Choose Your Foods: Exchange Lists for Diabetes, Sixth Edition, 2008: Description and Guidelines for Use

Madelyn L. Wheeler, MS, RD, FADA; Anne Daly, MS, RD; Alison Evert, MS, RD; Marion J. Franz, MS, RD; Patti Geil, MS, RD, FADA; Lea Ann Holzmeister, RD; Karmeen Kulkarni, MS, RD; Emily Loghmani, MS, RD; Tami A. Ross, RD; Pamela Woolf

ABSTRACT

Choose Your Foods: Exchange Lists for Diabetes (formerly *Exchange Lists for Meal Planning)*, a booklet used to help people with diabetes plan meals, has been in existence for more than 50 years. Planning for the fifth revision was guided by survey responses from >3,000 registered dietitians and other health professionals, current diabetes management and nutrition recommendations, and the food marketplace. In addition to a name change, major changes were made in design and overall readability. Changes within food groupings and the addition of a number of foods (mainly ethnic/regional) were accomplished while maintaining the well-recognized and accepted mean macronutrient and energy values of the basic lists. As with previous editions, this publication is intended as a resource for use by individuals with diabetes, with the guidance of a registered dietitian. This booklet is also intended to be used as a basis for nutrition educational materials developed by the American Dietetic Association and American Diabetes Association (eg, carbohydrate counting, weight management) and as a method for students and others to learn about diabetes meal planning. Practical guidelines for use of this updated resource for meal planning (eg, sugar alcohols, dietary fiber, and alcohol) are also presented.

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In 1950, the first edition of the *Exchange Lists for Meal Planning* booklet (1) was developed by the American Dietetic Association, the American Diabetes Association, and the United States Public Health Service. The goal was to provide a set of food values for estimating nutrients and energy for meal plans for people with diabetes, a short method for calculating the diet, and several lists of foods of similar values. Since that time, the booklet has been updated four times (2-4). Because of recent advancements in diabetes management, the evolving evidence base for nutrition recommendations for people with diabetes, and changes in the food marketplace and the eating patterns of Americans, this booklet has been revised again.

M. L. Wheeler *is coordinator, Nutritional Computing Concepts, Zionsville, IN.* ***A. Daly*** *is director of nutrition and diabetes education, Springfield Diabetes and Endocrine Center, Springfield, IL.* ***A. Evert*** *is a diabetes nutrition educator, University of Washington Medical Center, Diabetes Care Center, Seattle.* ***M. Franz*** *is a nutrition/health consultant, Nutrition Concepts by Franz, Inc, Minneapolis, MN.* ***P. Geil*** *is a certified diabetes educator, Geil Nutrition Communications, Lexington, KY.* ***L. A. Holzmeister*** *is a certified diabetes educator, Holzmeister Nutrition Communications, LLC, Tempe, AZ.* ***K. Kulkarni*** *is director of Scientific Affairs, Intensive Diabetes Management, Abbott Diabetes Care, Salt Lake City, UT.* ***E. Loghmani*** *is a diabetes educator, Endocrinology and Diabetes Consultants, an Affiliate of Wentworth-Douglass Hospital, Dover, NH.* ***T. A. Ross*** *is a diabetes nutrition educator, Internal Medicine Associates, Lexington, KY.* ***P. Woolf*** *is with the American Health Information Management Association; at the time of the study, she was a development editor, American Dietetic Association, Chicago, IL.* ***M. L. Wheeler, A. Daly, A. Evert, M. Franz, P. Geil, L. A. Holzmeister, K. Kulkarni, E. Loghmani,*** *and* ***T. A. Ross*** *are also certified diabetes educators.*

Address correspondence to: Madelyn L. Wheeler, MS, RD, FADA, Nutritional Computing Concepts, 5014 Turkey Foot Rd, Zionsville, IN 46077. E-mail: mlwheele@iupui.edu

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DIABETES/NUTRITION RECOMMENDATIONS

