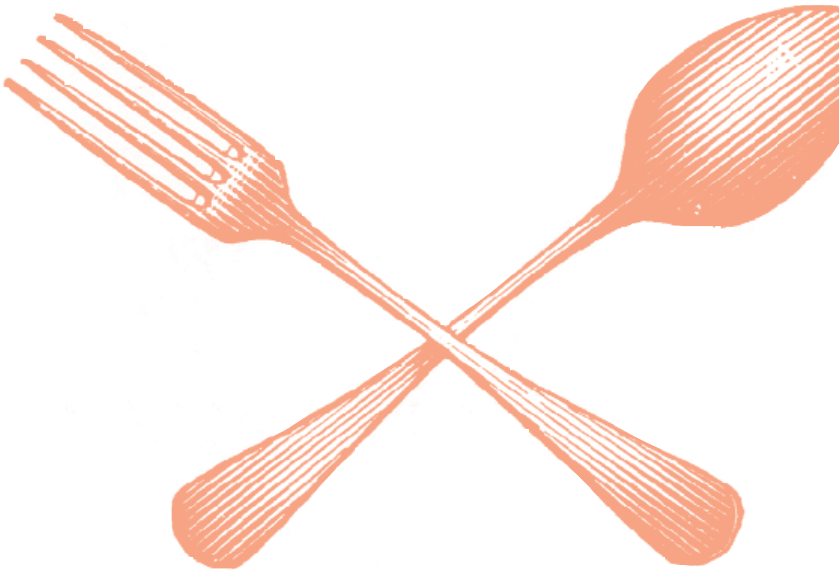
# Good Nutrition

## IN PARKINSON'S DISEASE



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## INTRODUCTION

When you have Parkinson's disease or any chronic illness, one important thing you can do for yourself is to make sure you are eating correctly. Your body will work better if your nutrition is optimal. You will have more energy, your medication will work better, and you will feel more like exercising. In the last few years, it has been shown that a diet low in protein can benefit some people with Parkinson's disease. Nonetheless, use of this diet without the proper attention to all nutritional needs can result in nutritional deficits.

This booklet is intended to help patients and families understand good nutrition as it applies to aging and chronic illness. The benefit of the low-protein diet will be addressed, who should use it, how it should be used, and some potential nutritional limitations. Finally, a practical approach to the use of the low-protein diet is included with a list of resources and recipes.

## RESOURCES

### Dieticians

To get the number of a dietician in your area, check the yellow pages under “dietician.” Be sure the dietician is registered or licensed.

Or call the American Dietetic Association at 1-800-877-1600, Ext 4898, and ask for the qualified dieticians in your area.

### Low-Protein Products

These resources can provide information on low-protein foods.

Dietary Specialties offers a variety of low-protein foods. Price list and order form may be obtained by calling the number below.

**Dietary Specialties, Inc**
PO Box 227
Rochester, NY 14601
(716) 263-2787
1-800-544-0099

Ener-G Foods is a northwest company that can provide low-protein recipes and foods.

**Ener-G Food, Inc**
5960 1st Avenue S
Seattle, WA 98124
(206) 767-6660

General Mills can provide information on the protein content of most food.

**General Mills, Inc**
PO Box 200
Minneapolis, MN 55440
(612) 540-2311

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# Principles of Good Nutrition

### 1. Eat a variety of food.

This includes selections from each of the four food groups to ensure the right amounts of vitamins, minerals, carbohydrates, fats, and proteins (Table 1).

Table 1

**Basic Four Food Groups**

| **Group** | **Meat**<br>2-3 servings per day | **Fruit and Vegetables**<br>4-5 servings or more per day | **Milk**<br>2-3 servings per day | **Bread and Cereal**<br>6-11 servings per day |
|---|---|---|---|---|
| **Nutrients** | Protein<br>Fat<br>Iron<br>Niacin<br>Thiamin<br>$B_{12}$<br>Zinc | Carbohydrates<br>Vitamin C<br>Vitamin A<br>Calcium<br>Iron<br>Vitamin E<br>B Complex<br>Calcium<br>Fiber<br>Folate | Protein<br>Carbohydrates<br>Fat<br>Riboflavin<br>Vitamin D<br>Calcium | Carbohydrates<br>Fiber<br>Niacin<br>Thiamin<br>Riboflavin<br>Iron |

### 2. Eat less fat.

Eating a high-fat diet has been linked to heart disease. Fat can be lowered by eating more fish, poultry, and other lean meats. Drink low-fat milk and eat less ice cream, butter, and cheese.

### 3. Eat more carbohydrates.

Eat more complex carbohydrates (starches, cereals, and breads), especially those high in fiber. They are a good source of energy, vitamins, and minerals.

### 4. Maintain a reasonable weight.

The proper number of calories should be consumed to maintain ideal weight. The person with Parkinson's disease has a tendency to lose weight rather than gain weight. Nonetheless, excess weight can worsen the existing problems of mobility.

### 5. Avoid too much salt.

Salt is a problem for people with high blood pressure or certain heart conditions. In Parkinson's disease, blood pressure can often be too low. If this is the case, and there are no heart problems, then salt does not need to be avoided.

# Important Nutrients: Why Are They Important and How Much Should You Eat?

## Carbohydrates

### What is the role of carbohydrates in nutrition?

Carbohydrates are sugars and starches and are the main source of energy in the diet. They are found in fruits, milk products, and bread products. One gram of carbohydrates supplies 4 calories.

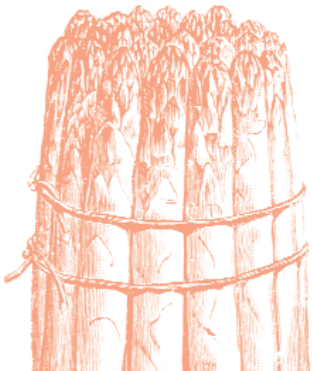
### What are calories?

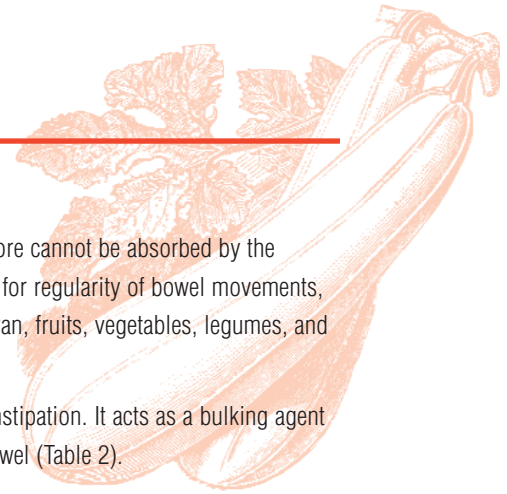
Calories are a unit of measurement used to express energy. They come from carbohydrates, proteins, fat, and alcohol. The amount of energy required to sustain all bodily processes such as circulation, breathing, muscle tone, and heartbeat is called the basal metabolic rate (BMR). The BMR varies from individual to individual but, on an average, requires 1,200 to 1,400 calories per day for women and 1,600 to 1,800 calories for men. To maintain an ideal weight, people should eat enough calories to sustain their BMR plus their normal level of physical activity. If you increase your physical activity, you need more calories; and if you decrease it, you need fewer.

### Are there specific calorie recommendations for Parkinson's disease?

The tendency in Parkinson's disease is to lose weight. The exact cause for this is unclear. Because of this, calorie needs should be individually assessed by a dietician using these steps:

1. Determine ideal body weight using tables with standardized norms (values) for age, sex, height, and body frame. This will be used in addition to your individual past history of weight.
2. Obtain a record of average daily food intake and calculate the number of calories eaten.
3. Estimate the amount of calories used daily in physical activity. Although many people with Parkinson's disease are sedentary, it should be noted that abnormal involuntary movements, or dyskinesia, can use as many calories as moderate physical exercise and should be calculated accordingly.
4. Compare the number of calories required to maintain ideal weight to the amount currently eaten and make individual calorie recommendations.





