



Department of Health and Human Services • National Institutes of Health

**National Heart Lung and Blood Institute**

People Science Health



# Childhood Obesity: A Lifelong Course

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Cancer Control Conference

November 12, 2008



# Outline

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- Childhood obesity and risk of adult obesity
- Childhood obesity and chronic disease risks (e.g. CVD risks)
- Obesity and cancer risk
- Examples of national efforts to curtail the obesity epidemic (e.g., NIH Obesity Task Force, WE CAN program)
- Potential opportunities for Maryland

# Childhood Obesity— a Lifelong Course



Childhood

Adolescence

Young  
Adult

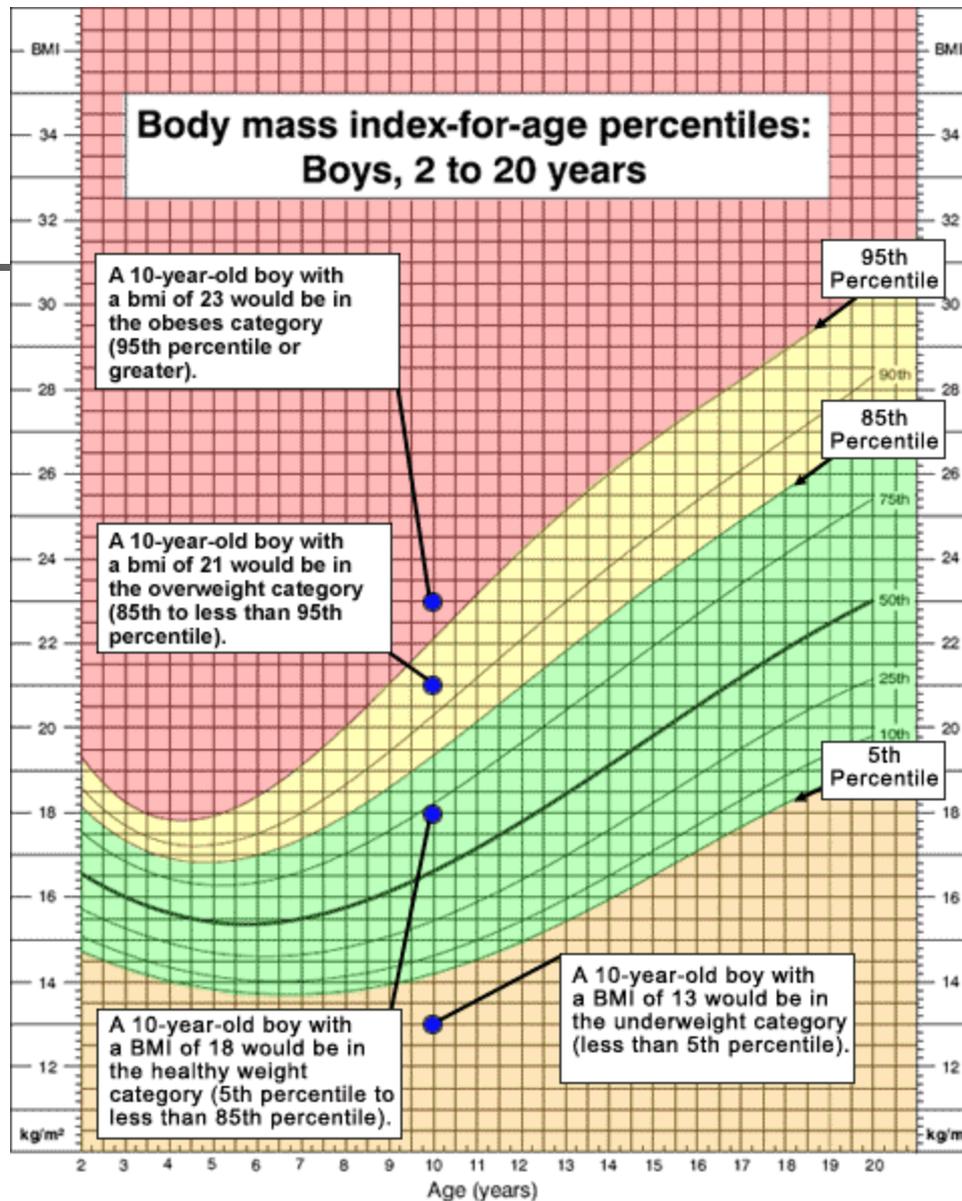
Mid  
Adulthood

Older  
Adult

GROWTH



# DEFINING OBESITY IN CHILDHOOD



$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

OR

$$\text{BMI} = \frac{[\text{Weight (lbs)}] \times 703}{[\text{Height (in}^2\text{)}]}$$

BMI 30 or above = obese; BMI 25-29.9 = overweight; BMI 18.5-24.9 = normal

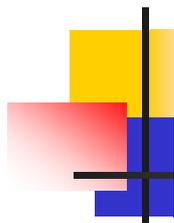
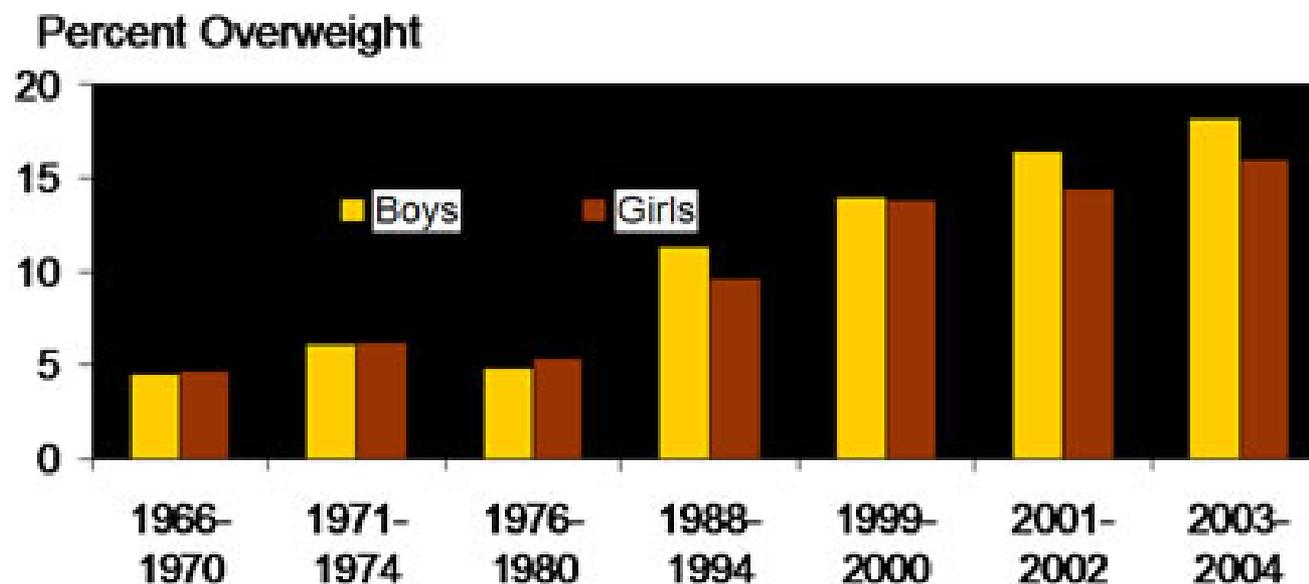