The American Diabetes Association has recently updated its nutrition recommendations (5) and the American Dietetic Association has updated and expanded the Evidence Analysis Library recommendations for type 1 and type 2 diabetes (6). Medical nutrition therapy is essential to help people with diabetes accomplish the goals of achieving and maintaining (a) blood glucose close to or at the normal range, (b) a lipid and lipoprotein profile that reduces risk for vascular disease, and (c) blood pressure close to or at the normal range. A registered dietitian is the health professional recommended to provide medical nutrition therapy (5,6). Studies employing a variety of nutrition interventions using medical nutrition therapy report a reduction in hemoglobin A1c levels, improved lipid profiles, improved weight management, decreased need for medications, and reduction in risk for onset and progression of comorbidities (6). Nutrition interventions include adjusting insulin doses to match carbo-

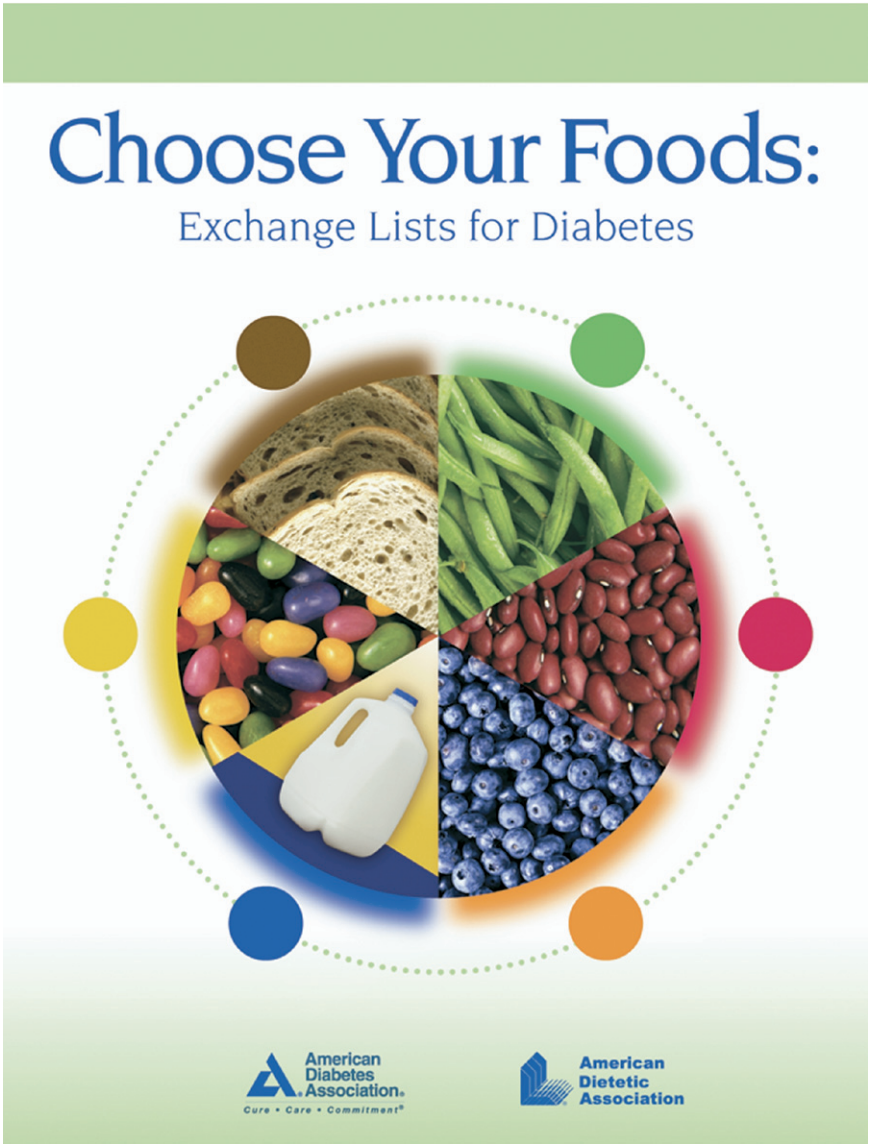

Figure 1. *Choose Your Foods: Exchange Lists for Diabetes* cover page. © 2008 American Diabetes Association and American Dietetic Association. Reprinted with permission.

hydrate intake, consistency in carbohydrate intake, weight management, increasing fiber to meet the Adequate Intake (14 g/1,000 kcal) recommended by the Dietary Reference Intakes (7), limiting saturated fats to <7% of total calories, minimizing trans fats, lowering cholesterol to <200 mg/day, and reducing sodium intake to <2,300 mg/day. Monitoring carbohydrate intake, either by carbohydrate counting, exchanges, or experienced-based estimation, is a key intervention in achieving glycemic control. Specific food recommendations include increased use of fruits, vegetables, whole grains, and legumes, as well as low-fat dairy products and lean meats rather than full-fat products, and unsaturated fats rather than saturated fats.

