

GLUTAMINE THERAPY

Glutamine is an amino acid under study for treatment of side effects associated with cancer therapies. NCI sponsored Cooperative Groups and academic based cancer centers are taking part in clinical trials to investigate the potential benefit that supplementing with glutamine may offer in protecting normal tissues from damage by chemotherapy and radiotherapy. So far, it looks like glutamine may be helpful in limiting side effects including infection, diarrhea, mouth sores, muscle aches/pain and peripheral neuropathy. Of particular interest, glutamine supplementation also may decrease tumor growth by improving immune function and by making the tumor cell more susceptible to chemotherapy.

Glutamine is the most abundant of the body's 20 amino acids involved in making protein. It is used for protein and energy needs by cells and tissues in the body, especially those that turn over frequently, like the cells of the intestinal tract and immune system. Under stress, the cells lining the gastrointestinal tract use glutamine more quickly than it can be made and released from the muscle, making it a "conditionally" essential amino acid.

Under stress, this lack of glutamine can reduce the body's ability to make glutathione (GSH), an important antioxidant within the cell, so that tissue is more easily damaged by chemotherapy and radiation. Supplementing the diet with glutamine increases GSH and natural killer cell activity, improving immune function at the same time that it decreases production of the inflammatory and immune suppressive local hormone, PGE2.

The fact that tumor cells in vitro (in the petri dish) use glutamine as a fuel caused initial concern that supplementation might stimulate the growth of the tumor and protect cancer cells from treatment. But research in vivo (in animals) show that the body actually increases glutathione stores only in *normal* tissues, with either no change or a decrease of levels in tumor cells. The acidic environment within cancer cells decreases the activity of the enzyme 5-oxoprolinase, used in making glutathione from glutamine. ***Animals treated with chemotherapy had greater tumor reduction, less treatment-related toxicities and improved survival with glutamine supplementation.***

Dosage Recommendations

10 grams of glutamine powder (not pills), used three times a day

- Associated with a significant reduction in damage to the GI tract (mouth sores, diarrhea), and in peripheral neuropathy.
- Some clinicians suggest that dividing this into more frequent doses (5 g, six times a day) may be even more helpful, but only if you are willing to take it this often!
- ***This also meets 1/3 - 1/2 of total protein needs, helping to reduce loss of muscle mass***

Method:

- Mix with at least 2 ounces of fluid, swish around in the mouth and swallow ***Use this solution ASAP, or refrigerate and use within 24 hours***
- Recommended fluids include Crystal Light, Gatorade, or Hawaiian Punch

***The powder will mix best with room temperature fluids
Avoid mixing with highly acidic fluids, and never heat glutamine solutions***

Glutamine treatments should begin before symptoms start, ideally

- **Chemotherapy:**
Beginning with the first day of chemotherapy and continuing for four days after each chemotherapy infusion.
- **Radiation:**
Starting one week prior to radiation and continuing daily until one week after the last dose of radiation therapy. Some advise weaning off glutamine over a couple months.

Sources

Always obtain pharmaceutical grade glutamine, since this is the product used in the studies. Recommended brands and sources are listed below. Glutamine should be protected from heat, light and moisture.

Local:

- **PenCol Pharmacy**
210 University
303-388-3613
This pharmacy offers free metro delivery as well
- **Colorado Pharmacy**
701 E. Colfax, @ Washington
303-863-7644; info@coloradopharmacy.net

Cost:

- 380 g jar, \$34.80 (approximately \$3.00/day), Thorne; L-glutamine powder
- Novartis Glutasolve 15 g packets @ similar cost/day at Colorado Pharmacy

Mail Order:

Cambridge Nutraceuticals

1-800-265-2202, option 1

Available in individual 10 g packets or bulk 280 g or 480 g jars (with a 10 g scoop). Glutamine is available either plain or with antioxidants added. **Your physician is likely to discourage antioxidant use, as it is not yet clear whether it may interfere with the efficacy of chemotherapy or radiation therapy.**

Cost:

- 60 packets, 10 grams each, \$103.20 (almost \$5.00/day) Sympt-X Plain; \$115.80 with antioxidants (Sympt-X Plus)
 - 480 gram jar, \$49.00, (approximately \$3.00/day)
- Shipping and handling is \$6.00 for any amount ordered.

