Food for thought…
healthy diet for people living with brain tumors

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Topics

- Diet and cancer – the connection
- Healthy eating during treatment & beyond
- Diet, supplements & memory
Risks for brain tumors

- Radiotherapy, radiation
  - Cell phones?
- Environmental exposures
  - N-nitrosomides or nitrosamines, solvents
- Certain professions
  - Farmers
  - Pathologists
  - Crude oil
  - Chemists, embalmers

- National Cancer Institute
Would you like cancer with that?
Other carcinogenic agents

- **PHA (polycyclic aromatic hydrocarbons)**
  - Drying or smoking food (smoked or barbequed meat)
  - Cooking at high temps (grilling, roasting, frying)

- **HCA (heterocyclic amines)**
  - Grilled or fried meats (beef, fish, poultry, pork)
  - Oven roasting or baking are safest

- **Pesticides**

*National Cancer Institute*
Diet and cancer…most recent headline.

- EPIC study - European Prospective Investigation into Cancer & Nutrition
- 477,000 men & women studied 1992-2000
- Reviewed link between F&V intake & cancer
  - Increasing number of servings had small effect on reducing cancer risk (3% drop)
  - Investigators did not look at specific nutrients

Boffetta, J National Cancer Institute, Apr 2010
Diet and risk of glioma

- Fruit & vegetable intake thought to reduce risk for gliomas by decreasing N-nitroso compounds
- Prospective study of 3 large cohorts
  - Carotenoids looked at closely
- Result? F&V intake was not protective against gliomas

Cruciferous vegetables & brain cancer

- 2007 study Journal of Pharmacological Science
- Isothiocyanate iberin (bioactive agent in cruciferous vegetables) inhibited glioblastoma cell growth
- What to eat?
  - Broccoli
  - Brussels sprouts
  - Cabbage
  - Cauliflower
  - Kale
  - Mustard greens

Other studies

- Diet & adult risk for glioma in Nebraska
- Food frequency questionnaires used on those with cancer & controls
- Lowest risk found in those with highest intake of dark yellow vegetables & beans
  - No difference in other foods or nutrients
- Increased risk NOT seen with natural sources of nitrosamines (cabbage, beets, cruciferous vegetables)

  - Chen, et. al, Cancer Causes Control, Sept 2002
Should we eat more F&V?

- **YES!**
- High fruit & vegetable intake may reduce risk for obesity, heart disease & certain cancers
  - Obesity is a risk factor for cancer
  - F/V reduce risk for other cancers (lung, prostate, ovarian, etc).
  - Aim for 9 servings/day (5-6 veggies, 3-4 fruit)
Dirty (Baker’s) Dozen- highest pesticides, buy organic

- Peaches
- Apples
- Nectarines
- Strawberries
- Cherries
- Grapes
- Pears
- Raspberries

- Bell peppers
- Greens (kale, mustard greens, etc)
- Celery
- Potatoes
- Spinach
Save your money!

- Onions
- Avocado
- Sweet corn
- Pineapple
- Mango
- Asparagus
- Sweet peas
- Kiwi

- Cabbage
- Eggplant
- Papaya
- Watermelon
- Broccoli
- Tomatoes
- Sweet potatoes
- Bananas
Fresh or frozen?

- **Broccoli**
  - 30% more sulfurafane absorbed when raw
- **Carrots & tomatoes?**
  - Beta-carotene & lycopene more available when cooked
- **Bottom line? Eat them!**
  - Frozen vegetables
  - Bagged salad
  - Vegetable trays
  - Raw, steamed, etc.
Beverages and cancer

- **Green tea**
  - EGCG (epigallocatechin-gallate)
  - Major polyphenol- inhibitory effect on malignant brain tumors
  - > 10 cups/day reduces cancer incidence
    - Yokoyama, Neuro-oncology, January 2001

- **Water**
  - Filter tap water to reduce toxins
  - Use stainless steel bottles and coffee mugs
  - Avoid hard plastic (contains BPA)
    - Environmental estrogen
Beverages, cont.

- **Alcohol**
  - Positive association with alcohol & cancer
  - Less is best!

- **Aspartame (NutraSweet)**
  - Increased consumption not associated with a higher risk for brain cancer based on 2006 study
  - NIH-AARP study, relied on information provided by subjects
Low carb diet?

- Most aggressive tumors (brain tumor cells) rely on glucose for growth & survival
- 2007 study using “Ketocal” (high fat/low carb diet supplement)
- Adult mice given diet & tumor growth assessed
  - Reduce growth of intra-cerebral tumors by 65 & 35% in ketocal groups, enhanced health & survival of animals compared to controls
  - Ketones are produced from fatty acid breakdown, used for energy by the brain & heart in absence of carbohydrate
- Low carb diet controls seizures to boot!
  - Zhou, et. al, Nutrition & Metabolism, 2007
Low carb diet cont.