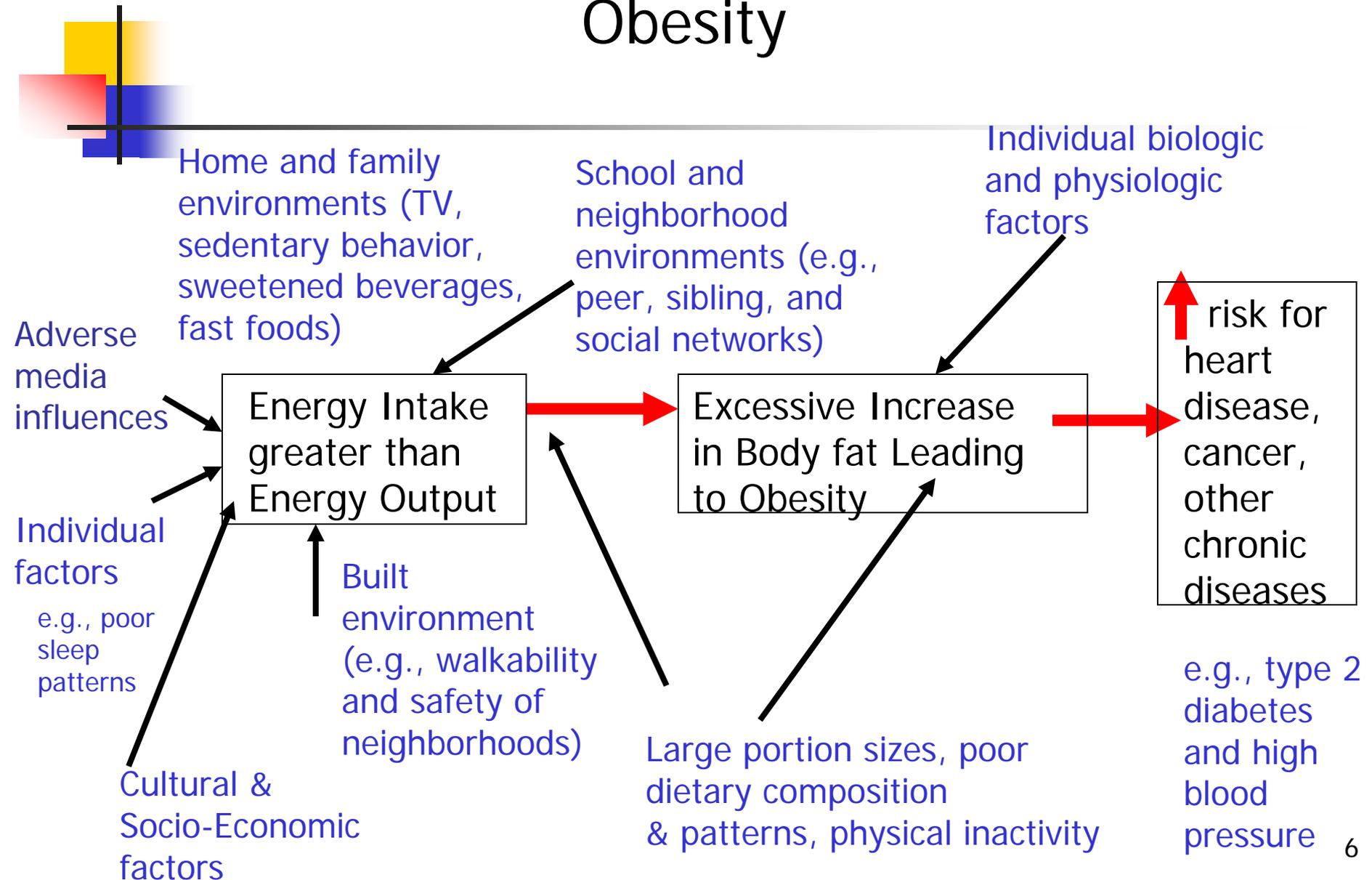
Figure 1.

# Childhood Obesity Epidemic



Ogden CL, et al. JAMA 2006; 295:1549-55

# Multiple Factors Contributing to Childhood Obesity



# Does being overweight in childhood increase your disease risks in adulthood?

## ■ The Bogalusa Heart Study (BHS)

- **Objectives:** To investigate the early natural history of cardiovascular disease in a cohort of children and young adults in a biracial, semirural community in Louisiana; More than 16,000 individuals.

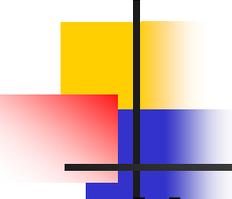
<http://www.nhlbi.nih.gov/resources/deca/descriptions/bhs.htm>

- Systolic and diastolic blood pressure, total cholesterol, LDL cholesterol, HDL cholesterol all track from childhood through adolescence to adulthood.

