Guiding Stars®
Nutritious choices made simple®

Understanding the Science behind Guiding Stars®

The Guiding Stars® nutrition guidance program is based on national and international dietary recommendations and aligns with the 2010 Dietary Guidelines for Americans (DGA). The Guiding Stars® program evaluates the nutrient content of foods using nutrition data gleaned from the Nutrition Facts label and the ingredient list on product packaging. For products that do not have food labels such as fresh produce and meats, nutrition data is obtained from the USDA National Nutrient database. Moreover, USDA data is used for foods that contain only a single ingredient or a single ingredient plus water in order to generate consistent ratings for such products. Prior to evaluation, all foods are standardized to a 100 kilocalorie (kcal) serving size. This standardization allows the consumer to compare products side by side and adjusts for serving size variation of the same product due to food packaging, as well as water weight. Four (4) separate algorithms are used to generate the Guiding Stars® ratings – 1) general foods and beverages, 2) meats/poultry/seafood/dairy/nuts, 3) fats and oils, and 4) infant and toddler foods.

To be consistent with the DGA and FDA labeling policy, nutrients are only included in the Guiding Stars® algorithm if a significant scientific consensus regarding health promotion and/or an association with reduced risk of chronic disease has been documented, and when recommendations or authoritative statements have been established by a key scientific body. Although many nutrients and food constituents were considered, the rationale for exclusion from the Guiding Stars program was a lack of consensus-based science, lack of a dietary recommendation, or feasibility issues. For example, the polyphenol content of foods is not possible to include as these data are not available for all edible products, nor are there established dietary intake recommendations. The Guiding Stars® algorithm includes as nutrients to encourage, vitamins and minerals, fiber, whole grains, omega-3 fatty acids (for fats and oils only), and monounsaturated fatty acids (MUFA; for fats and oils only), and as nutrients to limit, *trans* fatty acids, saturated fatty acids, cholesterol, added sodium, and added sugars.

Minimum and maximum threshold values were established for each nutrient included in the Guiding Stars® algorithm based on nutrient ratio to the 100 kcal energy referent, i.e., equivalent to 5% of energy intake based on a 2000 kcal diet. Nutrients listed on the nutrition facts label are presented as percentage of Daily Values (DV) and are based on a fixed average energy intake value of 2000 kcal. Thus, if a 100 kcal serving of a food provides 5% of total energy intake (based on 2000 kcal), then following the DGA recommendation to balance nutrients with calories, one serving should also contain at least 5% of the DV for nutrients to encourage, and no more than 5% of the DV for those to limit. For five of the eight nutrients included in the system with established DVs (saturated fat, cholesterol, sodium, vitamins/minerals, and fiber), threshold values using a base and multiples of 5% DV were assigned based on the model type (**Tables 1** and **2**). The thresholds for the remaining three nutrients without DVs were derived using established dietary guidance from authoritative scientific bodies. Cutoff values for added sugars were calculated based on the ideal of no added sugars, ≤10% of calories (based on World Health Organization recommendations), and ≤25% of calories (based on the Institute of Medicine recommendations). In order to not penalize foods which naturally contain sugars or sodium (such as milk and spinach, respectively), debit for added sugars and added sodium content is triggered by the presence of specific added sugars and sodium (i.e. salt) keywords identified in the ingredient statement. The added sugars keywords are consistent with those listed in the United States Department of Agriculture Added Sugars database but include additional sugars that have been found in the food supply. Additionally, all foods and beverages which exceed 600 mg sodium/100 kcal and all general foods and beverages that contained over 40% of calories from added sugars are automatically disqualified from earning a star rating regardless of the presence of positive nutrients.

The Guiding Stars® program is a point based system. The program awards credit points to products for nutrients to encourage and assigns debit points for nutrients to limit. The net score of a product is then translated into a Guiding Stars® rating of 0, 1, 2, or 3. Only foods with a score above 0, indicating that the positive nutrient contribution outweighs the negative nutrient contribution, receive stars. For example, a food containing 240 mg sodium per100 kcal, which is within the mid-range of assigned values, could earn stars as long as the positive points from the vitamin/mineral and/or fiber content outweigh the sodium debit.

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A manuscript which includes the Guiding Stars® algorithm for general foods and beverages, as well as meats, poultry, seafood, dairy, and nuts has been published in the November/December 2011 issue of the American Journal of Health Promotion.[1] The most current version of these algorithm tables are also given below in **Tables 1** and **2**. Please note that while the patented Guiding Stars® concept and approach is firm, the algorithm details are subject to flux as new science emerges and dietary guidelines/recommendations are refined. The Guiding Stars® Scientific Advisory Panel reviews the algorithm on a regular basis and makes changes as needed.

