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## Asia Pacific Clinical Nutrition Society Award Lectures for 2003

**Nutritional dilemmas for long-term health**

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**Introduction** - The life-span commences at conception and includes fetal life, infancy, childhood, adolescence and stages of adulthood (young, middle, older age). *Long-term health* implies adequate function and lack of debilitating illness through each of the phases.

**Evolution of Diet and of Health** - As primates, humans are omnivores, and traditional hunter-gatherers included all manner of edible flora and fauna in their diet, aided by the invention of fire to make dietary use of animal flesh and starchy tubers with equal efficiency. Paleo-anthropologists concur that traditional man was free of degenerative illness; but lifespans were short due to infections, childbirth, inter- and intra-clan conflict and predation. With more "stable and secure" systems of food provision such as pastoralist or agrarian forms, dietary options have become progressively narrower while longevity has extended greatly.

**Protection from or Promotion of Disability and Disease by Diet** - The modern context of long-term health has to consider longevity through 8 decades or more. The consequences of excess weight and insulin resistance for glucose tolerance, vascular patency, arterial pressure, and lipid metabolism (metabolic syndrome) and of altered control of cellular proliferation and immune vigilance (neoplasia), as well as senescent changes in ocular, osseous and muscular tissues, are increasingly incident with advancing age. Practices that optimize performance and suppress pathogenesis in one decade or phase of life may compromise health in subsequent years. Certain patterns of consumption are epidemiologically associated with lower cumulative risks of the aforementioned maladies.

**The Limits of Nutrients and Diet** - If dietary pattern can be *influential* in protection or aggravation in health matters, they are rarely *determinant* for protection without considerations of physical activity and exercise, environmental exposure and genetic constitution. Application of nutrients in doses higher than occur in human dietaries and in isolated (pure) forms, have limited potential. High-dose vitamin E and calcium do show promise against CVD and colorectal cancer, respectively. Folic acid prevents initiation of colonic dysplasia, but accelerates progression of already dysplastic cells. Beta-carotene has proven neutral regarding colonic adenoma recurrence and noxious for lung cancer.

**Stabilizing the Genes and the Genome** - Since unrepaired DNA damage is a mechanism for cell mutation and genesis of neoplasia, application of nutrients that "stabilize" the genes have been advocated, such as methylation saturation by folic acid or chromatin stability with high-dose zinc. Since human evolution (natural selection) is a process of "taking advantage of" favorable mutations, what protects the *individual* in a lifetime may be detrimental to the *species* over an evolutionary span.

**Policy Questions: Individualization or Collectivization of the Prevention Effort?** - Illness and incapacity incur suffering for the individual, and impose social and economic costs on the society. With increasing understanding of diet and lifestyle measures for prevention, and with genomic research revealing gene-lifestyle interactions, the policy dilemma becomes the tension between individualized solutions (based on genetic prescription) or collective redress (based on collective action in lifestyle education and commercial and environmental regulation).