- Weight change (normal weight to obese) exerts powerful effect

- Answer: YES; about 50%-60% of obese children become obese adults

Source: Dietz WH, J. Nutr, 128:411S-414S, 1998



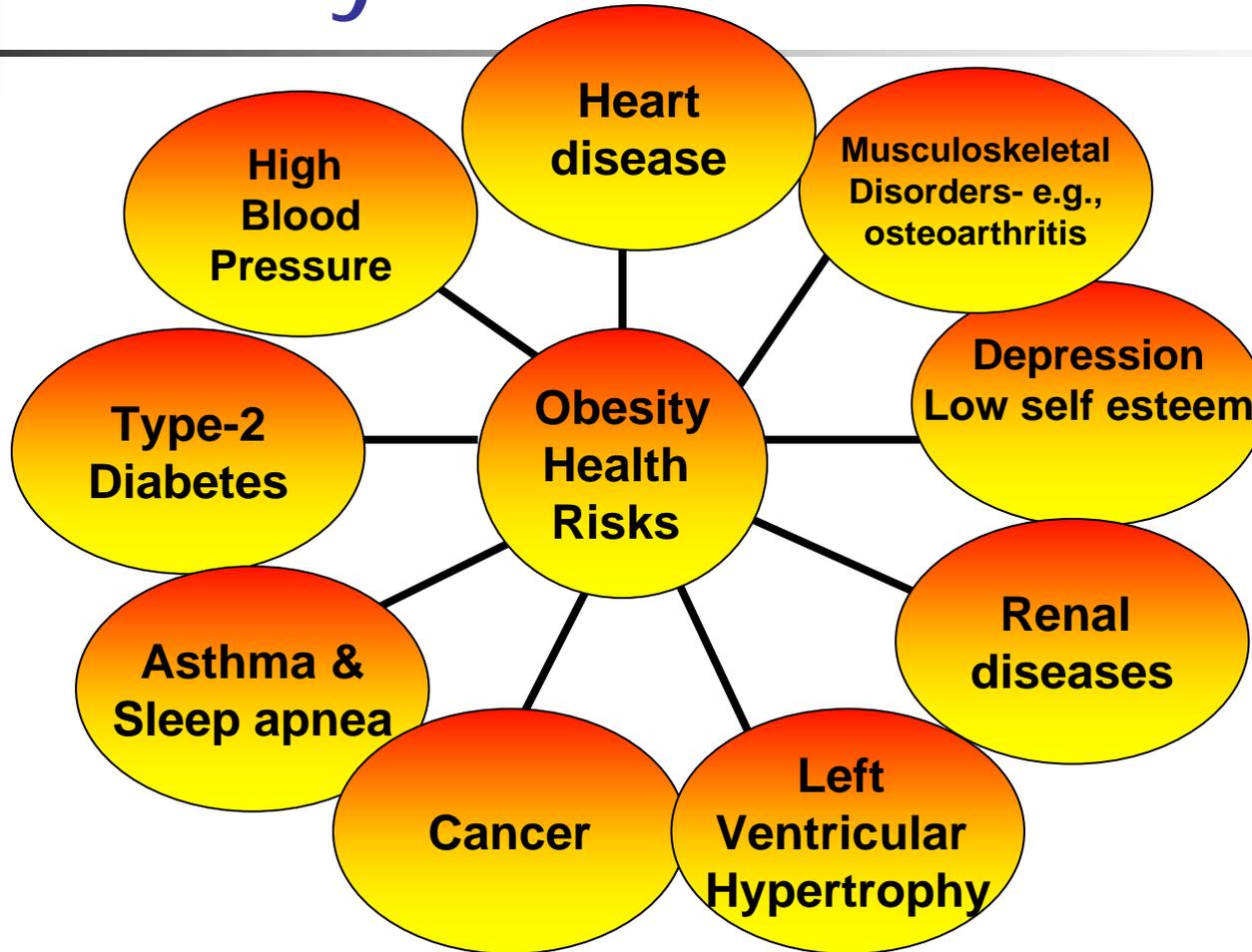
# Does being overweight in childhood increase your disease risks in adulthood?

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## ■ **Harvard Growth Study**

- Risk of mortality of males and females overweight during high school years; 1800 children.
- In Males: All cause mortality 1.8; CHD 2.3, Stroke 13.2, Colorectal cancer 9.1
- In Females: Risks are lower than males: All cause mortality 1.0; CHD 0.8, Stroke 0.4, Colorectal cancer 1.0, Breast cancer 0.9.
- Psychosocial consequences: fewer years of education, lower family incomes, higher rates of poverty, lower self-esteem.

# Obesity and Health Risks



## YOUNG LIVES AT RISK: Our Overweight Children

### How Obesity Harms A Child's Body

Click on a body part to learn about the effects of obesity



Hormonal Changes and Metabolic Syndrome

For the first time in history, American children could have a shorter life span than their parents. The cause: obesity. With about a third of all youths overweight or worse, adverse health effects are being seen in alarming proportions. And medical experts fear those problems foreshadow what tomorrow's young adults will face as the years of excess pounds add up.

So what happens inside a child or teen carrying this kind of load? As this organ-by-organ summary shows, obesity kills slowly, causing damage from head to toe, with painful lasting effects.

#### FAT AND THE BODY

One pound of fat is about the size of a coffee mug.

A fat cell is like a plastic bag that holds a drop of fat. The number of fat cells a person has is determined by late adolescence — overeating in childhood creates more. The cells increase and decrease in size depending on how much fat they store.

So although overweight children can become lean (as their fat cells shrink), they do not lose the extra fat cells no matter how much weight they lose.

#### LOSING WEIGHT

Weight is determined by the rate at which the body stores energy from the food one eats and the rate at which that energy is used. When one is not eating, food is not absorbed. However, the body is always using energy, and the energy must come from internal reserves.

#### WHAT IS BMI?

Body mass index is a measure of weight in relation to height that is used to estimate a person's body fat and, by extension, health risks. BMI is the most widely accepted method used to screen for overweight in children and adolescents, but it is not an actual measure of body fat. Being "obese" means that a child has a BMI at or above the 95th percentile for his or her age. A BMI at or above the 85th percentile is labeled "overweight."

