



SUMMARY

Concern that most Americans are overweight, yet undernourished, has refocused attention on the long-standing, underutilized concept of nutrient density (a ratio of nutrients to calories) to make healthier food choices. It is evident that advice focusing on calories alone or “nutrients to avoid” (e.g., fat, saturated fat, sodium, sugar) has not worked.

The concept of nutrient density underlies the nutrient-rich foods approach to healthy eating. This positive approach has the potential to help consumers choose foods and beverages that are naturally nutrient-rich first, and less nutrient-dense foods within food groups as calorie needs allow. Nutrient-rich foods include brightly colored fruits and vegetables; regular and whole-grain products; low-fat and fat-free milk, cheese, and yogurt; and lean meats, skinless poultry, fish, and legumes.

There is widespread support for nutrient density in scientific, academic, government, and industry communities. In 2003, the Nutrient Rich Foods Coalition – a partnership of leading scientific researchers, communication experts, and 12 food commodity groups – was formed to increase understanding of the complex nutrient package of foods and beverages as a means to improve overall diet quality. The Coalition hosted a scientific symposium in early 2004 to explore possible approaches to assessing the nutrient density of foods and beverages with leading researchers. Further support came from the 2005 Dietary Guidelines Advisory Committee which called for the development of a science-based definition of nutrient density. Choosing nutrient-dense foods is a basic concept emphasized in the 2005 *Dietary Guidelines for Americans* and *MyPyramid*,

which translates the Dietary Guidelines into practical advice for consumers.

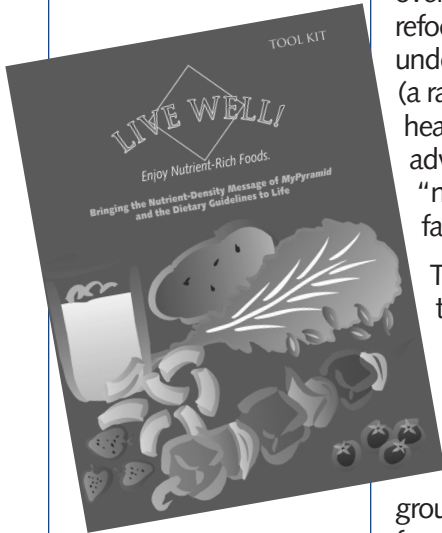
Despite support for nutrient density, a scientifically agreed upon definition has yet to be established. The 2005 *Dietary Guidelines* defines nutrient-dense foods on a nutrient to calorie basis: “Nutrient-dense foods are those foods that provide substantial amounts of vitamins and minerals (micronutrients) and relatively few calories. Foods that are low in nutrient density are foods that supply calories but relatively small amounts of micronutrients, sometimes none at all.”

Different approaches to rank the quality of individual foods and beverages based on their nutrient composition have been proposed (e.g., consideration of desirable nutrients only, undesirable nutrients only, or a combination of both). The Naturally Nutrient Rich score, a nutrient to calorie ratio to assess the nutritional quality of foods, focuses on the beneficial nutrients that are naturally present in foods, rather than mainly emphasizing the less desirable nutrients. A consistently determined nutrient density score could help people implement the *Dietary Guidelines*, be used on food labels, and form the basis of nutrition policy (e.g., nutrition standards for foods offered in schools).

There is a need to communicate the concept of a nutrient-rich approach to choosing a healthful diet and to provide tools to help people readily identify nutrient-rich foods. To meet this need, the Nutrient Rich Foods Coalition has developed the *Live Well!* tool kit, an educational guide for health professionals to use with their clients, as well as other resources (e.g., nutrient-rich menus and recipe ideas) found on the web site, www.nutrientrichfoods.org.



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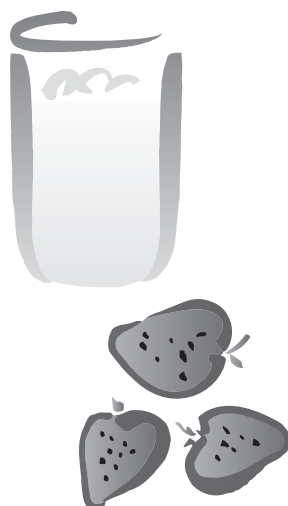
MAKING NUTRIENT-RICH FOOD CHOICES FIRST: KEY TO A HEALTHFUL DIET

