

Milk - cow's- Free-from Diet Instructions

Please use this diet sheet under the supervision of a registered dietitian

Milk Allergy and Lactose Intolerance

An adverse reaction to milk and dairy products is not uncommon and results in a variety of symptoms. The most frequent reactions are skin rashes and gastrointestinal symptoms such as abdominal bloating, pain, gas, diarrhoea, and nausea. Occasionally, upper respiratory tract symptoms and asthma may be caused or exacerbated when milk or dairy products are ingested.

Occult blood loss associated with cow's milk allergy can be a cause of iron deficiency anaemia in children. Another effect of cow's milk that is currently being investigated in children is an inability to fall asleep and restless, disturbed sleep. In an infant, failure to thrive may be a result of manifestations of milk allergy causing intestinal inflammation and malabsorption of nutrients.

The diagnosis of milk allergy is not a simple matter. Often, any adverse reaction experienced after drinking milk is ascribed to "milk allergy." However, when the symptoms are localized in the gastrointestinal tract, the problem may be lactose intolerance, not milk allergy.

Causes of Milk Allergy and Lactose Intolerance

Milk allergy is caused by an immune reaction to milk proteins. More than 30 milk proteins are identifiable. Any number of these may trigger an immune response.

Lactose intolerance is due to an inability to produce sufficient lactase, or beta-galactosidase, the enzyme which splits lactose into its constituent monosaccharides, glucose and galactose.

Milk Allergy

Biological Mechanisms

Milk allergy results when the immune system produces antibodies against milk allergens. The allergenicity of individual milk proteins has been studied using skin tests and oral challenges. Although casein proteins produced the highest number of positive skin tests in children with milk allergy, beta-lactoglobulin produced the highest number of positive oral challenges. Most milk allergic persons, whether children or adults, react to more than one milk protein.

The heat stability of individual milk proteins varies. Serum proteins and beta-casein are the most **heat** labile, whereas beta-lactoglobulin and alpha-lactalbumin are the most heat stable.

Management of Milk Allergy

Milk allergy is treated by the dietary elimination of milk, foods containing milk, and products made from milk. Liquid and evaporated milks, fermented milks (yogurt, buttermilk), cream, all cheeses (hard cheeses, cottage cheese, cream cheese), ice cream, and ice milk are excluded from this diet. Also excluded are foods containing milk solids, such as butter and margarine containing whey, and foods containing individual components of milk such as casein, whey, lactoglobulin, or hydrolysates of these proteins.

Nutritional Substitutes

Milk provides protein, calcium, and Vitamin D (added after pasteurization), all of which are obtainable from sources other than milk products. Protein is readily available from meat, fish, or combinations of legumes, nuts, grains, and vegetables. Obtaining adequate dietary protein does not depend on ingesting milk.

The situation with calcium is different, however, as milk is the most abundant and readily available source of calcium in the North American diet, with 250 mL (one cup) providing 290 mg of calcium. Alternative sources of dietary calcium include the following:

- Canned fish such as sardines, tuna, and salmon, eaten with the bones (the calcium is in the bones; the canning process softens them, making them more easily digested)
- Green leafy vegetables such as arugula, kale, beet and turnip greens, collards, mustard greens, and broccoli; however, the calcium in vegetables is not as readily available as from animal sources
- Some nuts and legumes that contain moderate levels of calcium.

When all milk and dairy products are removed from the diet, it can be difficult to obtain sufficient calcium from these alternative sources on a regular basis. A supplement is then necessary. Calcium gluconate and calcium citrate malate are the most well absorbed and well utilized forms of calcium, and thus are superior to calcium carbonate as a source of the mineral. The use of an antacid containing calcium (e.g., Tums®) is not recommended, because it neutralizes the gastric acid needed for protein digestion. In addition, the antacid produces an alkaline environment that may reduce the uptake of minerals such as iron, zinc, and copper, and of calcium itself, all of which require an acidic medium for efficient absorption.

Heating or boiling milk will not make it non-allergenic, although many of the proteins may be denatured, reducing their allergenicity somewhat. Milk as an ingredient in cooked products is sometimes tolerated, even though unheated milk is not. Some milk-allergic persons can tolerate canned milk (e.g., evaporated milk) that has been extensively heated. However, some allergenic milk proteins are heat stable and may cause a reaction even after cooking.

Similarly, cow's milk in infant formulas remains allergenic and induces an allergic reaction in milk allergic infants. Only formulas such as Alimentum®, Nutramigen®, and Pregestimil®, which contain extensively hydrolyzed casein (i.e., broken down into small peptides and individual amino acids) are usually tolerated by the milk-allergic infant.