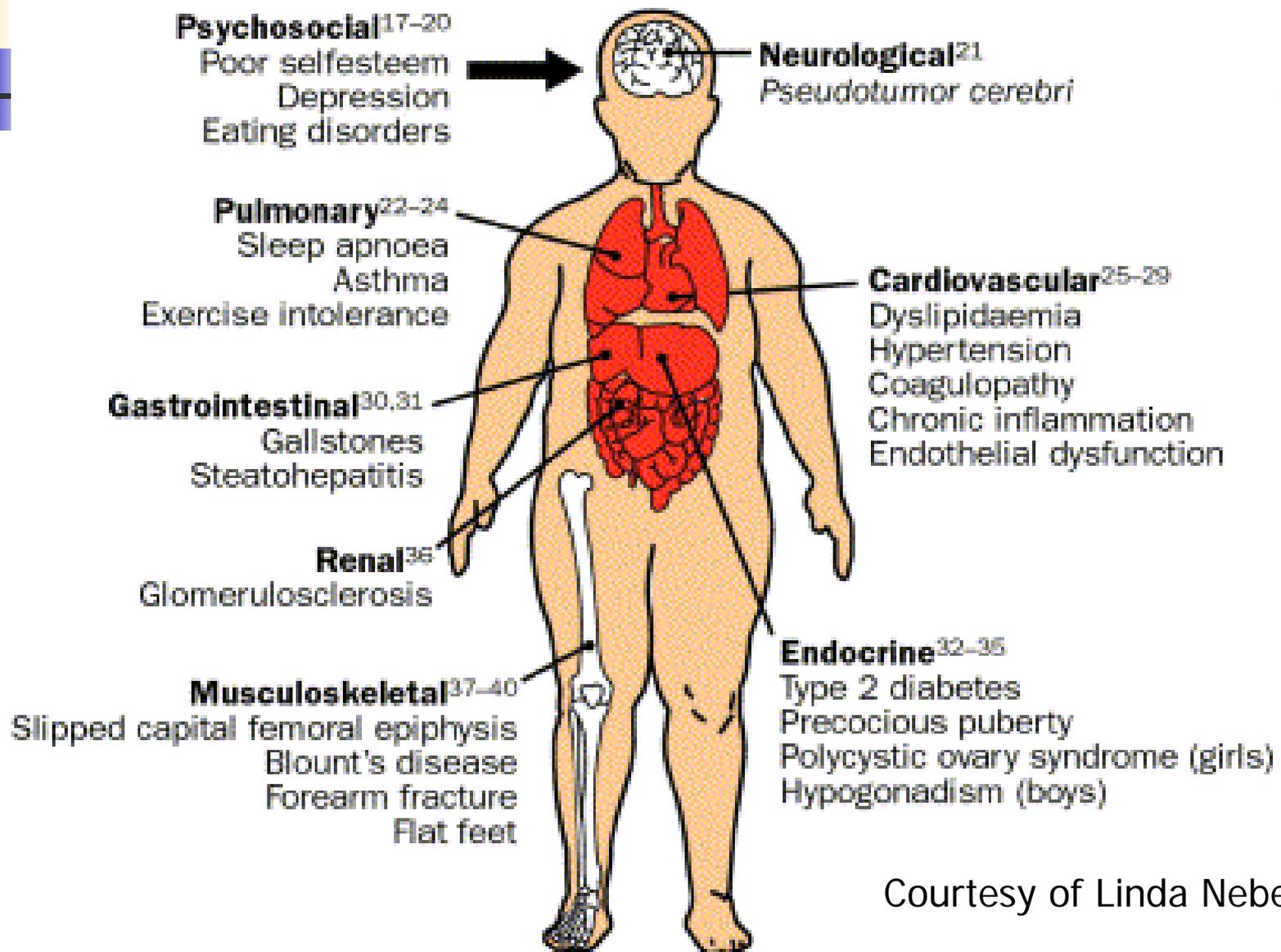
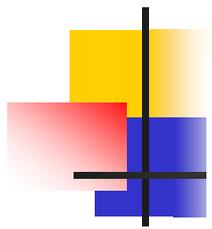
SOURCES: Jennifer Miller, assistant professor of pediatrics, University of Florida; Jeffrey Schwimmer, pediatric gastroenterologist, University of California at San Diego; surgeon Kurt Newman, Children's National Medical Center; Lori Karol, pediatric orthopedic surgeon, Texas Scottish Rite Hospital for Children; Robert H. Lustig, pediatric endocrinologist, University of California at San Francisco; Angela Shakley, pediatric cardiologist, Washington University in St. Louis; New England Journal of Medicine; William Marder, senior vice president, Thomson Reuters; Stephen Cook, professor of pediatrics, University of Rochester; Paul Kaplowitz, chief of endocrinology, Children's National Medical Center; William H. Dietz, director of the Division of Nutrition, Physical Activity and Obesity, federal Centers for Disease Control and Prevention; David S. Ludwig, obesity program director, Children's Hospital Boston; Matthew Gillman, associate professor of ambulatory care and prevention, Harvard Medical School; Steven Gortmaker, professor of health sociology, Harvard School of Public Health; Michael Goran, professor of preventive medicine, University of Southern California; Sonia Caprio, pediatric endocrinologist, Yale University School of Medicine; Francine Kaufman, director of the Comprehensive Childhood Diabetes Center, Children's Hospital Los Angeles; David Gozal, professor of pediatrics, University of Louisville; John Morrison, associate professor of pediatrics, Heart Center at Cincinnati Children's Hospital Medical Center; Fredric Wondisford, chief of the division of metabolism, Johns Hopkins Children's Center; Institute of Medicine, National Institutes of Health; Journal of the American College of Surgeons.

REPORTING: Susan Levine, Brenna Maloney, Brigid Schulte And Rob Stein; GRAPHIC: Todd Lindeman - The Washington Post

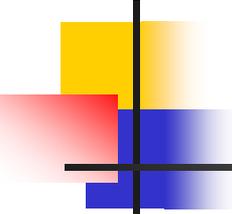
E-Mail This Graphic

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# Childhood obesity and chronic disease risks



Courtesy of Linda Nebeling



# Childhood obesity, risk of adult obesity, and chronic disease risk

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## Metabolic

- Type 2 diabetes mellitus
- Metabolic syndrome

## Orthopedic

- Slipped capital femoral epiphysis
- Blount's disease

## Cardiovascular

- Dyslipidemia
- Hypertension
- Left ventricular hypertrophy
- Atherosclerosis

## Psychological

- Depression
- Poor quality of life

## Neurological

- Pseudotumor cerebri

## Hepatic

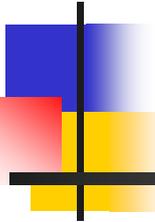
- Nonalcoholic fatty liver disease
- Nonalcoholic steatohepatitis

## Pulmonary

- Obstructive sleep apnea
- Asthma (exacerbation)

## Renal

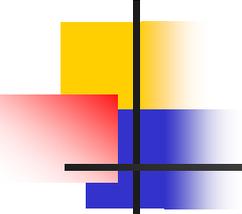
- Proteinuria



# Obesity and cancer risk

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# Established or suspected obesity-related cancers:



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## Sufficient evidence in humans

- Colon
- Breast (postmenopausal)
- Endometrium
- Kidney (renal cell)
- Esophagus (adenocarcinoma)

