



# Personalized Nutrition - How to Thrive

UCLA 8<sup>th</sup> Annual Brain Tumor Conference

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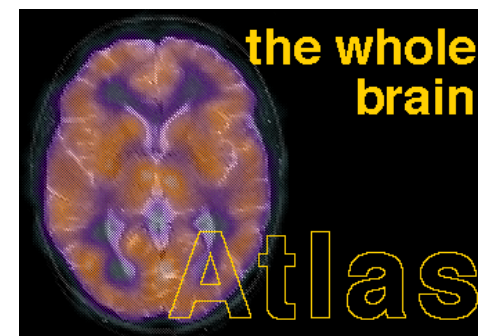


# Overview

- What you need to know to improve your outcome and thrive – *optimizing your Health Span*
- DNA Integrity and the 3 A's:
  - Antioxidants*
  - Anti-inflammatories*
  - Anticarcinogens*
- Symptom management
- Weight management
- Supplements – risk or benefit?
- Your Personal Nutrition Health Check

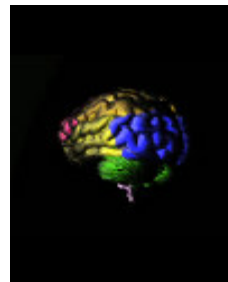
# Fuel for the brain

- Glucose is the main fuel for the brain under normal conditions
- **Glucose is crucial for brain function**
- Brain glucose transporter GLUT 3 found in neurons
- GLUT 3 is not responsive to insulin but depends on blood glucose concentrations
- Ketones are secondary fuel (derived from fat) rarely used under normal conditions and *ketogenic diet should be avoided during chemotherapy*



# The Blood-Brain Barrier (BBB)

- The brain is protected by a tight wall of endothelial cells and tile-like capillaries called the BBB
- Brain tissue doesn't require insulin to take up glucose unlike muscle and most other tissues; glucose is water soluble and is transported across (*mediated transport*)
- Some substances are fat soluble and slowly penetrate
- Many chemicals do not penetrate the barrier at all or do so very slowly (*semi permeable*)
- **Healthy Brain function depends upon glucose and oxygen**





# Nutrition

## What You Really Need to Know to Thrive

- **Work with the 3 A's**
  - Antioxidants
  - Anti-inflammatories
  - Anticarcinogens
- **Enhance your natural immunity and resilience**
  - Choose foods that balance the 3 A's
  - Mushrooms, berries and cherries
- **Maintain a healthy weight/waist**
  - Moderate your calories to match your activity level
  - Assess your current waist to height ratio (should be 0.5 or less)
  - Avoid stress related eating with mindfulness



# What are the Three A's?

## Your DNA Integrity Protectors

- **Antioxidants** reduce oxidation at the cellular level from metabolic or external radiation causes
- **Anti-inflammatories** reduce inflammation (redness, heat, swelling) often prevent metabolic “mistakes” that may lead to cancer
- **Anticarcinogens** reduce the overall risk of developing cancer

*Cancer is the result of mutated or altered function of DNA*



# 1. Antioxidants protect DNA Integrity *(sequence of nucleotides and gene expression) by "quenching" free radicals formation*

- **Fisetin** found in strawberries, apples and persimmon
- **Lutein and zeaxanthin** from spinach and other dark green leafy vegetables
- **Limonene, tangeretin, nobelitin** and other flavonoids from citrus fruits (rind is especially rich in essential oils)
- **Punicalagins and polyphenols** in pomegranates
- **Culinary herbs and spices**  
**Cloves** have the highest antioxidant content (ORAC score) followed by **oregano, ginger, cinnamon and turmeric**



# Antioxidant Assessment (ORAC)

*Beyond Vitamins A, C and E – how antioxidants work*

- In 2001, first ORAC scores identified. Water-soluble fruits and vegetables with high antioxidant capacity using color change test rated **BLUEBERRIES** and **SPINACH** highest
- Recent ORAC scores rate fat-soluble antioxidants **AVOCADO** and **ALMONDS**
- Highest overall are culinary herbs, spices **TURMERIC, CLOVES, ROSEMARY** and **OREGANO**
- **POMEGRANATE, ACAI** and **GOJI** also have exceptionally high ORAC scores (*Trolox units*)