INTRODUCTION

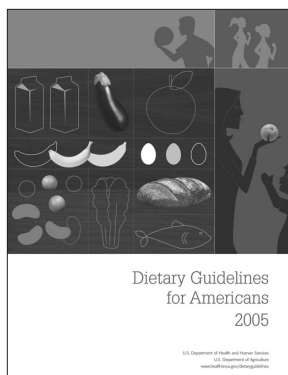
Two-thirds of adults in the U.S. are overweight or obese (1), only 10% of Americans meet the U.S. Department of Agriculture (USDA)'s *Healthy Eating Index* criteria for a healthful diet (2), and many people are not meeting recommended intake levels for several essential nutrients such as fiber, calcium, potassium, magnesium, and vitamins A, C, and E (3-5). Although most Americans understand that there is a connection between diet and health (6-8), knowledge or beliefs about healthful eating patterns are not translated into food habits (6).

Consumers are confused about how to improve the healthfulness of their diets and are tired of negative nutrition messages that focus on foods or nutrients to avoid, rather than on those to include (8,9). Defining foods or beverages as "good" based on what they do not contain (i.e., fat, saturated fat, sugar, sodium) rather than on what they do contain (e.g., beneficial nutrients such as calcium, fiber, etc.) may contribute to unhealthy eating behaviors and fail to provide people with the skills necessary to make healthier food choices (10,11).

Recognition that many Americans consume energy (calorie)-rich but nutrient-poor diets has led to renewed interest in providing information about the nutritional quality of individual foods and beverages based on their nutrient density (a ratio of nutrients to calories) (4,9-13). The concept of nutrient density underlies the "nutrient-rich" approach to healthful eating. This positive, science-based approach has the potential to help consumers choose nutrient-dense foods (i.e., those that provide substantial amounts of nutrients and relatively few calories) first, and less nutrient-dense foods (i.e., those that provide calories but few or no nutrients) as calorie needs and physical activity levels allow (9,11). Foods and beverages with a high nutrient-to-calorie ratio are "nutrient-rich," a term better understood and accepted by people than "nutrient-dense," according to consumer research conducted by the Nutrient Rich Foods Coalition (14). Considering that 60% of Americans attempting to lose weight say that they are trying to reduce calories (6), it is especially important to make calories



At this time when many Americans are overweight yet undernourished, people need tools to help them get more nutritional value from their calories.



count in terms of their nutritional value.

The Nutrient Rich Foods Coalition is conducting scientific and market research and developing tools to help people choose foods and beverages within each food group that contain more essential nutrients per calorie. Formed in 2003, this Coalition is a partnership of leading scientific researchers, communications experts, and 12 food commodity associations representing the five basic food groups in USDA's *MyPyramid*. The Coalition aims to shift the way people choose foods and beverages from focusing on "good foods" or "bad foods," calories, or individual "nutrients to avoid," to understanding the complete nutrient package of foods and beverages as a means to improve overall diet quality.

This *Digest* describes the current understanding of and support for nutrient density; discusses efforts and issues related to defining the nutritional quality of foods and beverages; and identifies tools currently available and under development to help people choose more nutrient-rich foods and beverages for a healthful diet.

NUTRIENT DENSITY: RENEWED INTEREST IN A LONG-STANDING CONCEPT

The advice to "choose your calories by the company they keep" is a long-standing dietary principle (10). Yet, only recently has this concept of nutrient density served as the cornerstone of dietary guidance, such as the 2005 *Dietary Guidelines for Americans* (4) and USDA's *MyPyramid* (12). The 2005 *Dietary Guidelines* recommends consuming a variety of nutrient-dense foods within and among the basic food groups to help ensure that nutrient needs are met while maintaining calorie needs (4). The *Dietary Guidelines* also provides examples of nutrient-dense foods – fruits and dark green and orange vegetables; fat-free and low-fat milk and milk products such as yogurt and cheese; lean meats, poultry, fish, and legumes; and regular and whole-grain products – within the DASH (Dietary Approaches to Stop Hypertension) and USDA food group patterns (4). USDA's *MyPyramid*, which translates the *Dietary Guidelines* into practical advice for

consumers, conveys the importance of nutrient density with the recommendation, “Get the most nutrition out of your calories” (12).