## Sufficient or limited evidence in animal studies

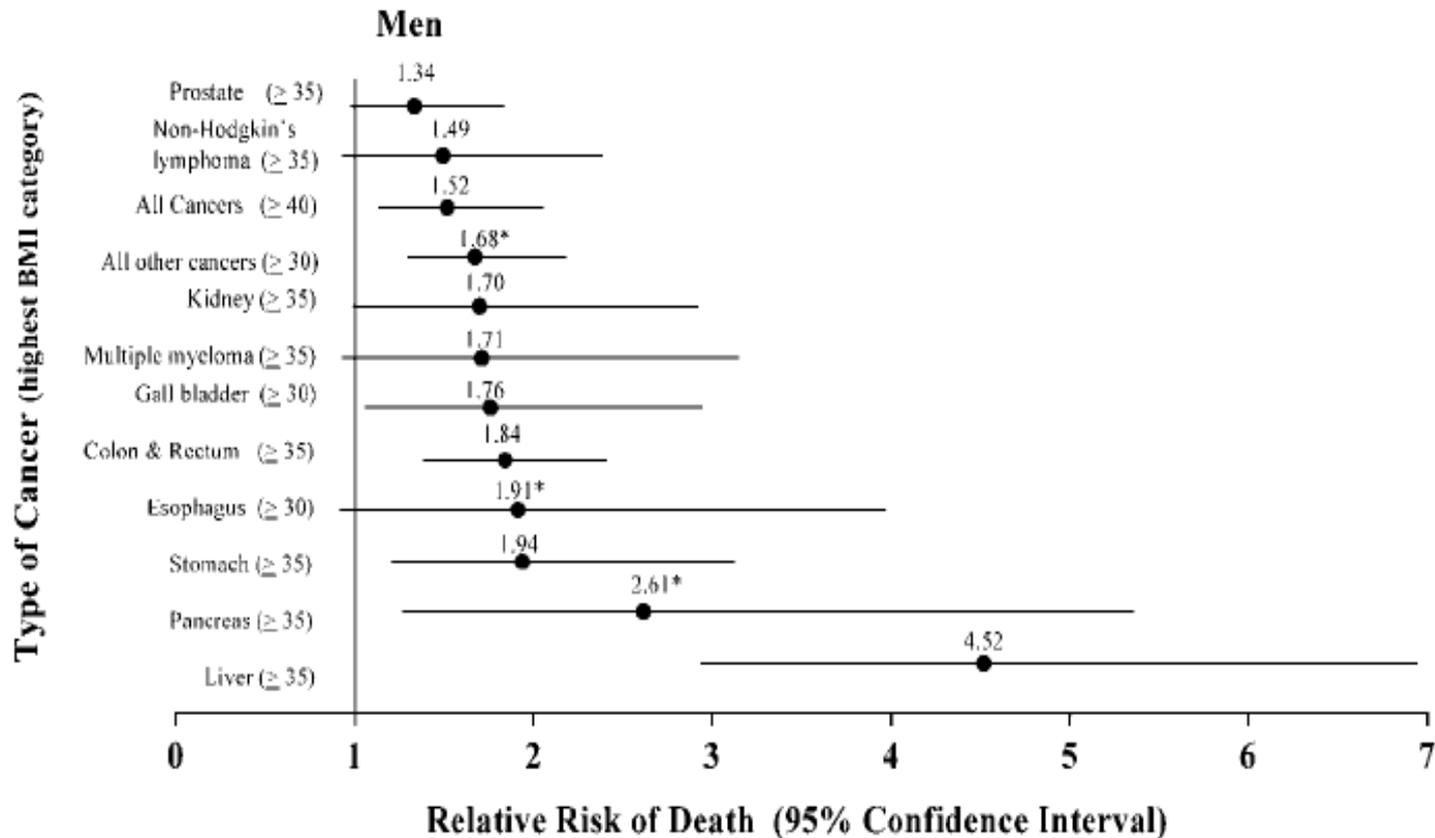
- Liver
- Mammary gland
- Pituitary gland (adenoma)
- Prostate
- Multiple Myeloma

# Risk of cancer associated with a 5 kg/m<sup>2</sup> increase of BMI

<u>Women</u>	<u>Relative Risk</u>	<u>Men</u>	<u>Relative Risk</u>
•Endometrial	1.59	•Oesophageal adenocarcinoma	1.52
•Gallbladder	1.59	•Thyroid	1.33
•Renal	1.34	•Colon	1.24
•Esophageal adenocarcinoma	1.51	•Renal	1.24
•Leukemia	1.17	•Malignant melanoma	1.17
•Thyroid	1.14	•Multiple myeloma	1.11
•Post-menopausal breast cancer	1.12	•Rectal cancer	1.09
•Pancreas	1.12	•Leukemia	1.08
•Non- Hodgkin's lymphoma	1.07	•Non-Hodgkin's lymphoma	1.06

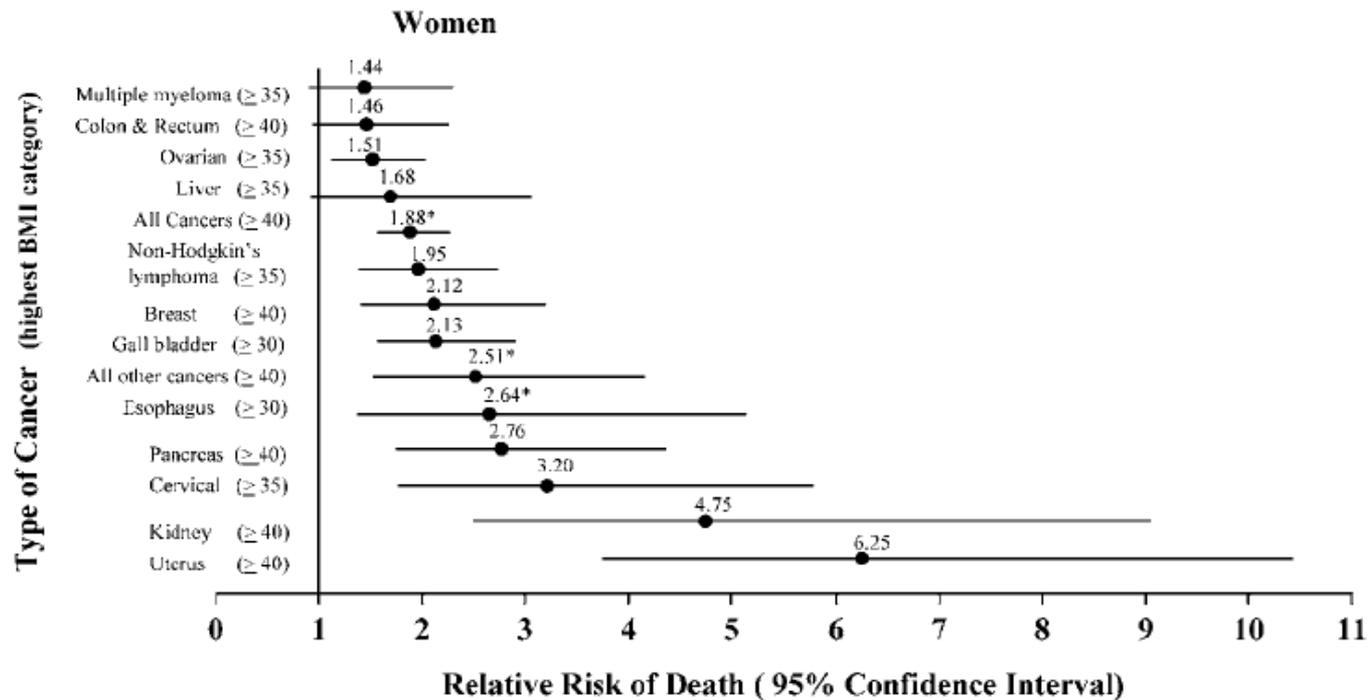
Source: Renehan, A., Tyson, M., Egger, M., Heller, R. & Zwahlen. Body-mass index and incidence of cancer: A systematic review and meta-analysis of prospective observational studies. Lancet, 371, 569-578, 2008.

# Mortality from cancer according to BMI for US men in the cancer prevention Study II, 1982-1998



Source: Calle, E.E. & Thun, M.J. (2004). Obesity and Cancer. *Oncogene*, 23, 6365-6378.