### What is fiber and why is it important?

Fiber is the part of the plant cell that cannot be digested and therefore cannot be absorbed by the bowel. Fiber is considered beneficial for the health of the intestine, for regularity of bowel movements, and for a number of chronic diseases. Major sources of fiber are bran, fruits, vegetables, legumes, and whole-grain cereals.

In Parkinson's disease, fiber is important in the management of constipation. It acts as a bulking agent by absorbing water, which then helps promote evacuation of the bowel (Table 2).

Table 2

**Management of Simple Constipation**

1. Eat a balanced diet, including fiber-containing food.
2. Get adequate rest and relaxation.
3. Do moderate routine exercises.
4. Don't put off the urge to move your bowels.
5. Drink 6 to 8 glasses of water or noncaffeinated drinks per day.
6. Check with your health care provider to see if your medications are contributing to your constipation.
7. Take a stool softener once or twice a day to manage simple constipation.
8. For more severe constipation, consult your health care provider. Some laxatives used chronically can be toxic to your bowel.

## PROTEIN

### What is the role of protein in nutrition?

Protein is composed of elementary structures called amino acids. The protein you eat is broken down into amino acids in the stomach and intestine and then absorbed into the blood. These amino acids are the building blocks for new protein used for building new tissue and repairing old tissue. Tissue protein of the body can also be broken down into amino acids and used for energy. This will occur if there are not enough carbohydrates and fats in the diet to provide energy. Protein provides 4 calories per gram.

There are 22 amino acids, 9 of which cannot be made by the body and therefore must be provided by the diet. These are called **essential** amino acids. Thirteen can be made by the body and are called **nonessential** (Table 3).

Table 3

| Essential Amino Acids | | Nonessential Amino Acids | |
|---|---|---|---|
| Histidine | Phenylalanine | Alanine | Glutamine |
| Isoleucine | Threonine | Arginine | Glycine |
| Leucine | Tryptophan | Asparagine | Hydroxyproline |
| Lysine | Valine | Aspartic acid | Proline |
| Methionine | | Cysteine | Serine |
| | | Cystine | Tyrosine |
| | | Glutamic acid | |

### Where is protein found?

Protein can come from either plant or animal sources. Animal sources include milk, meat, cheese, fish, poultry, and eggs. Plant sources are legumes, nuts, breads, cereals, and beans. Animal sources tend to be higher in fat and cholesterol.

### How much protein do we need?

Most Americans eat more protein than needed to meet the body's needs. The recommended daily allowance (RDA) for protein is 0.8 grams per kilogram (0.36 g/lb) body weight. This would be 62 grams of protein for the 77 kilogram (170 lb) man and 52 grams of protein for the 65 kilogram (143 lb) woman (Table 4). A quicker but slightly less accurate way to calculate RDA for protein is 0.4 grams times body weight in pounds. The RDA for protein is thought to be the same for aging and young adult populations.

It should be mentioned that RDA is calculated for healthy people and it may need to be modified in illness.

Protein deficiency can result in weight loss, reduced resistance to disease, skin and blood changes, slow wound healing, and muscle wasting.

Table 4

| Calculating Protein Requirements |
|---|
| 1 lb = 0.45 kg |
| 170 lb = 77 kg |
| 0.8 g x 77 kg = 62 g/170 lb body weight |

### What are the recommendations for protein use in Parkinson's disease?

For good health, all parkinsonian patients need a minimum of 0.8 g/kg body weight per day (0.36 g/lb). Higher amounts of protein have been found to interfere with Sinemet® (carbidopa-levodopa) in some people with Parkinson's disease. Recommendations for protein restriction will be described in the section "A Special Diet for Parkinson's Disease."

## FATS

### What is the role of fat in nutrition?

Fats are a major source of energy. One gram provides 9 calories. Fats are found in meats, milk products, butter, and oils. Some foods from the bread group also contain fat, such as pastries, cookies, biscuits, and muffins.

Although fats are very important in our diet, they have been implicated as a major contributor to heart disease. There are different types of fats in our diet and these affect the cholesterol in our blood. Cholesterol is a fatlike substance, which has important functions in the body, but high levels in the blood have been linked to coronary artery disease. "Good cholesterol" is known as HDL (high-density lipoprotein) and "bad cholesterol" is LDL (low-density lipoprotein).

High levels of LDLs increase heart disease risk, while high levels of HDLs reduce heart disease risk. The first line of therapy to reduce LDL is to reduce saturated fat and cholesterol in the diet. When diet has been altered and the LDL is still high, your physician may consider drug therapy to further lower the LDL.

In the diet, saturated fats are, in general, the "bad fats," since they tend to increase LDLs in the blood. Saturated fats come mostly from animal products such as butter, red meat, cheese, whole milk, and products made with whole milk. Saturated fats are also found in large quantities in some vegetable products such as coconut oil, palm oil, and vegetable oils that have been hydrogenated, such as shortenings.

The "good fats" are unsaturated, and they come in two classes: polyunsaturated and monounsaturated. These fats come mainly from plants and may help to reduce blood cholesterol (LDL), especially when they replace the saturated fats. Examples of polyunsaturated fats are safflower and corn oil. Olive, canola, and peanut oils are rich in monounsaturated fats.

Fats are not simple. It is important to understand that the fat in a food is not purely a saturated fat or purely an unsaturated one. The fat in any food or oil is a mixture of the types, but it is called saturated or unsaturated depending on which fat predominates. For example, while the fat in peanuts or in chicken is mostly unsaturated, these foods also contain significant amounts of saturated fats. This means that even foods rich in "good fats" should be eaten in moderation.

### What are the recommendations for fat use in Parkinson's disease?

The RDA for fat should be no more than 30% of the total calorie intake with an emphasis on low-cholesterol unsaturated fats. In Parkinson's disease, a low-protein diet often results in decreased fat and, therefore, weight loss. If this occurs, additional calories need to be added in the form of carbohydrates and possibly "good fats." Cholesterol intake should be no more than 300 mg per day.

## VITAMINS

### What is the role of vitamins in nutrition?

Vitamins are essential as regulators of certain body processes, such as metabolism of protein, carbohydrates, and fats. Although vitamins can easily be supplied in a well-balanced diet, those people whose food intake and diet are inadequate can develop vitamin deficiencies. (See section on prevention.) Vitamins A, D, E, and K are fat soluble. This means their absorption is enhanced by dietary fat, and they tend to be stored in the body. Greater than recommended intake of fat-soluble vitamins can lead to excess accumulation and toxicity. Water-soluble vitamins are the B-complex vitamins and Vitamin C. These vitamins are not stored in the body and tend to be less stable than fat-soluble vitamins (Table 5).

This section will review selected vitamins as they pertain to aging and Parkinson's disease. It is not intended to be comprehensive.

Table 5

**Recommended Dietary Allowances (RDA) for Vitamin Use in People Over 51**

| | Men | Women |
|---|---|---|
| **Fat Soluble** | | |
| Vit A | 1 mg | 0.8 mg |
| Vit D | 200-400 IU | 200-400 IU |
| Vit E | 15 IU | 10 IU |
| Vit K | 0.080 mg | 0.065 mg |
| **Water Soluble** | | |
| Vit $B_1$ | 1.2 mg | 1.0 mg |
| Vit $B_2$ | 1.4 mg | 1.2 mg |
| Vit $B_6$ | 2.0 mg | 1.6 mg |
| Vit $B_{12}$ | 0.002 mg | 0.002 mg |
| Folic acid | 0.200 mg | 0.200 mg |
| Niacin | 15 mg | 13 mg |
| Biotin | 0.030-0.100 mg | 0.030-0.100 mg |
| Pantothenic acid | 4-7 mg | 4-7 mg |
| Vit C | 60 mg | 60 mg |

1 mg=1/1,000 g

1989, adapted from *National Academy of Sciences National Research Council: Recommended Daily Allowances*, 10th ed.