SURVEY/QUESTIONNAIRE

The process for the fifth revision was initiated by the American Dietetic Association with an online survey sent to 14,000 members of the American Dietetic Association (particularly the Diabetes Care and Education and Weight Management practice groups), the American Diabetes Association, and the American Association of Diabetes Educators. The survey was of the exempt type and did not require institutional review board approval or informed consent. Questions were both closed (yes or no) and open-ended. Three-thousand and eighty-eight (22%) usable responses were received. Because the philosophy of food grouping for healthful meal planning is basic to diabetes education, and is used for other meal planning methods, such as carbohydrate counting as well as weight management, the survey indicated that the booklet should be retained and updated. The recommendations were summarized into five categories: title, food list groupings and foods within the lists (eg, more cultural diversity), sidebar ideas, design (eg, color coding), and other considerations (eg, more generalized diabetes health care information, more emphasis on readability). This revision is based on the survey results, nutrition recommendations (5,6), and an update of foods available in the marketplace.

SUMMARY OF CHANGES

Title of Booklet

The survey indicated that use of the word *exchanges* was outdated and confusing to many; on the other hand, the word has recognition for both organizations. Therefore, the title was changed to "*Choose Your Foods,*" but includes a subtitle (*Exchange Lists for Diabetes)* so that health professionals and the public would know this is a revision rather than a completely new concept (Figure 1).

Food List Groupings, and Foods within the Lists

The basic philosophy of this publication has always been the grouping of foods into general categories (or lists) that, per serving size, are similar in macronutrients and calories. While the lists generally remain the same as in previous editions, changes have been made so they are easier to use. For example:

- The "starch+fat" category has been deleted from the Starch List.
- A "dairy-like products" category (eg, soy and rice milks, smoothies) has been added to the Milk List.
- Leafy greens have moved from the

Table. Macronutrient and energy values assigned to each food list compared to a mean of all foods within each list

Food list	n	Carbohydrate (g)	Protein (g)	Fat (g)	Calories
		← *Average (mean±standard deviation)* →			
Carbohydrates					
Starch: breads, cereals and grains, starchy vegetables, crackers and snacks, and beans, peas and lentils	112	15 (16.0±3.2)	0-3 (2.8±1.9)	0-1 (1.3±1.6)	80 (84±20)
Fruit	50	15 (15.2±2.0)	— (0.8±0.4)	— (0.2±0.2)	60 (61±7)
Milk					
Fat-free, low-fat, 1%	8	12 (12.5±1.1)	8 (8.5±0.8)	0-3 (1.1±1.1)	100 (95±11)
Reduced-fat, 2%	5	12 (10.8±3.4)	8 (7.6±1.5)	5 (4.5±0.8)	120 (120±17)
Whole	4	12 (11.9±0.7)	8 (8.6±0.4)	8 (8.9±1.1)	160 (162±9)
Sweets, desserts, and other carbohydrates[a]	68	15	Varies	Varies	Varies
Nonstarchy vegetables	67	5 (4.8±2.5)	2 (1.3±0.7)	— (0.2±0.3)	25 (23±11)
Meat and meat substitutes					
Lean	78	— (0.6±1.1)	7 (7.1±1.5)	0-3 (1.6±1.1)	45 (46±12)
Medium-fat	32	— (0.5±0.8)	7 (6.9±1.5)	4-7 (4.6±1.1)	75 (72±9)
High-fat	26	— (0.7±0.6)	7 (5.7±1.6)	8+ (8.2±1.3)	100 (100±14)
Plant-based proteins[a]	17	Varies	7	Varies	Varies
Fat	72	— (1.1±1.4)	— (0.7±1.0)	5 (4.4±0.9)	45 (46±10)
Free foods	91	— (2.0±1.6)	— (0.6±1.0)	— (0.3±0.6)	— (13±8)
Combination foods[a]	30	15	Varies	Varies	Varies
Fast foods[a]	30	15	Varies	Varies	Varies
Alcohol[a]	7	Varies	—	—	100

[a]Five lists do not contain mean±standard deviation because of wide macronutrient or caloric variability.

