Laboratory of Environmental Physiology

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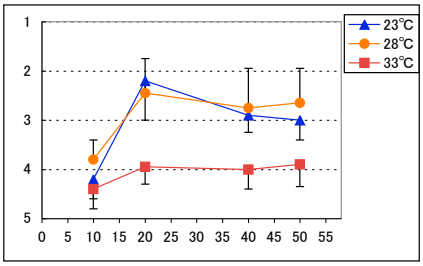
The Laboratory of Environmental Physiology studies the effects of changes in temperature and humidity on human thermoregulation. Using an artificial climate chamber, in which temperature and humidity can be adjusted, physiological and psychological reactions to variations in temperature and humidity are analyzed.
Experiments measure physiological thermoregulatory responses under fixed environmental conditions (heat, cold, humidity, etc.), thermal sensation, thermal comfort, etc., or analyze the regulatory mechanisms of psychological reactions.

The influence of indoor environmental conditions on mental workload (mental tasks)

During the summer, 28°C is the recommended temperature setting for a typical Japanese office when considering energy conservation. In order to study the effects of temperature on mental workload, we compared metal tasks in rooms with temperatures ranging between 23°C and 33°C.
The mental fatigue value (WWL, or mean weighted workload score) was lowest at 28°C, and a tendency to feel more comfortable at temperatures of 28°C or higher, as well as increased thermal comfort was noted among workers. We also studied the effects of cold environmental conditions and humidity levels on both work and clothing selection.

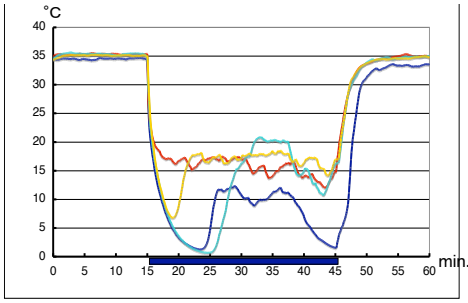


The influence of room temperature on thermal comfort during office work under three different conditions. (1: comfort, 3: normal, 5: discomfort)

These studies are expected to contribute to office design, the determination of optimal indoor temperatures, and the analysis of human thermoregulatory responses to a variety of
temperature and humidity conditions.

Cold-induced vasodilatation

In order to prevent heat loss, blood vessels in the skin constrict when exposed to cold temperatures. Once these blood vessels have been exposed to extreme cold, they rapidly constrict and skin blood flow decreases.
After a certain period of immersion in ice water, blood flow to the skin increases, resulting in an increase in skin temperature. This reaction is known as cold-induced vasodilatation (CIVD), and is an indicator of cold tolerance since it depends on the characteristics of skin temperature response patterns.



Responses of finger skin temperature in four subjects during cold water immersion