Support for the concept of nutrient density is widespread (4,9-17). In addition to the *Dietary Guidelines* (4) and *MyPyramid* (12), the 2005 Dietary Guidelines Advisory Committee called for the development of a science-based definition of nutrient density (15). The Institute of Medicine, Food and Nutrition Board’s *Dietary Reference Intake: Applications in Dietary Planning* proposed using nutrient density to plan diets for groups (16). The U.S. Food and Drug Administration (FDA) expressed interest in using a nutrient density approach instead of the 10% nutrient contribution requirement for health claims (17). The American Dietetic Association, in a recent practice paper, urges health professionals to use the current concept of nutrient density to provide guidance to their clients and to consumers to help them build healthier diets (11). Also, a scientific symposium held in Washington D.C. in 2004 and supported by the Nutrient Rich Foods Coalition explored approaches toward creating a nutrient density index or score for individual foods and beverages as an educational tool to help consumers choose foods that are naturally nutrient-rich first and less nutrient-dense foods as calories allow (9).

Despite the recent attention on nutrient density, a scientifically agreed upon definition of nutrient density or nutrient-dense foods has yet to be established (11). The 2005 *Dietary Guidelines* defines nutrient-dense foods on a nutrient to calorie basis: “Nutrient-dense foods are those foods that provide substantial amounts of vitamins and minerals (micronutrients) and relatively few calories. Foods that are low in nutrient density are foods that supply calories but relatively small amounts of micronutrients, sometimes none at all” (4). The 2005 Dietary Guidelines Advisory Committee, after a comprehensive review of the current literature on diet and health, called for more research to develop a scientifically valid definition for nutrient density and to determine what criteria are necessary for foods to meet this definition (15). In response to the Dietary Guidelines Advisory



Nutrient density is a long-standing dietary principle and a cornerstone of the 2005 Dietary Guidelines for Americans and MyPyramid. Efforts are underway to develop a scientifically valid definition for nutrient density and a scientific score to identify the most nutrient-rich foods and beverages.



Committee’s call-to-action, the Nutrient Rich Foods Coalition has been working with leading researchers to develop and validate a scientifically-based definition and score that indicates the nutrient density of individual foods and beverages.

DEVELOPING A NUTRIENT DENSITY SCORE: A WORK IN PROGRESS

An agreed upon scientifically valid nutrient density score or index that could be objectively applied to individual foods and beverages could help consumers identify and select nutrient-dense foods within food groups, while permitting some flexibility in discretionary calories (11). That is, this nutrient density score could help people implement the *Dietary Guidelines* to meet their nutrient needs within energy requirements and control calorie intake for weight management.

In Europe, nutrient profiling – the science of ranking foods based on their nutrient composition – is fast becoming the basis for food labeling, regulation of health claims, and marketing and advertising to children. Other potential applications of the nutrient density approach include use in development of nutrition policy, such as decisions about nutrient standards for foods available in schools.

With respect to food labeling, both internationally and domestically, there has been a proliferation of symbols or icons on food labels based on differing “nutrient profiling” criteria that are intended to help consumers choose healthier diets (18,19). For example, the United Kingdom (U.K.)’s Food Standards Agency has introduced a “traffic light” food label that indicates the level of fat, saturated fat, sugar, and salt in a food or beverage with the color green (low), yellow/amber (medium), or red (high) (19). Likewise in the U.S. and Canada, various food manufacturers and health professional organizations have adopted on-package food symbols that highlight healthful food choices (18,19).

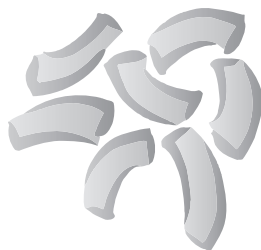
However, different criteria are used to determine whether or not a specific food can carry a “health logo.” Some criteria include the presence of health-promoting vitamins and minerals. Other criteria such

as that used to develop the U.K.'s "traffic light" food label, focus on the absence of nutrients such as fat, sugar, or sodium (18). Lack of standardized criteria to define the nutritional quality of food and beverages and failure to consider the whole nutrient package can result in consumer confusion and misinformation (18).

Over the years, several attempts have been made to define the quality of individual foods on a nutrient density basis (9-11,13,20). As many as eight such schemes, some dating back to the 1980's, have been identified by the American Dietetic Association (11). Nutrient profiles can be based on desirable nutrients only, undesirable nutrients only, or a combination of both. The basis for calculation can be 100 g, 100kcal, or RACC values (reference amounts customarily consumed) as defined by the FDA.