### What is the role of Vitamin D in nutrition?

Vitamin D promotes bone and teeth mineralization and aids in the absorption of calcium and phosphorus. The major sources of vitamin D are fortified milk and sunlight.

Vitamin D deficiency causes osteomalacia, which is demineralization of the bone.

### What are the recommendations for Vitamin D use?

The RDA for Vitamin D is 200 to 400 IU per day. Since one major source of Vitamin D is exposure to sunlight, this should be carefully assessed in the elderly. Not only does time out of doors decrease in many elderly people, but the ability of the skin to produce Vitamin D can also be decreased. If exposure to bright sunlight is limited, a supplement of 200 to 400 IU per day should be given or Vitamin D–enriched food used. One cup of milk fortified with Vitamin D is equal to 100 IU.

### What is the role of Vitamin E?

Vitamin E is an antioxidant that may decrease the deleterious effects of toxic substances called free radicals in the body and brain. Although not proven, this drug has gained much popularity as an antiaging drug, protective against cancer, and recently suggested to protect against the progression of Parkinson's disease. From current research, it appears unlikely that large doses (2,000 IU/day) play a role in delaying the progression of the disease.

Sources of Vitamin E include fish; legumes; vegetable oils; wheat germ; green, leafy vegetables; and nuts.

### What are the recommendations for Vitamin E consumption?

The RDA for males is 15 IU and 12 IU for females. There is no proven benefit to high doses of Vitamin E in Parkinson's disease. People on anticoagulants should be cautioned that Vitamin E can augment the effect of these agents, resulting in prolonged bleeding times. Headache and fatigue have been known to occur with high doses of Vitamin E.

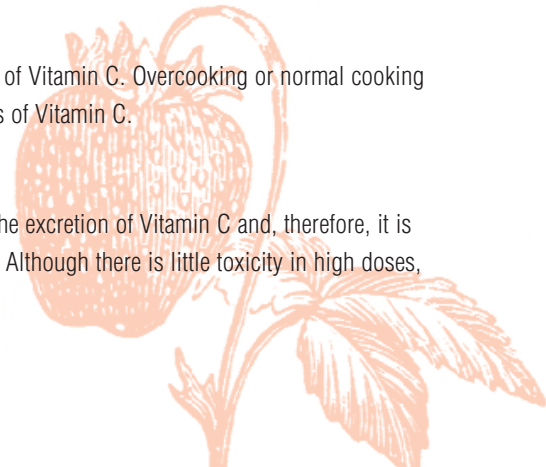
### What is the role of Vitamin C (ascorbic acid) in nutrition?

Vitamin C is important in wound healing and in the maintenance of many body tissues. It helps in the formation of red blood cells and in the absorption of iron from the intestine. It also destroys free radicals in the brain and, like Vitamin E, has been investigated regarding its role in delaying the progression of Parkinson's disease. To date, these studies do not show any clear benefit, and its role remains controversial.

Citrus fruits and green vegetables are the main source of Vitamin C. Overcooking or normal cooking of vegetables cut into very small pieces can cause loss of Vitamin C.

### What are the recommendations for use?

The RDA for Vitamin C is 60 mg. Smoking increases the excretion of Vitamin C and, therefore, it is recommended that smokers consume 100 mg per day. Although there is little toxicity in high doses,



there is no proven benefit to high doses of Vitamin C in Parkinson's disease. The only known side effects are possible diarrhea and the potential for kidney stones in some people.

### What is the role of B-complex vitamins in nutrition?

These vitamins are all water soluble. They are thiamine ($B_1$), riboflavin ($B_2$), pyridoxine ($B_6$), cobalamin ($B_{12}$), niacin, folic acid, biotin, pantothenic acid. Pyridoxine will be the only one discussed, because it is useful in the metabolism of protein. In Parkinson's disease, dopamine is the missing chemical in the brain. If levodopa is converted to dopamine before it reaches the brain, levodopa is ineffective. It was thought that a low $B_6$ diet would slow this metabolism and allow more levodopa to get to the brain, where it could be converted to dopamine and used effectively.

Common food sources for pyridoxine are fish and red meats, potatoes, green vegetables, bananas, and whole grains.

### What are the recommendations for dietary use?

The RDA for pyridoxine is 2 mg per day. A low pyridoxine diet may not be necessary in Parkinson's disease if a combination of carbidopa and levodopa is used. If multivitamins are needed, $B_6$ should not exceed 5 mg per day. If necessary, multivitamins are available that are pyridoxine free.

## MINERALS

### What is the role of minerals in nutrition?

Minerals are elements in the body that serve two functions: The first is building, such as the role of calcium in bone formation, and the second is a regulating function, as seen with calcium in muscle contraction.

There are major minerals and trace minerals. Major minerals are found in amounts greater than 5 g in the body, and trace minerals are found in amounts less than 5 g (Table 6).

Only calcium and iron will be discussed, as both have implications for aging and Parkinson's disease.

Table 6

| Nutritional Minerals | | | |
|---|---|---|---|
| **Major Minerals** | | **Trace Minerals** | |
| Calcium | Potassium | Chromium | Iron |
| Chloride | Sodium | Cobalt | Magnesium |
| Magnesium | Sulfur | Copper | Molybdenum |
| Phosphorus | | Fluorine | Selenium |
| | | Iodine | Zinc |

### What is the role of calcium in nutrition?

Calcium is primarily found in bones and teeth. Bone loss is inevitable with aging, contributing to increased risk of broken bones. Although the current RDA for calcium is still 800 mg, many risk factors in the aging population suggest that this is too low. These include menopause, decreased intake of dietary calcium, decreased calcium absorption by the small intestine, immobility and chronic illness, lack of exercise, and some medications.

The major source of all calcium is in milk and in milk products, but it can be found in small amounts in other foods (Table 7).

Table 7

**Major Sources of Calcium**

| | | |
|---|---|---|
| **Each contains 300 mg of calcium** | 1 cup of milk | 10 oysters |
| | 1 oz swiss cheese | 2 1/2 cups cottage cheese |
| | 1 cup yogurt | 2 1/4 oz sardines |

### What are the recommendations for calcium use?

Calcium intake of 1,000 to 1,500 mg per day is recommended to reduce the risk of osteoporosis in the elderly adult. Although the benefit of this increase over the RDA is somewhat controversial, it is still considered advisable to follow these guidelines, since they are safe and may play a role in preventing bone loss and fractures. In Parkinson's disease, people who are on a lowered protein diet will often decrease milk products in an effort to decrease protein. Adequacy of calcium intake should be carefully evaluated and calcium supplements used if there is any question about the calcium content of the diet (Table 8).

Table 8

**Calcium Content of Supplements**

| Calcium Carbonate | Mg per Tablet |
|---|---|
| Generic | 250 mg |
| Os-Cal 500 mg | 500 mg |
| Os-Cal 250 mg with Vitamin D | 250 mg |
| Caltrate 600 mg | 600 mg |
| Nature-Made Oyster Shell | 625 mg |
| Tums 500 mg | 200 mg |
| AARP Calcium Carbonate | 600 mg |

### What is the role of iron in nutrition?

More than one half of the iron in the body is in the hemoglobin of red blood cells. Hemoglobin carries oxygen to all cells of the body. A balance of copper, protein, vitamin $B_{12}$, and folate is necessary for the formation of hemoglobin. Mild anemia, which is decreased hemoglobin or decreased circulating red blood cells, is common in older people. The exact cause of this is unclear. The first consideration should always be internal bleeding and be carefully evaluated by your health care provider. It is suggested that many of the unexplained anemias seen with aging may be nutritional, emphasizing the importance of adequate diet.

