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President: Prof. Junko Kataoka (Japan Women's Junior College of Physical Education)

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L1 **Relations Between Figures, Features, and the Immune System**

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Most of human specific diseases cannot be explained by the concept of self and not-self immune system. Skeletal deformity, for example scoliosis and facial deformity have close correlation with immune disorder. In this paper the correlation between immune diseases and skeletal deformities are disclosed. A new concept of immune system proposed here, is digestion and respiration in cellular level, i.e., metabolism in organisms. Therefore, immune diseases are disorder of the digestion and respiration in cellular level. The self and not-self system means only tissue and organ immunity, which is brought about by the gene expression of genome of the major histocompatibility antigen. In embryo stage the gene of histocompatibility antigen as well as of bone marrow hemopoiesis is not expressed. In digestion as well as respiration in cytological level is carried out by leukocytes, lymphocytes, histiocytes, erythrocytes, and specially-differentiated cells which construct skeletal organs. Deformity of skeletal organ induces disorders of cytological respiration system. Therefore rest of skeletons and symmetrical use of human body is essential for the health.

S11 **Muscle architecture and sport**

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The present study focused on architectural factors which are considered to influence the linkage of muscle fiber and joint actions. By means of real time ultrasonography we can observe clearly and noninvasively *in vivo* the movement of fascicle and aponeurosis in human muscle and measure directly the changes in pennation angle and length of fascicle during muscle contraction. When the ankle joint was fixed and TA contracted "statically" the ultrasonic echo from deep aponeurosis in TA was observed to move proximally, indicating the elastic component was stretched significantly by the contraction force of muscle. The present results clearly show that the architecture of contracting muscle fibers differs considerably that which occurs when movement is passively induced.

S12 **Current Motor Control Research in Human Movement Science: Challenges to the Traditional Information-Processing Approach**

Kuniyasu IMANAKA (*Department of Exercise & Sport Science, Tokyo Metropolitan University, Tokyo, Japan*)

Human motor control has long been investigated in both the neurophysiological and psychological research areas. Although the information-processing approach to human motor control has been a powerful influence since 1960s, new conceptualizations (such as the ecological and the dynamical systems approaches) challenge the traditional information-processing models used in explaining the mechanisms of human motor control. A number of studies have suggested that non-reportable visual stimuli and uncontrollable 'attractors' could affect motor performance. In this symposium, we showed our recent findings that 90° head rotation distorted performer's spatial cognition during blind arm and finger positioning, suggesting that the unusual 90° head positions may act as an uncontrollable 'attractor' that systematically biases arm and finger positioning without performer's conscious awareness.

S13 **Plasma Catecholamine and Cardiovascular Responses during Mental Stress and Exercise**

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Most athletes would be in highly stressed state mentally and physically before and during major competitions. Mental stress is thought to be one of the crucial factors by which some athletes decrease performance in the competition. Recent studies in stress physiology have described a wide variety of responses in respiratory, cardiovascular, and endocrine systems to mental stress in humans. However, it has not been fully elucidated whether mental stress could modulate the physiological responses even during exercise as well as at rest.

Eight active young males cycled at their 50% $\dot{V}O_{2max}$ for 40 min with and without performing mental task (Stroop color-word test; CWT). While plasma norepinephrine and blood pressure responses did not show significant decreases between conditions (with and without CWT), plasma epinephrine and heart rate responses were consistently higher during exercise with CWT compared to exercise alone. Blood lactate concentration during exercise was also increased by CWT, presumably due to the increases in epinephrine which had a glycogenolytic effect.

These results suggested that mental stress that might be experienced by athletes during competition could affect normal physiological regulations during exercise. Further studies would be needed for better understanding of potential psychogenic influences on athletic performance in relation to the physiological responses.