6

Special Considerations and Adjustments

SUMMARY

This chapter provides a discussion of the process and criteria used to establish the Dietary Reference Intakes (DRIs) in order to help users make informed judgments during the dietary planning process.

The limitations in the data used to develop the DRIs and the relationship between dietary nutrient inadequacy and inadequate nutritional status are important considerations when planning diets. This chapter also addresses factors such as nutrient bioavailability and physiological, lifestyle, and health factors that may alter nutrient requirements and lead to adjustments in the DRI values when planning dietary intakes for individuals and groups.

INTRODUCTION

It is well established that biological variability exists among individuals with regard to both nutrient requirements and susceptibility to adverse effects from excessive nutrient intakes. These individual differences, when known, in the normal, apparently healthy population have already been considered in establishing the Dietary Reference Intakes (DRIs). Specifically, variability in individual requirements around the Estimated Average Requirement (EAR) is considered in setting the Recommended Dietary Allowance (RDA), the intake recommendation for individuals. The Adequate Intake (AI) is set at a level thought to meet or exceed the needs of almost all individuals of a given life stage and gender group. The Tolerable Upper Intake Level (UL) is set at an intake at which all but the most sensitive members of a population would not be expected to experience adverse effects. Thus, most normal sources of variability have already been considered in setting the DRI values, as they apply to the typical diets of apparently healthy people in the United States and Canada. However, there are other identifiable factors that may alter nutrient requirements systematically such that the DRI values may need to be adjusted when planning nutrient intakes for certain individuals or groups. These factors, discussed below, include characteristics of the nutrient source that influence nutrient bioavailability, as well as physiological, health, or lifestyle characteristics of individuals that may require tailoring of requirement estimates.

INFLUENCE OF THE NUTRIENT SOURCES

Bioavailability

Information on the bioavailability of nutrients from foods, fortified foods, and supplemental nutrient sources has been used in developing the Dietary Reference Intakes (DRIs) and must also be considered in applying the DRIs to dietary planning. Issues regarding bioavailability for each nutrient are discussed briefly below and in greater detail in the individual DRI nutrient reports (IOM, 1997, 1998a, 2000b, 2001, 2002a).

Different sources of a nutrient can vary in chemical or physical form, which can affect bioavailability. Thus, in planning diets for individuals or groups, consideration may need to be given to whether the nutrient is supplied in its natural food matrix, as a fortificant to a food source, or in a supplemental form not associated with food. For example, U.S. Department of Agriculture food composition data have only recently been modified to reflect the different bioavailability between natural food sources of folate (1 dietary folate equivalent [DFE] = 1 μg of folate found naturally in food) and folate added as a fortificant to foods (1 DFE = 0.6 μg). Accordingly, in planning to increase an individual's folate intake by about 100 DFEs to meet the Recommended Dietary Allowance (RDA), it would be necessary to consider whether to increase the intake of fruits and vegetables or fortified grain products (or both). An increase of 100 DFEs would require 100 μg of folate from fruits and vegetables, but only 60 μg from fortified grain products. However, if the food composition data were reported in DFE units, differences in bioavailability would already have been taken into account.

The source of a nutrient can also affect the potential risk of nutrient intakes that exceed the Tolerable Upper Intake Level (UL). For several nutrients, there is no known risk of excessive intake from natural foods. Accordingly, the UL for nutrients such as magnesium, folate, niacin, and vitamin E are based only on chemical or synthetic forms obtained from supplements or added to foods (IOM 1997, 1998a, 2000b). Excessive intakes for other nutrients such as calcium, selenium, iron, and vitamins C and D are based on the combination of intakes from food and supplements (IOM 1997, 2000b, 2001).

For some nutrients, the chemical form varies within natural foods, as well as between natural and synthetic sources. For instance, heme iron, the form of approximately 40 percent of the iron in meat, poultry, and fish (Monsen et al., 1978), is generally better absorbed than the remaining (nonheme) form of iron in foods. This difference between heme and nonheme iron absorption, which is one factor that can contribute to the lower iron absorption seen in plant-based diets, has been addressed by recommending intakes for vegetarians that reflect the lower average absorption.