Nonstarchy Vegetable List to the Free Foods List.
- Very lean meats have been integrated into the Lean Meat List, and a new category has been added to the Meats and Meats Substitute Group, the Plant-Based Protein List.
- Several lists (Sweets, Desserts and Other Carbohydrates, Combination Foods, and Fast Foods) have been subdivided for ease of use.
- An Alcohol List has been added to provide adults who choose to drink with information (in alcohol equivalents) about calories and carbohydrates.

Foods within the lists have been updated. While a few foods were deleted, a number were added, with the total being represented by >700 foods in the updated data set accompanying this revision. Foods were selected based on current common use and wide availability (8,9).

To verify the average energy and macronutrient values used in the latest set of food lists and to determine the most appropriate serving sizes for matching the list average values, the previous Exchange Lists for Meal Planning data set (10) was the initial starting point. The United States Department of Agriculture's Nutrient Database for Standard Reference (11) was used to obtain or update nutrient values for each individual food. Where this database was inadequate, information from nutrition labels of several brands of the food item were averaged. Nutrient information for a few foods was obtained from the United States Department of Agriculture's Food and Nutrient Database for Dietary Studies (12). The Table provides the average group macronutrient and energy values and the means per serving of all foods in each of the food lists for *Choose Your Foods*. This should reassure users that each food in a list, in the serving size given, is reflective of the rounded averages; however, it is also a reminder that while the means are close to the average values, the standard deviation indicates a range for each group.*

**The complete nutrient data set may be accessed by going to the American Dietetic Association's Web site, Food and Information section (www.eatright.org/knowledgecenter, then choose the Food Nutrient Dataset under "Consumer Resources." Accessed April 4, 2008.).*

Sidebars

Many sidebars and boxes provide suggestions to help people with diabetes better manage the food selection component for controlling their diabetes: concepts such as energy balance and helpful suggestions for portion sizes, smart supermarket shopping, eating more vegetables, ground beef labeling, and reducing *trans* fats. Increasing physical activity is also covered, in a "Get Moving" section. In addition, the nutrition and food selection tips for each list have been updated to reflect current food choices of the population and increased availability of a variety of foods and food products.

Design

Overall the booklet was designed to be more user-friendly. For example:

- A "table" design is used to help readers follow a food across the page to the amount.
- Color-coding separates the food groups: brown for starches; orange for fruits; blue for milk; green for vegetables; red for meats and substitutes; and yellow for fats.
- Flagging is used to alert readers to foods high in sodium and good sources of fiber. Following guidelines

from the Code of Federal Regulations for use of the term *healthy* in food labeling, a food is flagged as high in sodium if a serving contains >480 mg sodium, and a main dish/meal is flagged if a serving contains >600 mg sodium (13). The Code of Federal Regulations indicates that to define a food as a "good source" of fiber, it should contain 10% to 19% of the Dietary Reference Intake for fiber (14). Thus, those foods containing >3 g fiber/serving have been flagged. A third flag is the symbol to alert people when to "add a fat" (eg, a starch with an added fat).

Other Considerations

The booklet is written for a reading level of 6th grade or less and contains a number of small colorful food pictures to provide visual emphasis. While keeping essential content, the introduction was reduced. The glossary has been extensively revised and now includes basic diabetes information as well as food/nutrient information. In addition, an extensive index has been included to assist in finding specific foods easily.

Guidelines for Food and Meal Planning Using the *Choose Your Foods* Booklet

The booklet contains a "Your Meal Plan" page for use in individualized meal planning or for assessing food intake. There is a small area for personalization of nutritional goals (calories, percent of calories as carbohydrate, grams or choices of carbohydrate, grams of fat and protein) and a simple meal-planning template table. The template lists the main food groups in a set of vertical columns, with six rows for main meals and snacks. A final column is available for meal suggestions. An amount (eg, number of choices or grams of carbohydrate) can be inserted into each block. Or, this template, along with the carbohydrate, fat, protein, and calorie values assigned to each food group (Table) can be used for evaluating food intake for the nutrition assessment. Guidelines for using *Choose Your Foods* in helping people with diabetes accomplish healthy meal planning follow:

1. Each list general macronutrient and energy values are based on a range of individual food values. Calculations of food intake based on the *Choose Your Foods* booklet are not accurate enough for single-digit precision. Estimates of energy in calculated meal plans should be rounded off, for example to the nearest 50 to 100 kcal.
2. Recommending a wide variety of foods is important when planning meals. A food pattern that includes carbohydrate from fruits, vegetables, whole grains, legumes, and low-fat dairy products should be encouraged for good health. In addition, individuals should be encouraged to choose foods from the Lean Meat/Plant-Based Protein Lists of the Meats and Meat Substitutes Group, and the Mono- and Polyunsaturated Fat Lists from the Fat Group.
3. Percentages of macronutrients in the meal plan should be based on metabolic goals and the ability, need, and willingness of the person with diabetes to make lifestyle changes (5,6). While there is no carbohydrate percentage of energy recommended specifically for people with diabetes, it is not unreasonable to use the Dietary Reference Intakes' Acceptable Macronutrient Distribution Range of 45% to 65% of total daily energy for both adults and children (15).
4. Carbohydrate choices is a concept used in this booklet and is based on the fact that foods in the Starch, Fruit, and Milk Lists of the Carbohydrate Group each contain similar carbohydrate (~15 g) and energy (~80 kcal) content per serving and thus they can be interchanged:
   - One serving of starch, fruit or milk=1 carbohydrate choice (about 15 g carbohydrate). Possible problems need to be anticipated and, in some cases, individualized guidelines for interchanging foods need to be provided. For example, if regular substitution of fruits or starches for milk is made, calcium intake may be decreased and protein (eg, for children) may be reduced considerably.
   - The sample meal plan page does not include several of the lists within this booklet. The Sweets, Desserts and Other Carbohydrates, the Combination Foods, and the Fast Foods have their foods listed in a "count as" column, as x amount of carbohydrate, or x amount of carbohydrate + y amount of fat. In the case of dairy-like products included within the milk list (eg, soy milk), foods are listed as x amount of carbohydrate and perhaps y amount of fat and z amount of milk choices.
   - In a situation analogous to the carbohydrate choices, plant-based proteins have been added to the Meats and Meat Substitutes Group. While they are similar to meats in that, per serving, they have ~7 g protein, they have carbohydrate as well. For example, ¾ oz soy nuts is "counted as" ½ carbohydrate+1 medium-fat meat.
5. If foods in the Free Foods List are consumed often in 1 day (particularly those with amounts listed), the calories and carbohydrates consumed could affect expected clinical outcomes.
6. Because many adults with diabetes do consume alcohol, an alcohol equivalents list has been included, with each equivalent representing 100 calories of absolute alcohol. If adults choose to drink alcohol, they should be cautioned to consume one drink or less/day for women, two drinks or less per day for men. A "drink" is defined as 12 oz beer, 5 oz wine, or 1½ oz of distilled spirits (5). Because alcohol does not readily interchange with other food groups, the following guidelines can be used:
   - Because alcohol does not require insulin to be metabolized, it should not be counted in the meal plan if used occasionally.
   - If used daily, the meal plan calorie level should be adjusted accordingly.
   - Any carbohydrate taken with the alcohol (mixed drinks) needs to be counted.

Determining Food List Choices for Food Label Nutrition Facts or Recipes

Using information from food labels helps individuals to include favorite foods in their meal plans, and everyone uses favorite recipes at one time or another for meal planning. While the *Choose Your Foods* booklet contains a simple method that people can