The Naturally Nutrient Rich (NNR) score, a nutrient to calorie ratio focusing on beneficial nutrients only, was introduced in a 2005 article in the *American Journal of Clinical Nutrition* (13). The NNR is a mean of percent Daily Values (DVs) for a number of nutrients, including fiber (13). The nutrients are protein, vitamin A, vitamin C, calcium, iron, zinc, folate, thiamin, riboflavin, vitamin D, vitamin E, monounsaturated fatty acids, and potassium (13). Overall, scores have been shown to rank from 2 (soda) to 1,000 (spinach). In an evidence-based background paper on point-of-purchase nutrition programs, the NNR score was singled out by the Dietitians of Canada as an objective index to help consumers compare food products within and across food groups (18).

Since the NNR score is a nutrients-to-calories ratio, foods with higher energy density are typically awarded lower scores. The score does not specifically address the foods' content of fat, saturated fat, *trans* fats, total sugars, or sodium (13). However, many current nutrient profiles include these nutrients. The intent of nutrient profiling should be to focus on beneficial nutrients, not just calories or nutrients to avoid. This approach will better characterize food



The nutrient-rich foods approach to a healthy diet emphasizes enjoying nutrient-rich foods first within each food group identified in MyPyramid and selecting less nutrient-rich options as calories allow. This approach focuses on a full range of nutrients in foods – as opposed to just nutrients to avoid.



and beverages based on their full nutrient packages.

To date, there is no consensus regarding the best approach to assess nutrient dense foods and to determine a nutrient density score (11). The American Dietetic Association suggests that before a scientifically valid definition of nutrient-dense foods can be established, a number of questions need to be answered. Furthermore, research needs to verify whether a nutrient density approach is feasible, economical, culturally sensitive, and usable by health professionals and consumers (11). Also, research needs to identify the best way to validate nutrient density scores and nutrient density education materials (11).

The American Dietetic Association has published a paper on the role of nutrient density in nutrition guidance (11). The paper outlines questions related to defining and assessing nutrient-dense foods that should be considered in the development of a system to help put nutrient density into practice. For example, should nutrient density include beneficial/protective nutrients only, or both beneficial and less desirable nutrients? Although the *Dietary Guidelines* defines nutrient-dense foods as those that are low in fat and have no added sugar, foods such as some milk products (e.g., low-fat chocolate milk, fruit-flavored low-fat yogurt) and some cereals that have small amounts of added sugars are recognized as being nutrient-dense (4). It is suggested that the *Dietary Guidelines'* description of nutrient-dense foods be revisited (11).

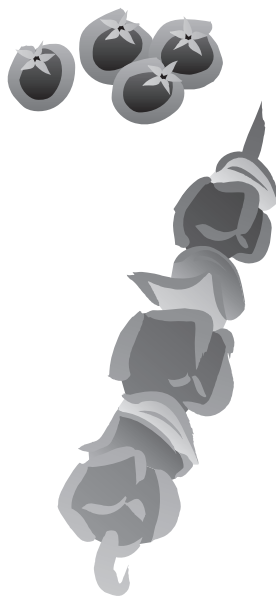
Some other questions related to specific nutrients in the definition of nutrient density are whether to consider beneficial/protective food components not considered to be nutrients (e.g., dietary fiber, carotenoids) (11). Also, should nutrients used to assess nutrient density differ for each food group? Should nutrient density be adjusted for different consumption patterns (e.g., lacto-ovo-vegetarian diets, ethnic diets) or expressed differently for naturally nutrient-dense foods vs. fortified nutrient-dense foods?

Other questions relate to how nutrient density should be expressed (e.g., nutrients per calorie, nutrients per gram, or nutrients per standard intake) and how nutrient-dense foods can be identified (i.e., nutrient-dense or not, or use of a score that rates foods on a continuum) (11). A scoring system indicating gradations of nutrient-dense foods within each food group would be less likely to lead to good and bad food categories (11). Another question concerns how to score foods that are energy-dense and nutrient-dense (e.g., dried fruits, nuts, non-lean meats, whole milk) (11). For example, foods such as whole milk and whole milk yogurt may still be considered nutrient-dense despite the availability of their lower-calorie counterparts (11). Clearly, a number of questions related to defining and assessing nutrient-dense foods and beverages need to be resolved (11).

COMMUNICATING THE CONCEPT OF NUTRIENT-RICH FOOD CHOICES FIRST

Although a scientifically valid definition of nutrient density and a consistent method of assessing the nutrient density of individual foods and beverages remain works in progress, the scientific community recognizes the immediate need to effectively communicate a way to help consumers get more nutrition from the calories they consume (9-11,13,14).

