

ESU 009 – Nutraceuticals for special situation such as cancer

Lecture 11



The need for action

- **As a cause of death in the developed world, cancer is only surpassed by cardiovascular disease**
- **Globally the number of people with cancer is projected to double by 2030**
- **Currently, more than one in 3 people will develop cancer in their lives!**

Understanding Cancer

- Before understanding the impact of nutrition on cancer, it is first important to understand the biochemical and physiological determinants of the disease
- .
- Cancers are as a result of the interaction of genetics, epigenetics and environment of the individual.
- Cancer is a chronic disease

What is cancer?

- **Healthy cells:** balance between growth and programmed cell death is tightly regulated
- **Cancer** cells are cells that grow and divide at an unregulated pace.

Cancer is a preventable disease

- Only 5-10 % of all cancer cases can be attributed to genetic defects, whereas the remaining 90-95% have their roots in the environment and lifestyle.
- The lifestyle factors include smoking, diet, alcohol, obesity, infectious agents, environmental pollutants and radiation
- Of all cancer-related deaths; 25-30% are due to tobacco, 30-35% diet, 15-20% infections, 10-20% obesity, 4-6% alcohol, 10-15% others, which includes environmental and radiation.

Good news we are in control

World Cancer Research Fund: high fruit and vegetable intake may reduce cancer incidence **by 40- 64 %**

US National Research Council: high fruit and vegetable intake may reduce US cancer rates and mortality by 1/3, roughly equivalent to the reduction in mortality from infectious diseases brought about by improved hygiene and better healthcare during the 19th century

In the November 2010 issue of Nutrition and cancer, a study indicated that women who consumed a greater amount of vegetables and seafood were 86% less likely to be diagnosed with breast cancer



Good news we are in control

- **Newest Research:**
through good nutrition we can also improve survival rates of people with some cancers by calming down the genes responsible for cancer growth!

(Ornish et al. 2005, Ornish et al. 2008, Saxe et al. 2006)

How diet can affect cancer



Diet-red meat

- Heavy consumption of red meat is a risk factor for several cancers, especially those of the gastrointestinal tract, but also for colorectal, prostate, bladder, breast, gastric, pancreatic and oral cancers.
- The heterocyclic amines produced during the cooking of meat are carcinogenic. Charcoal cooking and/or smoke curing of meat produces harmful carbon compounds such as pyrolysates and amino acids which have a strong cancerous effect.

Diet: Fats and sugars

- **S**aturated fatty acids, trans fatty acids and refined sugars and flour present in most foods have also been associated with various cancers (1)
- Epidemiologic studies suggested a positive association between dietary fat and colon cancer. (2)
- Frequent consumption of sugar and high-sugar foods may increase the risk of pancreatic cancer by inducing frequent postprandial hyperglycemia, increasing insulin demand, and decreasing insulin sensitivity. (3)

(1) Anand P et al, Cancer is a preventable disease that requires major lifestyle changes. 2008

(2) Reddy, B Dietary Fat & Colon cancer. Chemistry & material science vol 27 no 10 807-813

(3) American Journal of Clinical Nutrition Vol 84 No 5 1171-1176 Nov 06

Metabolic Tumour Promoters:

- **insulin**- promotes cancer cell proliferation and decreases apoptosis
- **estrogens**- induces cancer cell proliferation
- **oxidative stress**- can act as cancer initiator and promoter
- **inflammation**- strong association between chronic inflammation and cancer (mechanisms: promoting proliferation of cancer cells, formation of cancer blood vessels?-not entirely understood)

(Heber et al 2006)



Alcohol



Colon Cancer Risk-increases by 10% if you drink 1 glass of wine daily

Colon Cancer Risk-increases by 25% if you drink 2 glasses of wine or 1 pint of beer daily

Drinking as little as one pint of beer or one large glass of wine a day increases risk of breast cancer by more than 7%.

Mouth, Oesophagus, Larynx, Throat Cancer-↑ 168% risk with 1 glass of wine/d

(World Cancer Research Fund 2007; Riboli et al 2002; American Cancer Society 2007; Cancer Research UK 2009a)

Obesity/Excess Body Fat and Cancer



Take one a day with tomato and cucumber.

