Dietary Modulation of the Microbiome and Cancer Risk

Cindy D. Davis
davisci@mail.nih.gov
The Human Microbiome

- We are a composite of species: eukaryotic, bacterial, viral-up to 10x more microbial cells than human
- Gut Microbiota = microbes in our GI tract, ~100 trillion organisms
- Microbiome = their collective genome, >100 times as many genes as human genome
What Do Microbes Do For Us?

- Provide ability to harvest nutrients
- Produce additional energy otherwise inaccessible to the host
- Produce vitamins
- Metabolize carcinogens
- Prevent colonization by pathogens
- Assist in the development of a mature immune system
Specific Bacteria Can Influence Cancer Risk !!

- Specific strains of bacteria implicated in cancer risk at several organ sites
- Balance between detrimental and beneficial bacteria
- Dietary components can modify this balance
The Gut Microbiota Differs between Healthy Individuals and Colorectal Cancer Patients

Mechanisms Whereby the Bacterial Population Can Modify Carcinogenesis

- Metabolism of Bioactive Food Components
- Immune Stimulation
- Binding of Mutagens
- Energy Production
- Carcinogen Metabolism
WHAT YOU NEED TO KNOW ABOUT OBESITY AND CANCER

After not smoking, BEING AT A HEALTHY WEIGHT is THE MOST IMPORTANT THING you can do to prevent cancer.

Overweight and obesity INCREASE RISK FOR

- ESOPHAGEAL CANCER
- LIVER CANCER
- KIDNEY CANCER
- STOMACH CANCER
- COLORECTAL CANCER
- ADVANCED PROSTATE CANCER
- POST-MENOPAUSAL BREAST CANCER
- GALLBLADDER CANCER
- Pancreatic CANCER
- OVARIAN CANCER
- ENDOMETRIAL CANCER

AICR ESTIMATES THAT EXCESS BODY FAT IS A CAUSE OF APPROXIMATELY 130,600 U.S. CANCER CASES EVERY YEAR.

AND YET... 7 in 10 Americans are currently overweight or obese. 69%

AND ... Only about half of all Americans are even aware of the obesity-cancer link. 52%
BEING PHYSICALLY ACTIVE DECREASES RISK OF THESE CANCERS:

Activity helps to:

- Regulate blood levels of hormones that contribute to cancer risk
- Speed food through the colon, reducing exposure to dietary carcinogens
- Prevent the build up of body fat, a cause of many cancers

AIM FOR 30 MINUTES A DAY, IN ANY WAY
Can We Use Information about the Microbiome and Diet to Make Personalized Recommendations for Disease Prevention?

Session Speakers

- **Diet, the Microbiome and Cancer**
  Johanna Lampe, Fred Hutchinson Cancer Center

- **The Microbiome and Obesity**
  Vanessa Leone, University of Chicago

- **The Effect of Exercise on the Microbiome**
  Corrie Whisner, Arizona State University

- **The Microbiome and Personalized Nutrition**
  Erin Elinav, Weizmann Institute of Science