Automate if possible.

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Manual staining:

- 1) Avoid repeatedly dipping the slides during manual staining procedures.
- 2) Purchase a slide holder for slides to be stained in Coplin jars to avoid the use of forceps.
- 3) Avoid using pressure to squeeze small reagent bottles and squirt bottles.
- 4) Be aware of your reach zone and use caution in getting materials from underneath the counter and from overhead shelves.
- 5) Prop up one foot or stand with one foot forward if standing for long periods of time. Alternate feet often.
- 6) Automate if possible.

Manual coverslipping:

Again, automate if possible, if not:

- 1) Alternate duties.
- 2) Take multiple mini-breaks and do stretching exercises for the wrists and fingers.
- 3) Use forceps that don't require force to hold an object.
- 4) Be aware of the position of the wrists. Try to keep them in a neutral position.

Cryotomy:

- 1) Remember that cold temperatures will reduce the feeling and sensitivity in the hands and fingers.
- 2) Find a means of operating the microtome in a comfortable sitting or standing position.
- 3) Do not lean into the chamber or stretch to reach things.
- 4) Use the same microtomy skills that are listed under "sectioning".

Microscopy:

- 1) Avoid static postures which are characterized by contraction of muscles over extended periods of time.
- 2) Work with the head slightly bent down instead of bending it back. The head weighs from 15 to 20 pounds, and the neck and shoulders hold, secure and balance that weight.
- 3) Use arm rests with soft, smooth surfaces and no sharp edges.
- 4) Make sure that the microscope focus and stage movement controls are ergonomically positioned within reach.
- 5) Request a tiltable eyepiece.
- 6) Request extenders for the microscope body if the eyepieces are still not high enough. Do not elevate the microscope as this moves the controls out of a comfortable reach.
- 7) Position the work area in a quiet place away from drafts, noise, and traffic. ■



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