The nutrient-rich approach emphasizes enjoying nutrient-rich foods first within the basic food groups identified in *MyPyramid* (12) and selecting less nutrient-rich options as calorie recommendations allow. To show people how to build and enjoy a healthier diet that delivers the most nutrition per calorie and follow the *Dietary Guidelines* (4) and *MyPyramid* (12), the Nutrient Rich Foods Coalition has developed the *Live Well! Enjoy Nutrient-Rich Foods* tool kit (14) and a new web site (www.nutrientrichfoods.org). The tool kit, designed to help health professionals educate consumers about how to follow recommendations of the 2005 *Dietary Guidelines* (4) and *MyPyramid* (12),



The Nutrient Rich Foods Coalition – a partnership of scientific researchers, communications experts, and agricultural commodity groups – has developed a comprehensive Live Well! tool kit for health professionals and a web site (www.nutrientrichfoods.org) to help Americans improve the nutritional quality of their diets.

contains a Leader Guide, reproducible handouts, and a *MyPyramid* poster (14). The Leader Guide outlines nutrient density scientific research and provides a framework for teaching consumers how to follow *MyPyramid* (12) by choosing nutrient-rich foods. The guide also includes ideas for using the materials in a variety of settings and highlights findings from market research conducted with consumers and Registered Dietitians. The reproducible handouts include practical tips to help health professionals work with clients to build more nutrient-dense diets based on the *Dietary Guidelines* and *MyPyramid* (14). The Nutrient Rich Foods Coalition web site provides nutrient-rich menus, recipe ideas, tips, grocery shopping lists, and information on nutrient-rich options in each food group. The information on this web site is based on nutrition guidelines for *MyPyramid* (12).

CONCLUSION

To be effective, nutrition education messages need to focus on positive ways to encourage people to make healthful food choices over time, rather than emphasizing good or bad foods, nutrients to avoid, or calories alone (9,21). Nutrient density is a positive approach with the potential to help consumers choose naturally nutrient-rich foods first and less nutrient-dense foods as calories allow. This concept is compatible with the American Dietetic Association's position that "the total diet or overall pattern of food eaten is the most important focus of a healthful eating style" and that "all foods can fit within this pattern, if consumed in moderation with appropriate portion size and combined with regular physical activity" (21). For example, consumers can meet their nutrient needs within their calorie limits by basing diets on nutrient-dense foods (e.g., low-fat or fat-free dairy foods, regular and whole grains, lean meats, poultry, fish or legumes, fruits and vegetables) while balancing with small amounts of lower-nutrient, higher-energy foods to achieve an overall healthful pattern (21). Scientific research is underway to create an easy-to-use

tool (i.e., nutrient density score and consumer application) that will help people readily identify and enjoy nutrient-rich foods and beverages among all basic food groups.

Nutrient density is receiving increasing support as a means to help Americans adopt more healthful diets. However, it is important to appreciate that health is not the single or most important factor driving consumers' food choices (6,9,21). Taste and food preferences, convenience, lifestyle, cost, attitudes and beliefs, social/cultural influences, the media, and food safety considerations are among other factors impacting food choices (6,9,21). For example, food prices and diet costs may be a limiting factor for consumers wishing to adopt a more nutrient-dense diet. A recent cross-sectional study in more than 1,400 adults found that higher quality diets (i.e., less energy-dense) cost more than energy-dense diets (22). The findings led the researchers to suggest that the relatively low cost of energy-dense diets may contribute to the high rates of obesity and diabetes among low-income populations (22). The researchers also suggest that economic, environmental, and policy measures may be needed to supplement nutrition education (22).

Another study found that food groups and individual foods within food groups differ in their nutrient-to-price ratio (23). In this study, dairy foods were reported to have a high nutrient quality relative to price. Among dairy foods, milk had a higher nutritional quality-to-price ratio than either cheese or yogurt, and milk was the least expensive source of energy (23). The researchers suggest that healthful diets can be obtained at a moderate cost by preferentially selecting foods within food groups with the highest nutritional quality-to-price ratio (23). D

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RELATED RESOURCES

www.nationaldairycouncil.org

- National Dairy Council. Dairy foods' contribution to nutrient dense diets. *Dairy Council Digest* 75(1), 2004.
- Milk's Unique Nutrient Package – Fact Sheet
- Live Well! Enjoy Nutrient-Rich Tool Kit Leader Guide
- Live Well! Enjoy Nutrient-Rich Foods Tool Kit Handouts

Coming Next Issue:

HEALTH BENEFITS OF DAIRY FOODS: AN UPDATE

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