The recommended daily allowance of iron is 10 mg for males and females. Iron is found in meat and plants, although the best source is calf's liver, which provides four times as much as other meats. The absorption of iron is enhanced when eaten with Vitamin C–containing foods.

### What are the recommendations for iron use?

If anemia is noted, a careful work-up should be done in all older adults, as well as those with a chronic illness. If iron-deficiency anemia is determined, supplemental iron should be taken in the recommended amount. It should be noted that recent studies have shown that iron taken with Sinemet reduces the effectiveness of this drug. If both drugs are necessary, iron administration should be separated from Sinemet administration by as many hours as possible.

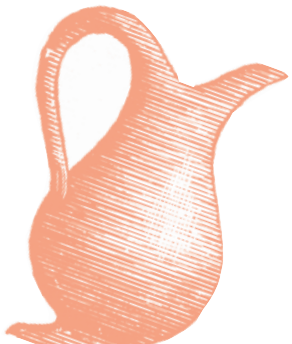
### What is the role of water in nutrition?

Water is an extremely important part of nutrition. The body is three quarters water with most of the water being in cells and the remaining in the blood, lymph, and secretions. Water aids in many processes, such as digestion, absorption, circulation, and excretion. It is part of the blood that helps carry nutrients to cells and waste products from cells. It is necessary for regulation of body temperature and is the medium for chemical changes in the body.

People in the older age group have a tendency to drink less water. It is suggested that there are alterations in the awareness of thirst in the aging population. Other factors, such as decreased access to water and self-imposed restriction of fluids because of problems with urination, contribute to decreased water intake.

### What are the recommendations for water intake?

Water should be considered as important as all other nutrients. Fluid intake of 6 to 8 glasses per day should be encouraged. Drinks that contain caffeine do not count, since they act as a diuretic. In Parkinson's disease, fluid intake at this level is particularly important for reducing constipation.



# Prevention of Malnutrition: Who Is at Risk?

Preventing malnutrition requires identifying those at risk for inadequate nutrition. There are psychosocial and physical risk factors that predispose to undernutrition (see Table 9). If you or the person you are caring for has more than 4 risk factors on this list, careful attention should be given to prevent inadequate nutrition.

### What psychosocial factors are nutritional risks?

Appetite is reduced by depression and by the loneliness of social isolation. Low income and other social and physical limitations may make it difficult to obtain and prepare nutritious meals.

### What physical factors in Parkinson's disease are nutritional risks?

Mobility problems in Parkinson's disease, such as swallowing difficulties and slowness of feeding and chewing, pose nutritional risks. The difficulties with dexterity, balance, and walking may interfere with shopping and meal preparation. Dyskinesia (ie, extra involuntary movements) can impair feeding and eating and, if severe, can increase calorie expenditure by increasing nutritional demands.

Although not specific to Parkinson's disease, other factors that are common in the normal aging population, such as dementia, poor teeth, and other acute and chronic illness, can compound the nutritional risk. It should be emphasized that during an infection or following surgery there are increased nutritional requirements. If a person has borderline nutrition, these increased demands can quickly result in malnutrition.

Table 9

**Nutritional Risk Factors**

- Social isolation
- Low income
- Impaired appetite
- Depression
- Dementia
- Poor dentition
- Chewing and swallowing problems
- Immobility and inactivity
- Drugs with nutritional interactions
- Increased metabolic requirements (ie, surgery, acute illness)
- Dietary restrictions for weight loss
- Alcohol/drug abuse
- Acute infection

### How do antiparkinsonian drugs affect nutrition?

Drugs can result in nutritional deficiencies. All antiparkinsonian drugs (ie, anticholinergics, deprenyl, levodopa-carbidopa, amantadine, pergolide, and bromocriptine) can cause nausea, vomiting, loss of appetite, and constipation. The nausea and loss of appetite usually occur on starting the drug and then subside over time as people become tolerant to these side effects. Other strategies can be used if these

symptoms do not improve, but the bottom line is that the person with continuing nausea and loss of appetite should be watched carefully for poor nutritional intake. Many drugs, in addition to antiparkinsonian drugs, can influence nutrition and should be considered when assessing nutritional risks.

**Are there physical signs of undernutrition?**

Body weight is probably the best physical indicator of nutritional status. Unexplained weight loss of 10% or more body weight over a short period of time (3 months or less) is a sure sign of undernutrition and should be carefully evaluated. In Parkinson's disease there is a tendency to lose weight; and, therefore, weight should be carefully monitored.

**What should be done if a person is at increased risk of malnutrition?**

Referral to a dietician, who can make a careful assessment and establish a nutritional care plan, should be made. This plan should take into account many of the physical and social factors discussed above. It may require education of family members and referral to appropriate social supports, such as the Meals on Wheels Program.

## A Special Diet for Parkinson's Disease

A special diet for Parkinson's disease has evolved out of the knowledge that diet can interfere with the effectiveness of levodopa. Therefore, this section pertains only to those people receiving levodopa who are experiencing fluctuations in their mobility.

**Why are there interactions between levodopa and diet?**

First we must understand some special features of levodopa.

1. Levodopa has a very short plasma half-life. This means that levodopa rapidly disappears from the blood. This takes from 60 to 90 minutes. Therefore, the blood levels of the drug bounce up and down. It is easy to imagine that anything that would delay it from entering the blood would also delay how much gets to the brain and, consequently, would affect how well the medication works.
2. Levodopa is not absorbed from the stomach, but from the small bowel. Therefore, anything that delays the emptying of the stomach contents into the small bowel can decrease absorption of the drug.
3. Levodopa is a type of amino acid called a large neutral amino acid (LNAA). To be absorbed, it must attach itself to carrier molecules in the wall of the intestine, which then carry it across the intestinal wall to the blood. This same mechanism is present to move levodopa from blood to brain. Therefore, anything that also uses this carrier system can compete with levodopa and potentially interfere with its ability to get to the brain.

### What factors interfere with the absorption of levodopa?

Since levodopa is not absorbed into the blood stream, the stomach's role is simply to deliver the medication to the place where it is absorbed, which is the small bowel. Because of this, the contents of the stomach, the rate at which they are digested, and the rate at which the stomach empties into the small bowel become very important. Another consideration is that there are enzymes in the stomach lining that play a role in metabolizing the drug. Therefore, the longer the drug stays in the stomach, the more it will be chemically broken down and less drug will be available for absorption. There are many dietary factors that affect how rapidly the stomach empties its contents. In regard to the food groups, fat takes the longest to be digested, followed by protein, and then carbohydrates. Dietary fiber also slows the emptying of the stomach. Other factors, such as increased stomach acidity and certain medications (eg, anticholinergics) have been shown to slow the rate of stomach emptying. Experiments are being done to see if decreasing stomach acidity with antacids might improve the absorption of the drug in a few patients. It should also be noted that stomach or bowel diseases, as well as constipation, can affect the rate of absorption.

Research has compared the absorption of levodopa when it is given on an empty stomach versus when it is given with a meal. This clearly demonstrates that, in some people, taking the drug with a meal can dramatically delay the absorption of the drug.

### What is the recommendation for timing of medication?

Sinemet* should be taken 15 to 30 minutes before meals to ensure the most predictable absorption. There are two exceptions to this rule:

1. If this drug produces nausea, the medication should be taken with a light, low-protein snack such as crackers and juice or, if necessary, with a meal. If this does not help, a drug called Domperidone† can block the nausea side effects and enhance the absorption of the drug.
2. The second exception is if a person experiences too much dyskinesia or involuntary movement after taking the drug. Dyskinesia may be improved by slowing the absorption of the drug by taking it with meals.

