CHARACTERISTICS OF HEAT-INDUCED HYPERVENTILATION AT REST AND DURING EXERCISE IN HUMANS

Takeshi Nishiyasu1, Bun Tsuji1,4, Naoto Fujii1,2, Yashushi Honda1, and Narihiko Kondo3

1Faculty of Health and Sport Sciences, University of Tsukuba.
2 University of Ottawa, 3 Kobe University, 4 Hiroshima Prefectural University

Abstract

In humans, hyperthermia leads to activation of a set of thermoregulatory responses that includes cutaneous vasodilation and sweating. Hyperthermia also increases ventilation in humans, as is observed in panting animals (e.g. dogs, sheep), but the physiological significance and characteristics of the hyperventilatory response in humans remain unclear. The relative contribution of respiratory heat loss to total heat loss in a hot environment in humans is much small as compared with those of sweating and cutaneous vasodilation, and this hyperventilation usually causes a concomitant reduction in arterial CO2 pressure (hypocapnia), which can cause cerebral hypoperfusion. Consequently, hyperventilation in humans may not contribute to the maintenance of physiological homeostasis (i.e., thermoregulation). To gain some insight into the physiological significance of hyperthermia-induced hyperventilation in humans, in this talk, we discuss 1) the mechanisms underlying hyperthermia-induced hyperventilation, 2) the factors modulating this response, 3) the physiological consequences of the response, and 4) the physiological responses of the voluntary breathing control to suppress the hyperthermia-induced hyperventilation.

Takeshi Nishiyasu, Ph.D.
nisiyasu@taiiku.tsukuba.ac.jp

Undergraduate Education:
- 1979-1983 Osaka University, Department of Engineering, Suita, Osaka, Japan., Degree: BE

Graduate Education:
- 1983-1988 University of Tsukuba, Institute of Health and Sport Sciences, Tsukuba, Ibaraki, Japan , Degree: Ph.D.

Professional and Academic Positions

Chair of Doctoral Program in Physical Education, Health, and Sport Sciences, University of Tsukuba, 2016-
present, Tsukuba City, Ibaraki, Japan

Professor, 2012-present, Faculty of Health and Sport Sciences, University of Tsukuba, Tsukuba City, Ibaraki, Japan

Associate Professor, 2002-2012, Institute of Health and Sport Sciences, University of Tsukuba, Tsukuba City, Ibaraki, Japan

Assistant Professor, 1999-2002, Institute of Health and Sport Sciences, University of Tsukuba, Tsukuba City, Ibaraki, Japan

Associate Professor, 1996-1999, School of Medicine, Yamaguchi University, Yamaguchi City, Yamaguchi, Japan.

Assistant Professor, 1991-1995, Faculty of Liberal Arts, Yamaguchi University, Yamaguchi City, Yamaguchi, Japan.

Postdoctoral Fellow, 1988-1991, John B. Pierce Laboratory, Department of Epidemiology and Public Health, School of Medicine, Yale University, New Haven, CT, USA