

# Practice Points

## Energy density: New educational tool, same healthy eating message

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**T**he key to weight loss is good nutrition and the key to good nutrition is education. Finding new and interesting ways to educate clients on eating right that inspire change in their behaviors can be

difficult. Energy density diets put a new spin on an old message: eat a balanced diet, plenty of fruits and vegetables, and nutrient rich foods. Energy density diets are not a fad, rather, they are here to stay (1). They are currently being advertised by the Department of Health and Human Services (DHHS) Centers for Disease Control (CDC) (2), and the American Institute for Cancer Research (AICR) (3) using easy to understand patient handouts available to nutrition professionals and the general public. As stated in a *Research to Practice Series* by the CDC, "Low-energy-dense diets help people lower their caloric intake while maintaining feelings of satiety and controlling feelings of hunger" (4).

Food and nutrition professionals understand that weight loss occurs during periods of negative energy balance, and the hard part for their clients is maintaining that progress over time. Energy density diets, like other healthful eating diets, require that clients make knowledgeable food choices consisting of items that are low in energy density, many of which make their clients feel full (increased satiety) and thus eat less afterwards (5). Following such plans, clients can lose weight because they feel full and achieve a negative caloric balance, thus, they are more likely to stick to their diet. This is, in part, because they are relatively simple to understand, easy to follow, and effective (6). These are all important factors because a common criticism by clients is that diets are overly complicated or contain too many scientific facts or jargon.

**Diets based on "energy density" have gained increased attention recently. But are they a fad or a new take on the same "healthy eating" message?**

### What is energy density?

Two of the more fundamental concepts of nutrition are the calorie (unit of energy) and the gram (unit of mass). Energy density diets are relatively simple. Energy density is defined as the amount of calories per gram in a given food item. Foods can have an energy density ranging from 0 to 9 calories per gram (Table 1). Specifically, high fat items can contain up to 9 calories per gram (pure fat); whereas, items that contain mostly water (i.e., watermelon or iceberg lettuce) approach 0 calories per gram. Carbohydrates and proteins contain 4 calories per gram, while fiber contains around 1.5 or 2.5 calories per gram (depending on the amount of soluble fiber).

**Table 1: Energy Density of the Major Food Components**

Food Components	Energy Density (calories per gram)
Fats	9.0
Protein	4.0
Carbohydrates	4.0
Fiber	2.0-2.5
Water	0.0

The energy density of food items can be calculated by dividing the number of calories by the number of grams listed on the Nutrition Facts panel or using the USDA National Nutrient Database (7). The average energy density of many homemade food items (such as a tuna fish sandwich, grilled chicken without skin, and steamed shrimp with seasoning) or other food items (such as yogurt, hard-boiled eggs, and hummus) are between 1 to 2.5 calories per gram. Energy dense foods (such as potato chips, pepperoni,

and peanut butter granola bars) have an energy density of closer to 4 or 5 calories per gram or even higher.

### How do energy density diets work?

One simple commonality between most diets is that they recommend eating items with a relatively low energy density, in a society where more and more food choices are packed with calories. Energy density diets work by helping clients to select foods that are low in calories. Shifting to a low energy density diet is a way to reduce caloric intake while controlling hunger. Over time, clients will learn to make smarter food choices that they still enjoy.

Biologically speaking, unlike carbohydrates and fat, the protein, fiber, and water content of foods help to make you feel full. This occurs through various mechanisms. For example, protein increases the feeling of fullness compared to carbohydrates and fat (8), can increase thermogenesis, and help to prevent weight regain (9). Meanwhile, fiber and water contribute weight (or volume) to foods making you feel full while contributing very few calories (10). Consequently, foods with more water and fiber are generally low in energy density. Therefore, followers of energy density diets can consume equal or larger portions of foods while losing weight (by feeling fuller) using these plans (5). Taken together, eating a low energy density diet can help your clients to lose weight by eating fewer calories over time.

### What foods are low in energy density?

Generally speaking, the energy density of foods is inversely proportionate to nutrient density. In other words, high energy density

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foods are nutrient lean; while, lower energy density foods are nutrient rich. Therefore, lower energy density foods are generally healthier and contain more nutrients. Most fruits and vegetables contain very low calories per gram while providing lots of nutrients. Other low energy density foods include whole grains and cereals while a heartier choice might include lean meat such as skinless chicken, beans/lentils, or a fresh turkey sandwich with lettuce and tomato, particularly with guacamole instead of mayonnaise. Soups and stews, which contain lots of water, are generally low in energy density and relatively filling.

Table 2 illustrates the energy density of a wide variety of common food items (7). Items such as fruits, vegetables, and soup, which have a high water content, have a low energy density; whereas, items such as some meats and cheeses that contain more fat, have a higher energy density. With an understanding of energy density, your clients can begin to replace higher energy density (around 4 or more calories per gram) foods with lower energy density items (1 to 2.5 calories per gram); thereby, reducing their caloric intake over time. While the items in Table 2 are single item foods, the same would apply to more complex food items such as sandwiches and spaghetti with meatballs.

Importantly, energy density diets are educational diets so they are sustainable over the long term. As with all diets, it is important to emphasize the importance of healthy eating while encouraging exercise and proper nutrition counseling where appropriate.

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**Table 2: Energy Density of Some Common Food Items**

Food Item	Food Energy (Calories)	Weight (grams)	Energy Density (calories per gram)
Iceberg lettuce (1 cup)	10	72	0.1
Broccoli (1 cup)	54	156	0.3
Minestrone soup, prepared (1 cup)	82	241	0.3
Apples (1 cup)	65	125	0.5
Sliced peaches, sweetened (1 cup)	235	250	0.9
Refried beans (1 cup)	238	217	1.1
Baked potatoes with skin (1 cup)	122	114	1.1
Bananas (1 cup)	150	134	1.3
Roasted turkey, skinless (1 cup)	238	140	1.7
Ground beef, 80% lean (1 serving)	209	85	2.5
Frankfurter, pork (1 link)	204	76	2.7
Mozzarella cheese (1 slice)	78	28	2.8
Cheddar cheese (1 cup, shredded)	113	28	4.0
Salami, dry (2 oz)	230	56	4.1
Bacon, fried (2 slices)	86	16	5.3

Note: numbers are rounded. Source: <http://www.nal.usda.gov/fnic/foodcomp/search>

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