### What dietary factors affect levodopa getting from blood to brain?

Once levodopa gets from the stomach to the small bowel, it is absorbed into the blood stream. As mentioned earlier, to get across the intestinal wall, levodopa must be transported by attaching to carrier molecules. This carrier system transports the drug from intestine to the blood stream and from the blood stream to the brain. It can be likened to seats on a train. There are a limited number of seats and when these seats are filled, no more levodopa can be transported. At the level of the intestine, this is not a problem, since the "train" has a large carrying capacity; but at the level of the brain, the "train" is much smaller. Other LNAAs found in the diet use the same carrier system as levodopa. These amino acids are isoleucine, leucine, valine, phenylalanine, tryptophan, and tyrosine. Meals high in protein, and therefore high in LNAAs, can interfere with the ability of levodopa getting into the brain by taking up the seats on the train.

*The same recommendation would apply for Sinemet CR, although it is not thought to be as critical for its absorption.

†Domperidone is a registered trademark of Jensen and is presently unavailable in the United States.

Research has substantiated this idea, suggesting that a low-protein diet can improve the response to levodopa.

### Who should try the low-protein diet?

Consideration should be given to the severity of the disease. If a person has motor fluctuations that interfere with activities or has noticed that food seems to interfere with how well their medication works, a reduced-protein diet may help these problems.

### How much protein should be eaten?

People who need to lower the protein in their diet should reduce it to the recommended daily allowance of protein. Most Americans eat far more than this on a daily basis. The RDA for protein is 0.8 g/kg (0.36 g/lb) body weight.

### How should the protein be distributed throughout the day?

Restricting protein to the RDA, compared with the typical American consumption of protein, clearly improves the time a person is mobile throughout the day. Restricting the majority of the protein to the evening meal, compared with evenly distributing it throughout the day, further improves the amount of time a person is mobile. The decision between these two methods of distribution depends on the severity of the disease and the person's life-style needs.

For the person who has moderate motor fluctuations, a diet with protein spread evenly throughout the day will reduce the likelihood of high levels of amino acids and improve the amount of mobile time. For the person with marked motor fluctuations, a diet with protein restricted to the evening meal will allow for an even more predictable response. The drawback to this diet is a less mobile evening. If this is compatible with the life-style of the patient, this diet is best for the person who has marked fluctuations in mobility.

### Do carbohydrates play a role in the parkinsonian diet?

It has been shown that increased carbohydrates result in increased insulin secretion, which lowers LNAAs circulating in the blood. Therefore, increased carbohydrates plus a decreased protein intake may further enhance the delivery of levodopa to the brain by lowering the competition with other LNAAs. The therapeutic role of carbohydrates in the parkinsonian diet needs further investigation.

### What are the recommendations for carbohydrate use in the parkinsonian diet?

If weight is lost when protein is lowered in the diet, carbohydrates should be increased to maintain ideal body weight. The amount should be determined with the help of a dietician. If excessive but predictable dyskinesia results from the increased carbohydrates and lowered dietary protein, it may be helpful to try to evenly distribute carbohydrate intake throughout the day, as well as reduce the dosage of the medication.

## Practical Guidelines for a Well-Balanced Diet in Parkinson's Disease

1. Eat a daily diet that has a balance of all food groups. This should include 2 to 3 servings from the meat group, 4 to 5 from fruit and vegetables, 2 to 3 from the milk group, and at least 6 from the bread and cereal group. An average man may need 11 more servings from the bread and cereal group to provide enough calories to maintain weight.
2. On an average, calorie intake should be maintained at 25 to 30 calories per gram of body weight. If dyskinesia is present, additional calories should be added to prevent weight loss. Monitor weight on a weekly basis. Weight loss is the best sign of undernutrition.
3. Fiber and adequate fluids are important in the control of constipation and prevention of bowel disease. Fiber can be found in whole grains, fruits, and vegetables. If necessary, unprocessed bran can be added. To avoid gas, start with 1 teaspoon daily and increase by 1 teaspoon per day to a total of 1 tablespoon twice daily. In addition, adequate amounts of fluid are essential. This should be equivalent to 6 to 8 glasses of water per day.
4. An effort should be made to eat a diet low in saturated fats and low in cholesterol. Cholesterol consumption should be approximately 300 mg per day. If calories are needed in the Parkinson's diet, they are best added in the form of complex carbohydrates and unsaturated fats.
5. The need for vitamin supplements remains controversial. Although most people should be able to get adequate vitamins from a balanced diet, most elderly people with a chronic illness have enough nutritional risk factors to warrant taking a multivitamin. On the other hand, vitamins are drugs, and overuse of some can cause toxicity. High doses of Vitamins C and E used in the hope of slowing the progression of Parkinson's disease have minimal toxicity; however, their true benefit is still unclear.
6. Pyridoxine ($B_6$) does not worsen Parkinson's disease if used in the recommended amount of 2 mg per day. If supplemental vitamins are used, intake should not exceed 5 mg. Pyridoxine-free multivitamins are only needed if a person is taking levodopa rather than Sinemet.
7. Elderly people have many risk factors for decreased calcium intake, which can contribute to osteoporosis and increased risk of broken bones. In Parkinson's disease, decreased calcium intake may occur when protein is restricted in the form of dairy products. Careful attention should be given to ensure daily calcium intake of 1,000 to 1,500 mg.
8. Vitamin D is important in calcium balance. If exposure to sun is inadequate, or chronic use of sunscreen products is necessary, supplements of 200 to 400 IU of Vitamin D should be given daily.
9. Iron is essential in the formation of hemoglobin, which carries oxygen to the cells. If iron supplements are needed, they should be separated from the time levodopa-carbidopa is taken to reduce interference with the effectiveness of the drug.

10. Take levodopa-carbidopa 15 to 20 minutes before meals to ensure more predictable absorption.
11. Avoid high-protein meals.
12. For people on levodopa-carbidopa who are noticing fluctuations in their mobility, protein manipulation may be helpful. The following steps should be followed:
    a. Your health care provider should determine if an evenly distributed or restricted protein diet would be best. This is decided by disease severity and life-style needs. Referral is then made to the dietician.
    b. The dietician establishes current dietary intakes of calories, protein, and calcium. A nutritional-care plan is then established, with appropriate instruction regarding reduction of protein and how it should be distributed throughout the day.
    c. Protein should be reduced to meet the recommended daily allowance of 0.8 g/kg (0.36 g/lb) of body weight.
    d. If protein is to be evenly distributed, it should be equally divided among three meals. For example, a man who is 170 pounds weighs 77 kilograms and would require 62 grams of protein per day, which is approximately 21 grams per meal.
    e. If protein is to be restricted, the protein in breakfast and lunch together should equal approximately 10 grams of high-quality protein. The rest of the protein (ie, 52 g for the 170-lb man) should be eaten from dinner to bedtime.
    f. Calorie intake should be calculated to provide adequate calories to prevent weight loss. Decreased calories from protein reduction may need to be replaced by increasing carbohydrates or unsaturated fats.
    g. Calcium intake should be monitored to ensure 1,000 to 1,500 mg per day.
    h. This diet should be tried for 2 to 4 weeks. The improvement in response to the medication should be evident within a few days. At this time, reevaluation of the benefits should be made by your health care provider. Evaluation of proper use of the diet should be made by the dietician.

# Protein Exchange List for Assistance in Designing Reduced-Protein Diets

Exchange lists are foods that are grouped together because they contribute similar nutrients to the diet. The 6 food lists are milk, meat, bread, vegetable and fruit, fat, and protein free. All the foods on 1 list provide an equal amount of protein in the designated amounts. Any food on the list can be traded for any other item on the same list. The following lists may not have some of your favorite foods. They can always be added with the help of a dietician.

**How do I use exchange lists?**

It is best done with instruction from a dietician. Your health care provider can refer you to a local dietician in the hospital or outpatient setting. If a reduced-protein diet is thought to be appropriate for you, your health care provider should tell the dietician whether the protein should be evenly distributed or restricted to the evening meal.

