



Section 3: Medical Nutrition Therapy

Concern	Care/Test	Frequency
Medical Nutrition Therapy	<ul style="list-style-type: none"> Refer for medical nutrition therapy (MNT) provided by a registered dietitian (RD), preferably a CDE 	At diagnosis or first referral to RD: 3 to 4 visits, completed in 3 to 6 months; then, 1-2 hours of routine RD visits annually. RD determines additional visits based on needs/goals.

MAIN TOPICS INCLUDED IN THIS SECTION:

- Nutrition Care Process
- Medical Nutrition Therapy Goals
- Frequency of Visits
- Recommended Amount of Daily Carbohydrates
- Dietary Fats and Cholesterol
- Dietary Fiber
- Dietary Choices for Individuals with Pre-Diabetes
- Nutritional Guidance for Non-Dietitian Health Professionals
- Referral to a Registered Dietitian and Coordination of Care
- Additional Resources
- References

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Medical nutrition therapy (MNT) is a cornerstone of diabetes self-management training. It is strongly recommended that a person with diabetes be referred to a registered dietitian (RD), preferably one who is also a certified diabetes educator (CDE), to provide MNT. MNT includes a nutrition assessment, goal setting for clinical and behavioral outcomes, and a self-management training plan for reassessment and communication to other members of the health care team.

Intervening early with MNT is essential. MNT is an integral component of diabetes self-management education. Even small consistent nutrition changes can be critical in achieving and maintaining glycemic control, reduce the risk of cardiovascular disease and other complications associated with poor blood glucose control. MNT can assist with the prevention of type 2 diabetes, and prevent (or at least slow) the development of costly diabetes-related complications and hospitalizations. MNT can assist people at risk for or with diabetes in making informed and beneficial nutrition changes, ultimately reducing the amount of oral medication(s)/insulin needed to optimize glycemic control. Strategies used by the RD in providing MNT take into consideration educational or cultural needs, literacy level/skill, and learning barriers while respecting the individual's willingness to change behavior.

An RD has specific expertise and resources to carry out the entire process from nutrition diagnosis to intervention, monitoring, and evaluation. It is important to note that Medicare Part B and most insurance plans only reimburse MNT for persons with confirmed diagnosis of diabetes when it is provided by a RD.

Nutrition Care Process

The nutrition recommendations for MNT must incorporate the evidence-based guidelines developed by the Academy of Nutrition and Dietetics (formerly the American Dietetic Association) and be based on a comprehensive assessment of medical history, nutrition, lifestyle factors, and learning ability. Interventions must include strategies that encourage responsibility for self-management. Several meal-planning approaches are available to help people develop realistic and achievable goals. Standardized calorie-level meal plans are no longer recommended. Nutrition recommendations may be as simple as three regularly scheduled meals without sweetened beverages, or as complex as the use of carbohydrate-insulin ratios for people using insulin pumps.

The RD monitors and evaluates food intake, medication(s), metabolic control (glycemia, lipids, and blood pressure), anthropometric measurements, physical activity, and goal progress. To evaluate the effectiveness of MNT, the RD uses blood glucose results, changes in lipids and blood pressure, goal achievement, and reported measures of self confidence management. Self-monitoring of blood glucose (SMBG) results can serve as a basis for making adjustments in amounts and types of foods eaten at meals to achieve blood glucose goals. The RD can suggest medication(s)/insulin adjustments if he/she determines that sufficient nutrients and calories are achieved yet blood glucose values are not at goal. The RD bases MNT goals on the specific situation (e.g., age, type of diabetes). For more on situation-specific goals, see Table 3-1.