*Source: United States Department of Agricultural (USDA) and Tufts developed ORAC test, Oxygen Radical Absorbance Count*



# Antioxidant Activity of Selected Fruits and Vegetables

Oxygen Radical Absorbance Capacity (ORAC)  
In Trolox equivalents per gram



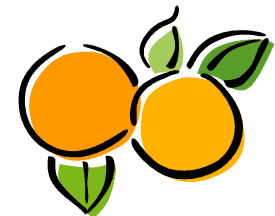
Source: Tufts University, 2001

Blueberry	23
Blackberry	20
Garlic	19
Kale	17
Raspberry	15
Spinach	13
Brussels sprouts	10
Plum	9
Broccoli	9
Beet	8
Red grape	8
Kiwi	5
Pink grapefruit	5

## 2. Anti-inflammatories

*Identified by reducing serum inflammatory markers*

- Omega 3 fatty acids from fish and certain plants
- Flaxseed, borage and blackcurrant seed oils beneficial fatty acids (GLA and ALA)
- Natural salicylates, e.g. turmeric, rosemary, thyme, apricots, broccoli
- Lutein and other carotenoids, e.g. spinach, egg yolk
- Naturally occurring bioflavonoids with apoptosis and anti-angiogenesis inhibitor activity, e.g. tangeretin and nobiletin from citrus fruit
- Naturally occurring NSAID's or COX-2 Inhibitors, e.g. green tea and cocoa





# Inflammation

*Increases rate of cell turnover and raises the risk for molecular errors -loss of DNA integrity*

- Inflammation and high sugar intake may be linked
- IGF-1 (Insulin-like Growth Factor) is a genetic marker found to increase in high sugar diet
- Caloric restriction also lowers IGF-1
- Inflammatory reactions, wheat sensitivity - some benefit from avoiding gluten (*try a 7-day gluten free diet and then gradually reintroduce wheat to see how you feel*)
- Glucose uptake from foods and beverages is measured by **Glycemic Index (GI)** and Glycemic Load
- Some medications affect insulin sensitivity (raise blood glucose)
- Consume plenty of dietary fiber to maintain healthy blood sugar levels (lower Glycemic Load)

### 3. Anticarcinogens (Anti-cancer)

*Identified by killing cancer cells in vitro*

- Black Raspberries
- Curry powder ( a combination of turmeric, cumin and other spices)
- Citrus fruits (naringinin and limonene)
- Green tea (EGCG and other natural ingredients)
- Pomegranates (especially the oil from the seed)
- Brazil nuts (excellent source of selenium)
- Tomatoes (excellent source of lycopene)
- Saffron a rare, yellow colored treat
- Red grapes and red wine (resveratrol)





# Vitamin D - New Findings

- **Vitamin D** is also a hormone when activated in the skin by UV light. Aging may affect renal activation
- Functions:
  - **Calcium** uptake and bone breakdown regulation
  - Carbohydrate and insulin regulation
  - Brain and nervous system function
- Prostate, breast and colorectal cancer relationship thought to be associated with Vitamin D receptor polymorphisms and UV light exposure
- **Daily requirement may be higher than earlier thought** – 800 – 2000 IU (Daily Value is 400 IU).
- Blood level is good test of adequacy (should be 50-80 ng/ml ideally)

*Source: Vitamin D status and cancer: new insights*

*Schwartz, GG and Skinner, HG Curr Opin Clin Nutr Metab Care 10:6–11 2007*



# Food Sources of Vitamin D

Food	Serving Size	Vitamin D (IU)	Note
Sardines	3 ½ ounces (100g)	500	Canned in oil
Salmon	3 ½ ounces (100g)	360	Cooked
Mackerel	3 ½ ounces (100g)	345	Cooked
Tuna	3 ½ ounces (100g)	200	Canned in oil
Milk	1 cup	90	
Breakfast cereals	¾ - 1 cup	40	Usually 10% DRI
Egg	1 whole	20	
Liver, beef	1 ounce	15	
Swiss cheese	1 ounce	12	