Soy based formulas may be tolerated by milk-allergic infants. Approximately 50% of infants with milk allergy seem to also develop an allergy to soy, thus requiring casein hydrolysate formulas .

Lactose Intolerance

Lactose intolerance does not involve a response by the immune system and no antibodies are produced. In this condition, the enzyme *lactose* is insufficient to break down the quantity of lactose consumed at any one time. Lactase is produced by the brush border cells of the small intestine. When these cells are damaged, for example, as a result of inflammation (in gastrointestinal infections, or food allergy), or as a congenital characteristic, the sugar remains undigested in the intestine. Microbial enzymes metabolize lactose, resulting in a variety of organic acids (e.g., lactic and propionic acids) and gases such as hydrogen. Because an osmotic imbalance results from the excess sugar and excess acid, water is drawn into the digestive tract to correct the problem, which results in diarrhea. The symptoms of pain, bloating, and gas are due to bacterial fermentation of lactose.

Incidence of Lactase Deficiency

A number of ethnic groups such as the Asian and black African races, and people of the Mediterranean region, lose the ability to produce lactase, starting at about five years of age. Lactose intolerance among these groups may be as high as 80% of the population. In contrast, only about 20% of people of northern European origin lose the ability to produce lactase.

Lactase deficiency is uncommon in infants, because lactose is the principal sugar in human milk and infants require lactase to digest their mother's milk. However, a secondary lactase deficiency can develop in an infant following a bacterial or viral infection of the digestive tract. Inflammation

damages the brush border cells in the lining of the small intestine which produce the enzyme. The infant is unable to tolerate lactose until the infection subsides and the intestinal mucosa recovers.

Distinguishing Between Milk Allergy and Lactose Intolerance

It is frequently difficult to distinguish milk allergy from lactose intolerance on the basis of clinical symptoms alone, because some of the symptoms, such as abdominal pain, diarrhea, vomiting, gas and bloating, are common to both conditions. However, milk allergy will sometimes cause symptoms in the upper respiratory tract (e.g., a stuffy, runny nose, or pain, itching, and serous drainage from the ears) or skin reactions (e.g., eczema or hives) that are not seen with lactose intolerance.

Since secondary lactase deficiency is a consequence of inflammation in the digestive tract, the intestinal inflammation caused by milk allergy sometimes results in lactase deficiency. Thus, both milk allergy and lactose intolerance can exist concomitantly. Because milk is the only source of lactose in the normal diet, eliminating milk from the diet cures both conditions, without identifying the cause of the symptoms.

Despite these difficulties, it is important to determine which of these conditions is causing the problem, because milk and dairy products are a significant source of nutrients, especially for infants and young children, and should not be eliminated unless absolutely necessary. Furthermore, it is not easy to completely eliminate milk from the diet, because it is contained in many different foods (e.g., baked goods, soups, salad dressings, gravies, desserts) and avoiding these foods can make meal planning very challenging.

Diagnosis

Allergy tests such as skin tests, and blood tests such as RAST, are not reliable methods for diagnosing milk allergy. The most reliable method is to remove all milk and dairy products from the diet for two or three weeks to see if symptoms subside. If the symptoms disappear, appropriate challenge tests are used to determine the source of the symptoms, (see the methods for *Challenge Phase*, and *Sequence of Testing Foods*).

Laboratory Tests for Lactose Intolerance

There are a number of tests to diagnose lactose intolerance.

The Fecal Reducing Substance Test is perhaps the most reliable. This test detects the presence of a reducing substance in feces when lactose has not been broken down by lactase.

The Hydrogen Breath Test is a more common test for lactose intolerance. In this test, the patient ingests a quantity of lactose and, after a prescribed interval, a breath sample is analyzed for the presence of hydrogen. If hydrogen is detected, it indicates that bacteria in the digestive tract have acted on undigested lactose and produced hydrogen as one of their metabolic byproducts. Unfortunately, this test is not specific for lactase deficiency, because any sugar remaining in the digestive tract will be metabolized by bacteria, resulting in production of hydrogen. Undigested sucrose, maltose, or a starch will give a similar result.

Feeding the Milk Allergic Infant

Cow's milk proteins in the mother's diet can be passed into her breast milk and cause an allergic reaction in her infant. If the breast-fed infant is allergic to cow's milk protein, the elimination of all milk and dairy products from the mother's diet should be beneficial. If the elimination of milk and milk products only partially eases the infant's distress, carefully kept exposure diaries by the mother may isolate other possible dietary or medication irritants.