Medical Nutrition Therapy Goals

Medical nutrition therapy goals for diabetes include:

1. Attain and maintain optimal metabolic outcomes
 - Blood glucose levels in the normal range (or as close to normal as is safely possible) to prevent or reduce the risk of diabetes complications

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- Lipid and lipoprotein profile that reduces the risk for vascular disease
 - Blood pressure level that reduces the risk for vascular disease
2. Prevent, or at least slow, the rate of development of chronic complications by modifying nutritional intake and lifestyle
 3. Maintain the pleasure of eating while making food choices indicated by scientific evidence
 4. Assess individual nutritional needs taking into consideration lifestyle, personal and cultural preferences, and food security, while respecting the individual's wishes and willingness to change behavior
 5. Assess literacy and other special educational needs

Table 3-1: Situation-Specific Medical Nutrition Therapy Goals

Situation	Medical Nutrition Therapy Goals
Type 1 – Youth	Provide adequate energy to ensure normal growth and development. Integrate insulin regimens into normal eating and physical activity habits.
Type 2 – Youth	Facilitate changes in eating and physical activity habits to reduce insulin resistance, improve metabolic status, and promote a healthy weight.
Pregnancy and Lactation	Provide adequate energy and nutrients needed for optimal outcomes for mother and baby.
Older Adults	Provide for the nutritional and psychosocial needs of an aging individual.
Individuals who take insulin	Provide self-management education for treatment and prevention of hypoglycemia, acute illnesses, and physical activity-related blood glucose fluctuations.
Pre-diabetes	Encourage physical activity and promote healthier food choices to facilitate moderate weight loss or at least prevent weight gain. (For additional information, see <i>Section 13: Assessing Risk and Prevention of Type 2 Diabetes.</i>)
Metabolic Syndrome	Encourage physical activity and promote healthier food choices to facilitate moderate weight loss (or at least prevent weight gain) and help achieve optimal blood pressure, lipid, and glucose goals. (For additional information, see <i>Section 13: Assessing Risk and Prevention of Type 2 Diabetes.</i>)

Frequency of Visits

An initial series of three to four MNT encounters, each lasting 45 to 90 minutes, is recommended. Completing this series within three to six months, beginning at diagnosis of diabetes or at first referral to an RD for MNT for diabetes, is optimal. The RD should determine if additional MNT encounters are needed after the initial series, based on nutrition assessment of learning needs and progress toward desired outcomes.

After completing the initial series of MNT visits, a person with diabetes should see an RD for a minimum of one visit annually. More frequent appointments may become necessary during major changes in therapy, at times of uncontrolled diabetes, in the event of hospitalization for diabetic ketoacidosis or hypoglycemia, at the onset of complications, during preconception counseling, and during pregnancy. Family members or other caregivers are encouraged to attend MNT visits to assist and support healthy eating for the person with diabetes as well as the entire family.

Recommended Amount of Daily Carbohydrates

Nutrition interventions to regulate pre- and post-meal blood glucose levels are key to improving glycemic control. Both the quantity and type/source of carbohydrates found in foods influence post-meal blood glucose levels. An RD can assist the person with diabetes to evenly distribute his or her carbohydrate intake to keep blood glucose in the goal range; this may include matching doses of insulin to the carbohydrate content in each meal. There are a variety of methods that an RD can use to estimate the nutrient content of meals, including carbohydrate counting.

Carbohydrate counting is the most common meal planning method. When using carbohydrate counting, the amount of carbohydrates per meal is individualized to each person, based on their nutrition goals, weight goal, present eating habits, and physical activity level. Choosing carbohydrates from whole grains, fruits, vegetables, beans, and low-fat dairy is encouraged. A helpful tool entitled “Ready, Set, Start Counting: Carbohydrate Counting – A Tool to Help Manage Your Blood Glucose,” is available at: http://www.dce.org/pub_publications/education.asp.

Keeping carbohydrates around 45 to 50 percent of daily calories has been shown to improve blood sugars and lipids. Depending on age and other factors, this is between 150 and 300 grams per day for most people. Keeping meal and snack carbohydrate intake consistent on a day-to-day basis supports glycemic control. Children and adults need a minimum of 130 grams of carbohydrates per day for proper brain and body functions. There is no evidence to recommend carbohydrate restriction to less than 130 grams per day. Pregnant women need a minimum of 175 grams of carbohydrates per day to prevent ketosis.

