



Ergo Tip of the Month - August 2007

Effects of Heat on Cognitive Performance

In the July, 2007 Ergo Tip of the Month, we talked about the *physical* effects of hot environments and how to protect against them. It is also important to note that there are *cognitive* effects associated with working in hot environments. A decrease in mental performance could lead to an increased number of mistakes and longer time required to complete work. In this month's Ergo Tip will discuss how to safeguard against the cognitive effects of heat stress.

Understanding Heat

It is important to note that the cognitive effects of heat may not be obvious to an observer and may occur at temperatures lower than limits set for physical exposure.

The higher the humidity, the more heat is trapped by moisture in the air, therefore increasing the body's exposure to heat. This is the reason why a 90°F day in Phoenix doesn't feel as hot as a 90°F day in Miami! Air speed is another contributor, as wind (even when it's warm) will help remove heat from the body. To help measure these variables, we use an Effective Temperature Index (ETI), which tells you the temperature a person is exposed to based on environmental factors. An example of an ETI is the Heat Index, which you may hear mentioned during a weather report on the news.

Example of an Effective Temperature Index - <http://www.doli.state.mn.us/effectivetemp.html>

Performance Effects from Heat on Mental Processes

Studies have shown that physical task performance begins to decrease when the body is exposed to Effective Temperatures of 27-30°C (80-86°F) (Pulat, 230). However, for simple cognitive tasks (e.g. reaction times, simple arithmetic), performance can actually improve when ETs are in this range (Pulat, 230), and exposure is of brief duration (around 30 minutes) (Hancock and Vasmatazidis, 361). This has been explained by the increased neural activity and alertness brought on by heat (Pulat,230).

In contrast, for more complex tasks (e.g. perceptual motor tasks), research by Hancock and Vasmatazidis (2003) found that performance degradations occur when Effective Temperatures reach 27°C (80°F). In addition, the more complex the task, the less exposure time required before a significant decrease in performance is seen.

How to Safeguard against the Effects of Heat

The same controls that were described in the July, 2007 Ergo Tip for the physical effects of heat can also be applied to limit cognitive effects. Acclimatizing employees in preparation for working in hot environments or providing methods to reduce heat stress will help prevent a decrease in cognitive performance. Additional methods of safeguarding against the heat may include;

- a. Providing a break area protected from the heat
- b. Rotating workers between simple and complex cognitive tasks
- c. Providing fans and cold drinking water to cool the body.

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