LOW AMINE DIET FOR PATIENTS WITH GASTROINTESTINAL NEURO-ENDOCRINE TUMORS

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The Gastrointestinal (GI) Tract

The GI tract is made up of a series of organs joined in a long tube from mouth to anus. Hollow organs along the tract are the mouth, esophagus, stomach, small intestine, large intestine (colon) and anus. The liver, pancreas, and gallbladder are solid organs of the tract. Over 60% of NETs occur or reoccur in one or more of the GI organs.

Neuro-Endocrine Tumors and Serotonin

NETs are hormonally active tumors which usually produce/secrete serotonin. Serotonin is an AMINE (ah-meen). Serotonin plays a part in numerous bodily functions.

What is an Amine?

Amines are naturally occurring chemicals that are caused by bacteria breaking down amino acids. Amines are particularly high in foods that are overly ripe, over cooked, processed, fermented, or ripening. Levels of amines increase in foods as they age or mature, and in fruits as they ripen.

Symptoms of Overabundant Amines/Serotonin

Symptoms of NETs range from no symptoms to profound symptoms, and include one or more of the following (most common noted in green):

- Abdominal Pain
- B3 Deficiency
- Bloating
- Brain Fog
- Confusion
- Constipation
- Depression
- Dermatitis
- Diarrhea
- Fatigue
- Feeling Full
- Flatulence
- Flushing
- Gallbladder Probs
- Headaches
- Heart Palpitations
- Heartburn
- Hives
- Hypertension
- Itching
- Joint Aches
- Loss of Appetite
- Memory Loss
- Muscle Aches
- Nausea
- Night Sweats
- Restless Legs
- Shortness of Breath
- Sinus Trouble
- Sweating
- Ulcers
- Weight Loss
- Wheezing

Diagnosis

Diagnosis/treatment of NETs is complicated because of extreme variation of symptoms. NETs are frequently misdiagnosed as Crohn's Disease and are only verified as NETs with a CT, MRI, or Gallium 68 scan. NETs can also be detected, diagnosed, and verified by measuring serotonin in blood or urine tests (5-HIAA).

Triggers

Triggers are those foods that aggravate symptoms. Triggers include amine-rich foods, large meals, high-fat foods, spicy foods, caffeinated and carbonated drinks, aged and preserved foods, and alcohol.

Unfortunately, three of the "most effective" triggers are three of our favorites: tomatoes, nuts, and chocolate. As a group "Baking Aids, Herbs, Spices, Oils, Spreads, and Condiments" may be the sneakiest culprits because they lie hidden in MOST commercially manufactured foods. Offenders here are preservatives, artificial flavors, and food dyes which are identified on ingredient labels in unrecognizable multi-syllable words. When in doubt, look it up!

Amine intolerance reactions are mystifying because they don't look the same each time they occur, even in the same patient with the same foods. A small amount of an amine food may cause no symptoms or a serious reaction. Symptoms can occur at one time and not another. EACH PERSON WILL REACT DIFFERENTLY, having different symptoms with different timing for different foods. Amine foods may have no effect on some people, while other amine foods may cause severe reactions and symptoms.

Symptoms appear 1-48 hours after amine ingestion. A food eaten an hour ago can trigger symptoms BEFORE symptoms appear from something eaten yesterday. This causes symptoms and flare-ups to appear random and make it difficult to identify triggers. To assist in identification, eat a small serving of one food only. Document symptoms over the following 48 hours.

To help control symptoms and aid diagnosis keep a food journal. Including when and what was eaten, what symptoms were, how soon after ingestion symptoms occurred, and how long symptoms persisted.

What SHOULD I Eat?

- EAT only NO or LOW amine foods. Avoid high amine foods, fat, spices, caffeine and alcohol (see lists below.)
- EAT small meals (1 cup or less in volume) 4-6 times a day.
- EAT only fresh foods. Be cautious of leftovers held at refrigerator temperature. When in doubt, throw it out! Freeze leftovers that will be stored for more than 2 days.
- EAT mostly SOLUABLE FIBER (cooked carrots, peas, etc). Soluble fiber slows digestion, allowing the body to absorb nutrients. Avoid INSOLUBLE FIBER (stalks, skins, seeds.) Insoluble fiber doesn't dissolve in water and moves through the digestive tract too fast for the body to absorb calories and nutrients, and consequently contributes to diarrhea.
- EAT increased amounts of protein to provide more B3 (Niacin) or a daily B3 tablet of 16 mg.
- DRINK eight 8-ounce glasses daily—about half a gallon (2 liters.)
- DO THE ABOVE and your symptoms will tame down!

The following tables list "high" and "very high" amine foods. They also list low or no amine foods. THEY CONTAIN GENERAL INFORMATION ONLY. If a trigger cannot be identified or if symptoms persist, please seek advice of an appropriate health care professional.