There are calculations people with diabetes can use to adjust for fiber and sugar alcohols:

1. Check total grams of carbohydrates listed on nutrition facts label
2. Look for grams of dietary fiber:
 - If the total grams of dietary fiber per serving consumed is **greater** than 5g, then **subtract** half of the grams of dietary fiber from the total grams of carbohydrates
 - If the total grams of dietary fiber per serving consumed is **less** than 5g, then there are insignificant effects on blood glucose levels; therefore, you should not subtract the grams of dietary fiber from the total grams of carbohydrates
3. Look at total grams of sugar alcohols
 - Subtract **half** of the total grams of sugar alcohols from total carbohydrates.

For information on how to read a food label, see the tool titled “How to Use a Food Label to Select Foods” in the Tools Section.

However, the same is not true for sugar alcohols. Sugar alcohols affect blood sugar levels less than the same amount of other sugar or starch, but individuals with diabetes need to take them into account when counting carbohydrates. Some manufacturers include a “net carbs” calculation by subtracting all of the sugar alcohols from total carbohydrates. Even so, sugar alcohols are still partially absorbed in the small intestine and people who are counting carbohydrates should pay attention to these ingredients. Examples of sugar alcohols include sorbitol, mannitol, and xylitol. Sugar alcohols are only partially absorbed and may cause intestinal discomfort. Some individuals may experience varying degrees of a laxative side effect following ingestion of foods containing these sugar derivatives. For information about sugar alcohol, see the tool titled “Understanding Sugar Alcohols” in the Tools Section.

Dietary Fats and Cholesterol

The recommended nutrition changes for reducing lipids (cholesterol and triglycerides) is the same for those with diabetes. The amount of saturated fat and trans fat should be limited in order to help reduce lipids and therefore reduce CVD risk. **Saturated fat should be limited to < 7% of caloric intake, or not greater than 15-20 grams per day.** A Registered Dietitian (RD) can help determine individual goals. Saturated fat is commonly found in meats, full-fat dairy products (milk, cheese, and ice cream), butter, sausage, lard, poultry skin, tropical oils, and coconut. Lean meats, such as skinless chicken and fish, and low-fat dairy products, such as fat-free or 1% milk are preferred.

Trans fatty acids are commonly found in fried foods from restaurants, stick margarines, shortening, and processed foods. **The recommendation is to limit the intake of trans fatty acids to as few as possible.** The federal government now requires that trans fat be listed on all food labels. For information on how to read a food label, see the tool titled “How to Use a Food Label to Select Foods” in the Tools Section.

Despite the listing of trans fat on food labels, it should be noted that according to the United States Food and Drug Administration rules, a product claiming to have zero trans fat can actually contain up to a half gram. If “partially hydrogenated” is found anywhere in the ingredient list, the product does contain a small amount of trans fat, even if the label states that 0 grams of trans fat are in the product.

Monounsaturated fats can lower LDL and total cholesterol levels, as well as raise HDL cholesterol. Good sources of monounsaturated fats include olive oil, canola oil, avocados, sesame seeds, peanut oil, peanut butter, almonds, macadamia nuts, pecans, peanuts, and pistachios. Suggested daily amounts may be 1-2 tablespoons of olive oil, 2 tablespoons of peanut butter, or 1/4 to 1/3 cup of nuts per day, while keeping within total calorie goals.

Polyunsaturated fats in place of saturated fats can reduce blood cholesterol and help lower the risk of cardiovascular disease. Omega-3 fatty acids are a type of polyunsaturated fat that can help reduce the risk of cardiovascular disease. Omega-3 fatty acids are found in certain fish such as salmon, tuna, mackerel, rainbow trout, herring, and sardines. Two or more 3-ounce servings of non-fried fish per week are recommended. The Food and Drug Administration and the Environmental Protection Agency has issued consumer advisory information about mercury in fish and shellfish. Women who might become pregnant, women who are pregnant or nursing and young children should limit fish and shellfish consumption to no more than 12 ounces per week. More information is available at <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm110591.htm>. Plant sources of omegas-3s include flaxseed, walnuts, tofu, soybean products, and canola oil.