In addition to the protein restriction, these exchange lists can prevent other nutritional deficiencies, such as inadequate calorie or calcium intake. It should be tailored for you, including your likes and dislikes. To make this diet plan work for you, you will need to try and follow the plan established, including eating the correct portions of food. This may seem overwhelming at first, but after you measure or weigh your food for 1 to 2 weeks, you will quickly be able to estimate appropriate amounts. Be patient and visit your dietician regularly for help and follow-up. Your diet plan may require adjustment to make it work for you. The way you eat and what you eat can make a big difference in how you feel. It is something you can give yourself.

## YOUR MEAL PLAN: _____

**Total Servings per Day**

| | | **Grams of Protein** |
|---|---|---|
| _____ | Milk List | _____ |
| _____ | Meat List | _____ |
| _____ | Bread/Starches List | _____ |
| _____ | Vegetable List | _____ |
| _____ | Fruit List | |
| _____ | Fat List | |
| _____ | Protein-Free, High-Calorie List | |

**Morning**

_____ Egg(s) or _____ Servings Lean Meat
_____ Servings From the Bread List
_____ Servings From the Fat List
_____ Servings From the Fruit List
_____ Milk
_____ Protein-Free, High-Calorie List

**Noon**

_____ Servings of Meat or Equivalent
_____ Servings From the Vegetable List
_____ Servings From the Bread List
_____ Servings From the Fat List
_____ Servings From the Fruit List
_____ Milk
_____ Protein-Free, High-Calorie List

**Evening**

_____ Servings of Meat or Equivalent
_____ Servings From the Vegetable List
_____ Servings From the Bread List
_____ Servings From the Fat List
_____ Servings From the Fruit List
_____ Milk
_____ Protein-Free, High-Calorie List

**Snack** (if allowed) _____

## Meat List

_____ Servings per day

One serving contains approximately 7 grams of protein. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| Beef, chicken, duck, lamb, organ meats, pork, turkey, veal, venison, and fish (fresh or frozen) | 1 oz |
| Clams | 4-6 medium |
| Crab, lobster | 1/4 cup |
| Oysters | 3-5 medium |
| Scallops | 2 small |
| Shrimp | 5 small |
| Tuna | 1/4 cup |
| Sardines | 1 oz |
| Cheese* | 1 oz |
| Cottage cheese | 1/4 cup |
| Egg, large* | 1 |
| Egg substitute | 1/4 cup |
| Peanut butter | 2 tbsp |
| Soybeans, mature cooked | 1/3 cup |
| Beans, peas, lentils | 2/3 cup |
| Tofu, bean curd | 1/4 block (3 1/2 oz) |
| Lunch meat* | 1 1/2 oz |
| Frankfurter* | 1 |
| Wafer-sliced meats | 1 oz |
| Kielbasa* | 2 oz |
| Pork sausage* | 1 1/2 links or 1 oz |
| Vienna sausage* | 4 links |
| Bacon* | 3 strips |

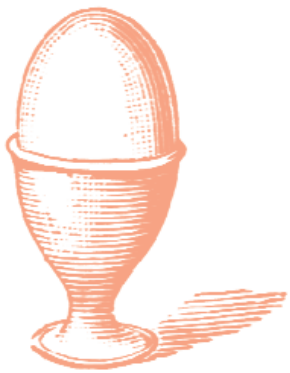
## Milk List

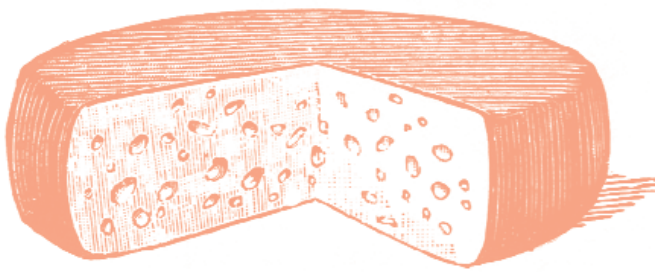
_____ Servings per day

One serving contains approximately 4 grams of protein. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| Milk | |
| Whole | 1/2 cup |
| 2% | 1/2 cup |
| Skim | 1/2 cup |
| Buttermilk | 1/2 cup |
| Evaporated | 1/4 cup |
| Chocolate | 1/2 cup |
| Condensed | 2 tbsp |
| Nonfat dry solids | 4 tsp |
| Yogurt | |
| Plain or flavored | 1/2 cup |
| Frozen | 1/2 cup |
| Cream cheese* | 3 tbsp |
| Cream, whipping* | 3/4 cup |
| Half & Half* | 1/2 cup |
| Sour cream* | 2/3 cup |
| Ice cream* | 2/3 cup |
| Ice milk | 2/3 cup |

*High in saturated fats or cholesterol.





## Bread & Starch List _____ Servings per day

One serving contains approximately 2 grams of protein. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| Bagel | 1/2 medium |
| Bread crumbs | 3 tbsp |
| Bread stick | 4 medium |
| Bread | 1 slice |
| Raisin bread | 1 slice |
| Cake | 2″ square |
| Cereal, dry; flakes | 3/4 cup |
| Cereal, dry; puffed | 1 cup |
| Cereal, cooked | 1/2 cup |
| Cookies | 2 small |
| Cornbread | 2″ square |
| Crackers, graham | Two 2 1/2″ squares |
| Crackers | Four 2 1/2″ squares |
| Doughnut, raised and cake | 1 small |
| English muffin | 1/2 muffin |
| Flour | 3 tbsp |
| Gelatin | 1/2 cup |
| Hamburger or frankfurter bun | 1/2 bun |
| Macaroni | 1/3 cup |
| Melba toast | 4 slices |
| Muffins, plain | 1 small |
| Noodles | 1/3 cup |
| Popcorn | 2 cups |
| Pancakes, plain | One 3″ diameter |
| Rice | 1/2 cup |
| Rice-a-Roni | 1/2 cup |
| Roll, yeast, raised | 1 small |
| Rusk, Holland | 1 small |
| Rye Crisp | 2 squares |
| Tortilla | One 6″ diameter |
| Vanilla wafers | 10 small |
| Rice cakes | 2 |
| Saltines | 8 |
| Ritz | 10 |

*High in saturated fats or cholesterol.

## Vegetable List _____ Servings per day

One serving contains approximately 2 grams of protein. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| Yellow wax beans, green beans, beets, cabbage, carrots, mushrooms (raw), summer squash, tomato juice, V-8 juice, tomatoes, bok choi, cauliflower, sauerkraut, spinach (raw), green pepper, lettuce, endive | 1 cup |
| Mushrooms (canned), okra, winter squash, turnip greens (raw), yams, sweet potato, broccoli, mixed vegetables, spinach (frozen), potatoes (raw, cooked), potatoes (frozen), frozen oriental vegetables, peas and carrots, prepared potato mixes, french fried onion rings, corn | 1/2 cup |
| Green peas | 1/4 cup |
| Cream soup (diluted with water) and broth type (no meat chunks) | 6 oz |

## Fruit List _____ Servings per day

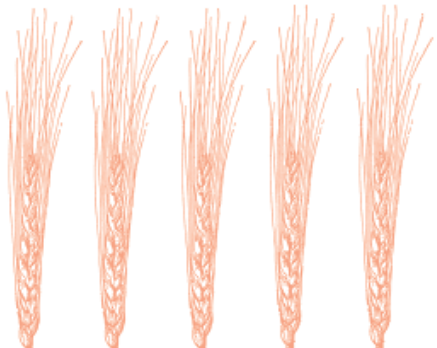
One serving contains negligible amounts of protein. The portion listed is 1 serving.

| Food | Portion |
|---|---|
| All fruits and fruit juices | 1/2 cup |

## Fat List _____ Servings per day

One serving contains negligible amounts of protein. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| Butter, margarine* | 1 tsp |
| Oil, mayonnaise, shortenings, salad dressing | 1 tsp |