If the infant is lactose intolerant, a milk-free diet for the mother *will not help*. The lactose content of mother's milk will remain stable at about 6%, regardless of whether or not the mother consumes milk and dairy products.

Infant formulas that are milk-free can be given to a milk allergic infant.

If the infant tolerates soy, a soy-based formula may be tolerated, such as: Isomil® (Ross), Nursoy® (Wyeth), or Prosobee® (Mead Johnson).

If the infant tolerates neither milk or soy proteins, a casein hydrolysate formula such as Nutramagin® (Mead Johnson), Pregestimil® (Mead Johnson), or Alimentum® (Ross), may be tolerated.

This eating plan is designed to remove all milk and milk products from the diet.

Method: Lactose Restricted Diet

Phase I Restriction of all lactose. Phase I should be followed until the diarrhea improves. Liberalization of these restrictions will determine each individual's limit of tolerance for lactose.

Phase II Lactose tolerance is determined by introducing dairy products and milk.

Feeding the Lactose Intolerant Infant

Infant formulas that are lactose-free can be given to a lactose intolerant infant.

If the infant is not allergic to milk, the milk based formula Alactamil® (Mead Johnson), which is free from lactose and sucrose, is suitable.

If the infant is allergic to cow's milk proteins, but tolerates soy, the soy-based formula Prosobee® (Mead Johnson), which is sucrose-free, is suitable.

If the infant is allergic to both cow's milk and soy proteins, a casein hydrolysate formula such as Nutramigen® (Mead Johnson) or Pregestimil® (Mead Johnson) may be tolerated. Both are free from lactose and sucrose.

A breast-fed infant will ingest significant quantities of lactose in mother's milk. The lactose composition of mother's milk will remain constant, regardless of whether or not mother consumes milk and dairy products. If the lactose intolerance is secondary to a gastrointestinal tract infection or other condition that is expected to be transient, some authorities advise continuing breast-feeding and expect the diarrhoea to gradually diminish as the underlying inflammation disappears. Alternatively, the mother can pump her breast milk and treat the milk with Lactaid® drops (4 drops per 250 mL milk), and allow the enzyme to act for 24 hours in the fridge. The infant can be fed the lactose-free milk the next day. This is continued until the diarrhoea abates, when the infant can be gradually put back to the breast.

Lactose Restrictions

It is necessary only to avoid lactose. The other components of milk are tolerated. Foods, medications, and beverages containing milk and milk solids all contain lactose.

Products labeled as containing lactose, milk, milk solids, milk powder, cheese and cheese flavor, curd, whey, cream, and butter and margarine containing milk solids should be avoided.

Products containing lactic acid, lactalbumin, lactate and casein, do not contain lactose and can be consumed.

Acidophilus milk is milk to which *Lactobacillus acidophilus* has been added. These bacteria do not digest the lactose enough for the milk to be tolerated by people with a lactose intolerance.

Phase II - Determining Lactose Tolerance Levels

A lactose intolerance is dose related. Usually some level of the enzyme lactase is produced and a certain amount of lactose can be processed. It is important to establish how much lactose can be broken down at one time (Step 1) and how much lactose can be processed over the day (Step 2).

Step 1:

Day 1

Morning: Eat a portion of food containing 1 gram of lactose (e.g., 1 oz or 2 tbsp cream cheese). If there are no symptoms of intolerance, double the amount of lactose the next day.

Day 2

Morning: Eat a portion of food containing 2 grams of lactose (e.g., 2 ounces or 1/4 cup cream cheese or 1/2 cup of uncreamed cottage cheese). If there are no symptoms of intolerance, increase the amount of lactose on Day 3.

Day 3

Morning: Eat a portion of food containing 5 grams of lactose (e.g., 1 cup of low fat yogurt). If there are no symptoms of intolerance, increase the amount of lactose on Day 4.

Step 2:

To establish how much lactose may be tolerated over the day, go back to the amount last tolerated. (For example, on Day 2, 2 grams of lactose were tolerated, but on Day 3, there was bloating, cramping, and diarrhea following one cup of yogurt).

Day 1

Morning: Eat a portion of food containing the amount of lactose tolerated in Step 1 (e.g., 2 grams of lactose).

Afternoon: Repeat the morning procedure. If there are no symptoms of intolerance, increase the number of servings on Day 2.

Day 2

Morning: Eat a portion of food containing the amount of lactose tolerated in Step 1. Repeat the process in the afternoon and evening.