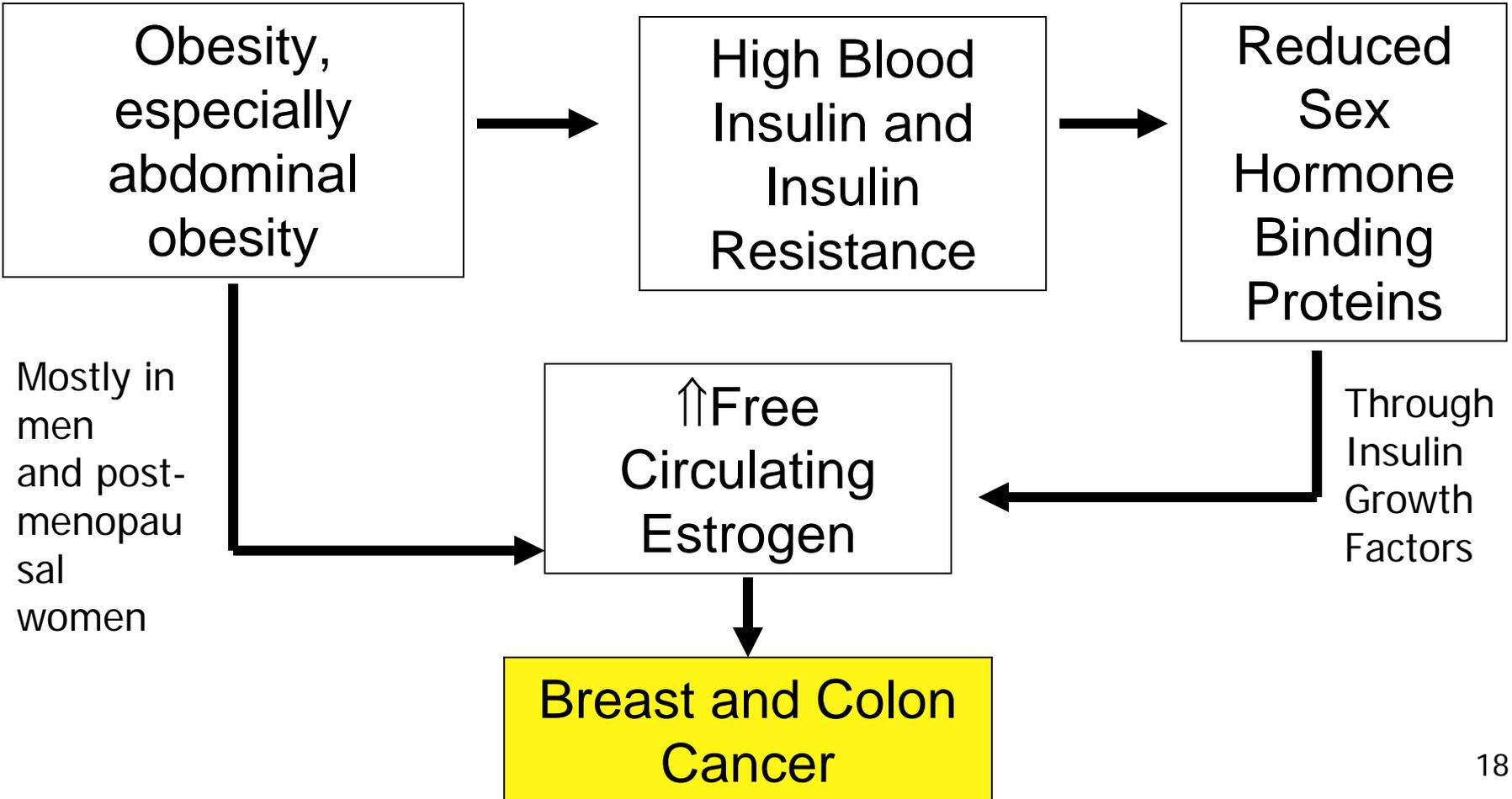
# Mortality from cancer according to BMI for US women in the cancer prevention Study II, 1982-1998



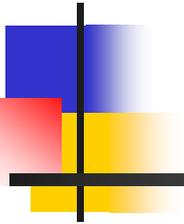
Source: Calle, E.E. & Thun, M.J. (2004). Obesity and Cancer. *Oncogene*, 23, 6365-6378.

# Possible Mechanisms

Source: Calle EE & Thun MJ. Obesity and Cancer, *Oncogen*, 23, 6365-6378, 2004



# Examples of National Efforts to Curtail the Obesity Epidemic



# We Can!<sup>TM</sup> An Evidence-based Program to Help Children and Families Maintain Healthy Weight



NIH Science working through Communities, Partnerships and Media...

## Communities

- Curricula
- Local Partnerships
- Local Media
- Outreach Events

## Partnerships

- Federal
- Clinical
- Outreach
- Media
- Corporate

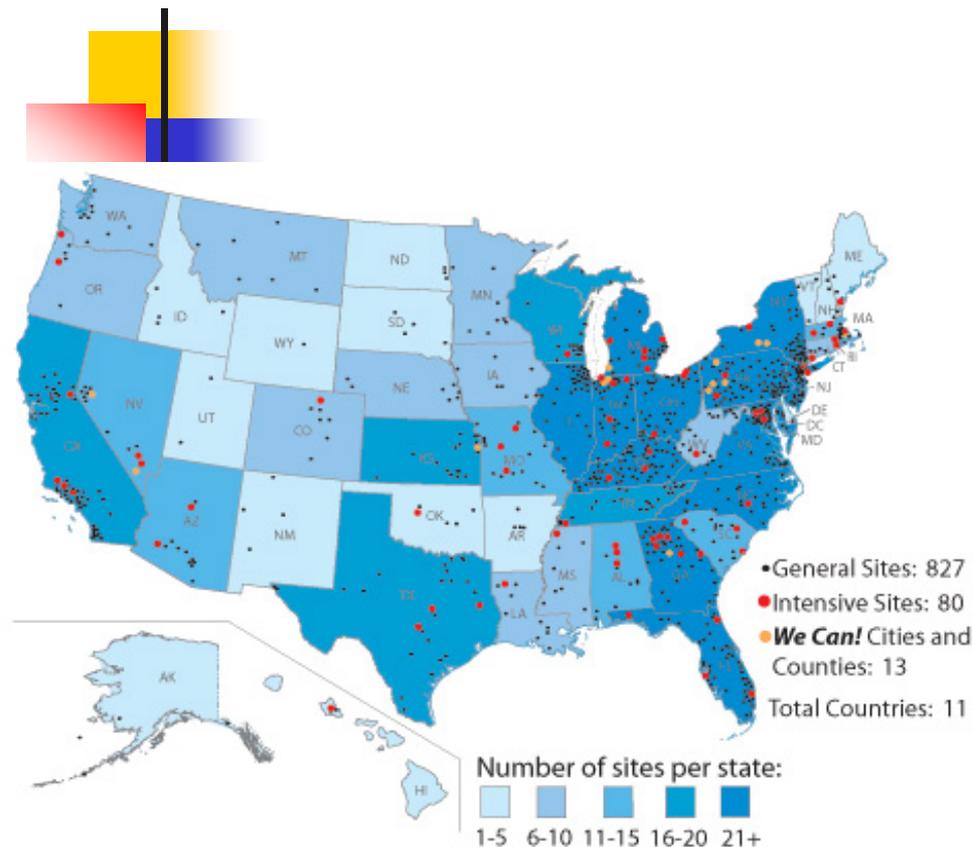
## Media

- Web
- Print
- Television

...to help children and families maintain a healthy weight.