- **Wursburg trial in Germany**
  - Patients that exhausted all other treatments put on low carb diets
  - Drop out rate due to difficulty with compliance
  - 5 patients that stayed & followed diet for 3 months stabilized or improved & tumors slowed or stopped growing
    - High quality plant oils (hemp seed, linseed oil)
    - Protein from soy & animal products
      - *Schmidt, Kammerer, 2005*
  
- Based initially on 1924 research by Otto Warburg
- Research to continue
What to eat during treatment

- **Nausea**
  - Bland foods often tolerated better
  - Mashed potatoes, cottage cheese, cheese sticks
  - Apple sauce, canned fruit in juice
  - Soft vegetables (peas, cooked beans)
  - Ginger (added to tea, sweet potatoes or other foods) may reduce nausea
Other issues...Diarrhea

- Antibiotics
- Radiation Therapy
  - BRATY diet
  - Bananas
  - Rice
  - Applesauce
  - Toast
  - Yogurt or kefir to colonize gut
Quick ‘meals’

- PB & J on whole wheat with milk
- Cereal & fruit
- Cottage cheese & fruit or tomatoes
- Salad with grilled chicken or fish
- Beans and rice
- Tuna on toast
Nutrients that affect immunity

### Protein
- Beans
- Beef *
- Dairy products *
- Eggs *
- Nuts
- Poultry *
- Seafood
- Soy foods

*Buy organic- less antibiotics & hormones used

### Iron
- Beans *
- Beef
- Broccoli *
- Eggs
- Enriched breads & cereals *
- Greens
- Oats *
- Poultry
- Seafood
- Soy *

* Include a food high in vitamin C to boost absorption
Other nutrients & immunity

**Zinc**
- Beans
- Cereal
- Dairy products
- Meat
- Fish
- Nuts/seeds
- Pork
- Poultry
- Seafood
- Wheat

**Vitamin C**
- Broccoli
- Citrus
- Greens
- Kiwi
- Melon
- Peas
- Potatoes
- Strawberries
- Tomatoes

- Vitamin C supplements do NOT reduce risk for cancer.
Supplements during radiation & chemotherapy

- Taking vitamin C, E, beta-carotene considered controversial
- Free radicals produced during therapy to destroy cancer cells
- Best to obtain nutrients from food VS pills.

National Cancer Institute
Nutrients and memory

- Omega-3 fat thought to help
  - Controls inflammation & protects cells

- Sources of omega-3
  - Salmon, tuna, mackerel
  - Flaxseed, canola oil

- Observational studies have found benefits in cognition & lower risks for dementia in older people who ate a lot of fish

- Results have been mixed
Latest research on supplements & memory

- British study compared fish oil to placebo in > 800 people ages 70-79
- Results? No difference in cognitive decline after 2 years.
- Researchers caution this may not have been a long enough time to see effects.
  - Can’t hurt to take it!

- Dangour, Am J Clinical Nutrition, June 2010
Other memory nutrients

- **Gingko biloba**
  - Popular botanical supplement
  - Study of >3000 people followed for 6 years found no effect in delaying or preventing Alzheimer’s or improving memory.
    - *Dekosky, JAMA, Dec 2009*

- **Vitamin E**
  - Research has been mixed
  - Neurologist in Mass. uses it on Alzheimer’s patients, unclear if beneficial & at what dose
  - Not to be used with patients with bleeding disorders
    - *Atri, American Geriatrics Society Meeting, 2009*
More on memory…

- **Blueberries**
  - Wild blueberries (frozen, pureed, used in processed foods) have high antioxidant capacity
  - Blueberry extract given to aging rats reversed loss of balance & coordination
  - Small Cincinnati study using 2 ½ cups juice/day x 3 mos. found improved memory in 18 older adults

  • Krikorian, Journal of Agricultural and Food Chemistry, Jan 2009

- **Exercise**
  - Improves blood flow to brain
  - Enhances immunity
  - Improves blood sugar, blood pressure and lipids
  - Aids in weight management
  - Reduces depression

  • JUST DO IT!
Conclusions

- **Keep your diet ‘clean’**
  - Lots of plant foods
    - Choose organic when appropriate
  - Limit animal and processed foods
    - Avoid ‘extruded’ meats!
    - Limit grilled and red meat
    - Consider a ketogenic (low carbohydrate) diet

- **Don’t smoke, limit alcohol, drink green tea!**

- **Exercise regularly!**
Thank you!

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