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This section has been extracted and modified with permission from the author, Prof. Janice Joneja, from her excellent book:

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	Foods Allowed	General Foods Restricted
Milk and Dairy:	<p>No milk or milk products are allowed in a milk free diet.</p> <p>The following can be seen as substitutes for milk:</p> <ul style="list-style-type: none">Soy MilkSoy infant formulaHydrolysate formulaCoconut milkNut milkMilk-free margarineMilk-free soy bean cake	<p>Avoid all milk and milk products</p> <p>Milk (whole, 1%, 2%, reduced fat, low fat, nonfat, fat free)</p> <p>Acidophilus milk</p> <p>Artificial butter</p> <p>Cheese food and cheese flavour</p> <p>Cream, ghee</p> <p>Cultured milk</p> <p>Milk fat, milk protein</p> <p>Yoghurt powder</p> <p>Buttermilk solids</p> <p>Nonfat milk solids, milk solid paste.</p> <p>Amasi</p> <p>Bologna</p> <p>Butter (dairy)</p> <p>Buttermilk</p> <p>Cheese - Cottage, creamed</p> <p>Cheese Spread</p> <p>Cheese Spread - Reduced fat</p> <p>Chocolate</p> <p>Chocolate confectionery</p> <p>Chocolate products</p> <p>Cocoa and milk</p> <p>Dessert (milk)</p> <p>Dessert (powdered, milk)</p> <p>Drinks (chocolate, powder)</p> <p>Ice cream</p> <p>Infant formula / Infant milk / Hydrolysate</p> <p>Malted milk powder</p> <p>Milk - alpha lactalbumin</p> <p>Milk - beta-lactoglobulin</p> <p>Milk - boiled</p> <p>Milk - casein</p> <p>Milk - cow's milk formula</p> <p>Milk - curds</p> <p>Milk - dried</p> <p>Milk - powder (Alfare, Nestle)</p> <p>Milk - whey</p>

Milk (condensed)
 Milk (dried, vending machines)
 Milk (evaporated)
 Milk (fermented)
 Milk (flavoured)
 Milk (powdered)
 Milk (skim)
 Milk (solids)
 Milk products
 Milkshake

Bread and Cereal:	<p>Breads and cereals that do not contain milk or products of milk.</p> <p>French bread Italian bread Some whole wheat bread Some rye bread Soda crackers Bagels Pasta Plain cooked cereal Ready-to-eat cereals Plain grains Plain flours Plain starches</p>	<p>Breads or baked-products that contain milk or products of milk as an ingredient</p> <p>Chocolate biscuits Drinks (fermented malt)</p>
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Vegetables:	<p>All vegetables and their juice extracts are allowed, unless they are prepared or combined with milk or products of milk.</p>	<p>Vegetables are only restricted in a milk free diet if they are prepared or combined with milk or products of milk (See specific food restricted).</p> <p>Battered vegetables Breaded vegetables Creamed vegetables Mashed vegetables Potato (instant, mashed) Scalloped Vegetables</p>
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Legumes:	<p>All plain legumes not prepared in combination with milk or products of milk.</p> <p>Milk-free tofu Plain legumes Peanut butter Soya cream</p>	<p>Legumes are not restricted in a milk free diet unless they are prepared in combination with milk or products of milk (See specific food restricted).</p>
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Fruit:	<p>All fruit and their juice extracts are allowed, unless they are prepared or combined with milk or products of milk.</p>	<p>None (unless prepared or combined with milk or products of milk).</p>
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Meat, Poultry & Fish:	<p>All fresh and frozen meat, poultry and fish All egg unless prepared with milk or milk products.</p> <p>All fresh meat, poultry and fish All frozen meat, poultry and fish Kosher (parve/pareve) processed meats Processed meats (not prepared with milk or</p>	<p>Meat, poultry (including egg) or fish are not restricted in a milk free diet unless prepared with milk or products of milk.</p> <p>Battered meat, poultry and fish Breaded meat, poultry and fish Cold cuts</p>
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	products of milk) Canned meat, poultry and fish (not prepared with milk or products of milk) Plain egg Boiled egg Fried egg Poached egg Omlette (prepared without milk or milk products) Scrambled egg (prepared without milk or milk products)	Creamed meat, poultry and fish Meat (hamburger patties) Meat (salami sausage) Meat (sausage) Meat loaf Shrimp - cooked (Crustacea) Wieners
Nuts & Seeds:	All plain nuts and seeds Popcorn	None (unless prepared or combined with milk or products of milk)
Fats & Oils:	Pure vegetable oils Margarines (milk free) Margarines (low sodium, no salt) Real/Pure mayonnaise Shortening Lard Meat Dripping Gravy (milk free)	Butter Margarine containing whey or milk Salad dressings containing milk or milk products Margarine
Spices & Herbs:	All spices and herbs	None
Miscellaneous:	All artificial sweeteners except those containing lactose. Carob chocolate	Some gravies Ammonium caseinate Potassium caseinate Sodium caseinate Magnesium caseinate Whey hydrolysate Whey protein hydrolysate Casein hydrolysate Milk protein hydrolysate Batter / Battered food Cakes (pre-packed mix) Coffee whiteners / Coffee creamer Custard Custard icing Custard powder (instant) Hot milk puddings Icing toppings Pudding / Dessert mix Sandwich spread Soup Soup (canned) Soup (concentrates) Sweets / Candy Toppings White sauce
	Unreferenced Sources / Other:	Cereals that contain milk or milk solids as an ingredient. Commercial baking mixes.