FOOD LISTS

Fruits

EAT THESE! LOW OR NO AMINES - 5 Servings per day; Fresh (barely ripe), peeled and de-seeded. Because fruits are high in insoluble fiber they contribute to incidences of diarrhea. NOTE: Pears are the only fruit in which amines do not increase as they ripen.

- apple
- apricot
- cantaloupe
- guava
- lychee
- nectarine
- peach

High in Amines

- avocado (just ripe)
- banana (just ripe)
- custard apple
- fig
- grapefruit
- mango
- papaya
- pawpaw

Very High in Amines

- avocado (mushy)
- banana (black)
- berries
- blueberries
- cherry
- citrus (all)
- currant
- date
- dried fruit
- grapes
- kiwifruit
- passionfruit
- pineapple
- plum
- raisins
- raspberry

Vegetables

EAT THESE! LOW OR NO AMINES - 3 Servings per day; fresh or frozen; peeled, de-seeded. Because vegetables are high in insoluble fiber they contribute to diarrhea.

- bell pepper (any color)
- carrots (cooked)
- celery (peeled)
- corn
- cucumber (peeled)
- ginger
- green beans
- green onion
- lemongrass
- lettuce (any kind)
- onion (cooked)
- parsnip
- peas
- potato (peeled)
- pumpkin (not pie!)
- shallots
- squash
- sweet potato
- turnip
- zucchini (peeled)

High in Amines

- beets
- bok choy
- broccoli
- broccolini
- cauliflower
- Chinese broccoli
- radicchio
- rocket

Very High in Amines

- asparagus
- avocado
- broad beans (fava)
- Chinese spinach
- eggplant
- mushroom
- olives
- onion (raw)
- pickled vegetables
- refried beans
- sauerkraut
- seaweed (sushi wrap)
- spinach
- tomatoes in any form!
- tomato (dried)
- tomato (juice)
- tomato (paste)
- tomato (puree)
- tomato (sauce)
- tomato (sun dried)
- truffles
- vegetable juice
- vegetable soup
- vegetable soups

Legumes, Grains, Nuts, and Seeds

EAT THESE! LOW OR NO AMINES – 5 Servings per week. Eat beans sparingly to avoid flatulence. Cashews are the ONLY nuts low in amines, but should be eaten in moderation.

- black beans (sparingly)
- black eyed peas
- cannellini beans (sparingly)
- cashews (fewer than 10 per day)
- chickpeas (garbanzo)
- corn
- kidney beans (sparingly)
- lentils
- lima beans (sparingly)
- peas
- pinto beans (sparingly)
- popcorn (butter and salt only)
- rice cakes (plain)
- white rice

High in Amines

- almond
- beechnut
- Brazil nut
- chestnut
- linseed
- macadamia
- pine nuts
- pistachio
- poppy seed
- pumpkin seed
- sesame
- sunflower

Very High in Amines

- beans in sauce
- broad beans (fava)
- brown rice
- coconut
- falafel
- grits
- hazelnut
- hominy
- hummus
- marzipan (almond)
- peanut
- peanut and other nut butters
- pecan
- tahini (sesame) paste
- walnut

Very High in Fats

- refried beans

Meat, Poultry, Seafood, and Eggs

EAT THESE! LOW OR NO AMINES - 3-6 Ounces per day. LEAN. Fresh (preferred) or frozen. Freeze immediately upon purchase or discard after 2 days. Go lightly on seasonings.

- beef
- chicken
- eggs
- fish
- pork
- shellfish (fresh)
- shrimp
- turkey

High in Amines

- canned salmon
- chicken skin

Very High in Amines

- 2-day old meat
- aged beef
- anchovies
- bacon
- battered chicken
- battered fish
- canned clams
- canned oysters
- canned tuna
- chicken nuggets
- deli meats
- dried fish
- fatty meat
- fish pastes
- fish sticks
- gravy
- ham
- hot dogs
- krab (fake crab)
- liver
- meat paste
- meat pies
- organ meats
- pastrami
- pickled fish
- salami
- salted fish
- sardines
- sausages
- smoked beef
- smoked fish
- smoked pork
- smoked turkey

Dairy Products

EAT THESE! LOW OR NO AMINES - 3 Servings per day. Unaged.

- acidophilus milk
- American cheese
- frozen yogurt (vanilla)
- goat cheese
- low-fat cottage cheese
- low-fat milk
- low-fat yogurt (plain)
- Mexican queso fresco
- mozzarella (non-aged)
- nonfat canned milk
- nonfat cream cheese
- nonfat sour cream
- ricotta

High in Amines

cheddar cheese
feta
Swiss cheese

Very High in Amines

blue cheese	flavored yogurt	camembert	parmesan
Brie	almond milk	chocolate milk	soymilk

Beverages

EAT THESE! LOW OR NO AMINES. Drink at least eight 8-ounce glasses of water daily. If drinking alcohol stick to clear, colorless, unaged brews. The darker the brew, the higher the amine content!

