



## NEUTROPENIC DIET-AN OVERVIEW

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**ABSTRACT** The main objective of neutropenic diet is to improve the quality of life of the patients with low neutrophil count, by limiting the detrimental pathogens invading the body, so that they can overcome the nutritional problems like malnourishment/ undernourishment, gut related disorders, aversion towards food and to improve the function of impaired cell mediated immunity, thus reducing the risk of cross infections with ease. Even though the implications of neutropenic diet is under debate, its success depends on multitude factors such as the type of food included or consumed, food preparation methods adopted, food storage conditions, food handling techniques, hygiene of the food handlers and above all the degree of severity of the disease in patient. Hence, it is of unlimited importance to focus on the specific food groups and factors which accelerate the growth of harmful bacterias in the gastro intestinal tract, and worsen the condition of patients by subjecting them to life threatening infections. It is for sure, that these preventable complications can be overcome with the basic knowledge of neutropenic diet.

**KEYWORDS :** Neutropenia, Neutropenic diet, Food Safety guidelines

**INTRODUCTION:**

Neutropenia is a disorder characterized by the deficiency of granulocyte -an abnormally low number of neutrophils, the most important type of white blood cell. Neutrophils generally make up 50-70% of circulating white blood cells, constituting to about 1500 to 7000 per microliter. Since, neutrophils serve as the primary defense force against infections, by destroying bacteria in the blood, patients with neutropenia are more susceptible to bacterial infections and, without swift medical attention, the condition may become lethal leading to neutropenic sepsis.

The condition is categorized as mild, moderate and severe based on the absolute neutrophil count (ANC) as follows:

- Mild neutropenia – Absolute neutrophil count ranges between 1000 and 1500 per microliter.
- Moderate neutropenia - Absolute neutrophil count ranges between 500 and 1000 per microliter.
- Severe neutropenia - Absolute neutrophil count drops below 500 per microliter.

Further, based on the duration of neutropenia, it is classified as acute neutropenia (short duration) or chronic neutropenia (greater than three months). This understanding of classifications provides an insight to the patients to adapt to neutropenic diet.

In a wide sense, a neutropenic diet is tailored for people with weakened immune systems, predicting to protect them from bacteria and other hazardous microbes which harbor in some foods and drinks.

**Who needs to follow a neutropenic diet?**

- For patients on certain types of chemotherapy and other cancer treatments.
- When the ANC is less than 500 cells/mm<sup>3</sup>, the patient is often instructed to follow a neutropenic diet.
- Patients undergoing autologous stem cell transplants or allogeneic stem cell transplants are advised to be on a neutropenic diet during the pre-transplant chemotherapy and for the first 3 or more months after transplant or until they no longer take immunosuppressive drugs.
- Persons who have had an organ transplant.
- Patients who are being treated for HIV/AIDS.

In general, the neutrophil count for all the subjects with above stated conditions will be below proceeding to a declining immune system.

The following pages list the foods to be included and avoided in a neutropenic diet.

**FOODS TO BE INCLUDED AND AVOIDED**

Food Group	Foods Included	Foods Avoided
Dairy	<ul style="list-style-type: none"> <li>• Pasteurized milk &amp; dairy products.</li> <li>• Yogurt made with pasteurized milk</li> <li>• Pasteurized non-dairy milk &amp; cream products</li> <li>• Packaged ice cream, frozen yogurt, sherbets &amp; frozen desserts without nuts &amp; raisins</li> <li>• Cottage cheese</li> <li>• Ricotta cheese</li> <li>• Prepackaged hard cheese: mile &amp; medium cheddar, mozzarella, parmesan, Swiss</li> <li>• Individually packaged, pre-sliced, pasteurized cheese</li> </ul>	<ul style="list-style-type: none"> <li>• Unpasteurized milk &amp; dairy products</li> <li>• Ice cream &amp; frozen yogurt dispensed from soft-serve machines</li> <li>• Soft cheeses &amp; cheeses with mold: sharp cheddar, brie, camembert, feta, gorgonzola, goat cheese, Roquefort, stilton &amp; blue cheese (unless well cooked)</li> <li>• Any cheese containing vegetables, herbs or chili peppers (unless well cooked)</li> <li>• Sliced delicatessen cheese</li> </ul>
Meat, pork, lamb, poultry, fish & eggs	<ul style="list-style-type: none"> <li>• Well cooked &amp; canned meat, beef, pork, lamb, poultry &amp; fish</li> <li>• Homemade seafood &amp; meat salads</li> <li>• Cooked processed, smoked meats: bacon, hotdogs, sausage</li> <li>• Cooked tofu (cut into 1" cubes boiled – minimum of 5 minutes)</li> <li>• Cooked, commercially packaged luncheon meats</li> <li>• Eggs – well cooked, pasteurized egg substitutes</li> </ul>	<ul style="list-style-type: none"> <li>• Raw &amp; undercooked meat, beef, pork, lamb, poultry &amp; fish</li> <li>• Meats &amp; poultry on the bone (e.g. chicken drumstick; pork chop)</li> <li>• Commercial seafood &amp; meat salads</li> <li>• Cold, smoked fish: salmon, lox</li> <li>• Pickled fish</li> <li>• Uncooked sandwich meats</li> <li>• Uncooked &amp; undercooked eggs</li> <li>• All miso products</li> </ul>
Entrees & soups	<ul style="list-style-type: none"> <li>• Homemade meals &amp; soups if eaten or frozen within 1 hour of preparation</li> <li>• Prepackaged frozen meals &amp; pizza</li> <li>• Canned entrees</li> </ul>	<ul style="list-style-type: none"> <li>• Cold, uncooked vegetable or fruit soups</li> <li>• Leftovers</li> </ul>