Soluble Fiber

Soluble fiber can help reduce LDL cholesterol. Food sources of soluble fiber are fruits, vegetables, oats, and legumes. Oat bran is higher in soluble fiber per serving than oatmeal. Soluble fiber can also be increased by using ground psyllium or Metamucil (also psyllium). When using these products follow directions for proper mixing with water.

Plant sterol and stanol esters block the intestinal absorption of dietary and biliary cholesterol. This lowers LDL cholesterol without lowering HDL cholesterol. Plant sterols and stanols do not interfere with cholesterol-lowering medications. The National Cholesterol Education Program Adult Treatment Panel III program guidelines recommend plant sterols/stanols as part of a heart-healthy eating plan. Studies

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show effectiveness with dosages of 2 to 3 grams plant sterols/stanols per day. Plant sterol and stanol esters occur naturally in some foods; they are present in small quantities in many fruits, vegetables, vegetable oils, nuts, seeds, cereals, and legumes. However, the average intake of these foods does not provide a great enough amount to lower cholesterol. In recent years, manufacturers have introduced items fortified with plant sterol and stanol esters to address reduction of cholesterol. These products are specifically-labeled, indicating cholesterol-lowering effects. Examples include some brands of margarines, juices, vitamins, snack bars, and yogurts.

Other Important Nutritional Factors

Sodium: A low sodium diet can assist in lowering blood pressure. The U.S. Department of Agriculture and the U.S. Department of Health and Human Services revised the sodium recommendations in the Dietary Guidelines for Americans in 2010. **Sodium recommendations are less than 1500 mg among persons who are 51 years and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease (CDC, 2012).** Foods highest in sodium are lunch meats, canned goods, and frozen entrees. Seasonings such as Mrs. Dash[®], garlic powder, onion powder, and other herbs or spices can be used to flavor foods without additional sodium.

Artificial Sweeteners: Artificial sweeteners, also called sugar substitutes, are substances that are used instead of sucrose (table sugar) to sweeten foods and beverages. Artificial sweeteners are regulated by the U.S. Food and Drug Administration. Questions arose about the impact of artificial sweeteners on cancer risk when early studies showed that cyclamate in combination with saccharin caused bladder cancer in laboratory animals. Studies have been conducted on the safety of several artificial sweeteners, including saccharin, aspartame, acesulfame potassium, sucralose, neotame, and cyclamate and there is no clear evidence that the artificial sweeteners available commercially in the United States are associated with cancer risk in humans.

Vegetarian diet option: Plant-based diets are “healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases”(American Dietetic Association, 2009, p.1266) including type 2 diabetes. Great variability exists in the vegetarian diet and a registered dietitian should be consulted to determine the adequacy of the diet of the person with diabetes. Managing carbohydrate intake may be more challenging since many protein sources also contain carbohydrates.

Modified carbohydrate diets (Atkins, South Beach, or Zone): There are no known health risks with modifying carbohydrates to promote weight loss. After one year, the total weight loss between low-carbohydrate and low-fat diets was similar. Safety of the Atkins diet in individuals with diabetes has not been established, since it is a very low carbohydrate diet. The body needs a minimum of 130 grams of carbohydrates daily to fuel the brain and central nervous system.

Nutritional supplements: Some supplements claim to assist with diabetes control. Examples of supplements include alpha-lipoic acid, chromium, garlic, magnesium, cinnamon, polyphenols, prickly pear cactus, gumar, and others. There is not enough scientific evidence to prove that dietary supplements benefit people with diabetes. The U.S. Food and Drug Administration (FDA) review and approval of supplement ingredients and products is not required before marketing. Persons with diabetes must know that labels on supplement bottles may not accurately reflect the actual amount of supplement that is present. All persons with diabetes who are interested in taking supplements should discuss with their health care provider(s).

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Weight loss: The National Weight Control Registry (NWCR) is a longitudinal, prospective study of individuals 18 years and older who have successfully maintained a 30-pound weight loss for a minimum of one year. Findings of the NWCR show that of those individuals who successfully maintain weight loss:

- 78% eat breakfast every day
- 75% weigh themselves at least once a week
- 62% watch less than 10 hours of television per week
- 90% are physically active, on average, about one hour per day

Weight loss and physical activity can also significantly improve lipid levels. Weight loss and regular physical activity can lower LDL cholesterol and triglycerides, while raising HDL cholesterol.