# *We Can!* Around the Country



- ***We Can!*** is currently running in 920 Community Sites in 50 states, the District of Columbia, Puerto Rico, the Northern Mariana Islands, and 9 other countries (Australia, Bangladesh, Canada, Fiji, Greece, India, Israel, Nigeria, the Philippines, and Uganda). Settings, include schools, park and recreation departments, hospitals, health systems and public health departments (12 different settings).

13 ***We Can!*** cities, including Boston, Pittsburgh, and Las Vegas are coordinating intensive *We Can!* programming for employees, parents and youth.

- More than 40 National and Corporate Partners

# We Can! Resources to Mobilize Communities

## PEOPLE

**We Can! Food Comparison Chart**

Food Item	Calories	Total Fat	Sodium	Sugars	Fiber
Apple	95	0.5	0	19	1.7
Banana	105	0.5	0	27	3.1
Orange	62	0.1	0	15	1.0
Apple (with skin)	95	0.5	0	19	1.7
Banana (with skin)	105	0.5	0	27	3.1
Orange (with skin)	62	0.1	0	15	1.0
Apple (with skin, sliced)	95	0.5	0	19	1.7
Banana (with skin, sliced)	105	0.5	0	27	3.1
Orange (with skin, sliced)	62	0.1	0	15	1.0

**Energize Community Toolkit**

Community Toolkit Tip Sheets

Science-based information around We Can's 4P's

**We Can!**  
Ways to Enhance Children's Activity & Nutrition

**What's We Can?**

**Live It!**  
Get smart, start healthy eating and get active. It's all about making smart choices. It's all about making smart choices. It's all about making smart choices.

**Learn It!**  
Get smart, start healthy eating and get active. It's all about making smart choices. It's all about making smart choices. It's all about making smart choices.

**Partnership Toolkit**

**Parent and Youth Programs**

**Media-Smart Youth**

**CATCH Kids Club**

From a National Web Platform  
<http://wecan.nhlbi.nih.gov>

## PARTNERING

**we can!**  
Ways to Enhance Children's Activity & Nutrition

A National Obesity-Prevention Program Developed by the National Institutes of Health

National Heart, Lung, and Blood Institute  
National Institute of Diabetes and Digestive and Kidney Diseases  
National Institute of Child Health and Human Development  
National Cancer Institute

Partnership Toolkit

## PROGRAMS

**Parent and Youth Programs**



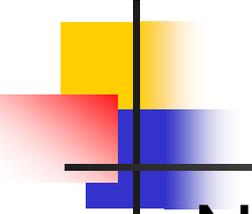
## PUBLIC VISIBILITY

**Sample Press Release**

**News Articles**

**Less TV, Fewer Videos Help Keep Weight in Check**

Sample Press Release News Articles



# Resources to Curtail the Obesity Epidemic

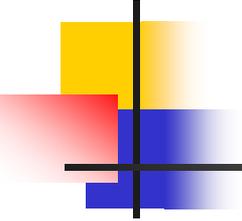
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- NIH Obesity Research: Strategic Plan

<http://obesityresearch.nih.gov>

- Centers for Disease Control and Prevention

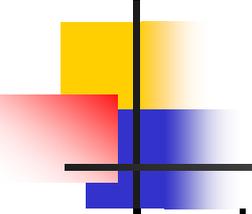
[http://www.cdc.gov/nccdphp/dnpa/obesity/state\\_programs/index.htm](http://www.cdc.gov/nccdphp/dnpa/obesity/state_programs/index.htm)



## Resources to Curtail the Obesity Epidemic Continued

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- Robert Wood Johnson Foundation (Goal: to reverse childhood obesity epidemic by 2015)  
<http://www.rwjf.org/childhoodobesity/index.jsp>
- Evidence-based Physical Activity Guidelines from DHHS  
<http://www.cdc.gov/HealthyYouth/physicalactivity/guidelines.htm>; <http://www.health.gov/PAguidelines/>
- USDA/DHHS Dietary Guidelines for Americans  
[www.healthierus.gov/dietaryguidelines](http://www.healthierus.gov/dietaryguidelines)



# Potential Opportunities for Maryland

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- Implement the physical activity guidelines in all schools and communities. Encourage children to spend 60 minutes (1 hour) or more on moderate to vigorous physical activity daily. <http://www.cdc.gov/HealthyYouth/physicalactivity/guidelines.htm>
- Encourage healthy eating habits in school, home and when eating out-- [www.healthierus.gov/dietaryguidelines](http://www.healthierus.gov/dietaryguidelines)
- Adopt the *We CAN* program in schools, homes and communities in Maryland.
- Learn from other states, for example, Arkansas.
- Leverage resources and funds from other national programs: The CDC and RWJF obesity programs.

## Other Resources: Dissemination into Practice



<http://cancercontrolplanet.cancer.gov>

Links to comprehensive cancer control resources for public health professionals

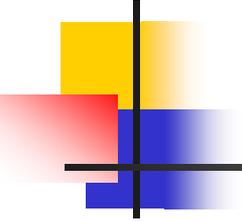
There is a lot to do!



To move from this.....

To this.....



