OPENING ACT

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Hydration and health

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The majority of biochemical reactions supporting vital processes in humans occur in a water environment in which carbohydrates, proteins, minerals and other molecules are present. However, water is not only a solvent but a substrate for numerous chemical reactions and the final product of oxidative reactions. Indeed, water is a nutrient we must ingest; it is absorbed and has a key role in metabolism. Water is essential in all physiological processes requiring convection transport with net fluid flux, as it occurs with nutrient absorption in the digestive tract and renal excretion. Moreover, circulation system functionality is based on the fact that blood, due to its elevated fluidity because of its high water content, can be easily transported to all organs and tissues. Water is also fundamental in the body temperature homeostasis. Firstly, due to its high specific heat, it is able to capture a great amount of thermal energy as body temperature varies too little. Secondly, water contributes to maintain the body temperature through sweeping and transpiration. The evaporation of 1 liter of water in the skin surface dissipates about 600 kcal. Likewise, electrolytes maintain the osmotic equilibrium between diverse liquid compartments of the organism. Moreover, concentration ion differences among those compartments are responsible for transmembrane potential influencing cell excitation.

Water is the major component of our organism representing about 60% of the total body weight. i.e. about 40 kg for a subject of 70 kg. However, the water body content varies considerably among tissues, reaching a maximum in muscles and viscera and minimum in bones and other calcified tissues. Likewise, the water content varies among diverse individuals; these variation is related to age, sex and amount of adipose tissue. In fact, water is the only nutrient whose requirements vary as a function of sex, age, physiological situation and environmental conditions.

The European Food Safety Authority (EFSA) Panel on Dietetic Products, Nutrition, and Allergies (NDA) issued in 2010 the dietary reference values for water for specific age. The reference values for total water intake include water from drinking water, beverages of all kind, and from food moisture and only apply to conditions of moderate environmental temperature and moderate physical activity levels (PAL 1.6). Current scientific evidence supports that maintaining an adequate hydration status is not only important for exercise, and particularly for sportsmen, but to support global physical conditions and cognitive function in all subjects.

Dehydration is the process of losing body water and leads eventually to hypohydration (the condition of body water deficit) and eventually to fatal dehydration. Water body content decreases with increasing age and this must be taken into account in early infancy and the elderly. In newborns the water body content is very high (about 80%), thus being very susceptible to dehydration. On the contrary, aged subjects have a reduced content of water (about 45%), close to compatibility with normal functionality; this together with frequent alterations in the mechanisms of urinary concentration and thirst make elderly people very susceptible to hypohydration.

Depending on the ratio of fluid to electrolyte loss, dehydration can be classified as isotonic, hypertonic or hypotonic. Increasing dehydration with fluid losses of more than 1% leads successively to reductions in exercise performance, in thermoregulation, and in appetite; with fluid deficits of 4% and more, severe performance rate decreases are observed as well as difficulties in concentration, headaches, irritability and sleepiness, increases in body temperature and in respiratory rates; when fluid deficits continue to exceed 8% death may ensue. Particularly, hypertonic dehydration in which water loss exceeds salt loss, e.g. through inadequate water intake, excessive sweating, osmotic diuresis and diuretic drugs, can be fatal if water together with appropriate amount of sodium are ingested.

Key words: fluid restriction, hydration, nutrient recommended intakes, water.

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