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Healthy Snacks for Cancer Patients

Smart snacking can help cancer patients meet their daily nutrient needs. Snacks can be especially helpful for those who have trouble eating large meals

- Adding calories that are missed when you get full quickly, preventing the rapid weight loss that otherwise leads to breakdown of muscle and loss of strength
- Making it easier to fit in the recommended 7+ servings of fruits and vegetables

Snacks can help

- Reduce fatigue, providing a steady (but stable) supply of blood sugar to cells
- Improve attention span and general mental alertness and function

Snacks can also be helpful where weight *control* is the goal

- Maintaining a steady burning of calories. Those who eat more often are less likely to be overweight (if meals are smaller!)
- A mid afternoon snack can prevent the excessive hunger that can overcome your best intentions at dinner time

Healthy Snacks = Protein + Carbohydrate

<i>Protein Sources</i>	<i>Carbohydrate Sources</i>
Yogurt	Berries or Canned Fruit
Peanut/Nut Butter	Apple Slices
Cottage Cheese	Sliced Pears or Peaches
String Cheese	Ry Crisp or Low Fat Triscuits
Tuna fish	Crackers
Egg Salad, Chicken Salad	(in half a sandwich, pita bread, bagel)
Hummus Dip	Broccoli, Jicama, Carrots . . .
Split Pea, Bean or Minestrone Soup	Multigrain Bread/Toast
Vegetarian Refried Beans/Salsa	Baked Chips
Soy Milk	Fruit (Try them together in a smoothie)
Chili Beans	Baked Potato
Sunflower Seeds, Nuts	Fruit: Dried, Fresh or Juice
<i>Fill in your own ideas:</i>	

Plan Ahead!

- Stock healthy snacks in your refrigerator, pantry, office desk drawer, backpack
 - Take along snacks when you're traveling to doctor's appointments and therapy
- Need more? Go to aicr.org to download "Sneaking Health Into Your Snacks"***

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Nutrition and Cancer

Recommended References

Books

- Eat, Drink and Be Healthy, Walter Willett; Eat Well for Optimum Health, Andrew Weil
Reviewing general "good nutrition" information including the benefits of fruits and vegetables, good fats, carbohydrates and the glycemic index
- How to Prevent and Treat Cancer with Natural Medicine, M. Murray, et al. 2002
- Nutrition After Cancer, the Role of Nutrition in Cancer Survivorship, AICR. 2002
- Dietary Options for Cancer Survivors, AICR. 2002
- Stopping Cancer Before It Starts. American Institute for Cancer Research. 1999.
Good review of cancer prevention research and guidelines
- A Dietitian's Cancer Story. Diana Dyer, MS RD. 6th Edition, 2002.
Concise recommendations for a comprehensive, integrated approach to optimizing health after cancer
- Tell Me What to Eat to Help Prevent Breast Cancer, Nutrition You Can Live With. Elaine Magee, MS RD. 2000 (Colon Cancer, 2001)
- Natural Compounds in Cancer Therapy. John Boik. 2001.
For the person seeking detailed, scientific information on nutrients and natural products that may affect the carcinogenic process
- Oncology Nursing Secrets. Rose Gates and Regina Fink, eds. 2001
Review of individual cancers, therapies, and management strategies

Symptom Management Booklets

- Nutrition for the Patient with Cancer. American Cancer Society.
www.cancer.org, for a free copy
- Eating Hints for Cancer Patients. National Institutes of Health.
Call 1-800-4-Cancer for a free copy

Cookbooks

- Lickety Split Meals for Health Conscious People on the Go. Zonya Foco, RD.
- Cancer Survival Cookbook. Donna Weihofen MS RD and Christina Marino, MD
- Easy to Swallow, Easy to Chew. Donna Weihofen, MS RD
- Betty Crocker's Living with Cancer Cookbook. Kris Ghosh, MD; Linda Carson, MD; and Elyse Cohen, MS, LN. *Targeted to patients dealing with eating problems during treatment, with specific menu plans and recipes indexed to individual barriers. Recipes appropriate for the longterm cancer prevention diet are indexed in a list on pp 243-4*
- Quick Flip to Delicious Dinners, Eileen Faughey. *10 easy, healthy recipes, with five variations of each, inspired by flavors from around the world. Includes pantry and shopping lists*

