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# Motion in the Office: Proactive Ergonomics

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Due to the cacophony of voices resulting from what can appear to be conflicting evidence, corporate approaches to enhancing productivity, reducing stress, and minimizing the risk of injuries take almost as many forms as the number of organizations. While probable links between the design of the physical environment and injury risk have been established, more global features of the environment-task context (such as psychosocial issues and corporate culture) may turn out to be the most important in predicting musculoskeletal disorders and other workplace hazards. However, the important details explaining how these contextual issues relate to individual cases of injury and recovery remain frustratingly elusive.

### Passive versus Active Ergonomics

Savvy ergonomists, industrial hygienists, facilities managers, and health and safety officials have begun to recognize the important behavioral aspects of injury prevention and performance improvement. While fitting the task and environment to the person will always be an important focus, we must also consider how people interact with their work tools and accessories. This shift in emphasis represents an ergonomics of behavior (“active” ergonomics) in addition to the ergonomics of environments and work tools (“passive” ergonomics), although to be precise, such behavioral ramifications have always informed the theory and practice of ergonomics.

The behavioral conditions and other risks implicated in musculoskeletal difficulties include assuming or maintaining awkward postures, repetitive movements, exposure to extreme temperatures or vibration, and the requirement of excessive force in pounding, twisting, lifting, pushing, or pulling. Traditional ergonomics programs have relied on redesigning the characteristics of the task and the task environment so that such behaviors are reduced or eliminated. For example, if reaching a keyboard requires your arms to be held up or out in front of your body (maintaining an awkward posture), then it should be moved down, close to your waist (immediately above your lap).

### Dynamic Postures

Unfortunately, interventions such as static adjustments of work tools from one location to another leave out the advantages of movement, postural variety, and frequent position changes and adjustments that can increase circulation, thus boosting attention and concentration. Due to gravity, the ischial tuberosities (the seat bones) begin pushing through overlying tissues after eight to 10 minutes of continuous sitting. If posture is constrained, this process closes the surrounding capillaries, resulting in tissue damage and tissue death within as little as 10 to 15 minutes. Eventually, if a static posture is maintained, these physiological changes release prostaglandin E<sub>2</sub>, a central nervous system depressant, into the bloodstream. This chemical causes drowsiness, contributing to depression, fatigue, and sluggish reflexes. Sitting down for extended periods of time makes you sleepy and can destroy tissue, regardless of what kind of chair you’re using. The only answer involves movement — changing postures, changing pressure points, standing up, and stretching your arms and legs. If your chair and other aspects of your work area accommodate such shifts and changes, you’ll be more likely to adjust your posture, and this will keep you more alert.

If you have to sit for long periods (the way a truck driver does), you should flex your leg and seat muscles, point your toes, and readjust your posture and pressure points approximately every 10 minutes. If possible, try to shift your weight to your feet periodically by raising your body off the seat slightly. Although simple, such maneuvers will decrease blood pooling in the feet and lower extremities by redistributing blood flow, improving alertness.

### Backbone Basics

Even though there have been few studies evaluating the direct benefits of movement in the workplace, some of the disadvantages of its alternatives have been well documented. For example, the basic structure of the spine consists of vertebrae divided by intervertebral disks. Holding one posture for long periods of time places a static load on these intervertebral disks. Such static loading results in changes to the disks very similar to those that occur as a result of aging — decreased circulation and mechanical deformation, causing the disks to lose moisture and elasticity, making them less flexible and more susceptible to injury.

It has been found that systematic spinal exercise can help prevent the deleterious effects of static spinal loading, to some extent maintaining the cushioning properties of the intervertebral disks. In addition, movement influences the efficiency with which nutrients can diffuse inside the disks and waste products be eliminated. These can help maintain disk health and function. In contrast, prolonged static loading can prevent such wastes-for-nutrients exchanges. Due to this imbalance, the outer sleeve of the disks becomes more brittle and susceptible to injury from sudden loading, and the inner cushion of the disks loses fluid. This results in less cushioning, less elasticity, and less nutrients for injury recovery, leading to a downward spiral of chronic spinal dysfunction. Regular exercise of the spine — starting very gently and gradually increasing the duration and resistance — can help prevent or help correct this problem.

Spine researchers now accept that the functionality of the independent components of our backbones depends not only on their physical features, but also on the health, strength, and conditioning of the surrounding muscles and support tissues. The spine must be considered as a functioning unit, involving vertebrae, intervertebral disks, ligaments, joints, tendons, muscles and even the circulatory system. A malfunction in any portion of this integrated support structure carries consequences for the rest of the system. Since recovery from injuries to the intervertebral disks — particularly to the outer cover — can be slow and tedious, prevention represents the best approach for reducing chronic low back pain and other disorders. However, evidence accumulated over the last two decades argues that aggressive sports-medicine rehabilitation grounded in extensive exercise and reconditioning represents the ideal treatment for chronic spinal disorder patients, whether or not they have undergone surgery. This body of research also

suggests that vigorous conditioning may be the primary way to prevent back problems.

### **Movement and the Mind**

While regular movement can help keep the spine healthy, it also increases circulation and may reduce the hypnotizing effects on the brain of prolonged sitting. Static seated postures not only put the brain to sleep, they also result in blood pooling in the legs and feet, decreasing brain oxygen levels. The muscle contractions and other demands required for movement and postural variety increase the flow of blood throughout the body, restoring higher oxygen levels in the brain and improving the flow of nutrients to the spine and other support tissues. This not only helps prevent injury, it can also maintain attention and concentration and generally improve cognitive performance. For office workers, such improvements represent critical advantages for maximizing productivity and ensuring a healthy working environment. However, individuals with pre-existing back problems should consult with a knowledgeable professional before engaging in any strenuous program of exercise.

Research indicates that subjecting the back to sudden exertion, particularly in awkward or twisted postures, can result in acute injury, so only gradual increases in the range of motion and the resistance involved when exercising the back should be emphasized. Momentarily overloading our musculoskeletal systems beyond their limits can be dangerous, but gradually and systematically challenging them through motion and exercise can help prevent injuries over the long term, and can even promote healing of some types of existing problems. Nonetheless, people with pre-existing back injuries should only engage in a program of strenuous activity as part of an integrated treatment plan supervised by their physician.

### **Conclusions**

Ergonomics must involve not only adjusting workstations to fit people, but also those people performing well-designed tasks in well-adjusted environments in ways that help prevent injury and improve productivity. If you sit still, even a great ergonomic chair can become intolerable in a relatively short period of time. Ideally, chairs would not only allow but encourage movement and changing postures. Maintaining static postures over long periods of time can interfere with more than circulation — it might even hurt your creativity. Our minds, after all, depend directly on our brains, and the brain functions best when the body is active. In short, if you feel sluggish, bogged down, or bored at work, start moving! Move around in your chair. Frequently adjust your posture. Walk to the printer once in awhile. Go mail your own letters. Walk to lunch. Not only your gluteus maximus — but your brain — will thank you.

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