These differences between sources of a nutrient can be of such importance that, in some cases, it is specified which source should be used to meet nutrient intake recommendations. For example, because about 10 to 30 percent of older adults have reduced gastric acidity, they may not readily absorb the protein-bound form of vitamin B_{12} that is found naturally in food sources. To ensure that adequate vitamin B_{12} is absorbed when planning for individuals or groups where the average age is over 50, planners are encouraged to include foods fortified with vitamin B_{12} or a supplement containing vitamin B_{12} since the synthetic form of the vitamin is absorbed effectively even in those with low gastric acid secretion. Another example relates to planning for individuals or groups where women are in their childbearing years. In this case, the diet plan should include 400 μg of folate from fortified foods or supplements in addition to the food folate contained in a varied diet since studies that showed reduced risk of neural tube defects were conducted with 400 μg of folate as supplements.

Interactions with Other Nutrients, Food Components, and Properties of the Dietary Matrix

In addition to the bioavailability factors discussed above, nutrient utilization can be influenced by interactions with other nutrients or food constituents. Examples include enhancement of nonheme iron absorption by ascorbic acid; inhibition of calcium, iron, and zinc absorption by phytic acid from whole grains, nuts, and legumes; enhancement of the absorption of the fat-soluble vitamins A, D, E, and K by dietary fat; improved absorption of β-carotene in some vegetables after cooking and blending; and competitive imbalances of minerals such as calcium, iron, zinc, and copper (Mertz et al., 1994). Excessive intake of one nutrient may interfere with absorption, excretion, transport, storage, function, or metabolism of another.

Specific nutrient interactions with food components and drugs have also been identified (IOM, 1997, 1998a, 2000b, 2001, 2002a). Because of quantitative and bioavailability differences, nutrient–nutrient interactions are of particular concern in diet planning when nutrients are provided by supplementation or fortification rather than by food sources. Such interactions have been considered in setting the DRIs, including the establishment of ULs that may be specific for nutrients used in fortification or taken as supplements. Accordingly, in most cases planners do not need to make adjustments to DRIs based on nutrient–nutrient interactions.

Special Considerations for Vegetarian Diets

Well-planned vegetarian diets are associated with good health (Messina and Burke, 1997). However, not all vegetarian diets are the same. Depending on the foods included or excluded from the diet, careful planning may be required to meet recommendations for various nutrients.

For example, vitamin B_{12} is found only in foods derived from animal sources or in those foods to which it is added during fortification. Individuals following vegan diets (exclusively composed of plant foods) will need to either use a vitamin B_{12} supplement or consume fortified foods containing sufficient amounts of synthetic vitamin B_{12}. Vegetarians who do not use fluid milk are likely to have low vitamin D intakes, especially those living in northern latitudes where exposure to ultraviolet light does not occur during winter months (Ladizesky et al., 1995; Webb et al., 1988). Populations who do not use milk and milk products are likely to need additional sources of calcium in their diets. This can be achieved with the judicious selection of plant sources or the use of calcium-fortified foods and beverages.

Individuals or groups who follow vegetarian diet plans that omit all animal products are likely to be at risk for inadequate intakes of iron and zinc, which also needs to be taken into account when planning diets. Hunt and Roughead (1999) demonstrated that iron absorption from vegetarian diets was reduced compared with an omnivorous diet. In similar studies, zinc absorption was approximately 35 percent less from a lactoovovegetarian diet as compared with an omnivorous diet (Hunt et al., 1998). The description of the recommended intakes for iron and zinc further reviews the evidence of lower bioavailability of these nutrients from plant sources and recommends iron intakes for vegetarians that are higher than the RDAs for the general population (IOM, 2001).

Another nutrient of potential concern for vegetarians is protein. Because protein intakes of vegetarians are typically lower than intakes of those following omnivorous diets, the issue of protein quality becomes particularly important. In the past there were no recommended intakes for indispensable amino acids, and it was assumed that individuals consuming a mixed diet (animal and vegetable proteins with a biological value of 75 percent) with the recommended amounts of protein would obtain the needed amounts of indispensable amino acids. Now that both Estimated Average Requirements (EARs) and RDAs have been provided for indispensable amino acids, it is important to reexamine this issue.