Newsletters

- Environmental Nutrition. 800-829-5384
- Dr. Andrew Weil's Self Healing. 800-523-3296
- American Institute for Cancer Research. **Free!** 800-843-8114
- Cancer Updates, Research, Education. **Free!** 800-210-2873(CURE)
- Herbalgram. 800-373-7105

Internet

www.cancerrd.com, Diana Dyer

This site provides two weeks of menus with recipes, frequently asked questions, and 13 pages of "useful links" for direct connection to other web sites for specific cancers and related subjects

www.consumerlab.com, Consumer Labs

www.pathfinder.com/drweil/, Dr. Andrew Weil

www.cancer.org, American Cancer Society

www.aicr.org, American Institute of Cancer Research

Numerous free pamphlets about various aspects of cancer and nutrition can be ordered from AICR or downloaded off the computer

www.eatright.org, American Dietetic Association

General information, help locating dietitians (RD's) in private practice by location & zip code

www.herbalgram.org, American Botanical Council

www.lancaster.unl.edu/food, U. Nebraska Cooperative Extension

www.naturaldatabase.com

Subscriber funded database of herbs and supplement information, interactions, updated continuously. Patient education handouts can be printed out directly

www.mcp.edu/herbal/default.htm, Longwood Herbal Task Force

www.vrg.org, Vegetarian Resource Group

www.supplementwatch.com, Supplement information with references

www.Needs.com, site that sells various brands of supplements

www.ncahf.org, National Council Against Health Fraud

www.quackwatch.org, Quack Watch, Stephen Barrett's antiquackery site

Evaluate everything on the Internet very critically. Be cautious, think about who is funding the web site and where there might be a potential for bias in the presentation of information

Other Resources

American Cancer Society, check for your local chapter in the phone book

National Cancer Institute, 800-4-Cancer

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University Hospital, 303-372-8093

Nutrition Foundations, 303-810-8612

UNIVERSITY OF COLORADO HOSPITAL
4200 E. 9th Ave., Denver, CO 80262
Scored Patient-Generated Subjective
Global Assessment

<p>1. <u>Weight</u></p> <p>I currently weigh about _____ pounds I am about _____ feet _____ inches tall</p> <p>One month ago I weighed about _____ pounds Six months ago I weighed about _____ pounds</p> <p style="text-align: center;">(The clinic will calculate this)</p> <p>% weight loss over past month _____ % weight loss over past six months _____ 1 = 2 -3% in one month; 2 - 6% in six months 2 = 3 - 5%/ 1 month; 6 - 10%/ 6 months 3 = 5 - 10%/ 1 month; 10 -20%/ 6 months 4 = >10%/ 1 month; >20%/ 6 months</p>	<p>• <u>Food Intake</u></p> <p>Compared to my normal, I would rate my food intake during the past month as: (Please circle)</p> <p style="padding-left: 20px;">Unchanged More than usual Less than usual (1)</p> <p><u>I am now taking:</u></p> <ul style="list-style-type: none"> • <i>Normal food</i> but less than normal amounts (1) • Little solid food (2) • Only liquids (3) • Only nutritional supplements (3) • Very little of anything (4) • Only tube feedings or nutrition by vein (TPN) (4)
<p>3. <u>Symptoms</u> (Check all that apply)</p> <p>I have had the following problems that have kept me from eating enough during the past two weeks:</p> <ul style="list-style-type: none"> • No problems eating • No appetite, just didn't feel like eating (3) • Nausea (1) • Vomiting (3) • Diarrhea (3) • Constipation (1) • Pain; where? _____ (3) • Mouth sores (2) • Things taste funny or have no taste (1) • Problems swallowing (2) _____ • Smells bother me (1) • Feel full quickly (1) • Dry mouth (1) • Other: _____ (1) For example: Depression, money, dental problems 	<p>4 <u>Activities and Function</u></p> <p>Over the past month, I would generally rate my activity as:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Normal with no limitation <input type="checkbox"/> Not my normal self, but able to be up and about with fairly normal activities (1) <input type="checkbox"/> Not feeling up to most things, but in bed less than half the day (2) <input type="checkbox"/> Able to do little activity and spend most of the day in bed or chair (3)

The remainder of this form will be completed by the doctor, nurse or therapist. Thank you.