Steps	Suggestions
1. Determine what list(s) to use as choices/servings	Use starch, fruit, milk, and nonstarchy vegetables lists when possible rather than the generic "carbohydrate." This helps in planning healthy meals. If there are substantial amounts of carbohydrate from three or all four of the abovementioned lists, if the serving has ≥1/3 of the carbohydrate as added sugars, or if the food is a dessert-type food, simply call the choice "carbohydrate." Occasionally a solution will include both a specific carbohydrate list and a general carbohydrate serving (eg, one starch+½ carbohydrate).
2. Adjust carbohydrate grams if needed	If a food contains >5 g sugar alcohols or dietary fiber, subtract half the grams of sugar alcohols or fiber from the carbohydrate grams to get the total adjusted carbohydrate grams (16).
3. Use rounding to determine the approximate number of choices	For carbohydrate, use 15 g per choice for starch, fruit, sweets; 12 g per choice for milk; 5 g per choice for nonstarchy vegetables. Actual carbohydrate per serving should be within ±5 g of choice determination. Range and rounding guidelines: ≤5 g: do not count >5 to ≤10 g: ½ choice/serving >10 to ≤20: 1 choice/serving For protein, use 7 g per choice for meats/meat substitutes. Actual protein per serving should be within ±3 g of choice determination. Range and rounding guidelines: ≤4 g: do not count >4 to ≤10 g: 1 choice/serving For fat, use 5 g/choice. Actual fat per serving should be within ±2 g of the choice determination. Range and rounding guidelines: ≤2: do not count >2 to ≤4 g: ½ choice/serving >4 to ≤7 g: 1 choice/serving The actual energy value per serving should be within ±20 calories of the total choice determination value. Do not use ¼ or 1/3 choices, and do not use ½ vegetable or ½ meat exchanges. Half choices for starches, fruits, milk, or carbohydrate can be more easily used in meal planning.
4. Prioritize	Give carbohydrate grams first priority, protein second, and fat third. The calories will usually fall into the acceptable level if the other figures are correct. Milk and vegetables are sometimes hard to include in adequate amounts in a meal plan. Make an effort to include even half amounts of milk. Designating a recipe or Nutrition Facts label as having three or four nonstarchy vegetable choices (5 g carbohydrate each), given that the vegetables are truly available in the food, would be appropriate.
5. Make adjustments if needed, particularly for main dishes or meals	No food group is represented completely by one nutrient (eg, the carbohydrate group foods contain small amounts of fat and protein, see the Table). For example, three starches could have up to 9 g of protein, which will reduce the number of meat choices by one; two lean meat choices may have up to 5-6 g fat, which will reduce the number of fat choices by one.

Figure 2. Suggestions for converting label Nutrition Facts or recipe servings into food list choices/servings.

use to convert recipes/nutrition facts to food list choices, the information in Figure 2 can be used as a guide to increase the accuracy of the analysis.

The booklet also includes a sample food label. Of particular interest is the guidance for how to handle dietary fiber and sugar alcohols, as they are incompletely digested, absorbed and metabolized (16). Grams of sugar alcohol (polyols) and dietary fiber are included on the Nutrition Facts panel of a food label; however, in deriving energy value for food labeling, they are calculated as having about half the energy (2 kcal/g) of most other carbohydrates (4 kcal/g). The Institute of Medicine indicates that less energy is recovered from fiber than the 4 kcal/g that is recovered from carbohydrate, with the range being 1.5 to 2.5 kcal/g (17). The energy yield of sugar alcohols ranges from 0.2 kcal/g (erythritol) to 3.0 g (hydrogenated starch hydrolysates) (18), and averages about 2 kcal/g. Adjustment is practical only if the amount per serving of either dietary fiber or sugar alcohols is >5 g. In that case, counting only half of the carbohydrate grams from these food ingredients/components would be useful when calculating exchanges/food choices for food labels or recipes and for individuals who are using insulin-to-carbohydrate ratios for managing their diabetes.

CONCLUSIONS

The fifth revision of this booklet continues to provide a structure for choosing foods for diabetes and weight-management meal planning. Based on a survey of registered dietitians and other health professionals, current diabetes/nutrition recommendations, and current marketplace foods, many changes

were made, including title change and design; however, it retains the validated system of dividing foods into groups (starches, fruits, milks, nonstarchy vegetables, meats and fats). Thus, this booklet can be used as a resource for people with diabetes, a method for assessing food intake, a base for developing/revising other meal planning publications (eg, carbohydrate counting, weight management), and a method for college students, dietetic interns, diabetes health professionals, and others to learn about diabetes meal planning. *Choose Your Foods: Exchange Lists for Diabetes*, as well as companion publications (Spanish version, *Choose Your Foods: Exchange Lists for Weight Management*) may be purchased from the online stores of the American Dietetic Association (http://www.eatright.org, accessed April 4, 2008) or the American Diabetes Association (http://www.diabetes.org, accessed April 4, 2008).

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