FARMACY



Tumour Anti- Promoters:

-**Folic acid** (reducing likelihood of DNA damage)

-**Antioxidants** (preventing oxidative damage and lipid peroxidation, which compound DNA damage in tumor promotion)

-**Phytochemicals** (various mechanisms)

- **Low-fat plant-based diet** (various mechanisms, see above)
(World Cancer Research Fund 1997, Wattenberg 1985)



Promotion-Protection

low fat; high fibre

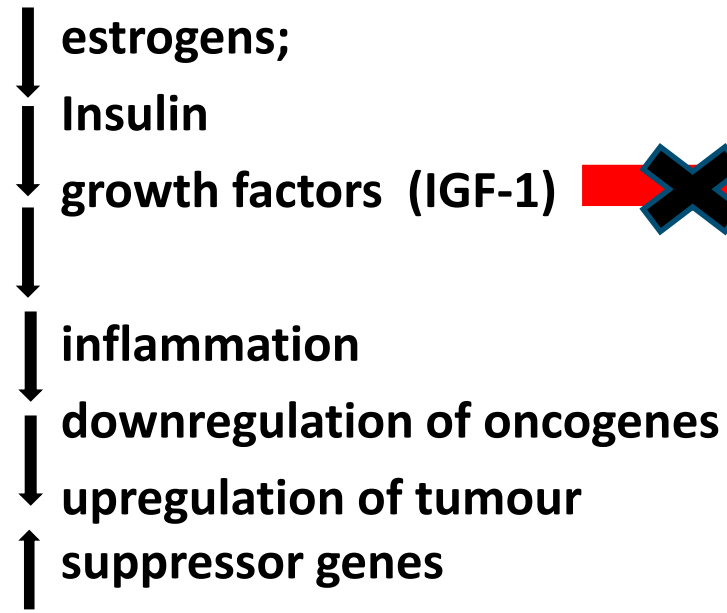
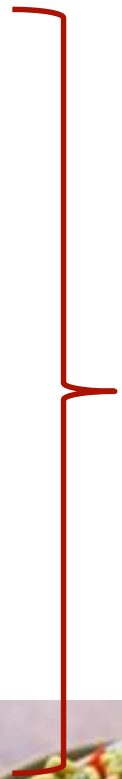
adequate protein