# Anticarcinogens as Phytonutrients

## Cancer fighters *or Phyters*

- *Select at least one food from each of these categories and consume regularly to support liver detoxification and health*
- Garlic, onions, chives (**Allium** family) are rich in sulfur amino acids and phytonutrients - **SHALLOTS**
- Cruciferous or cabbage family (**Brassica** family) also rich in sulfur amino acids, indoles and other phytonutrients - **WATERCRESS**
- Green and black tea (**Camellia sinensis**) are rich in phytonutrients such as catechins and fisetin and may enhance some chemotherapy treatments – **GREEN TEA**



# Resveratrol

*Blocks initiation and process of cancer at various stages*

- A polyphenol phytonutrient and antioxidant abundant in
  - Red grapes (and red wine and raisins)
  - Berries
  - Tea (*Camellia sinensis*)
  - Red cabbage
  - Egg plant
  - Beans
  - Whole grains
  - Cocoa





# The Power of 3 for Health

*Support immune system - stimulate Natural Killer cell production*

- Mushrooms
- Elderberries
- Dark red cherry
- Pomegranate
- Oregano, Rosemary, Thyme and other **culinary herbs**
- Turmeric, coriander and other **spices** also found combined in curry



**Many culinary herbs and spice are rich in all 3 A's -  
use them often in marinades, sauces and soups**



# What are Nutrient Rich Foods?

## Protein (*meaning for life* in Latin)

Choose protein regularly during treatment

1-2 extra servings each day

*(15 grams of protein in about 4 ounce serving)*

- eggs, fish, chicken, turkey, lean meat
- tofu and beans
- pre-digested or hydrolyzed protein sources for smoothies or in bars
- rice and beans

For most people - 6-7 servings per 24 hours

2 servings at each meal plus one or more as a snack (smoothie for example)

Both during and after cancer treatment has ended it is a good idea to continue to eat protein rich foods often

# Valuable Protein-rich Foods

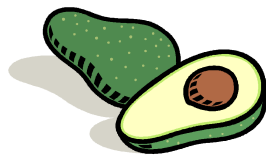
- Almond or peanut butter (*unsweetened, not hydrogenated*)
- Almonds, peanuts, walnuts, pignolas (pine), pistachios, pecans and other **Nuts**
- Non-fat dairy products (cottage cheese, whey protein)
- **Eggs** (egg whites have no cholesterol and can be freely eaten)
- Lean meat and poultry, especially when cooked slowly in liquids
- **Fish** and shellfish
- **Beans**
- Tofu and other fermented bean products



# What is a Healthy Balance of Fat?

*Recommended Fatty Acid Balance (Omega 6:3 of approx 4 to 1 – typical American diet is 15 to one)*

- **1 part Omega-3** (DHA and EPA from oily fish like salmon and sardines, walnuts and pine nuts) or blue green algae
- **3 parts mono unsaturated** (olive oil, almonds and avocado)
- **1 part saturated** fat (cocoa butter, palm oil or coconut)
- Supplement with 100 mg DHA and 500 mg borage or blackcurrant seed oil (as a source of GLA)