It appears that diets adequate in total protein may not be necessarily adequate in all the indispensable amino acids, at least for lysine. Data in Table 6-1 compare the amino acid composition of various protein sources to the Food and Nutrition Board/Institute of Medicine amino acid scoring pattern (IOM, 2002a). The scoring pattern indicates the amounts of each indispensable amino acid per gram of protein needed to meet the EAR for the indispensable amino acid when total protein intake equals the EAR. A single scoring pattern has been adopted because there are relatively small differences between the amino acid requirements of children and adults when the requirements are expressed relative to total protein requirements. The data suggest that although most protein sources provide recommended amounts of threonine, tryptophan, and sulfur-containing amino acids, this may not be true for lysine. Animal protein sources provide relatively high amounts of lysine, so individuals who do not consume animal protein sources (or who consume limited amounts) may be unlikely to obtain the recommended amounts of lysine when total protein intake is limited to the RDA, unless beans are the primary protein source in their diet. Even then, diets may be marginal, as the data in the table are not adjusted for the lower digestibility often seen in plant protein sources. Therefore, in addition to planning total protein intakes, it may be necessary to plan for intakes of lysine in vegan diets.

TABLE 6-1 Selected Indispensable Amino Acid Content of Protein Sources[a] Compared to Recommended Levels

	Indispensable Amino Acid (mg/g protein)			
	Lysine	Threonine	Tryptophan	Methionine + Cysteine
FNB/IOM scoring pattern[b]	51	27	7	25
Beef, lean	83	44	11	37
Cheddar cheese	76	33	12	29
Egg	70	49	16	56
Tofu	66	41	16	27
Soymilk	65	41	16	32
Garbanzo beans	67	37	10	26
Almonds	29[c]	32	15	25
Peanut butter	36[c]	34	10	33
Brown rice	38[c]	37	13	35
Cornmeal	28[c]	38	7	39
Wheat bread	28[c]	30	13	39

[a] USDA Nutrient Database for Standard Reference, Release 15, August 2002.
[b] From IOM (2002). The scoring patterns indicate the amounts of essential amino acids per gram of protein needed to meet the Estimated Average Requirement (EAR) for the essential amino acid when total protein intake equals the EAR for protein.
[c] The protein source would not provide recommended amounts of the indispensable amino acid if it were the only source of protein in the diet.

The need to plan intakes of lysine is likely of greatest importance for individuals whose diets emphasize plant foods *and* are relatively low in total protein. For example, the RDA for total protein for the reference 57-kg woman is 46 g/day. If she followed a plant-based diet and ate no more than the RDA of 46 g of protein daily, she would be unlikely to meet her RDA for lysine (2.2 g/day) unless 50 percent or more of her dietary protein was provided from beans or tofu (rich sources of lysine). To be specific, 23 g of protein from beans and tofu would provide about 1.5 g of lysine, and 23 g of protein from other sources, such as wheat, rice, and nuts, would provide about 0.7 g of lysine. However, if her total protein intake was greater (e.g., about 63 g/day, or similar to the median protein intake reported by women in the 1994–1996 Continuing Survey of Food Intakes by Individuals [USDA/ARS, 1997]), she could meet her RDA for lysine with much smaller amounts of beans and tofu (providing about 10 percent of her total dietary protein). Thus, planning for individuals who consume only plant sources of protein should involve careful review of lysine intakes. If their total protein intake is limited to the RDA for protein, beans and legumes should be emphasized as the major source of dietary protein.

INDIVIDUAL CHARACTERISTICS THAT INFLUENCE DIETARY REQUIREMENTS

Recommended Dietary Allowances (RDAs) and Adequate Intakes (AIs) are used as goals for nutrient intakes to meet the known nutrient requirements of almost all healthy individuals in various life stage and gender groups. As discussed below, the Dietary Reference Intake (DRI) process has already accounted for normal individual variability, and individual adjustments for factors such as age, nutrient status, genetic variation, or body size are generally not required. In other instances, adjustments may be warranted for individuals with lifestyle differences or who are ill.

Nutrient Status

Nutrient absorption, excretion, and utilization can all be substantially affected by the nutrient status of the individual (e.g., low, moderate, or high tissue concentrations). Individuals with lower body stores or who have adapted to lower intakes of a nutrient are likely to have greater rates of absorption and lower rates of excretion. These relationships have probably been best characterized in humans for iron. However, the Estimated Average Requirement (EAR) and resulting RDA are based on 18 percent iron absorption by people with minimal iron stores (defined as a serum ferritin level of 15 μg/L) and have already been adjusted for individual variation in iron status; thus, no further adjustments are required.