adequate calories

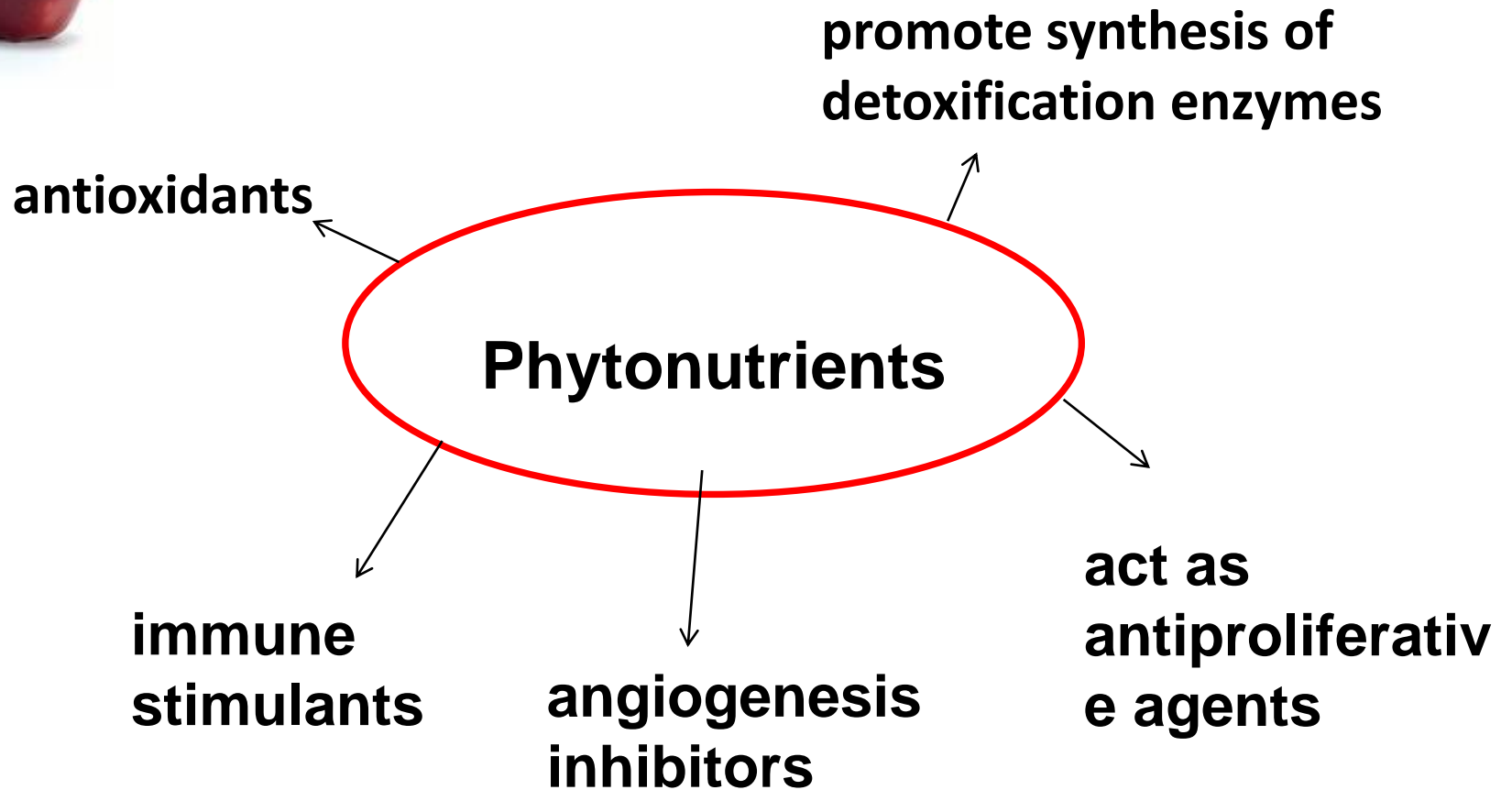
whole plant foods

O6: O3 ratio 2:1

Physical activity



© CNM; by Gosia Desmond MA, MBS, BSc Nut
(World Cancer Research Fund 2007; Heber 2006; Ornish et al 2008; Saxe 2006)



(Omenn 1995; Talalay et al 1995; Wattenberg 1970; Engwerda et al 2001; Zawa and Duve 1997; Fotsis et al 1993)

Phytonutrients –Flavonoids:

- Onions
- Grape
- Citrus fruit
- Apple
- Pear



-powerful inhibitors of many cancers including human breast cancer cells

(So et al 1996; Guthrie and Carroll 1998)



Phytonutrients –Flavonoids:

**Broccoli,
Brussel sprouts,
Cabbage,
Cauliflower,
Chinese cabbage,
Daikon (Japanese radish),
Turnip**



potent carcinogen detoxifiers –inducers of detoxification enzymes

(Zhang and Callaway 2002)

Other anti-cancer nutrients:

Other anticancer substances:

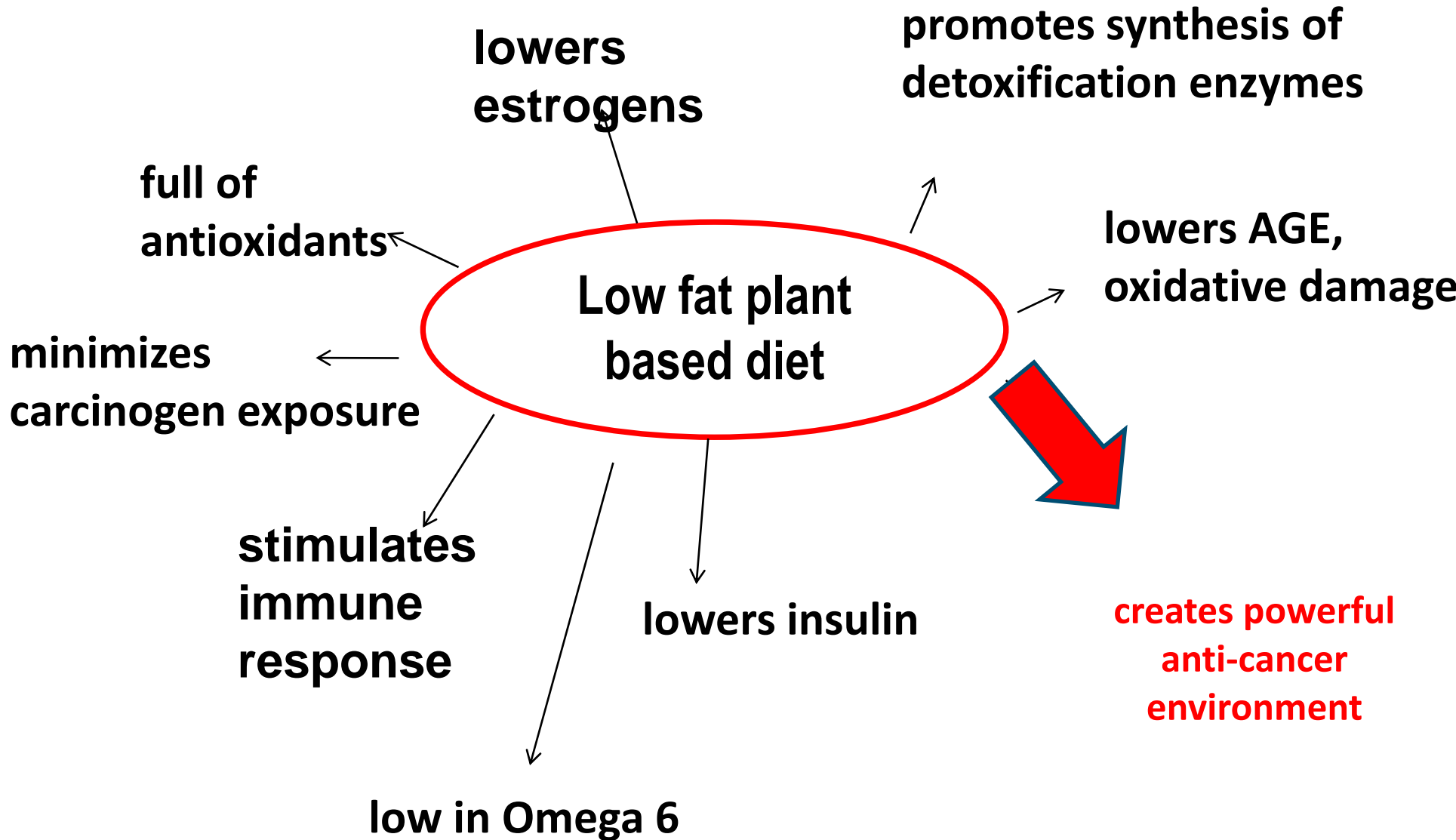
-sulphur compounds of garlic (tumour growth inhibition; cancer formation inhibition)

