Medical and Health Aspects of Potassium

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Potassium, the principal intracellular cation in humans, is physiologically important in many of the functions of the human body. These include the functional integrity of the cardiovascular, respiratory, digestive, endocrine, renal, and neurological systems. Indeed, K is involved in a very fundamental way with normal cell function involving activities of the source of cell energy, adenosine 5'-triphosphate (ATP). Important considerations regarding metabolism of K⁺ include the acquisition, distribution, and excretion of K⁺.

Under normal circumstances, the average adult eats approximately 50 to 140 meq of K · day⁻¹ (Fregly, 1983), which is in the range of the recommended daily allowances of 47 to 140 meq day⁻¹ (NRS-NAS, 1979). On a day-to-day basis, there appear to be wide swings in one’s K intake, which may vary from 25 to 110 meq day⁻¹ (Flink, 1983). Normal subjects ingesting a balanced and varied diet to include representative foods from the four basic food groups (meat and poultry, dairy products, cereals and grains, and fruits and vegetables) generally need not be concerned about K imbalances.

Of the 50 to 140 meq of K ingested daily, approximately 90% is absorbed from the gastrointestinal (GI) tract. For K⁺ balance to be maintained, it is essential that approximately 45 to 126 meq of K⁺ be eliminated per 24 h. This is carried out primarily by the kidneys. Eighty to 90% of the K in plasma is filtered by the glomeruli, the remaining 10 to 20% being protein bound (Gabow & Peterson, 1980). Of the filtered K⁺, approximately 50% is reabsorbed proximally, another 30 to 40% of filtered K⁺ is reabsorbed in the loop of Henle, with about 10% of the filtered K⁺ arriving at the early distal convoluted tubule. Potassium secretion takes place in exchange for Na⁺ under the influence of aldosterone. There also appears to be K⁺ secretion or reabsorption (or both) from the collecting ducts. Thus, the final amount of urinary K is the result of both tubular reabsorption and secretion and establishes the importance of the kidneys in maintenance of K⁺ homeostasis.

As mentioned earlier, K⁺ is the principal intracellular cation in humans. As such, approximately 98% of body K⁺ is located within cells, and only 2% is found in the extracellular compartment. Thus, the normal serum K⁺ concentration of 4 to 5 meq L⁻¹ is reflective of only a very small portion of total body K⁺ (Papper & Whang, 1964). The largest pool of body K⁺ resides in muscle tissue and liver. There are approximately 40 to 55 meq of K kg⁻¹ of body weight in a man (Kem & Traчewsky, 1983). Thus, of the approximately 3500 meq of K in a 70-kg subject, only 70 meq is found in the extracellular compartment. Extracellular K⁺ concentration is 4 to 5 meq L⁻¹, whereas intracellular K⁺ concentration is approximately 110 meq.