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Editorial

The Current Approach to Requirements for a Healthy and Sustainable Diet

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Introduction

Tables outlining nutrient requirements, commonly known as Recommended Dietary Allowances (RDAs), provide guidelines for suggested daily levels of essential nutrients necessary for maintaining satisfactory nutritional status or achieving nutrient consumption goals. These allowances typically offer a margin of sufficiency, with energy needs being the only exception, often set slightly above physiological requirements. It is crucial to note that these recommendations are designed for groups of people rather than individuals independently.

When discussing a healthy diet, it is essential to trace back to pioneering research, such as that of Justus von Liebig in 1840, who discovered the fundamental role of carbohydrates, fats, and proteins in nutrition. Subsequently, in 1860, Claude Bernard demonstrated that body fat could be synthesized from carbohydrates and proteins, illustrating that energy in blood glucose can be stored as fat or glycogen. The first Nutritional Recommendations tables date back to 1938 for the populations of Canada and the United Kingdom [1-3]. The Institute of Medicine (IOM) formulated recommendations for the U.S. population in 1941. In the 1950s, under the auspices of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO), global recommendations were developed [4-7]. It was not until 1986 that more precise definitions, known as Dietary Reference Intakes (DRIs), were introduced [8]. Since that date, the Food and Nutrition Board has reviewed nutritional recommendations accumulated over more than 50 years, producing the DRIs [8-10]. These revisions, based on new scientific knowledge and statistics, established updated reference limits to guide population dietary intake and assess government nutritional interventions.

Development

The upper level of nutrient requirements, often referred to as the Tolerable Upper Intake Level (UL), represents the highest level of nutrient intake unlikely to pose health risks to the majority of the general population. The evolution of these upper levels has been subject to continuous research and evaluation by health authorities [4-10]. Opinions on the upper level of nutrient requirements have evolved over time due to advances in scientific understanding, improved research methodologies, and a growing awareness of individual variations in response to nutrient intake. In the early stages of establishing nutritional guidelines, the focus was primarily on preventing deficiency diseases. However, as research progressed, attention expanded to include potential adverse effects of excessive nutrient intake.

Upper levels are established based on a comprehensive review of available scientific evidence, including clinical trials, observational studies, and toxicity data. Health organizations such as the Institute of Medicine (IOM) and other international bodies periodically assess and update these guidelines to reflect the latest research findings. They consider factors such as age, sex, life stage, and potential interactions with other nutrients [4-10].

It is important to note that upper levels are not recommendations for optimal intake but rather thresholds beyond which there may be an increased risk of adverse effects. Individual tolerance to nutrient intake can vary, and exceeding upper levels does not necessarily guarantee harm for everyone.

In recent years, greater attention has been given to personalized nutrition, recognizing that individual needs and responses to nutrients may differ. Ongoing research in nutrigenomics and nutrigenetics aims to better understand how genetic variations influence nutrient requirements and metabolism [10-15]. The evolution of criteria and changes in nutrient requirement levels from the first meeting in 1936 in the United Kingdom [1] to more recent meetings in the United States and Canada have been influenced by various factors, including advances in scientific research, changes in understanding nutrition, and recognition of diversity in nutritional needs [10-15].

