

Dietary Reference Intakes : Electrolytes and Water

Nutrient	Function	Life Stage Group	AI	UL ^a	Selected Food Sources	Adverse Effects of Excessive Consumption	Special Considerations
Sodium	Maintains fluid volume outside of cells and thus normal cell function.	Infants	(g/d)	(g/d)	Processed foods to which sodium chloride (salt) /benzoate/phosphate have been added; salted meats, nuts, cold cuts; margarine; butter; salt added to foods in cooking or at the table. Salt is ~ 40% sodium by weight.	Hypertension; increased risk of cardiovascular disease and stroke.	The AI is set based on being able to obtain a nutritionally adequate diet for other nutrients and to meet the needs for sweat losses for individuals engaged in recommended levels of physical activity. Individuals engaged in activity at higher levels or in humid climates resulting in excessive sweat may need more than the AI. The UL applies to apparently healthy individuals without hypertension; it thus may be too high for individuals who already have hypertension or who are under the care of a health care professional.
		0–6 mo	0.12	ND ^b			
		7–12 mo	0.37	ND ^b			
		Children					
		1–3 y	1.0	1.5			
		4–8 y	1.2	1.9			
		Males					
		9–13 y	1.5	2.2			
		14–18 y	1.5	2.3			
		19–30 y	1.5	2.3			
		31–50 y	1.5	2.3			
		50–70 y	1.3	2.3			
		> 70 y	1.2	2.3			
		Females					
		9–13 y	1.5	2.2			
		14–18 y	1.5	2.3			
		19–30 y	1.5	2.3			
31–50 y	1.5	2.3					
50–70 y	1.3	2.3					
> 70 y	1.2	2.3					
Pregnancy							
14–18 y	1.5	2.3					
19–50 y	1.5	2.3					
Lactation							
14–18 y	1.5	2.3					
19–50 y	1.5	2.3					

NOTE: The table is adapted from the DRI reports. See www.nap.edu. Adequate Intakes (AIs) may be used as a goal for individual intake. For healthy breastfed infants, the AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all individuals in the group, but lack of data prevent being able to specify with confidence the percentage of individuals covered by this intake; therefore, no Recommended Dietary Allowance (RDA) was set.

^aUL = The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents total intake from food, water, and supplements. Due to lack of suitable data, ULs could not be established for potassium, water, and inorganic sulfate. In the absence of ULs, extra caution may be warranted in consuming levels above recommended intakes.

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SOURCE: *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*. This reports may be accessed via www.nap.edu. Copyright 2004 by The National Academies. All rights reserved.

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Chloride	With sodium, maintains fluid volume outside of cells and thus normal cell function.	Infants	(g/d)	(g/d)	See above; about 60% by weight of salt.	In concert with sodium, results in hypertension.	Chloride is lost usually with sodium in sweat, as well as in vomiting and diarrhea. The AI and UL are equi-molar in amount to sodium since most of sodium in diet comes as sodium chloride (salt).
		0–6 mo	0.18	ND ^b			
		7–12 mo	0.57	ND ^b			
		Children					
		1–3 y	1.5	2.3			
		4–8 y	1.9	2.9			
		Males					
		9–13 y	2.3	3.4			
		14–18 y	2.3	3.6			
		19–30 y	2.3	3.6			
		31–50 y	2.3	3.6			
		50–70 y	2.0	3.6			
		> 70 y	1.8	3.6			
		Females					
		9–13 y	2.3	3.4			
		14–18 y	2.3	3.6			
		19–30 y	2.3	3.6			
		31–50 y	2.3	3.6			
		50–70 y	2.0	3.6			
		> 70 y	1.8	3.6			
Pregnancy							
14–18 y	2.3	3.6					
19–50 y	2.3	3.6					
Lactation							
14–18 y	2.3	3.6					
19–50 y	2.3	3.6					

