Potassium

1. What is the nutrient?

   Potassium is the principal cation within the body's cells; critical to the maintenance of fluid balance, nerve impulse transmissions, and muscle contractions. Potassium plays a major role in maintaining fluid and electrolyte balance and cell integrity. During nerve impulse transmission and muscle contraction, potassium and sodium briefly trade places across the cell membrane. The cell then quickly pumps them back into place. Controlling potassium distribution is a high priority for the body because it affects many aspects of homeostasis, including a steady heartbeat. Cellular enzymes also need potassium to work properly (Rolfes, Pinna, & Whitney, 2009, p. 414).

2. What is the RDA/DRI for the nutrient?

Age (yr)	Potassium AI (mg/day)
Infants	
0-0.5	400
0.5-1	700
Children	
1-3	3000
4-8	3800
Males	
9-13	4500
14-70+	4700
Females	
9-13	4500
14-70+	4700
Pregnancy (all ages)	4700
Lactation (all ages)	5100

   Rolfes et al., 2009, p. B

3. How is the nutrient metabolized?

   Potassium is absorbed in the large intestine and moves across the cell membrane through the sodium-potassium pump. High levels of potassium cause the adrenal glands to release aldosterone. Aldosterone secretion results in increased excretion of K^+ by the kidney (Nelms, Sucher, & Long, 2007, p. 187).

4. What are food sources of the nutrient?

   Potassium is abundant in all living cells, both plant and animal. Because cells remain intact unless foods are processed, the richest sources of potassium are fresh foods. Significant sources of potassium include: meats, milks, fruits, vegetables, grains, and legumes. The best sources of potassium per kcalorie include: broccoli, carrots, tomato juice, strawberries, acorn squash, and artichoke (Rolfes et al., 2009, p. 414-415).

5. What disease states alter the nutrient's metabolism?

   Diets low in potassium seem to play an important role in the development of high blood pressure. Low potassium intakes raise blood pressure, whereas high potassium intakes, especially when combined with low sodium intakes, appear to both prevent and correct hypertension. Potassium-rich fruits and vegetables also appear to reduce the risk of stroke – more so than can be explained by the reduction in blood pressure alone (Rolfes et al., 2009, p. 414). Furthermore, individuals with bowel-related diseases, such as inflammatory bowel disease, may have altered potassium metabolism.

6. What are the tests or procedures to assess the nutrient level in the body?

   Potassium levels are assessed through biochemical data, which provide information about protein-energy nutrition, vitamin and mineral status, fluid and electrolyte balance, and organ function. Most tests are based on analyses of blood or urine samples, which contain proteins, nutrients, and metabolites that reflect nutrition and health status (Rolfes et al., 2009, p. 601-602).

7. What are the drug-nutrient interactions?

   The following medications may cause potassium levels to rise (Ehrlich, 2007):
   - Nonsteroidal anti-inflammatory drugs (NSAIDs)
   - ACE inhibitors: including Benazepril (Lotensin), Captopril (Capoten), Enlapril (Vasotec), Fosinopril (Monopril), Lisinopril (Zestril), Moexipril (Univasc), Peridopril (Aceon), Ramipril (Altace), and Trandolapril (Mavik)
   - Heparin
   - Cyclosporine
   - Trimethoprimand sulfamethoxazole (Bactrim or Septra)
   - Beta-blockers: including Atenolol (Tenormin), Metoprolol (Lopressor, Toprol-XL, and Propranolol (Inderal)

   The following medications may cause potassium levels to decrease (Ehrlich, 2007):
   - Thiazide diuretics: including Hydrochlorothiazide, Chlorothiazide (Diuril), Indapamide (Lozol), and Metolzaone (Zaroxolyn)
   - Loop diuretics: including Furosemide (Lasix), Bumetanide (Bumex), Torsemide (Demadex), and Ethacrynic acid (Edecrin)
   - Corticosteriods
   - Amphotericin B (Fungizone)
   - Antacids
   - Insulin
   - Fluconazole (Diflucan)
   - Theophylline (TheoDur)
   - Laxatives

   Other potential interactions (Ehrlich, 2007):
   - Digoxin – Low blood levels of potassium increase the likelihood of toxic effects for digoxin, a medication used to treat abnormal heart rhythms and heart failure.

8. How is the nutrient measured?

   The acceptable range for potassium in a blood test is 3.5-5.1 mEq/L (Rolfes et al., 2009, p. 603).

9. What is the Upper Tolerable Limit?

   Potassium toxicity does not result from overeating foods high in potassium; therefore an Upper Level was not set. Instead, potassium toxicity can result from overconsumption of potassium salts or supplements (including some "energy fitness shakes") and from certain diseases or treatments (Rolfes et al., 2009, p. 414-415).

10. What are the physical signs of deficiency?

    Potassium deficiency is characterized by an increase in blood pressure, salt sensitivity, kidney stones, and bone turnover. As deficiency progresses, symptoms include irregular heartbeats, muscle weakness, and glucose intolerance (Rolfes et al., 2009, p. 414-415).

11. What are physical signs of toxicity?

    Given more potassium than the body needs, the kidneys accelerate their excretion. However, if the GI tract is bypassed and potassium is injected directly into a vein, it can stop the heart. Symptoms of toxicity include muscular weakness and vomiting (Rolfes et al., 2009, p. 414-415).

References:

Ehrlich, S. D. (2007, October 1). Possible interactions with: Potassium. *University of Maryland Medical Center*. Retrieved April 18, 2010 from http://www.umm.edu/altmed/articles/potassium-000975.htm

Nelms, M., Sucher, K., & Long, S. (2007). *Nutrition therapy and pathophysiology*. Belmont, CA: Thomson Wadsworth.

Rolfes, S. R., Pinna, K., & Whitney, E. (2009). *Understanding normal and clinical nutrition (eighth edition)*. Belmont, CA: Wadsworth.