## Protein-Free List

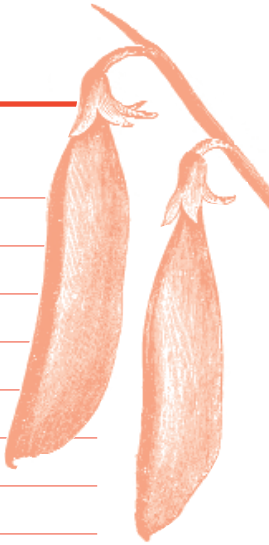
_____ Servings per day

These foods have negligible amounts of protein, and each serving is approximately 100 calories. These items will add calories for those with higher energy needs. Each portion listed is 1 serving.

| Food | Portion |
|---|---|
| **Beverages** | |
| Carbonated | 1 cup |
| Fruit-flavored drinks | 1 cup |
| Cool Whip nondairy topping | 1/2 cup |
| Corn syrup | 2 tbsp |
| Cotton candy | 1 |
| Cranberry sauce or relish | 2 tbsp |
| Dessert toppings | 2 tbsp |
| Fruit roll-ups/snacks | 1 |
| Fruit ice | 1/4 cup |
| Gum drops | 3 large |
| Hard candy, unfilled | 8 |
| Honey | 1 tbsp |
| Hunt's Lemon Snack Pac pudding | 1/2 can |
| Jam or jelly | 2 tbsp |
| Jelly beans | 10 |
| Lemonade | 1 cup |
| Lifesavers | 10 |
| Low-protein products | (check label) |
| Mocha Mix nondairy frozen dessert | 1/2 cup |
| Marshmallows | 4 |
| Nondairy creamers* | 1/3 cup |
| Popsicles | 2 sticks |
| Sugar | 2 tbsp |
| Syrup | 2 tbsp |
| Sherbet | Limited to 1/2 cup |

*Select those made with unsaturated fats.

## Notes



# Low-Protein Recipes

## RICE WITH MUSHROOMS

1 cup uncooked regular white rice

1 cup chopped tomato

1 pound fresh mushrooms, sliced

1/2 cup chopped onion

1/2 cup butter or margarine

1 chicken bouillon cube dissolved in 3 cups boiling water

1/2 cup red wine

2 tsp salt

1/8 tsp pepper

3 cheese crackers

In a skillet, sauté rice, tomatoes, mushrooms, and onion in margarine for 10 minutes, stirring occasionally. Add chicken broth, wine, and seasonings. Mix well. Cover; simmer for 45 minutes or until liquid is absorbed. Sprinkle with crushed cheese crackers before serving.

**Note:** The rest of the family may enjoy grated Parmesan cheese sprinkled on top before serving.

**Yield:** 16 servings; 1 serving = 1.9 grams protein.

## SWEET POTATOES IN ORANGE CUPS

2 medium oranges (3 per pound)

1 1/2 tsp brown sugar

1/2 cup mashed, cooked sweet potato

Preheat oven to 350°F. Cut oranges in half. Remove pulp and membrane. Use orange juice to moisten potatoes. Add orange pulp, cut small. Fill orange shells with this mixture. Sprinkle with brown sugar. Bake for 10 minutes or until slightly glazed.

**Yield:** 4 servings; 1 serving = 1.8 grams protein.

## POTATOES BOULANGERE

1 1/2 cups pared, thinly sliced potatoes

3 tbsp minced onion

1 tsp chopped parsley

pepper, to taste

1/4 tsp salt

2 tbsp butter or margarine

1/4 cup boiling water

Preheat oven to 400°F. In a shallow baking dish, spread first 5 ingredients about 1/2-inch deep; dot with 2 tablespoons margarine. Add boiling water. Bake uncovered for 30 to 40 minutes or until brown and crusty on top and water is absorbed.

**Yield:** 6 servings; 1 serving = 0.9 grams protein.

## ONION POTATOES

1/2 cup butter or margarine

6 medium potatoes (4 per pound), pared and quartered

1 envelope onion soup mix (4-serving size)

In a small saucepan over medium heat, melt margarine. Stir in onion soup mix until blended. Place quartered potatoes on a large sheet of heavy-duty aluminum foil. Spoon onion mixture between cut potatoes; fold foil over and wrap securely. Bake on cookie sheet at 375°F for 45 minutes or over hot coals until fork tender. Serve from foil package.

**Yield:** 12 servings; 1 serving = 1.3 grams protein.

## HERB-FRIED POTATOES

3 tbsp butter or margarine

3 cups pared, thinly sliced potatoes

1/2 tsp oregano

salt and pepper

2 tbsp finely chopped celery

2 tbsp parsley

2 tbsp minced onion

Melt margarine in a heavy skillet. Add potatoes. Cover and cook over medium heat for 10 minutes. Turn potatoes carefully. Cook uncovered for 10 minutes more, turning occasionally to brown all sides. During last 5 minutes, sprinkle with oregano, celery, parsley, and onion. Add salt and pepper to taste.

**Yield:** 10 servings; 1 serving = 1 gram protein.

## ORANGE RICE

3/4 cup chopped celery

1/4 cup sliced green onion (including tops)

1 cup uncooked regular white rice

1/4 cup butter or margarine

1 cup orange juice

1 tsp salt

1 cup water

1 medium orange (3 per pound)

Cook celery, onions, and rice in hot margarine in a large saucepan over medium heat until onions are tender and rice is browned (about 5 minutes), stirring occasionally. Stir in orange juice. Add salt and 1 cup water; heat to boiling. Reduce heat to low; cover and simmer for 20 to 25 minutes, until rice is tender and liquid is absorbed. Meanwhile, peel orange and cut into bite-size pieces. When rice is tender, gently stir in orange pieces until well mixed.

**Yield:** 16 servings; 1 serving = 1.1 grams protein.

## SAVORY VEGETABLE STEW

1 tbsp minced onion

2 tsp butter or margarine

1/2 cup water

1/4 cup tomato juice

1/4 cup fresh or canned cut green beans

1/4 cup sliced carrots

1/4 cup pared, diced potatoes

2 tbsp diced celery

1/4 tsp salt

dash of garlic

2 tsp cornstarch

Sauté onion in margarine until tender. Add water, tomato juice, vegetables, salt, and garlic. Simmer 15 minutes or until tender. Take out small amount of hot liquid and mix with cornstarch to form a paste. Stir cornstarch liquid into vegetable mixture and continue simmering a few minutes, until slightly thickened. Other herbs such as oregano or basil may be added, if desired.

**Yield:** 2 servings; 2 servings = 2.4 grams protein.

## GREEN BEANS A LA NICOISE

1/2 cup chopped onion

1 clove garlic, minced

3 tbsp vegetable oil or olive oil

Two 10-oz packages frozen cut green beans, thawed

One 14-oz can Italian-style tomatoes

1 tsp crumbled leaf oregano

1 tsp salt

1/4 tsp pepper

In a large skillet, sauté onion and garlic in oil until tender. Stir in green beans and toss to coat well. Drain liquid from tomatoes, reserving for a soup or stew. Add tomatoes, oregano, salt, and pepper to green beans. Stir to blend well. Cover skillet. Simmer until green beans are tender (about 10 minutes).

## BAKED APPLES AND SQUASH

1 cup pared, cubed acorn or butternut squash

1 1/2 tsp brown sugar

1/2 tbsp butter or margarine

1 cup pared, sliced apples

Preheat oven to 350°F. Place squash cubes in a greased baking dish. Dot with margarine and sugar. Bake until squash begins to get tender (30 to 45 minutes). Add sliced apples to squash, and continue baking until tender.