Salad Dressing (containing milk or products of milk).

Sweetener/sugar substitutes containing lactose.

Acid whey, cured whey, whey protein, whey solids, delactosed whey, hydrolyzed whey, demineralised whey, sweet dairy whey, whey concentrate.

Ingredient terms to avoid on labels

Artificial butter flavour
Butter
Butter fat
Buttermilk solids
Calcium caseinate
Caramel colour
Caramel flavouring
Casein
Caseinate
Cheese
Cream
Curds
Delactosed whey
Demineralised whey
Dried milk
Dry milk solids
Dry milk solids
Full cream milk powder
High protein flavour
Hydrolysed casein
Hydrolysed whey
Hydrolysed whey proteins
Hydrolysed whey sugar
Lactalbumin
Lactalbumin phosphate
Lactoglobulin
Lactic acid
Lactose
Milk
Milk derivative
Milk fat products e.g. ice cream
Milk protein
Milk solids
Natural flavouring
Non-fat milk solids
Pasteurised milk
Rennet casein
Skim milk powder
Skimmed milk
Sodium caseinate
Solids
Sour cream (or solids)

Sour milk solids
Whey
Whey powder
Whey protein concentrate
Whey solids
Yoghurt

Label Alerts

CHECK LABELS ON ALL PROCESSED FOODS - if a food label is absent, unclear or vague it is best to avoid it. Read all labels, even familiar brands, as manufacturers may change suppliers or ingredients.

Kosher foods and vegan foods are milk free. The words "pareve" or "parve" indicate a product is milk free.

See <http://AllAllergy.net> - Food Alerts, and, <http://www.safetyalerts.com>

Substitutes

Rice Milk - increases sweetness, so decrease sugar in baked goods.

Almond Milk

Soya milk

Oat milk

Coconut milk

Nut milks - blanch nuts and remove skins. Grind in food processor with a little water. Combine with 2-3 times amount of water. Refrigerate for a couple of hours and then strain through cheese cloth.

Horchata (This is a Spanish beverage made with rice, almonds, or chufa.)

Goat's milk (often provokes reactions to people who are already sensitive to cow's milk)

Sheep's milk (may provoke a cross-reaction in those sensitive to cow's milk)

NB. Ensure that these milks are adequately fortified.

Cashew milk (cashew nuts can be ground in a blender and mixed with water to form a cream substitute. Add honey and vanilla extract to taste and dilute further to make cashew milk)

Ground almonds and creamed coconut can also be used to substitute cream.

BUTTER

Margarine (some contain small amounts of milk solids)

Tahini - ground sesame seeds (can readily provoke allergy or intolerance)

Sunflower spread

Clarified butter/ghee (tolerated by most milk sensitive people)

Substitute butter in sauces with creamed coconut for certain foods.

Oil - use heavier oils like pure olive oil for frying. Pie dough made with oil will be sand-like, not flaky but it is suitable for pressed pie dough.

Vegetable shortening will make a flakier pastry rather than a rolled shell.

CHEESE

Goat cheese

Sheep cheese

Soy-based cheese spreads

Tofu

*Soya, goat and sheep can provoke cross-reactions in people sensitive to cow's milk.

Other options to consider for sandwich fillings besides cheese are: hummus, pate, taramasalata (a Greek dish made with smoked fish roe, olive oil, lemon juice and garlic), Gjetost (Norwegian brown cheese made from milk whey)

Reminders

Medic alert?

Cross reactivity ?

Free-from Recipes and Related Information

http://allallergy.net/recipes/recipes_milk.cfm