Vegetables	<ul style="list-style-type: none"> <li>Cooked fresh, frozen, or canned vegetables</li> </ul>	<ul style="list-style-type: none"> <li>Raw vegetables</li> <li>Salads from delicatessens or supermarkets</li> </ul>
Fruits & nuts	<ul style="list-style-type: none"> <li>Thick skinned, peelable fruits without visible mold: oranges, grapefruits, tangerines, melons &amp; bananas</li> <li>Cooked, frozen &amp; canned fruits &amp; pasteurized fruit juices</li> <li>Dried fruits added just before cooking</li> <li>Commercial, shelf-stable peanut butter</li> <li>Canned &amp; vacuum packed roasted nuts</li> </ul>	<ul style="list-style-type: none"> <li>Any fruits not listed as allowed</li> <li>Freshly squeezed &amp; unpasteurized fruit juices</li> <li>Cider</li> <li>Uncooked dried fruits</li> <li>Fresh, roasted nuts &amp; peanut butter</li> </ul>
Potatoes, rice & noodles	<ul style="list-style-type: none"> <li>All cooked potatoes, rice &amp; noodles</li> <li>Homemade potato &amp; macaroni salads</li> <li>Individual packaged snack foods</li> </ul>	<ul style="list-style-type: none"> <li>Commercial potato &amp; macaroni salads</li> <li>Salads</li> <li>Snack foods with added flavoring/herbs: nacho cheese, sour cream/herb</li> </ul>
Breads & cereals	<ul style="list-style-type: none"> <li>Packaged &amp; homemade breads, muffins, rolls &amp; pastries</li> <li>Plain packaged hot &amp; cold cereals</li> <li>Hot cereal with dried fruit or nuts only if micro waved on high &gt;1 minute or cooked on stove with fruits/ nuts added at the same time as the cereal</li> </ul>	<ul style="list-style-type: none"> <li>Bakery cakes &amp; pastries that need refrigeration e.g., cream &amp; custard filled products</li> <li>Loose breads, muffins, rolls, pastries from store bins or displays</li> </ul>
Fats	<ul style="list-style-type: none"> <li>Commercial, shelf stable salad dressings &amp; mayonnaise</li> <li>Cooked, canned gravies &amp; sauces</li> </ul>	<ul style="list-style-type: none"> <li>Refrigerated, not shelf stable salad dressings containing herbs &amp; spices</li> <li>Salad dressings containing aged cheese (blue cheese) or raw eggs</li> <li>Salad dressings made from mixes containing herbs/spices</li> </ul>
Beverages	<ul style="list-style-type: none"> <li>Tap water, except well water (unless boiled 20 minutes)</li> <li>Water bottled</li> <li>Alcoholic beverages only if permitted by your doctor</li> <li>Pasteurized fruit juices</li> </ul>	<ul style="list-style-type: none"> <li>Well water (not boiled)</li> <li>Cider</li> <li>Home brewed beer</li> <li>Non-pasteurized fruit juices</li> </ul>
Miscellaneous	<ul style="list-style-type: none"> <li>Herbs &amp; spices (including pepper) added during cooking</li> </ul>	<ul style="list-style-type: none"> <li>Unpasteurized, raw honey</li> <li>Relishes, salsa &amp; pickles that require refrigeration prior to purchase</li> <li>All miso products</li> <li>Herbal &amp; "health food store" supplements</li> <li>Brewers yeast</li> <li>Fresh raw or dried spices used after cooking</li> </ul>

- acceptable.
- Avoid raw or half-cooked meat, fish and eggs. Meat should be cooked to the "well- done" stage. All eggs should be thoroughly cooked (no runny yolks).
- Avoid raw nuts. You may eat baked products with these ingredients.
- Consume only pasteurized dairy products. Avoid yogurt and yogurt products with live and active cultures.
- Refrigerate leftovers promptly in airtight containers. Better to avoid leftovers, if to be used should have been stored properly and have been around for no more than 24 hours.

**OTHER NUTRITIONAL CONSIDERATIONS**

- Eat small, frequent meals or snacks with timely intervals.
- Eat soft, high protein moist diet.
- If the patient experiences dry mouth as a result of treatment avoid caffeine products.
- Consume nutritional supplements like ice cream frappes made with enriched milk to increase the protein, calorie and vitamin content of the milk.
- In case of bloating, gas, cramps, or diarrhea after consuming milk products, prefer soy milk or cereal milk products.
- DON'T forget to check with your doctor after blood work is done, to see when this low bacteria diet can be liberalized.

**GENERAL HYGIENE POINTS TO BE CONSIDERED**

- Be safe in the way you handle foods. Wash with soap/cleanser and hot water all the following items before and after contact with food:
  - Counter tops,
  - Cutting boards (Wash them in a dishwasher if you have one.)
  - Cutlery and Crockeries.
- Wash dishes in hot soapy water or in dishwasher. Air dry dishes-- DO NOT use cloth towel.
- Wash your hands before handling food. Keep hot food hot and cold food cold. Maintenance of proper temperature is crucial to ensure the keeping quality of foods.
- Boiled tap water or well water can be always used. If bottled water is an option, check for the following points:
  - Reverse osmosis or distilled water
  - Filtered through an absolute 1 micron or smaller filter.

**CONCLUSION:**

The immune-compromised patients can lead life with ease by advocating the principles of neutropenic diet with a special focus on the above discussed safe food handling procedures, food choices and individualized diet practices with specific consideration given for the likes and dislikes of each individual.

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**GENERAL GUIDELINES FOR A NEUTROPENIC DIET**

- Check expiration dates on purchase of all products. Never opt for expired products.
- Avoid all raw fruits and vegetables, including all fresh garnishes. Fruits such as banana and oranges with thick peel off skin can be a choice always. Cooked vegetables, canned fruits, and juices are