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Potassium	Maintains fluid volume inside/outside of cells and thus normal cell function; acts to blunt the rise of blood pressure in response to excess sodium intake, and decrease markers of bone turnover and recurrence of kidney stones.	Infants	(g/d)	No UL.	Fruits and vegetables; dried peas; dairy products; meats, and nuts.	None documented from food alone; however, potassium from supplements or salt substitutes can result in hyperkalemia and possibly sudden death if excess is consumed by individuals with chronic renal insufficiency (kidney disease) or diabetes.	Individuals taking drugs for cardiovascular disease such as ACE inhibitors, ARBs (Angiotensin Receptor Blockers), or potassium sparing diuretics should be careful to not consume supplements containing potassium and may need to consume less than the AI for potassium.
		0–6 mo	0.4				
		7–12 mo	0.7				
		Children					
		1–3 y	3.0				
		4–8 y	3.8				
		Males					
		9–13 y	4.5				
		14–18 y	4.7				
		19–30 y	4.7				
		31–50 y	4.7				
		50–70 y	4.7				
		> 70 y	4.7				
		Females					
		9–13 y	4.5				
		14–18 y	4.7				
		19–30 y	4.7				
31–50 y	4.7						
50–70 y	4.7						
> 70 y	4.7						
Pregnancy							
14–18 y	4.7						
19–50 y	4.7						
Lactation							
14–18 y	5.1						
19–50 y	5.1						

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Water	Maintains homeostasis in the body and allows for transport of nutrients to cells and removal and excretion of waste products of metabolism.	Infants	(L/d)	No UL.	All beverages, including water, as well as moisture in foods (high moisture foods include watermelon, meats, soups, etc.).	No UL because normally functioning kidneys can handle more than 0.7 L (24 oz) of fluid per hour; symptoms of water intoxication include hyponatremia which can result in heart failure and rhabdomyolysis (skeletal muscle tissue injury) which can lead to kidney failure.	Recommended intakes for water are based on median intakes of generally healthy individuals who are adequately hydrated; individuals can be adequately hydrated at levels below as well as above the AIs provided. The AIs provided are for total water in temperate climates. All sources can contribute to total water needs: beverages (including tea, coffee, juices, sodas, and drinking water) and moisture found in foods. Moisture in food accounts for about 20% of total water intake. Thirst and consumption of beverages at meals are adequate to maintain hydration.
		0–6 mo	0.7				
		7–12 mo	0.8				
		Children					
		1–3 y	1.3				
		4–8 y	1.7				
		Males					
		9–13 y	2.4				
		14–18 y	3.3				
		19–30 y	3.7				
		31–50 y	3.7				
		50–70 y	3.7				
		> 70 y	3.7				
		Females					
		9–13 y	2.1				
		14–18 y	2.3				
		19–30 y	2.7				
31–50 y	2.7						
50–70 y	2.7						
> 70 y	2.7						
Pregnancy							
14–18 y	3.0						
19–50 y	3.0						
Lactation							
14–18 y	3.8						
19–50 y	3.8						

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Inorganic Sulfate	Required for biosynthesis of 3'-phosphoadenosine-5'-phosphate (PAPS), which provides sulfate when sulfur-containing compounds are needed such as chondroitin sulfate and cerebroside sulfate.	<p>Infants 0–6 mo 7–12 mo</p> <p>Children 1–3 y 4–8 y</p> <p>Males 9–13 y 14–18 y 19–30 y 31–50 y 50–70 y > 70 y</p> <p>Females 9–13 y 14–18 y 19–30 y 31–50 y 50–70 y > 70 y</p> <p>Pregnancy 14–18 y 19–50 y</p> <p>Lactation 14–18 y 19–50 y</p>	No recommended intake was set as adequate sulfate is available from dietary inorganic sulfate from water and foods, and from sources of organic sulfate, such as glutathione and the sulfur amino acids methionine and cysteine. Metabolic breakdown of the recommended intake for protein and sulfur amino acids should provide adequate inorganic sulfate for synthesis of required sulfur-containing compounds.	No UL	Dried fruit (dates, raisins, dried apples), soy flour, fruit juices, coconut milk, red and white wine, bread, as well as meats that are high in sulfur amino acids.	Osmotic diarrhea was observed in areas where water supply had high levels; odor and off taste usually limit intake, and thus no UL was set.	

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