Genetic Variation

Rapidly expanding information on the human genome indicates many possible interactions between individual genetic traits and nutrient requirements. Examples of genetic disorders requiring nutritional treatment include classical inborn errors of metabolism such as phenylketonuria, lipoprotein lipase deficiency, and vitamin D-dependent rickets. More subtle genetic differences may contribute to variability in requirements within populations generally regarded as normal and healthy. For example, a genetic polymorphism under current investigation adversely affects homocysteine concentrations (and thus potential heart disease risk) in subjects with relatively poor folate status (Jacques et al., 1996). The continuing discovery and evaluation of genetic influences on nutritional requirements may lead to more specific recommendations for subgroups of the population. In the meantime, however, the RDAs are expected to meet the needs of almost all individuals, which should include many who may have higher than average requirements.

Unusual Body Size or Composition, Energy Expenditure, or Physical Activity

By establishing EARs and using the estimated variability of the requirement distribution to set RDAs to include 97 to 98 percent of all individuals in a life stage and gender group, these recommended intakes already account for typical variation in body size or energy expenditure in a specific group. Depending on the function and tissue distribution of the nutrient, such variation may be associated with skeletal mass, lean body mass, body water, or total body mass (IOM, 1997, 2000b). Larger individuals would be expected to have greater requirements based on larger body nutrient pools or functional compartments. Although reference body sizes (IOM, 1997) have been considered in deriving recommended intakes for specific life stage and gender subgroups, information on most nutrients is inadequate to precisely set recommendations in relation to an individual's body size or energy expenditure.

While there was insufficient evidence to define a relationship between energy requirements or body size and the requirements for thiamin, riboflavin, and niacin (IOM, 1998a), the functions of these nutrients are known to be directly related to energy metabolism. If, when planning diets, professionals choose to make an upward adjustment of B vitamin recommendations for individuals with unusually high energy requirements, the conservative approach (in terms of making recommendations to minimize the possibility of dietary inadequacy) would be to assume that vitamin requirements increase in direct proportion to energy requirements. An example of how these adjustments should be made has been provided in the DRI assessment report (IOM, 2000a).

Research on the impact of physical activity on nutrient requirements was evaluated as part of the DRI process, especially in relation to the requirements for B vitamins, vitamins with antioxidant properties such as vitamins C and E, and protein. For most nutrients, the data were considered insufficient to recommend specific alterations in the EARs or RDAs related to physical activity or athletic performance. An exception is iron. Body iron losses appear to increase with vigorous exercise, perhaps because of increased gastrointestinal blood losses or because of erythrocyte rupture within the foot during running (IOM, 2001). Consequently, athletes engaged in regular intense exercise may have average requirements for iron that range from 30 to 70 percent above those of normally active individuals. Additionally, athletes with extremely high energy intakes (exceeding 6,000 kcal/day) may have dietary phosphorus intakes that exceed the Tolerable Upper Intake Level (UL), but this is not thought to be harmful (IOM, 1997).

Age and Physiological Stage

Children

Recommended intakes change considerably across some age boundaries in children. For example, the RDA for magnesium for children ages 4 to 8 years is 130 mg/day, whereas the RDA for children ages 9 to 13 years is 240 mg/day. Clearly, magnesium needs do not change abruptly on a child's ninth birthday. Although it might appear reasonable to speculate that those at the higher end of an age range would have higher requirements than those at the lower end of the age range, in most cases knowledge of exactly how a child's nutrient requirements change with age is imprecise. For this reason, adjustment of recommended intakes within an age range is not recommended.

Adjustments in recommended intakes may be appropriate when relevant physiological changes can be identified for individuals. An example is the onset of menarche in girls. The RDA for iron for girls 14 to 18 years of age allows for iron losses in menses. If menarche occurs prior to age 14, an additional amount, about 2.5 mg of iron/day, would be needed to cover menstrual blood losses. Conversely, girls ages 14 and above who have not reached menarche can subtract 2.5 mg from the RDA for this age group. When boys or girls can be identified as undergoing the growth spurt of adolescence, the RDA for iron can be further adjusted by increasing daily intakes by 2.9 and 1.1 mg, respectively (IOM, 2001).

