WEIGHT CONTROL, PHYSICAL ACTIVITY
AND DIET

Modifiable determinants of cancer risk

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In the United States overweight and obesity contribute to 14% to 20% of all cancer-related mortality.

Overweight and obesity are associated with an increased risk of:

- Breast cancer in postmenopausal women
- Colon and rectum cancer
- Endometrium
- Kidney cancer
- Adenocarcinoma of the esophagus
- Pancreas
Probably associated with an increased risk of cancer of the gallbladder.

May be associated with an increased risk of:

- Cancer of the liver
- Non-Hodgkin lymphoma
- Multiple myeloma
- Cancer of the cervix
- Cancer of the ovary
- Aggressive prostate cancer
Specific to particular cancer types
Levels and metabolism of several hormones
- Insulin and estradiol
- Factors that regulate cell proliferation and growth
  - Insulin-like growth factor (IGF)-1
- Proteins that make hormones more or less available to tissues
- Sex hormone-binding globulin and IGF-binding proteins
Abdominal fatness is associated with colorectal cancer

- Probably related to a higher risk of pancreatic, endometrial, and postmenopausal breast cancer
- Increased risk of gastroesophageal reflux disease and Barrett esophagus
  - Adenocarcinoma of the esophagus
After diagnosis many cancer patients gain weight

- Patients experience adverse changes in body composition
  - Loss of lean body mass (muscle and bone) and gain of adipose tissue

Weight gain is associated with chemotherapy, increased BMI at diagnosis and younger age

- Partially explained by decreased physical activity during treatment
Weight Loss and Cancer Risk Reduction

Weight loss may reduce the risk of postmenopausal breast cancer and possibly other cancers.

Results from large studies of lifestyle and behavioral weight loss interventions:

- Modest weight loss improves insulin sensitivity and biochemical measures of hormone metabolism.
  - Which have been postulated to contribute to the relationship between obesity and certain cancers.
Women's Intervention Nutrition Study

Phase III multicenter randomized trial
- The effect on relapse of a dietary intervention designed to reduce fat intake in women with early-stage, resected breast cancer
- The low-fat eating plan based on nutritional and behavioral science principles
- Percentage of calories from fat reduced to 15%

After 5 years of follow-up, women in the dietary intervention group had a 24% lower risk of relapse than those in the control group
- (HR = 0.76; 95% CI = 0.60 to 0.98) $P = .034$
Physical activity

Will increasing physical activity reduce cancer risk?
- Yes

People who engage in moderate to vigorous levels of physical activity are at a lower risk of developing several cancers
- Breast, colon, endometrium and advanced prostate cancer

For some cancers, this risk reduction is independent of the impact of activity on weight
Meyerhardt et al. reported two prospective studies. Colorectal cancer patients engaged in more than 18 metabolic equivalent task (MET) hours per week of physical activity or less than 3 MET hours per week:

- One MET is defined as 1 kcal/kg/hour and is roughly equivalent to the energy cost of sitting quietly.

 Patients had 50% higher disease-free survival (DFS) and half lower cancer-specific mortality and overall mortality.
Affect metabolic biomarkers in cancer survivors

- Exercise and Insulin study in Breast Cancer Survivors
  - Enrolled 101 sedentary, overweight breast cancer survivors (average BMI 30.0 kg/m2)
  - Randomized to 16-week mixed strength and aerobic training intervention vs. usual care
  - Endpoints: change in insulin and secondary endpoints were anthropometric measures, leptin, adiponectin, glucose, strength

- Fasting insulin concentrations decreased by an average of 2.86 μU/mL in the exercise group ($P = .03$)
Energy Balance Interventions

Exercise intervention was associated with a significant decrease in insulin levels and hip circumference in breast cancer survivors.

The relationship between physical activity and breast cancer prognosis may be mediated, in part, through changes in insulin levels and/or changes in body fat or fat deposition.
Breast cancer patients who engaged in at least 3 hours of moderate physical activity per week after diagnosis had a 40% to 50% lower risk of cancer recurrence and death compared with inactive women.

- The Nurses' Health Study