- decaffeinated coffee
- decaffeinated soda (sparingly)
- decaffeinated tea
- gin
- herbal tea
- low-fat milk
- mineral water
- moonshine
- pear juice
- tonic water
- vodka
- water water water!

Very High in Amines

- alcohol (all aged)
- apple juice/cider
- beer
- bourbon
- brandy
- caffeinated drinks
- carbonated drinks
- chai tea
- chocolate drinks
- cordials made from fruit
- flavored mineral water
- fruit juice (all except pear)
- ginger beer
- rum
- scotch
- sparkling water
- tequila
- vegetable juice
- whiskey

Baking Aids, Herbs, Spices, Oils, Spreads, and Condiments

EAT THESE! LOW OR NO AMINES. The group of high amine ingredients and triggers below often lie hidden in MOST commercially manufactured foods. Preservatives, artificial color and flavorings are the culprits here. Read ingredients on the label. Look up unrecognizable words.

- basil
- butter (sparingly)
- cumin
- chives
- cilantro
- cinnamon
- coriander
- homemade salad dressing
- honey
- maple syrup (real)
- mint
- oregano
- parsley
- salt (sparingly)
- sugar (sparingly)
- turmeric
- vanilla

High in Amines

- canola oil
- coconut oil
- coconut milk
- malt
- margarine
- safflower oil
- sesame oil
- sunflower oil

Very High in Amines

- artificial antioxidants
- avocado oil
- barbeque sauce
- black pepper
- bottled salad dressing
- bouillon
- canned gravy
- canned sauce
- canned soups and stews
- catsup
- chip dip
- chocolate
- cocoa
- color additives
- cream of tartar
- cream-based sauces
- cream-based soups
- curry powder
- fast-food dips
- fast-food sauces
- fish sauce
- flavor enhancers
- flavored corn chips
- flavored potato chips
- flavoring packets (ie: ramen)
- fry sauce
- jams
- jellies
- maple flavored syrup
- MSG - monosodium glutamate
- miso
- mustard
- nutmeg
- olive oil
- oyster sauce
- peanut oil
- preservatives
- soy sauce
- stock cubes/powder
- tomato paste
- tomato sauce
- vinegar

Breads and Cereals

EAT THESE! LOW OR NO AMINES - 6 Servings per day. Acceptable breads are unleavened or leavened with baking powder.

- biscuits
- carrot cake (no nuts, raisins)
- cookies (no chocolate, nuts)
- corn flakes
- corn puffs
- crackers (read label)
- cream of wheat
- egg noodles
- English muffin
- French bread
- matzo
- Melba toast
- pancakes
- pita (not wheat)
- pretzels
- rice cakes (plain)
- rice cereals
- Rice Crispy Treats
- rice noodles
- saltine crackers
- tortillas (corn and flour)
- waffles
- white bread
- white pasta
- white rice
- zucchini bread

High in Amines

- arrowroot
- barley
- buckwheat
- rye
- sago
- tapioca
- yeast leavened breads

Very High in Amines

- breads w/dried fruit or nuts
- cereal w/dried fruit or nuts
- graham crackers
- pumpernickel bread
- snacks w/chocolate
- snacks w/dried fruit
- snacks w/nuts

Very High in Insoluble Fiber

- bran cereals
- bran muffins
- rolled oats
- shredded wheat
- cereal
- wheat bran
- whole grain cereals
- whole wheat
- whole wheat bread
- whole wheat pasta

Where Did the Information in this Flyer Come From?

- **THE INTERNET** – A comprehensive search produced many food lists. These were the beginnings of the final list seen here. Definitions and explanations were also collected there.

  NOTE: Many food lists were found on Australian medical websites, where continuing research has shown amines to also be triggers of **MIGRAINE HEADACHES!**

- **TESTIMONIALS OF NET PATIENTS** - Statements made by patients with Neuro-Endocrine Tumors regarding their personal triggers and symptoms of reactions.

- **CONTENT OF PROFESSIONAL PAPERS AND CLINICAL STUDIES** – Medical and technical information came from the references cited below.

- **CONFIRMATIONS OF PROFESSIONAL HEALTH CARE PROVIDERS** – Doctors, Nurses, Radiologists, scan technicians, and others.

- **CONTRIBUTIONS OF READERS** – Corrections, additions, deletions and other edits of information in the first drafts.

- **PERSONAL EXPERIENCE AS DOCUMETED IN MY FOOD JOURNALS** – I personally tried individual foods and documented what happened!

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