# Omega-6 and Omega-3 Fatty Acids

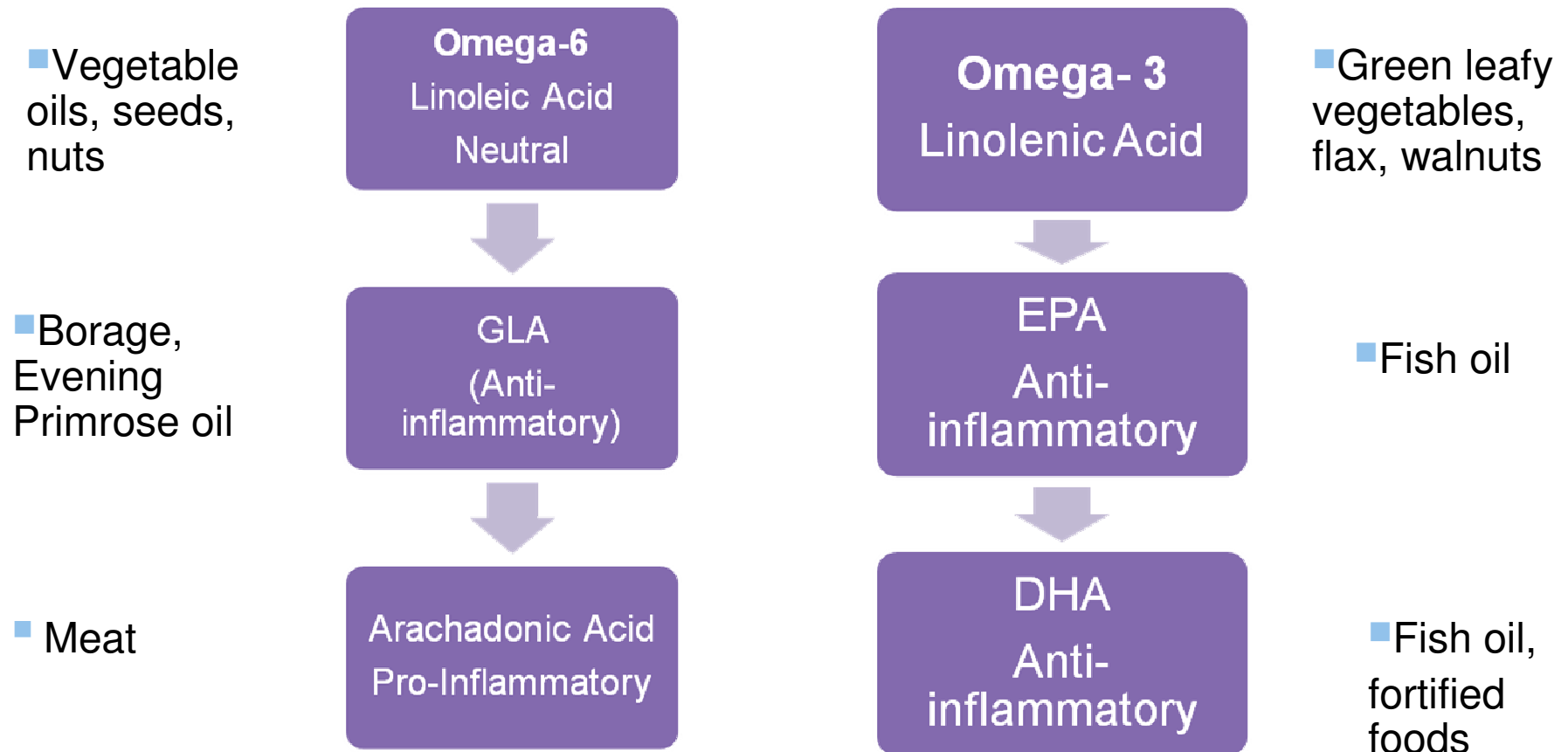



Table adapted from Simopolous, A (1998)  
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# What is a Healthy Balance of Carbohydrates?

- Carbohydrates provide energy and bulk to our diet
- Sugars provide energy
- Starches also provide energy but more slowly
- Glycemic Index is a measure of how fast this energy is released in the blood stream (how fast glucose levels rise)
- Dietary Fiber is indigestible carbohydrate or bulk
- Dietary fiber affects the Glycemic Index (slows down rate of glucose entering the blood stream)
- Dietary fiber is also beneficial for a healthy balance of intestinal flora
- Choose whole grains, beans and other sources of dietary fiber for an ideal balance of healthy carbohydrate
- **Make healthy carbohydrates (whole grains, beans, etc.) the base of your diet**



# Healthy Brain Fuel Delivery and GI

## High Glycemic Index Foods

*(not good - processed)*

Candy  
Corn chips  
Cornflakes  
Ice cream  
Mashed potato  
Plain bagels  
Pretzels  
White bread

## Low Glycemic Index Foods

*(good – less processed)*

Beans  
Breakfast cereals (high fiber)  
Fruit  
Milk  
Nuts (from trees)  
Oatmeal  
Pasta  
Whole grains

*Combinations of foods are described as having a Glycemic Load  
Remember to pair up a high GI food with a low GI food*



# Phytoestrogens and Lignans

- Lignans are a type of dietary fiber (assist in optimizing your colon health and reducing the Glycemic Load of your meals)
- Phytoestrogens are botanicals called isoflavones found in soy and red clover with estrogen like activity
- Lignans are not flavonoids but act more like antioxidants and may help regulate estrogen and other steroid hormones
- Lignans are found in dark rye, flaxseed, pumpkin seeds, sesame seeds and the woody part of plants such as tree barks
- Lignans are acted on by intestinal bacteria to enterolactone and enterodiol
- *AVOID phytoestrogens if you have estrogen positive breast cancer as your primary tumor*