5. Cancer diagnosis/stage _____

6. Metabolic demand: (circle all applicable) Fever / Steroid Therapy **7. Relevant Labs:** _____

Nutritional Triage Recommendations: (Additive Score)

- 0 - 1 No intervention required. Re-assess on routine basis throughout treatment.
- 2 - 3 Patient & family education by nurse or other clinician as indicated by symptoms, lab values
- 4 - 8 Refer to dietitian, in conjunction with nurse or physician, as indicated by symptoms, lab values
- >9 Critical need for improved symptom management and/or nutrition intervention program

Signature, Title

Date

Smoothie and Shake Recipes

Liquid Supplements for Snacks/Meal Replacements

The fatigue many cancer patients experience, along with other side effects of cancer treatments can make eating solid foods more difficult than drinking fluids. While slow, gradual weight loss is not a concern, rapid weight loss leads to breakdown of muscle and loss of strength, compromising your ability to continue normal activities.

Many commercial supplements are available and can be helpful when it is difficult to prepare your own smoothies or where refrigeration is not available.

Consider:

- Prosure or Resource Support: providing immune enhancing Omega 3 fats
- Scandishakes: a powder that can be added to milk or juice, or hot cereals
- Boost Breeze: a clear liquid, juice flavored supplement with protein

Your own blender can be used to make a variety of homemade drinks, allowing:

- Cost savings
- Increased variety, and control over sweetness
- Additional vitamins, minerals, fiber and phytochemicals from whole foods

Smoothie Ingredients Options

Protein sources:

- Soy milk, liquid or powder
- Tofu, silken (blends best) or block (2 ½ ounces = 1/6 of a one pound block)
- Low fat yogurt, kefir
- Milk or dried skim milk powder
- Whey protein powders
- Peanut or other nut butters

Phytochemical, fiber, vitamin and mineral sources:

- Whole fruits: fresh, frozen, or canned; 100% fruit juices
- Mild flavored vegetables
- Herbs and spices
- Wheat germ or bran

Healthy fat sources:

- Ground flaxseeds or flaxseed meal
- Canola, olive or flax seed oils

Thickeners:

- Low fat frozen yogurt, ice cream, sherbets and sorbets; bananas

Many of these ingredients are being researched for their possible cancer fighting activity. A few may be available only in health food stores like Wild Oats or Whole Foods.

Helpful Hints with Smoothie Recipes

Sweetness

- Can be increased with a vanilla flavored soymilk or yogurt; or by adding small amounts of honey, fruit spreads or maple syrup to taste
- Can be decreased by adding a few frozen cranberries to the mix

Fiber

- Increase fiber sources like wheat germ, bran and flax seed slowly; 1 t → 1 T
- Be sure to include more fluid as you increase your fiber intake
- For low fiber diets: avoid fruits with seeds, flax, bran or wheat germ

Calcium

- Choosing calcium-fortified tofu, soy drinks or OJ will increase calcium intake
- Research shows that 500 mg of calcium is the most that can be absorbed at one time, so drink the recipes with high calcium sources over 1 – 2 hours
- Concerns for men: data suggests that a high calcium intake is associated with higher prostate cancer risk, possibly due to its affect on lowering Vitamin D levels. Men should use products that are not calcium fortified.

Protein

- Choose brands of soymilk and tofu that are highest in protein
- To increase protein further add dried skim milk (11 g per ¼ cup); peanut butter (8 g/2 Tbsp); or whey protein powder

Calories

- If more calories are needed, add up to 1 tablespoon of canola or flaxseed oil before blending (125 calories, 14 g of fat)
- Honey, fruit spreads, maple syrup and nut butters can be added

Mouth Sores

- Avoid fruits that contain tiny seeds, such as some berries
- Choose fruit juices that are not acidic
- Buttermilk or yogurt may be soothing to the mouth, and may speed healing

Immune Suppression

- Substitute canned fruits and vegetables for fresh until your WBC is normal
- Take special care with food preparation, talk to the dietitian at the center
- Yogurt with active, live cultures is a theoretical concern
- Tofu: cover with fresh water and refrigerate in a sealed container; change water daily and use within one week

Cost Savings

- Buy wheat bran, wheat germ or flaxseeds in bulk at the health food stores

Vitamins

- Powdered or liquid vitamins can be added to smoothie recipes when a multivitamin is recommended, but swallowing difficulties prevent taking one