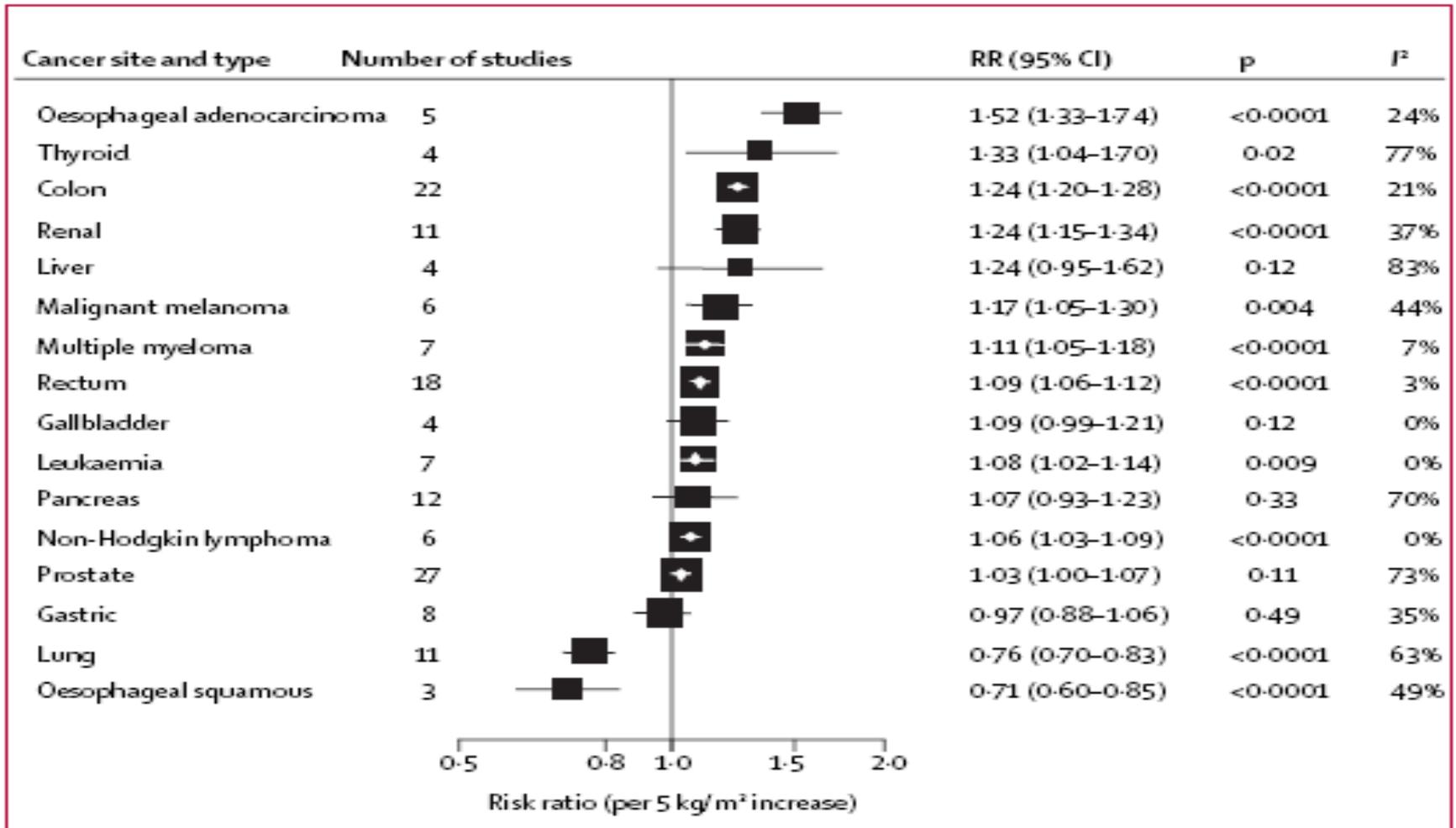


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Division of Prevention and Population Sciences,  
National Heart, Lung, and Blood Institute

# Risk estimates by cancer sites in Men



**Figure 3: Summary risk estimates by cancer sites in men**

Source: Renehan, A., Tyson, M., Egger, M., Heller, R. & Zwahlen. Body-mass index and incidence of cancer:

A systematic review and meta-analysis of prospective observational studies. *Lancet*, 371, 569-578, 2008.

# Risk estimates by cancer sites in Women

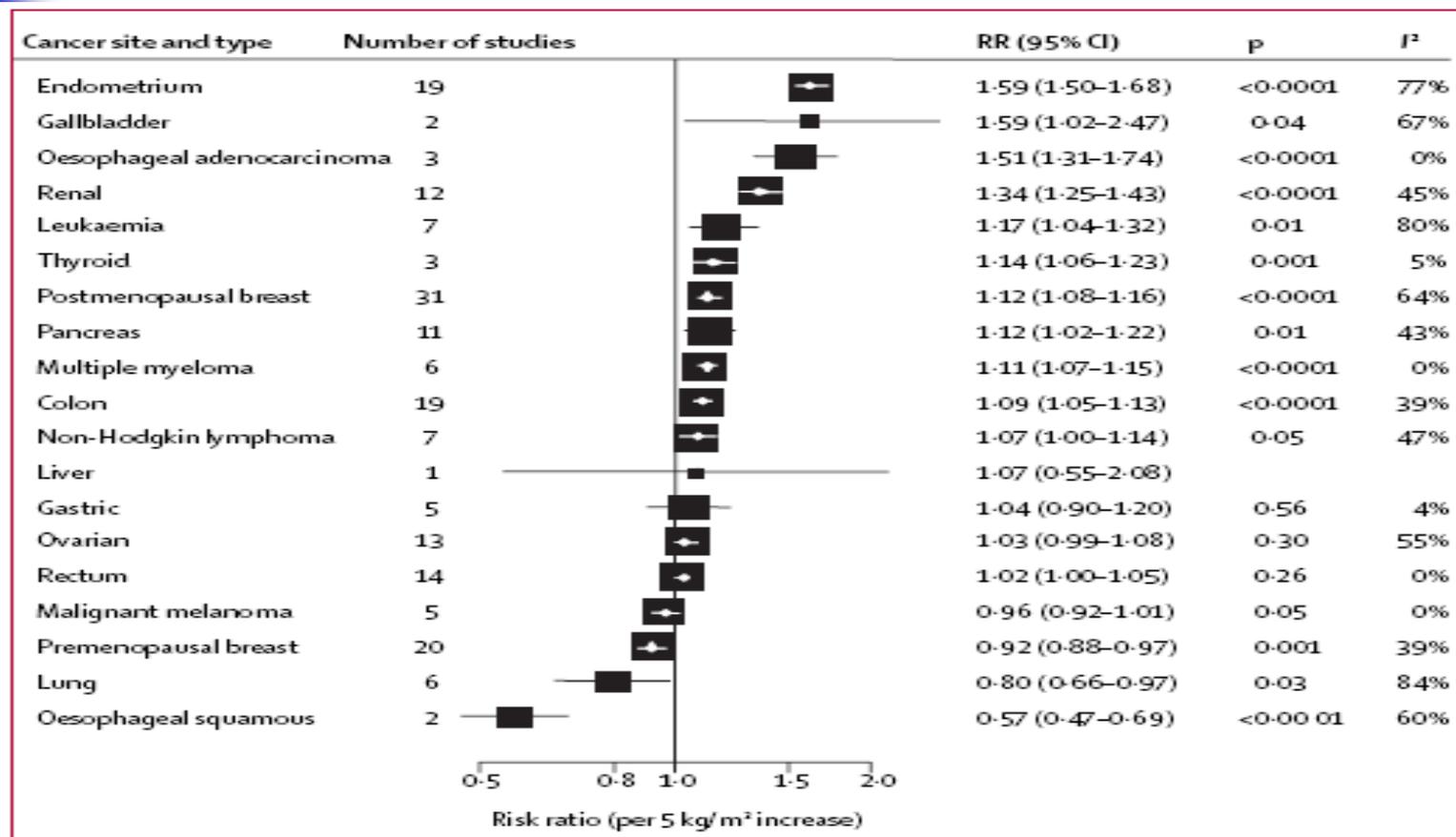


Figure 4: Summary risk estimates by cancer sites in women

Source: Renehan, A., Tyson, M., Egger, M., Heller, R. & Zwahlen. Body-mass index and incidence of cancer: A systematic review and meta-analysis of prospective observational studies. *Lancet*, 371, 569-578, 2008.