Women of Reproductive Age

To reduce the risk of neural tube defects it is recommended that all women capable of becoming pregnant obtain 400 μg of folate from fortified foods or supplements on a daily basis in addition to folate from a varied diet. For most women, a straightforward way to do this is to use a multivitamin supplement containing 400 μg of folate. Folate is also added to grains and cereals, but unless a highly fortified breakfast cereal is consumed, it would take unusually large amounts of some of these foods to obtain 400 μg. For example, a slice of bread contains 20 μg of added folate (the required level of folate fortification of bread).

Major differences in menstrual iron losses are an example of identifiable individual characteristics that modify nutrient requirements. These losses can be substantially modified by physiological changes such as menopause or hormonal therapy. The RDA for women ages 31 to 50 is intended to cover losses associated with menstruation, while the RDA for women over age 50 assumes that menopause has occurred. Menopause, then, rather than turning 50, is the physiologically significant event related to iron requirements. A woman who experiences menopause before age 50 (and who does not commence cyclic hormone treatment that results in the partial return of menstrual blood losses) could safely aim for an iron intake of 8 mg, the RDA for women over age 50. Conversely, a 51-year-old woman who is still menstruating regularly should aim for an iron intake of 18 mg, the RDA for women ages 31 to 50.

Dietary iron needs are lower for women using oral contraceptives due to reduced menstrual blood loss. Accordingly, the recommended intake for iron is adjusted down to 11.4 mg/day for adolescent girls and down to 10.9 mg/day for premenopausal women using oral contraceptives (IOM, 2001). Although a number of reports suggest some changes in riboflavin, B_6, or folate status for women using oral contraceptives, the available evidence does not indicate any need for adjustment in the RDAs for these nutrients.

Gestation of Multiple Fetuses

The RDAs and AIs for pregnancy and lactation have been developed for singleton pregnancies and the production of sufficient breast milk to nourish one infant. During pregnancy and lactation of multiple births, the intakes recommended for singletons may not be appropriate.

To experience good pregnancy outcomes, women who are pregnant with two or more fetuses need to gain more weight than has been associated with good outcomes for singleton pregnancies, and guidelines for weight gain during multiple pregnancies have been developed (IOM, 1990). At this point, however, average nutrient requirements for women pregnant with multiple fetuses are not known and specific recommended intakes have therefore not been derived. It has been noted, though, that intakes of some nutrients, such as protein, should be higher for women pregnant with two or more fetuses than for women pregnant with one (IOM, 2002a).

For lactating women, recommended intakes for many nutrients are developed, at least in part, on the basis of the amount of the nutrient secreted in breast milk. Women nursing two or more infants secrete greater volumes of breast milk (Saint et al., 1986); thus, it is reasonable to assume that their nutrient needs are also higher. The increased amount of energy required to nurse multiple infants will likely be met by natural appetite adjustments, and energy balance can be evaluated by monitoring body weight for mother and infants. If this increase in maternal energy intake emphasizes nutrient-dense food selections, then consumption of a variety of nutrients will be proportionally increased. Similar to pregnancy, however, specific recommendations for women nursing more than one infant have not been established.

Adults Over Age 50

For some nutrients, requirements (and thus recommendations) change in association with physiological changes that are expected to occur with aging. For example, the AI for vitamin D is higher for adults over age 50 years than for those under age 50 years.

The AI for vitamin D increases from 5 μg for individuals through age 50 years to 10 μg for those ages 51 to 70 years, and to 15 μg for those over age 70 years (IOM, 1997). Because vitamin D is not widely distributed in the food supply (it occurs naturally in liver, fatty fish, and egg yolk, and is routinely added to fluid milk, dried skim milk powder, and margarine), it is easy to envision diets that would not provide vitamin D in amounts recommended for older adults. Special attention to intakes of this vitamin is thus warranted for individuals in this category, particularly because endogenous synthesis is less efficient with advancing age (MacLaughlin and Holick, 1985). Use of a supplement containing vitamin D could be considered, particularly by those living in northern latitudes or who rarely receive sun exposure and do not regularly drink milk.

It has been estimated that from 10 to 30 percent of individuals over the age of 50 have low levels of gastric acidity, resulting in insufficient release of vitamin B_{12} from the protein to which it is bound in foods, and thereby resulting in reduced absorption of the vitamin. For this reason it is recommended that adults over the age of 50 obtain most of their RDA for vitamin B_{12} from synthetic sources (either in a supplement or in fortified foods) (IOM, 1998a).