For more information on the NWCR, go to: <http://www.nwcr.ws/>.

Dietary Fiber and Whole Grains

People with diabetes are advised to choose a variety of high fiber foods and whole grains. Whole grains provide a wide variety of vitamins, minerals, and other nutrients important to good health. Potential barriers to achieving a whole grain diet are palatability, limited food choices, and gastrointestinal side effects. Introduce high-fiber foods gradually to minimize the risk of gastrointestinal side effects. Sources of dietary fiber include beans, legumes, fruits, vegetables, and whole grain products. Whole grains consist of the intact, ground, cracked, or flaked kernel which includes the bran, the germ, and the innermost part of the kernel (the endosperm). To ensure that a product is whole grain, look in the ingredient list for the words “whole grain” or “whole wheat.” It is best if these words are the first ingredient listed.

The recommended amount of dietary fiber is 14 grams of fiber per 1000 calories or between 21 to 38 grams each day for most adults. Based on limited clinical data, the recommendation for children older than 2 years of age is to increase dietary fiber to an amount equal to or greater than their age plus 5 grams per day, gradually increasing to 25 to 35 grams per day after age 20.

Dietary Choices for Individuals with Pre-Diabetes

The Finnish Diabetes Prevention study and the Diabetes Prevention Program (DPP) found that reduced intake of calories and reduced intake of dietary fat can reduce the risk for developing type 2 diabetes by reducing insulin resistance and promoting weight loss. Several other studies provide evidence that increased intake of whole grains and dietary fiber can also reduce risk for developing type 2 diabetes. People at risk for type 2 diabetes benefit from intensive lifestyle programs, including MNT, for the prevention or delay of type 2 diabetes. For additional information on assessing those at risk for type 2 diabetes, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Nutritional Guidance for Non-Dietitian Health Professionals

Non-dietitian health professionals can provide nutrition education when access to MNT is delayed or not accessible. Often times, a non-dietitian health professional will be asked nutrition questions about weight loss or diabetes. When answering questions, it is important to remember that both the health professional and the individual asking the questions may have received nutrition information from various sources and have differing levels of knowledge and beliefs. In addition, people with diabetes or pre-diabetes often have other health complications that require diet intervention (e.g., hypertension, dyslipidemia). For these reasons, it is best to provide general information until the person is able to meet with a registered dietitian.

Table 3-2 provides simple initial nutrition education strategies for non-dietitian health care professionals to use with people newly diagnosed with diabetes until they are able to see a registered dietitian for MNT. The majority of people will see improvements in their blood sugar levels as they implement the simple strategies suggested below.

Table 3-2: Simple Nutrition Education Strategies Non-Dietitian Health Care Professionals Can Share with People Newly Diagnosed with Diabetes

<p>1. Set an eating schedule:</p> <ul style="list-style-type: none">▪ Eat three small- to medium-sized meals at the same time every day▪ Choose small amounts of healthy foods (e.g., fruit, vegetables) for a snack▪ Do not eat a large evening meal or late-night snack▪ Do not skip meals, especially breakfast
<p>2. Control portion sizes:</p> <ul style="list-style-type: none">▪ Eat about the same amount of food every day▪ Eat smaller portion sizes of all foods (carbohydrate, fat, and protein) if weight loss is needed▪ Use a salad plate at meals to help decrease portions▪ Fill ½ plate at lunch and dinner with vegetables, ¼ with lean protein, and ¼ with whole grains▪ Eat a second helping of vegetables only
<p>3. Reduce or eliminate sweetened beverages:</p> <ul style="list-style-type: none">▪ Limit regular soda/pop, regular kool-aid, energy drinks, and sports drinks▪ Limit juice to less than ½ cup (4 ounces) per day and no more than 3 cups (24 ounces total) of low-fat milk per day▪ Drink more water, flavored water, sugar-free drinks, diet soda/pop, or other calorie-free beverages

People often ask very specific questions, such as, “Can I eat corn?” or “How many carbs should I eat in a day?” or “Is sugar-free ice cream okay?” Remember the standard of care for diabetes is creating an individualized meal plan that can include a variety of foods when portion control and planning are implemented. A registered dietitian can answer more specific questions during the MNT appointment.