**Yield:** 4 servings; 1 serving = 3.2 grams protein.

## VEGETABLE POT PIE

### Filling

1/4 cup pared, diced potatoes

1/4 cup fresh or canned cut green beans

1/4 cup diced carrots

1 tbsp diced celery

1 tbsp wheat starch

3/4 cup water

1 beef or chicken bouillon cube

salt and pepper to taste

Prepare vegetables. In a small saucepan, dissolve wheat starch in a small amount of the water. Add remainder of water and bouillon cube. Bring to a rolling boil, stirring until thickened and clear. Stir in vegetables, salt, and pepper; and pour into 2 small, individual casserole dishes.

### Pastry

2 tbsp butter or margarine

1/3 cup wheat starch

dash of salt

2 tsp light corn syrup

1 tsp water

Preheat oven to 425°F. In a mixing bowl, cut margarine into wheat starch and salt. Add water and corn syrup, and stir with a fork until crumbly. Shape pastry into two balls; roll each between two sheets of waxed paper in a circle 1 inch wider than casserole diameter. Peel off top paper. Lift pastry and invert over vegetables, pastry side down. Carefully peel off remaining paper. Flute edges of crust, cut slits in top, and bake about 30 minutes, until vegetables are tender and crust is lightly browned. Makes 2 individual casseroles.

**Note:** Pot pie freezes well. Freeze before baking. Put directly into oven from freezer.

Bake 35 to 40 minutes at 425°F.

**Yield:** 2 servings; 1 serving = 1.4 grams protein.

## These low-protein recipes may be used to increase calories for those people who are losing weight:

## RUSSIAN BUTTER COOKIES

2 cups margarine

3/4 cup sugar

2 tsp vanilla

3 cups flour

Preheat oven to 375°F. Whip margarine and sugar until white and fluffy. Add vanilla and flour. Drop by spoonful on ungreased cookie sheet; flatten slightly. Bake 8 to 10 minutes until very light brown. Top cookies with frosting (water, powdered sugar, margarine).

**Yield:** 48 cookies; 1 cookie = 0.5 g protein.

## RICE KRISPIES BARS

1/4 cup margarine

4 cups miniature marshmallows

5 cups Rice Krispies cereal

Melt margarine in large saucepan over low heat. Add marshmallows and stir until completely melted. Cook over very low heat 3 minutes longer, stirring constantly. Remove from heat. Add Rice Krispies cereal. Stir until well coated. Using buttered spatula or waxed paper, press mixture evenly into buttered 13-inch x 9-inch pan. Cut into squares when cool.

**Yield:** 12 bars; 1 bar = 1.4 g protein.

## FROZEN CRANBERRY WHIP

One 8-oz can cranberry jelly or sauce

1 pint Bird's Eye Cool Whip (4 1/2 oz)

Chill cranberry jelly in refrigerator, then whip with egg beater until smooth. Gently fold cranberry jelly into the thawed Cool Whip. DO NOT OVERMIX. Divide into 4 individual cups, paper or china; cover with aluminum foil and freeze.

**Yield:** 4 cups; 1 cup = 0.4 g protein.

## DIVINITY

2 cups sugar

1/2 cup water

1/2 cup white corn syrup (Karo)

1 egg white

1 tsp vanilla

Combine sugar, water, and corn syrup in a saucepan, and stir until sugar dissolves. Cook to soft ball stage when tested in cold water, or 238°F on candy thermometer. Beat the egg white until stiff. Slowly pour half of the syrup over the egg white while continuing to beat. Return the other half of the syrup to the stove, and continue to cook until it forms a thread as it drips from a spoon. Add vanilla and pour over egg white mixture. Continue beating until thick. Pour mixture into a greased pan and allow to cool.

**Yield:** 12 pieces; 1 piece = 0.3 g protein.

## GINGERBREAD

1/3 cup sugar
1/3 cup molasses
1/3 cup shortening
1/2 cup water
1 egg
1 cup flour
1 tsp baking powder
1 tsp ginger
1 tsp cinnamon

Heat oven to 350°F. Combine sugar, molasses, shortening, water, and beaten egg. Sift dry ingredients together and add to the liquid mixture. Beat with egg beater until thick, smooth batter is formed. Pour into cupcake tins, and bake for 25 minutes.

**Yield:** 18 cupcakes; 1 cupcake = 1 g protein.

## FROZEN CHOCOLATE WHIP

4 tbsp Hershey's chocolate-flavored syrup

1 pint Bird's Eye Cool Whip (4 1/2 oz)

Thaw Cool Whip in refrigerator 2 to 3 hours. Place chocolate syrup in refrigerator for the same length of time. With a fork, lightly blend the chocolate syrup into the Cool Whip. Divide into 4 individual cups, paper or china; cover with aluminum foil and freeze.

**Yield:** 4 cups; 1 cup = 0.8 g protein.

## DANISH APPLE PIE

**Crust**

1 1/2 cups fine cake flour
1 1/3 cups cornstarch
3/4 cup sugar
1/2 pound (2 cubes) margarine
1 egg yolk
1 tbsp whipping cream

**Filling** (mix and set aside)

4 to 5 medium-size green cooking apples (1 pound, peeled)
3/4 cup sugar
2 tsp cinnamon
2 tbsp cornstarch
1 tbsp lemon juice
1/4 cup margarine

Measure flour, cornstarch, sugar, and margarine into a large mixing bowl. With pastry cutter or fork, cut margarine, flour, and sugar together until they are well mixed. Mix the egg yolk and cream and add to the flour; blend at first with a fork, then with hands until the dough is smooth. Place in the refrigerator 1 hour. When the dough becomes firm, knead it lightly and roll it into 2 round balls, one a little larger than the other. (The larger is for the bottom crust, the smaller for the top crust.) Roll crust out. Lay bottom crust in pie pan. Put mixed filling in and lay second crust on top. Crimp edges and cut several slits in upper crust. Bake at 375°F for 10 minutes, then at 300°F for 40 minutes. Cool before serving.

**Yield:** 9 servings; 1 serving = 1.5 g protein.

## TOURO'S FAMOUS FUDGE

1 pound powdered sugar

1/2 cup cocoa powder

6 tbsp margarine

4 tsp whole milk

1 tbsp vanilla

Combine ingredients in cooking pan. Heat and stir until smooth. Spread onto greased 9-inch x 5-inch pan and cool. Cut into 24 pieces.

**Yield:** 12 servings; 2 pieces = 1 serving. 1 serving = 1 g protein.

## LOW-PROTEIN COOKIES (A very tender and rich cookie)

2 3/4 cups margarine

1 2/3 cups sifted all-purpose flour

2 1/2 cups cornstarch

1 cup powdered sugar

Blend ingredients together. Drop by rounded tablespoon on ungreased cookie sheets. Bake at 350°F for 15 minutes or until lightly browned. Allow to cool further before frosting.

**Frosting**

1/2 cup margarine, melted

2 1/2 cups powdered sugar

2 tbsp water (approximately)

1/4 tsp lemon flavoring

Frost each cookie with 1 level teaspoon of frosting.

**Yield:** 5 to 6 dozen cookies; 1 cookie = 0.4 g protein.

Recipes on pages 26-29 (except Russian Butter Cookies): *Low Protein Cooking for PKU*, by Virginia Shult

Recipes on pages 29-32 (page 29, Russian Butter Cookies only): Oregon Health Sciences, Center Nutrition Services

**The American Parkinson Disease Association, Inc**

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# Good Nutrition

TO EASE THE BURDEN
APDA
TO FIND THE CURE

## In Parkinson's Disease

THE AMERICAN PARKINSON DISEASE ASSOCIATION, INC

# The American Parkinson Disease Association, Inc

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***Young Parkinsonians**

**†Armed Forces Veterans**

**Please contact the nearest I&R Center or the National Office for information regarding Support Groups and Chapters, or call the National Office at 1-800-223-2732.**
**You can also dial the toll free number 1-888-400-2732 to contact the I&R Center closest to you.**