LIFESTYLE FACTORS THAT AFFECT REQUIREMENTS

Alcohol Abuse

Alcoholism or alcohol abuse is associated with reduced food and nutrient intakes and a greater frequency of nutrient deficiencies, especially thiamin, niacin, vitamin B_6, and folate (IOM, 1998a). Chronic, excessive alcohol intake results in damaging physiological effects that may affect absorption, plasma concentrations, metabolism, and excretion of nutrients such as vitamin B_6 and folate. Specific nutrient requirements have not been established in relation to levels of alcohol consumption.

The importance of assuring adequate intakes of micronutrients in situations of alcohol abuse is emphasized by the greater frequency of nutrient deficiencies in alcoholics, an example of which is the irreversible consequences of the Wernicke-Korsakoff syndrome of severe thiamin deficiency. For uncontrolled alcoholics who are unable to correct their poor food intake habits, a nutrient supplement may be helpful in meeting their requirements for micronutrients.

Cigarette Smoking

Although blood folate concentrations have been reported to be lower in smokers than in nonsmokers (IOM, 1998a), data suggest that a low intake (Subar et al., 1990) rather than an increased requirement may account for the poorer folate status of smokers. In contrast, there is substantial evidence that smoking increases oxidative stress and metabolic turnover of vitamin C, thus recommended intakes of vitamin C are increased by 35 mg/day for smokers (IOM, 2000b).

DIETARY PLANNING FOR PEOPLE WHO ARE ILL

Just as is the case with healthy persons, planning diets for those who are ill first involves setting nutrient goals that are appropriate for their health status and nutrient needs. The Recommended Dietary Allowance (RDA), the Adequate Intake (AI), and the Tolerable Upper Intake Level (UL) are appropriate Dietary Reference Intakes (DRIs) for dietary planning for healthy individuals. However, some individuals who are ill have conditions that affect the absorption, storage, metabolism, or excretion of one or more nutrients and, as a result, the DRIs for these nutrients must be modified to take these disease-related factors into account. This section describes a general approach for using the DRIs in these situations. Once appropriate therapeutic goals are determined, they too must be converted into a diet that the individual can acquire, afford, and will eat.

Most diseases and conditions alter needs for only a few nutrients, with other nutrient needs remaining similar to those of healthy persons. In clinical practice it is usually assumed that unless there is a specific deviation of a nutrient known to be associated with the disease or condition, the individual is "healthy" with regard to that nutrient and the RDAs or AIs are reasonable goals for individual planning. Thus, the intake recommendation that is appropriate for the individual's gender, age, level of physical activity, and physiological state (e.g., pregnancy, lactation) would apply.

Government agencies or other organizations frequently specify that diets fed to patients or to institutionalized populations meet previously established RDA or Recommended Nutrient Intake (RNI) levels. The approaches described in this report to plan diets for a low risk of inadequate nutrient intakes for groups and individuals would apply in these situations. For example, patients who are not at nutritional risk, who do not require a nutrition intervention, or who receive a regular diet, can be treated as a group unless their nutritional status changes. Individual patients with specific nutrition therapy plans can have their dietary intakes planned initially using the RDAs or AIs with appropriate modifications made for their specific conditions by a trained health care professional or dietitian.

After the appropriate nutrient goals for the individual who is ill have been determined, these goals must then be converted into a dietary pattern that the individual will consume. Therapeutic dietary planning relies upon specialized food guidance and menu planning systems specific to the various disease states that affect nutrient needs. The DRIs will be useful in the development of diet manuals for people with special health care needs. Parenterally-fed patients require special forms of nutrients, and needs must be adjusted since bioavailability factors are not applicable and absorptive losses do not occur. Thus, the DRIs cannot be used directly to plan parenteral intakes.

As an example, a uremic patient who has end-stage renal disease might be placed on a very low protein diet to decrease blood urea nitrogen and other biochemical indices of uremia and to provide symptomatic relief. The diet might also be modified to restrict sodium and phosphorus. However, the RDA or AI would be used for other nutrients not known to be affected by the disease process.

The DRIs are formulated to meet the needs of the vast majority of the healthy population within specified life stage and gender groups. However, when the absorption, metabolism, or excretion of a nutrient is known to be altered by a specific illness or disease process, the DRIs can also be used as the base for developing therapeutic diets.