- Recognition of more nutrients and bioactive compounds: As research advanced, more essential nutrients and bioactive compounds with significant roles in health were recognized. Criteria expanded to address a broader range of substances affecting health.
- Better understanding of nutrient interactions: Scientific studies provided a more detailed understanding of how nutrients interact with each other. This led to adjustments in recommended levels for certain nutrients, considering their interactions and synergistic or antagonistic effects.
- Focus on preventing chronic diseases: As research demonstrated links between nutrition and chronic diseases, criteria were adapted to reflect the importance of certain nutrients in preventing conditions such as cardiovascular diseases, diabetes, and osteoporosis [16].
- Consideration of population diversity: There is increasing recognition of variability in nutritional needs among different population groups, such as children, pregnant women, the elderly, and individuals with specific medical conditions. Criteria have been adjusted to address these variations.
- Emphasis on food safety and toxicity: Over time, there has been a greater emphasis on assessing food safety and the potential toxic effects of nutrients at elevated levels. Criteria have evolved to reflect a more comprehensive understanding of the risks associated with excessive intake of certain nutrients.
- Advancements in research methodologies: Advances in research methodologies, such as laboratory technology and statistical tools, have allowed for a more accurate assessment of scientific data. This has led to adjustments in recommended levels based on more robust evidence.
- Incorporation of more holistic approaches: Recent meetings have adopted more holistic approaches to assess nutritional needs, considering not only the prevention of deficiencies but also the promotion of overall health and the prevention of chronic diseases throughout the life cycle.

In summary, the evolution of upper levels of nutrient requirements reflects the dynamic nature of nutritional science. Ongoing research and advancements contribute to generating more precise and nuanced guidelines, ensuring that nutrient recommendations align with the goal of promoting health while minimizing the risk of adverse effects. Throughout the decades, European institutions have actively participated in the review and update of nutritional recommendations. Organizations such as the European Food Safety Authority (EFSA), the World Health Organization (WHO) globally, and the European Food Safety Authority at the European level have significantly contributed to establishing evidence-based guidelines [2,3,5-7,11,15].

Key aspects influencing the evolution of criteria and nutrient requirement levels include:

- Harmonization of approaches: European institutions have worked to harmonize their approaches with international standards, ensuring consistency and cooperation in formulating nutritional recommendations.
- Incorporation of European research: Priority has been given to European research in decision-making on nutrient requirement levels, recognizing the relevance of region-specific data.
- Consideration of cultural and dietary diversity: European institutions have addressed diversity in diet and eating practices in their recommendations, acknowledging regional and cultural differences in dietary intake.
- Focus on preventing specific diseases: Similar to other regions, European institutions have adjusted requirement levels to reflect research linking nutrition to the prevention of specific diseases prevalent in the region.

In the past, while the criteria for requirements could vary among committees, the guidance was consistent: requirements were set at a level to prevent deficiency symptoms. More recently, the focus on promoting health through diet has led to the introduction of the concept of optimal nutrition, where optimal intake of a nutrient could be defined as that which maximizes physiological and mental function while minimizing the development of degenerative diseases. Increasingly, genetic variability is also taken into account; for example, individuals carrying certain variants of the MTHFR gene (about 10% of the analyzed population so far) might be considered to have higher folate needs than the rest of the population. Currently, there is recognition that there are various levels to consider for the concept of optimal nutrition, i.e. the level that:

- Prevents deficiency symptoms, traditionally used to establish reference nutrient intakes.
- Optimizes body reserves of a nutrient.
- Optimizes some biochemical or physiological aspects.
- Minimizes a risk factor for a chronic disease.
- Minimizes the incidence of a disease.

An example of attempts to establish the reference standard to optimize a biochemical function is a level of folic acid that would minimize plasma homocysteine levels, a potential risk factor for cardiovascular diseases. Another could be the level of zinc to optimize cell-mediated immunity. An example of a possible reference standard to optimize a risk factor for a disease is the sodium level that would minimize hypertension or the level of n-3 polyunsaturated fatty acids (PUFA) to reduce plasma triglycerides (TAG) [8,9]. The amount of folic acid needed to minimize the population burden of neural tube defects would be an example of a reference value to minimize the incidence of a disease. Currently, there is much debate about the best approach to choosing criteria to establish reference standards for minerals and vitamins, and this is an area that is likely to continue generating controversy. An important point to note in this regard is that while minimizing frank symptoms of micronutrient deficiencies is a serious concern in many developing countries, any evolution in our concepts of desirable or optimal nutritional needs must lead to a reassessment of the estimate of the number of people experiencing inadequate nutrition.

Conclusion

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