Table 1. Algorithm for General Foods and Beverages:

Nutrients to Limit	POINTS				
	0	**-1**	**-2**	**-3**	**-10**
***Trans* fatty acid‡**	<0.5 g (not listed in ingredients)	<0.5 g (listed in ingredients)	≤1 g	>1 g	
Saturated fat	≤1 g (5% DV)	≤2 g (10% DV)	≤3 g (15% DV)	>3 g (>15% DV)	
Cholesterol	≤15 mg (5% DV)	≤30 mg (10% DV)	≤45 mg (15% DV)	>45 mg (>15% DV)	
Added sugars*	None Added	≤10% kcal	≤25% kcal	≤40% kcal	>40% kcal
Added sodium*	≤120 mg (5% DV)	≤240 mg (10% DV)	≤360 mg (15% DV)	≤600 mg (25% DV)	>600 mg
Nutrients to Encourage	**POINTS**				
	+3	**+2**	**+1**	**0**	
Dietary fiber	≥3.75 g (15% DV)	≥2.5 g (10% DV)	≥1.25 g (5% DV)	<1.25 g (<5% DV)	
Vitamins & Minerals	≥10% DV of 2 or more vitamins/minerals	≥10% DV of 1 **OR** ≥5% DV of 2 or more vitamins/minerals	≥5% DV of 1 vitamin/mineral	<5 DV% of 1 vitamin/mineral	
Whole grain*	---	---	≥1.5 g fiber	---	

‡ *Trans* fat content is evaluated using an either/or two-step approach. If an amount of *trans* fat greater than zero is listed on the food label, then that value is evaluated; however, if 0 g or no amount is listed, then the ingredient list is scanned for the key words "partially hydrogenated" and subsequently scored. The Guiding Stars® algorithm requires a 0 g value and no indication of partially hydrogenated ingredients in order to avoid a debit to the product scoring.

*A two-step process of keyword recognition from the ingredients list and evaluation of nutrient value from the Nutrition Facts label is required.

Abbreviations: g (grams); DV (Daily Value); mg (milligrams); kcal (kilocalories).

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Meats/Seafood/Dairy and Nuts: As noted above, Guiding Stars® recognizes that there are different types of foods with inherently different nutrient profiles. Meats and seafood have intrinsically higher levels of certain nutrients such as saturated fat and cholesterol, and do not contain fiber and whole grains. Nuts likewise naturally contain higher levels of saturated fat, but do contain naturally occurring fiber. The Food and Drug Administration, along with other major health organizations, specifies different standards of saturated fat and cholesterol for meats and seafood in their definition of `healthy.' The DGA categorizes nuts with meat items. The model presented below was created to account for higher levels of endogenous cholesterol and saturated fats and lack of naturally occurring fiber (with the exception of nuts) or whole grain within these

food categories, and to generate star ratings that align with and underscore current DGA recommendations.

Table 2. Algorithm for Meats, Poultry, Seafood, Dairy, and Nuts:

Nutrients to Limit	POINTS				
	0	**-1**	**-2**	**-3**	**-10**
***Trans* fatty acid‡**	<0.5 g (not listed in ingredients)	<0.5 g (listed in ingredients)	≤1 g	>1 g	
Saturated fat	≤1.5 g (7.5% DV)	≤2 g (10% DV)	≤2.5 g (12.5% DV)	>2.5 g (>12.5% DV)	
Cholesterol	≤60 mg (20% DV)	≤90 mg (30% DV)	≤120 mg (40% DV)	>120 mg (>40% DV)	
Added sugars*	None Added	≤10% kcal	≤25% kcal	≤40% kcal	
Added sodium*	≤120 mg (5% DV)	≤240 mg (10% DV)	≤360 mg (15% DV)	≤600 mg (25% DV)	>600 mg
Nutrients to Encourage	**POINTS**				
	+3	**+2**	**+1**	**0**	
Dietary fiber	NA	NA	≥1.25 g (5% DV)	<1.25 g (<5% DV)	
Vitamins & Minerals	≥10% DV of 2 or more **OR** ≥20% DV of 1 vitamins/minerals	≥10% DV of 1 **OR** ≥5% DV of 2 or more vitamins/minerals	≥5% DV of 1 vitamin/mineral	<5 DV% of 1 vitamin/mineral	

‡ *Trans* fat content is evaluated using an either/or two-step approach. If an amount of *trans* fat greater than zero is listed on the food label, then that value is evaluated; however, if 0 g or no amount is listed, then the ingredient list is scanned for the key words "partially hydrogenated" and subsequently scored. The Guiding Stars® algorithm requires a 0 g value and no indication of partially hydrogenated ingredients in order to avoid a debit to the product scoring.

*A two-step process of keyword recognition from the ingredients list and evaluation of nutrient value from the Nutrition Facts label is required.

Abbreviations: g (grams); DV (Daily Value); mg (milligrams); kcal (kilocalories).

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Two additional algorithms have been created to evaluate fats and oils, as well as infant and toddler foods. A separate fats and oils model was created because the other algorithms do not include nutrients such as omega-3 fatty acids and monounsaturated fatty acids that must be considered to differentiate fats and oils in a meaningful way. The Guiding Stars® ratings for fats and oils are based on data obtained from the USDA National Nutrient database as these nutrients are not consistently listed on the Nutrition Facts label. Finally a separate algorithm was created to evaluate infant and toddler foods to reflect the unique nutritional needs of this age group. In this model emphasis is placed on vitamins and minerals recommended by the American Academy of Pediatrics', and central to federal feeding programs such as WIC. Moreover as there are no recommendations for saturated fat, cholesterol or *trans* fat for infants and toddlers under the age of 24 months, these nutrients are not included in this algorithm. Baby formula is not rated by the Guiding Stars® program.

[1]Fischer LM, Sutherland LA, Kaley LA, Fox TA, Hasler CM, Nobel J, Kantor MA, Blumberg J. Development and implementation of the Guiding Stars nutrition guidance program. Am J Health Promot. 2011 Nov;26(2):e55-63.

