2.4: Understanding Dietary Reference Intakes (DRIs)

Learning Objectives

• Use the Dietary Reference Intakes to determine daily nutrient recommendations.

Dietary Reference Intakes (DRIs) are the recommendation levels for specific nutrients and consist of a number of different types of recommendations. This system is used in both the United States and Canada.

Dietary Reference Intakes: A Brief Overview

The most recent recommendations from the Food and Nutrition Board are the “Dietary Reference Intakes” (DRIs). The DRIs include 4 sets of standards:

• **Estimated Average Requirements (EAR)**: expected to satisfy the needs of 50% of the people in that age group based on a review of the scientific literature.

• **Recommended Dietary Allowances (RDA)**: average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%-98%) healthy people.

• **Adequate Intakes (AI)**: established when evidence is insufficient to develop an RDA and is set at a level assumed to ensure nutritional adequacy.

• **Tolerable Upper Intake Levels (UL)**: maximum daily intake unlikely to cause adverse health effects.

The DRIs are not minimum or maximum nutritional requirements and are not intended to fit everybody. They are to be used as guides only for the majority of the healthy population. The Food and Nutrition Board of the Institute of Medicine, National Academy of Sciences issues updated reports on DRIs when scientific evidence warrants an update. For example, the DRIs for sodium and potassium were updated in 2019.
Figure 1: The DRIs are inclusive of all four reference values, the Estimated Average Requirements (EAR), Recommended Dietary Allowances (RDA), Adequate Intakes (AI), and Tolerable Upper Intake Levels (UL). © Networkgraphics

DRIs are important not only to help the average person determine whether their intake of a particular nutrient is adequate, they are also used by healthcare professionals and policy makers to determine nutritional recommendations for special groups of people who may need help reaching nutritional goals. This includes people who are participating in programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The DRIs are not appropriate for people who are ill or malnourished, even if they were healthy previously.

Determining Dietary Reference Intakes

Each DRI value is derived in a different way. See below for an explanation of how each is determined:

1. **Estimated Average Requirements (EAR).** The EAR for a nutrient is determined by a committee of nutrition experts who review the scientific literature to determine a value that meets the requirements of 50% of people within a given life stage and for a particular gender. The requirements of half of the group will fall below the EAR and the other half will be above it. It is important to note that, for each nutrient, a specific bodily function is chosen as the criterion on which to base the EAR. For example, the EAR for calcium is set using a criterion of maximizing bone health. Thus, the EAR for calcium is set at a point that will meet the needs, with respect to bone health, of half of the population. EAR values become the scientific foundation upon which RDA values are set.

2. **Recommended Dietary Allowances (RDA).** Once the EAR for a nutrient has been established, the RDA can be mathematically determined. While the EAR is set at a point that meets the needs of half the population, RDA values are set to meet the needs of the vast majority (97-98%) of the target healthy population. It is important to note that RDAs are not the same thing as individual nutritional requirements. The actual nutrient needs of a given individual may be different than the RDA. However, since we know that 97 to 98 percent of the population's needs are met by the RDA, we can assume that if a person is consuming the RDA of a given nutrient, they are most likely meeting their nutritional need for that nutrient. The important thing to remember is that the RDA is meant as a recommendation and meeting the RDA means it is very likely that you are meeting your actual requirement for that nutrient.

   - There is a distinct difference between a requirement and a recommendation. For instance, the recommendation for vitamin D is a 15 micrograms (or 600 International Units) each day. However, in order to find out your true personal requirement for vitamin D, a blood test is necessary. The blood test will provide an accurate reading from which a medical professional can gauge your required daily vitamin D amounts. This may be considerably more or less than the RDA, depending on what your level actually is.

3. **Adequate Intake (AI).** Al's are created for nutrients when there is insufficient consistent scientific evidence to set an EAR for the entire population. As with RDAs, Al's can be used as nutrient-intake goals for a given nutrient. For example, there has not been sufficient scientific research into the particular nutritional requirements for infants. Consequently, all of the DRI values for infants are Al's derived from nutrient values in human breast milk.

4. **Tolerable Upper Intake Levels (UL).** The UL was established to help distinguish healthful and harmful nutrient intakes. Developed in part as a response to the growing usage of dietary supplements, ULs indicate the highest level of continuous intake of a particular nutrient that may be taken without causing health problems. When a
nutrient does not have any known issue if taken in excessive doses, it is not assigned a UL. However, even when a nutrient does not have a UL it is not necessarily safe to consume in large amounts.

Figure \(\PageIndex{1}\): DRI Graph. This graph illustrates the risks of nutrient inadequacy and nutrient excess as we move from a low intake of a nutrient to a high intake. Starting on the left side of the graph, you can see that when you have a very low intake of a nutrient, your risk of nutrient deficiency (inadequacy) is high. As your nutrient intake increases, the chances that you will be deficient in that nutrient decrease. The point at which 50 percent of the population meets their nutrient needs is the EAR, and the point at which 97 to 98 percent of the population meets their needs is the RDA. The UL is the highest level at which you can consume a nutrient without it being too much—as nutrient intake increases beyond the UL, the risk of health problems resulting from that nutrient increases.


Acceptable Macronutrient Distribution Ranges (AMDRs)

The Acceptable Macronutrient Distribution Ranges (AMDRs) are another component of the Dietary Reference Intakes (DRIs). The AMDRs are used specifically for macronutrients (carbohydrates, fats, and protein). The AMDR is the calculated range of how much energy from carbohydrates, fats, and protein is recommended for a healthy diet. The AMDR is the range associated with reduced risk for chronic diseases, while providing essential nutrients like vitamins and minerals. People who do not reach the AMDRs for their target group increase their risk of developing health complications.

Table 2.1: AMDR Values for Adults

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value (% of total calories)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>45–65</td>
</tr>
<tr>
<td>Fat</td>
<td>20–35</td>
</tr>
<tr>
<td>Protein</td>
<td>10–35</td>
</tr>
<tr>
<td>Polyunsaturated fatty acids</td>
<td>5–10</td>
</tr>
<tr>
<td>Linolenic acid</td>
<td>0.6–1.2</td>
</tr>
</tbody>
</table>

Key Takeaways

• Nutrient-intake recommendations set for healthy people living in the United States and Canada are known as
Dietary Reference Intakes (DRIs).

- The DRIs includes the EAR, RDA, AI, and UL for micronutrients and the AMDR ranges for energy-yielding macronutrients. The DRIs provide a set of standards for researchers and government policy-makers, and specifies nutrient consumption guidelines for individuals.

References