# Food sources of Lignans

Food	Serving size	Lignans (mcg)	Notes
Flaxseed	100 grams	301,129	As secoisolariciresinol
Sesame seeds	100 grams	29,331	
Whole grain flaxseed bread	100 grams	12,474	
Curly kale	100 grams	2321	
Multigrain bread	100 grams	6744	
Broccoli	100 grams	1325	
Sunflower seeds	100 grams	891	
White cabbage	100 grams	787	
Cashew	100 grams	629	
Apricot	100 grams	450	
Strawberry	100 grams	334	
Dark rye bread	100 grams	320	
Red wine	100 mls	91	

Source: Miller, IEJ et al, 2005

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# Personalized Nutrition Health

## Supplements: Risk or Benefit?

- **Avoid mega-doses** (more than twice RDI or Acceptable Intake) of any supplemental nutrient (*unless specifically prescribed by your physician or oncologist*)
- **Be cautious with herbal products.** Many affect drug detoxification pathway efficiency and may interfere with other medications (reduce therapeutic dose or increase toxicity)
- **Pharmacogenomics** is a new field of personalized medicine
- Grapefruit and Seville oranges may cause adverse drug reactions by inhibiting enzymes that metabolize medications
- Choose nutrient dense foods rather than take supplements and **tell your health team about EVERYTHING you take**

