

patterns of longevity.

Effects of physical training on thermoregulation and peripheral vasomotor in the cold

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Environmental adaptability was affected by some characteristics and abilities of each individual. This time, we focused on physical fitness as individual factor. This study aimed to evaluate the change of acclimatization to the cold environment by physical training and to clarify the mechanisms of the change from the viewpoint of thermoregulation by the peripheral vasomotor. Subjects were healthy 8 male students (21.6 years old) in experiment 1 (Ex. 1). Cold exposing tests consisted of supine rest for 60 minutes in 28°C and for 90 minutes in experimental conditions (10 and 15°C). Rectal (Tr) and skin temperatures of 7 points, blood pressure, and heart rate were measured during Ex.1. Subjects performed physical training (over 30 min/time, over 3 times/week) for about 2 months. The decline of Tr, which was seen at 10°C before physical training (BPT), was not seen after physical training (APT). And Tr in 10°C was significantly higher ($P<0.05$) at APT than those at BPT. From these results, thermoregulation to cold was improved by physical training. In experiment 2 (Ex. 2), 7 males (22.0 years old) were experimented to clarify the mechanisms of the improved thermoregulation by training. The procedure and measurements of Ex. 2 were the same as Ex. 1 excluding the measurement of a diameter of blood vessel (DBV) of finger. Furthermore, individual aerobic capacity (VO₂max) was measured on the other day after cold exposing test to estimate relationship between physical fitness and vasoconstriction. There was a correlation between VO₂max and a decline rate of DBV from baseline, the higher VO₂max is, the larger vasoconstriction is. In conclusion, it was suggested that ability of vasoconstriction in the peripheral parts of the body was improved by physical training, which led to the maintenance of the core temperature.

Numerical simulation for the human body damage caused by collapsed building due to the earthquake

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The immediate victims of the 1995 Hanshin-Awaji Earthquake included 5,502 dead and 41,527 wounded. The death rate among victims in collapsed buildings was purported to be as high as 90%. However, we have no way to examination how the victim got dead or wounded, except for autopsy and an interview with the bereaved. We need knowledge in detail about what part of building or furniture caused casualty and how it was occurred. The objective of this study is to evaluate of the human body damage caused by the collapsed building or the inversion furniture due to the earthquake. We conducted a numerical simulation for the human body damage, because it's difficult to perform an experiment on a human body. At the first stage, we had investigated records of the casualties in the 1995 Hanshin-Awaji Earthquake, and made clear the typical death pattern and serious injury pattern. Based on these findings, we have developed the trial dummy for human body damage measurement. This dummy which is based on a crush test dummy of automobile will be used in large-scale fracture tests of buildings. At the second stage, we developed the virtual dummy for human body damage evaluation as the simulation using finite element method. Why we did it, we can conduct the large scale fracture test using real dummy rarely and the simulation is indispensable to estimate the impact on human body. We carried out CT scanner experiments on a human body with the simulation for validation.

Tentative ideas on the concept of physiological polymorphism and experimental approaches

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Physiological polymorphism is an important concept of physiological anthropology. From the viewpoint of population biology, it is thought that the human population is an assembly of plural groups. We tentatively thought that physiological polymorphism is a concept by which we could try to explain the traits of groups from the differences of types of physiological functions. Although physiological polymorphism

is observed as a phenotype, we must always take into consideration three viewpoints, namely 1) genotype as innate factor, 2) culture and environment and 3) phenotype as a result of modification by culture and environment. In the physiological experimental approach, the absolute value measurement of cerebral activity and autonomic nervous activity, etc., and elucidation of the mechanism of physiological changes are very important points. We have carried out an experiment using the absolute hemoglobin concentration of the prefrontal region by near-infrared time-resolved spectroscopy as an index. For categorizing some subject groups, we used personality tests (Japanese version of State-Trait Anxiety Inventory (STAI), type A tendency, etc.) which are known to reflect genotypes relatively. As a result, we found that prefrontal activity differed significantly between high anxiety and low anxiety groups, and type A and type B groups. It is concluded that there is a possibility that physiological polymorphism can be elucidated by an experimental approach.

Effects of Bright Light Exposure in the Office

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Bright light in daytime is important in our healthy circadian sleep wake rhythm. It has been thought that it increases diurnal alertness as direct influence and improves nocturnal sleep quality through melatonin secretion promotion and core body temperature fall at night. In order to investigate effects of bright light exposure on office workers, we conducted two experiments in the office used everyday. [Experiment 1]: 8 healthy subjects were exposed to the two lighting conditions for 4 weeks each. Illuminance at desk level was kept at 750 lx in L condition. In H condition it was increased to 2500 lx for 2 hours in morning and 1 hour after lunch. Subjective alertness, concentration and mood showed an increase tendency in the afternoon of H condition. [Experiment 2]: 4 healthy subjects were exposed to the two lighting conditions same as experiment 1 for 3 weeks each. Urinary melatonin level at night in the third week of H condition increased in 3 subjects. Rectal temperature was measured in two subjects and the circadian parameters in the third week were estimated by the cosinor method. In both subjects, the amplitude of the rhythm increased in H condition. These results suggest that bright light exposure can improve productivity and health status of office workers but further investigation is required to conclude the benefit of bright light exposure in the universal office environment.

Influence of intermittent feeding and fasting on diabetic states in OLETF rats

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Food restriction is known to be effective in the therapy of type 2 diabetes, however, the effect of the pattern of food supply has not been studied well previously. In this study, we investigated the effect of intermittent feeding and fasting on diabetes in Otsuka Long-Evans Tokushima Fatty (OLETF) rats, an animal model for obese type 2 diabetes in human.

Five-weeks-old male OLETF rats were randomly allocated to three groups: AL, fed ad libitum; IF, provided access to food every other day; and LDF, provided with a limited daily food allotment of 60% of that eaten by the AL-fed animals. Daily food intake was measured every day. Body weight was measured once per week. At 20 weeks of age, they were examined for plasma glucose and insulin levels in Oral glucose tolerance test (2 g/kg OGTT).

Intermittent feeding and fasting caused a reduced body weight gain as well as LDF compared to AL. Levels of serum glucose and insulin in OGTT were significantly decreased in IF and LDF compared with AL. Although there was no significant difference, glucose total area under the curve (AUC) in OGTT of IF showed the tendency lower than that of LDF. On the other hand, HbA1c of IF was significantly higher than that of LDF. These results suggest that IF and LDF has the different effect on glucose metabolism in type 2 diabetes.

Individual variations of physiological and subjective responses under floor heating and convective heating conditions

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Fifteen young females (21–23 years) participated in this experiment. They were asked about complains of unusual coldness in daily life and given the score of unusual coldness (SUC). They wore 0.8 clo clothing and exposed to two kinds of heating conditions which were produced by a floor heating (FH) and a convective heating (CH) system, for 60 minutes. The thermal conditions of FH were 18 and 20°C of air temperature (AT) with 26, 28 and 30°C of floor temperature (FT). That of CH was 23 deg C AT with 18°C FT. Tympanic and skin temperatures, heart rate, blood pressure, thermal and comfort sensations were recorded during the experiments. Heart rate variability (HRV) was measured using a chest lead cardiogram, and a HF component and a HF/LF ratio were calculated every 10 minutes during the experiments.

Thermal comfort was not obtained in the conditions of FH at 18 deg C AT. All subjects obtained the whole body thermal