Meal planning using the plate method is a simple approach to healthy eating and can be used by anyone. A Meal Planning with the Plate Method Tool is available in English and Spanish and can be found in the tools section of these guidelines. The MyPlate is another option available to assist people in adopting healthy eating habits. The Department of Agriculture introduced the new MyPlate icon that looks like a dinner plate. MyPlate replaced the MyPyramid. More information about MyPlate can be found at: <http://www.foodchannel.com/articles/article/replacement-food-pyramid-unveiled>.

Referral to a Registered Dietitian and Coordination of Care

Due to the complexity of diabetes nutrition issues, referral to a registered dietitian (RD) skilled in the current recommendations of diabetes care (preferably who is also a certified diabetes educator) is strongly recommended. Although other health professionals can contribute to and support MNT, the registered dietitian is the member of the diabetes treatment team responsible for coordinating overall MNT in order to ensure assessment, planning, intervention, evaluation, and follow-up for a person with diabetes. The registered dietitian is the only health professional allowed to bill for MNT. Many insurance providers cover MNT by a registered dietitian when referred by a physician, but coverage varies greatly among insurers. It is important for people with diabetes to check with their insurance provider for coverage of MNT and diabetes self-management education (DSME). Medicare Part B covers MNT for diabetes and kidney disease. Wisconsin-based insurance policies that include “mandated benefits” and cover the treatment of diabetes are required to cover DSME, including nutrition counseling.

Additional Resources

1. A variety of consumer and professional publications are available at the American Dietetic Association: <http://www.eatright.org>.
2. American Dietetic Association Evidence Analysis Library website: <http://adaevidencelibrary.com>. The library is only accessible to ADA members and subscribers.
3. A variety of patient and professional publications are available at the American Diabetes Association: <http://www.diabetes.org>.
4. Diabetes Prevention Program Lifestyle Manuals of Operations: <http://www.bsc.gwu.edu/dpp/manuals.htmlvdoc>. Slide set also available for download: <http://www.bsc.gwu.edu/dpp/slides.htmlvdoc>.
5. Dietary Guidelines for Americans, 2010. Current edition available at: <http://health.gov/dietaryguidelines/2010.asp>.
6. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. National Heart, Lung, and Blood Institute: http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm.
7. National Diabetes Education Program: <http://www.ndep.nih.gov/>.
8. The Dietary Approaches to Stop Hypertension (DASH) Eating Plan. National Heart, Lung, and Blood Institute: <http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/index.htm>.
9. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Full Report: http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3_rpt.htm.
10. National Institute of Diabetes and Digestive and Kidney Diseases. Health Information – Nutrition: www.niddk.nih.gov/health/nutrition.htm.
11. American Association of Diabetes Educators – Industry Allies Advisory Council. This is a listing of pharmaceutical and diabetes supply companies that provide a variety of materials including blood glucose logs, food and physical activity record forms, flow sheets, and patient and professional educational materials: <http://www.diabeteseducator.org/About/iac/>.

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12. The Portion Doctor. Plates, bowls, and glasses with guidance for food choices and portion sizes: <http://www.portiondoctor.com>.
13. Joslin Diabetes Center. Website contains extensive diabetes library separated into topics that are outlined and addressed in a question-and-answer format. Website also contains a “Beginner’s Guide to Diabetes” and an online class that provides information on the pathophysiology and treatment of diabetes: www.joslin.harvard.edu.
14. Diabetes Monitor. Website contains extensive index of links to a wide variety of reliable sources. Links are monitored and updated on a regular basis. Also included is a list of links for websites in other languages like Spanish, Russian, Korean, and many more: www.diabetesmonitor.com.
15. Patient Education Slicks from the Diabetes Care and Education; a dietetic practice group of the American Dietetic Association. Reproducible patient education slicks available in PDF format: http://www.dce.org/pub_publications/education.asp.

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