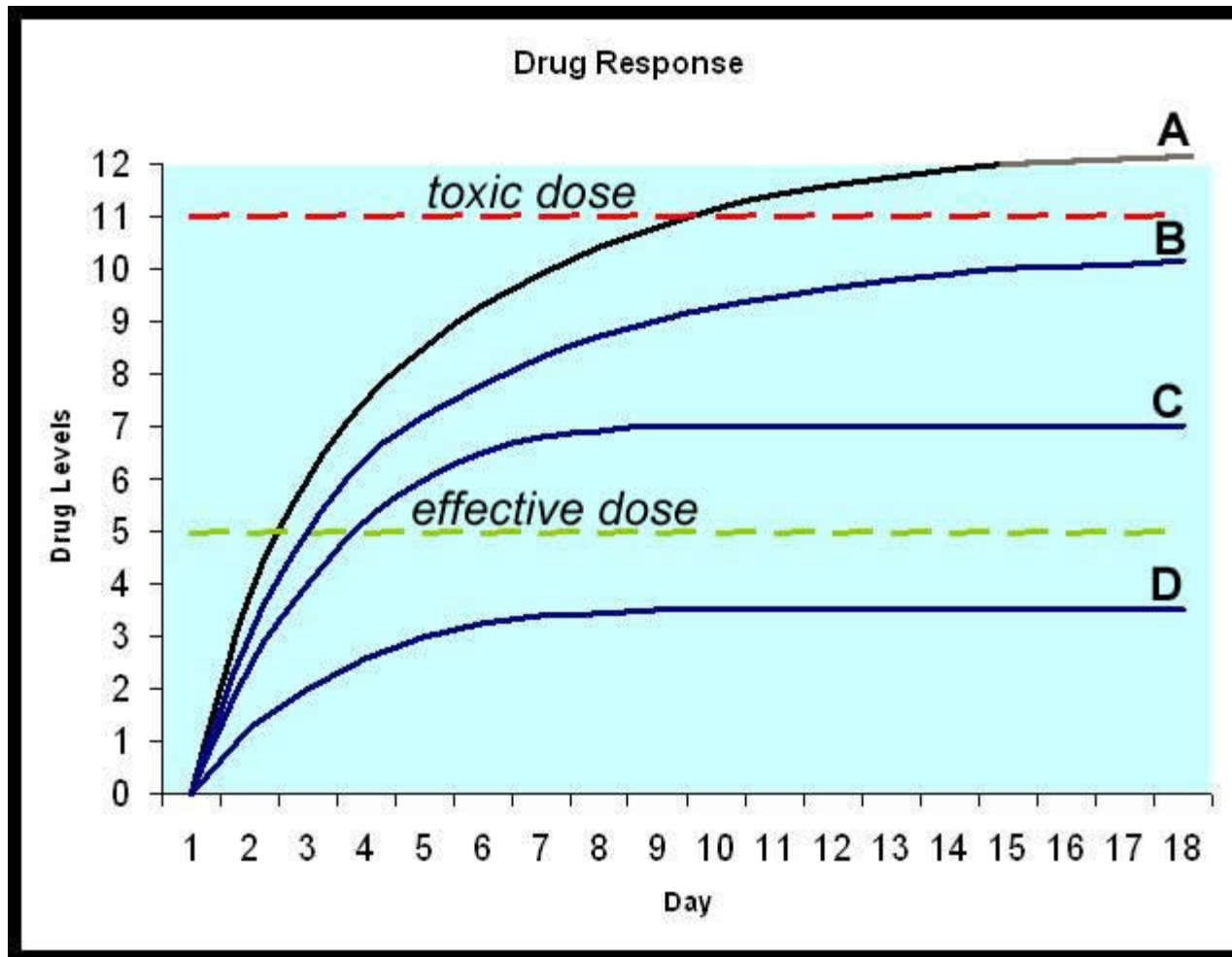




# Personalized Nutrition Health Nutrigenomics

- New field of nutrition and genetic expression
- **Personalized, predictive and preemptive** health using the latest molecular tools including genome wide associations
- My nutrigenomics research is looking at a panel of genes including MTHFR, GST's, IL-6, VDR and how diet affects measurable outcomes (blood levels of homocysteine, hs CRP or Vitamin D for example)
- **Carolyn Katzin's The DNA Diet™** provides personalized recommendations based on genetic testing data ([www.thednadiet.com](http://www.thednadiet.com))

# Personalized Health: Pharmacogenomics



- Poor Metabolizer
- Intermediate Metabolizer
- Extensive (normal Metabolizer)
- Ultra Metabolizer

*Some nutrients affect drug clearance – think **Phyto-genomics***



# Diet and Chemotherapy

- [Arimidex](#) (*anastrozole*) – a non steroidal aromatase inhibitor. Ensure adequate Vitamin D and bone building minerals (calcium, magnesium, zinc, boron and silica)
- [Avastin](#) (*bevacizumab*) – a targeted therapy used with other chemotherapy agents like CPT-11 or 5-FU. Eat small, easy to digest meals frequently
- [Tarceva](#) (*erlotinib*) – a tyrosine kinase inhibitor (TKI). Avoid grapefruit juice. Tell medical team of any herbs you may take. As with all medications supplements may affect dosage and possible toxicity
- [Rapamycin](#) (*sirolimus*)– IL-2 inhibitor. Avoid grapefruit and grapefruit juice which affects liver handling of this medication and may increase side effects

*This is only a partial list – please consult with your health care practitioner and pharmacist for more details and personalized advice*



# Diet and Brain Tumor Treatment

- Accutane (isotretinoin) -support bone health with exercise and mineral rich foods (non fat dairy, broccoli, etc.) Avoid high glycemic index (GI) foods (choose low sugar, high dietary fiber carbohydrates like oatmeal, whole grain cereal) Avoid sodas Don't take extra Vitamin A (may increase negative side effects)
- Corticosteroids (Dexamethasone) - low salt, high potassium. Emphasize protein and vegetables.
- Anticonvulsants (Dilantin, Phenytoin) – eat foods rich in Vitamins D, K and folate. Avoid megadoses of Vitamin B6 (decreases efficacy)



# Steroids and Weight

- **Recognize the benefit** of the treatment compared with the side effects of weight gain
- **Reduce salt and sodium** intake (mostly in processed foods like potato chips, prepared meals, etc.)
- **Increase potassium** intake by eating more vegetables and fruits
- **Lower simple sugar** intake; chose foods with a low glycemic index/load (GI)
- **Stay as active as possible**; activity improves your metabolism – mental and physical activity is important
- **Drink plenty of water** and other fluids

