mRNAs expressions. These findings suggest that the diurnal rhythm of lipid metabolism would be regulated by nuclear receptors like LXR and FXR.

1-3 Observation of Collagen in Biological Tissue by Second-Harmonic Generation Microscopy

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Ultra short pulse laser induces second-harmonic generation (SHG) light specifically from collagen in biological tissue. Thereby we developed a SHG microscope, and observed skin sections and collagen gel, in which fibroblasts were embedded. SHG image of skin sections clearly captured collagen fibers and was similar to histological observation. In reticular dermis, entangled structure of thickly-growing collagen fiber was shown. By contrast, fine collagen fiber was uniformly distributed in papillary dermis. Although SHG light emitted from a fibroblast embedded gel was weaker than that from skin section, SHG light could detect collagen structure of the gel. After 4-week culture, intensity of SHG light was increased in the gel and fibrous pattern was appeared in the SHG image. This change in the SHG image probably indicated remodeling of collagen due to cell culture. Because SHG microscopy provides invasive and non-staining observation, further in vivo measurement of human tissue will be a powerful tool for studies in physiological anthropology.

1-4 Molecular-biological Study on Regulatory Mechanism of Cutaneous Blood Flow

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The purpose of the present study was to investigate the relationship between the hunting reaction due to cold-water exposure and nitric oxide synthase (NOS), which is involved in vasodilation. First, the change in blood flow after immersing a finger into cold water (7°C) was observed in 9 healthy male university students. The involvement of NOS in the hunting reaction was examined by investigating the activity of endothelial nitric-oxide synthase (NOS3) upon temperature stimulation of human microvascular endothelial cells (HMVEC). The hunting reaction was confirmed in all subjects. With regard to NOS activity, although the level of total NOS3 was largely constant regardless of cold-water exposure time, the level of phosphorylated NOS3 decreased as the duration of cold-water exposure increased. The results of the present study suggest that phosphorylated NOS is involved in the hunting reaction.

1-5 Responses in Index Finger Temperature during Cold Exposure

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Cold water immersion test is commonly used in Japan to assess peripheral circulation, where recovery rate of finger temperature is calculated. Cold induced vasodilation (CIVD) has been recognized as a key mechanism in preventing local cold injuries. The purpose of this study was to examine responses in index finger temperature during cold exposure focusing on CIVD. Twenty one healthy males aged 19 to 25 participated in this study. After 10 minutes rest, participants were asked to immerse their right hand in stirred water at 5.0 degrees C for 30 minutes, and the index finger skin temperature was monitored till 15 minutes after the exposure. All participants showed good recovery rates. One to three CIVD reactions were observed during cold exposure. Shorter onset time and greater amplitude of the first CIVD were significantly correlated with higher mean finger skin temperature during cold exposure. Furthermore, higher amplitude was significantly correlated with better recovery rate. CIVD may contribute to maintain finger skin temperature and could be a good measure for assessing peripheral circulation.

1-6 Effects of Maximum Oxygen Uptake and Vascular Endothelial Function on Cold-Induced Vasodilation

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This study aimed to estimate the individual differences of Cold-Induced Vasodilation (CIVD) from the view point of the relationship between CIVD and maximum oxygen uptake and vascular endothelial function. Thirty-five healthy male students volunteered to participate in the study. CIVD was estimated by measurement of skin temperature on finger pad of right index finger before, during, and after immersion into ice water. Individual physical fitness and vascular endothelial function were estimated by the measurements of maximum oxygen uptake during incremental exercise and of blood flow at reactive hyperemia (endothelium-dependent vasodilation) which related with release of nitric oxide, respectively. Significant correlations were seen among CIVD, maximum oxygen uptake, and endothelium-dependent vasodilation. These findings suggested that individuals with higher levels of maximum oxygen uptake had profitable response of CIVD because they had also good function of vascular endothelium, and that release ability of nitric oxide and/or responsiveness to nitric oxide were prominently involved in the individual differences of CIVD.