-folic acid (fruits and vegetables; DNA protection)

-beta sitosterol (fruits and vegetables; tumour growth inhibition)

(Fleischauer and Arab 2001; Awad et al 1996; Duthie 1999)

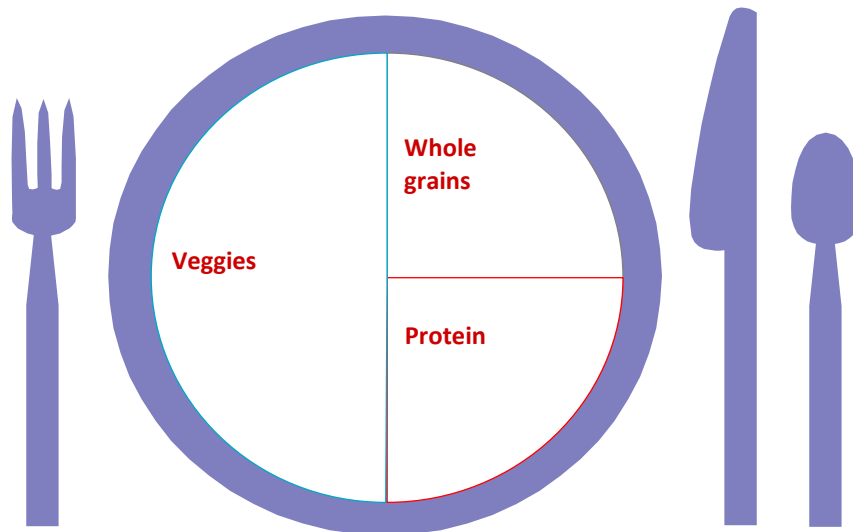
Low Fat Vegan Diet Full of Unprocessed Plants



Balancing Your Plate

Divide your plate into 3 sections:

- 50% is vegetables, salad
- 25% is mixed whole grains or starch
- 25% is protein source – poultry, fish, beans, soy products



What are the main components of a wellness diet?

- Water 2 liters of hydrating fluid daily
- Well balanced macro nutrients throughout the day
- High levels of micro nutrients
- Avoidance of anti-nutrients

Macro nutrients

- Complex carbohydrates
- Protein
- Essential fats

Complex carbohydrates

- Whole meal bread
- Whole meal pasta
- Brown rice
- Oats
- Beans and lentils
- Root vegetables

Protein

- Eggs
- Fish
- Poultry
- Meat
- Beans and lentils
- Nuts and seeds
- Tofu



Essential fats

- Oily fish
- Nuts and seeds
- Avocados
- Cold pressed oils
- Olives

Anti-oxidants

- Have been studied individually and collectively for their potential to enhance physical performance.
- Prevent exercise induced muscle tissue damage
- Fight against chronic diseases such as cancer, cardio-vascular disease, strokes



Hydrating fluid

2 litres of hydrating fluid each day:

- * Water
- * Herbal tea

Avoid dehydrating fluids

- * tea/coffee
- * Alcohol
- * fizzy drinks



Avoid anti-nutrients

- Aspartame
- Trans fats
- Refined carbohydrate
- Processed foods
- Sugar

"The wise man should consider that health is the greatest of human blessings. Let food be your medicine." - Hippocrates



Thank you

Dr. Rahul Thory
School of Bioengineering and Food Technology
Shoolini University
Village Bajhol, Solan (H.P)

+91 9466266628(Mob No.)
rahul.560@shooliniuniversity.com