# Fatigue Management

- **Maintain a healthy weight.** Carrying around extra weight is tiring
- **Regular physical activity** can improve mood and fatigue levels. Activity is also helpful for insomnia – try T'ai Chi or yoga, going to the park
- **Regular mental stimulation** helps brain function and minimizes fatigue
- **Protein**, iron, zinc, B vitamins and Vitamin C all important for red cell production to minimize anemia related fatigue
- **Avoid caffeine** and stimulants
- **Drink green tea** (not after 4 pm or decaffeinated)
- **Eat dark chocolate** (not after 4 pm)







# Taste or the Hedonic Quality of Food

## - why we love to eat!

- Choose foods that are tasty and appealing
- Dysgeusia (taste distortion) is common during treatment
- Temperature affects taste
- Try using different textures
- The sequence of foods order of eating often affects taste
- Some people find plastic utensils minimize metallic taste
- **Eat in a relaxed environment and be mindful as you dine**
- Use garnishes and attractive place settings
- Structure your meals to optimize your appetite and energy levels
- Bitter flavors may indicate foods that are beneficial for your liver
- Salt enhances sweet flavor



# Weight and Waist Management

- BMI usual measure of healthy weight (ideal 19-24)
- Waist or abdominal girth is a better guide to health than body weight alone
- **Central adiposity (belly fat) is associated with inflammation**
- Belly fat increases risk of metabolic syndrome
- *Waist measurement is the easiest body fat to lose*
- Men - usually 2 inches more than pant size
  - ideally **under 40 inches** (under 38 even better)
- Women – ideally **under 35 inches** (under 32 even better)
  
- **Waist to height ratio should be 0.5 or less (half your height)**

*Source: Ashwell, M and Hsieh, D. 2005*



# Proactive Nutrition - How to Thrive

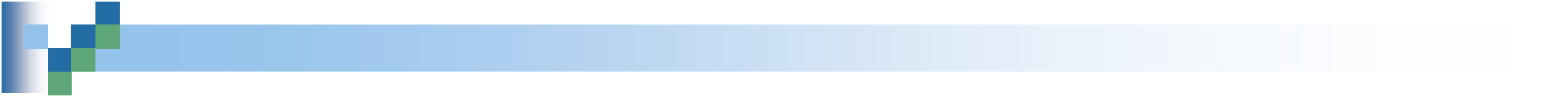
- Keep a personal record of your nutrition related health data (see hand out) with [Your Personal Nutrition Health Check](#)
- Share this data with your health care team
- Optimize your health span by balancing the 3 A's
  - [Antioxidants](#)
  - [Anti-inflammatories](#)
  - [Anticarcinogens](#)
- Choose fresh, locally grown, organic food
- “Eat Your Water” – choose high water content vegetables and fruits
- Avoid fad diets
- Maintain your energy with a consistent intake of nutrient rich foods balanced with an active lifestyle and regular sleep



# Healthy Food Choices

## - Nutrition to Thrive

- Choose **fish** at least 3 times a week
- Choose **fruit** for breakfast, dessert and snacks
- Choose **2 or more vegetables for lunch and dinner**
- Take a multivitamin and mineral supplement daily
- **Cook often with herbs, curry and spices**
- Think of food as sustenance – make healthy food your friend not a dietary restriction
- Seek professional advice to help you craft an eating plan that works for you and your family



# Balancing the 3 A's for Health

## ■ Antioxidants

- increase intake if exposed to tobacco smoke or other environmental pollutants
- Increase intake if traveling long distances (natural radiation exposure) or if having X-rays

## ■ Anti-inflammatories

- Increase intake if your waist to height ratio is above 0.5
- Increase intake if you suffer from an autoimmune disorder

## ■ Anticarcinogens

- Increase intake if you are a cancer survivor
- Important for all to reduce risk of cancer and stay healthy



# Rebuild Resilience

- Maintain lean muscle mass
- Keep active
- Eat sufficient protein (check with a nutritionist)
- Get plenty of rest and sleep
- Use stress reduction techniques
  - yoga
  - breathing
  - music, etc.
- Walk frequently
- Spend quality time with loved ones





For more information and support

[www.cancernutrition.com](http://www.cancernutrition.com)

(310)471-0529

Carolyn Katzin





"There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle."

Albert Einstein (1879-1955)





“There is no sincerer love than the love of food”

George Bernard Shaw (1856-1950)