


Improving People's Lives Through Innovations in Personalized Health Care

Obesity, the Obesity Paradox and Cancer Disparities

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Disclosers: No conflict

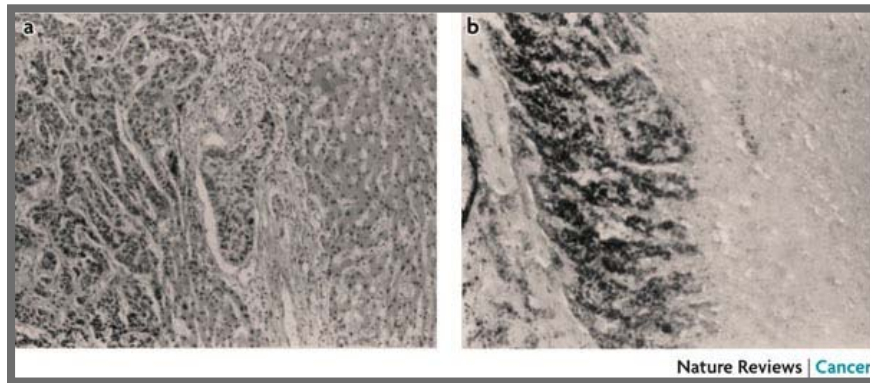
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Today's agenda:

- A. Colorectal cancer (CRC): A bird eye view
- B. The risk of CRC, Obesity and racial disparity
- C. CRC outcomes: The obesity paradox and disparity



A. Colorectal cancer (CRC): A bird eye view

Colorectal cancer: The history



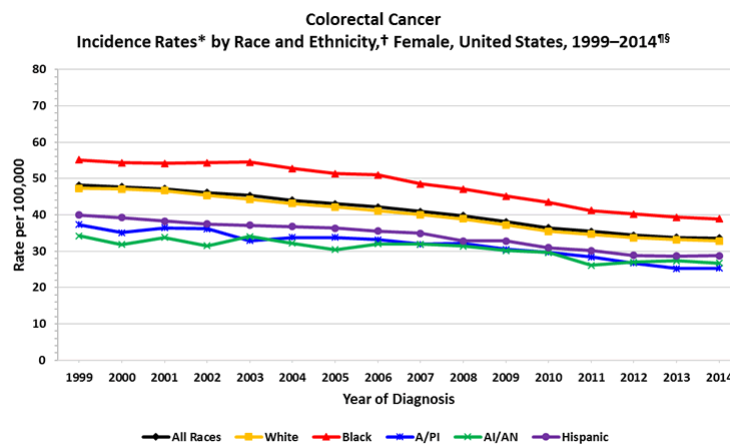
David AR, Zimmerman MR. Nature Rev Cancer.
2010 Oct;10(10):728-33

2017: U.S. cancer estimates

	Male				Female		
Estimated New Cases	Prostate	161,360	19%	 	Breast	252,710	30%
	Lung & bronchus	116,990	14%		Lung & bronchus	105,510	12%
	Colon & rectum	71,420	9%		Colon & rectum	64,010	8%
	Urinary bladder	60,490	7%		Uterine corpus	61,380	7%
	Melanoma of the skin	52,170	6%		Thyroid	42,470	5%
	Kidney & renal pelvis	40,610	5%		Melanoma of the skin	34,940	4%
	Non-Hodgkin lymphoma	40,080	5%		Non-Hodgkin lymphoma	32,160	4%
	Leukemia	36,290	4%		Leukemia	25,840	3%
	Oral cavity & pharynx	35,720	4%		Pancreas	25,700	3%
	Liver & intrahepatic bile duct	29,200	3%		Kidney & renal pelvis	23,380	3%
	All sites	836,150	100%		All sites	852,630	100%

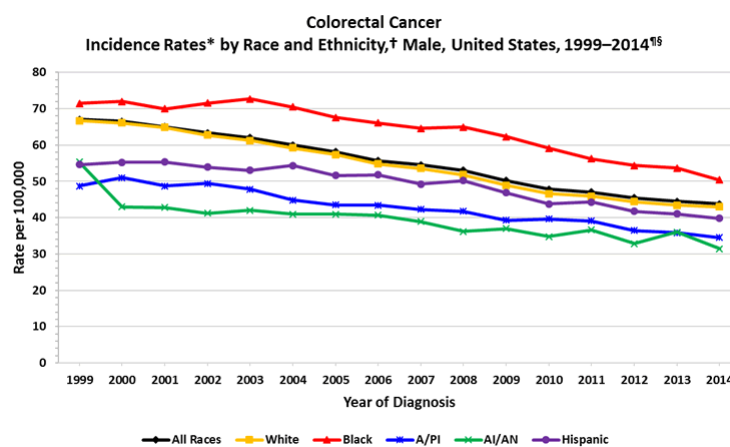
American cancer society 2017

U.S. CRC incidence trends by race/ethnicity: Females



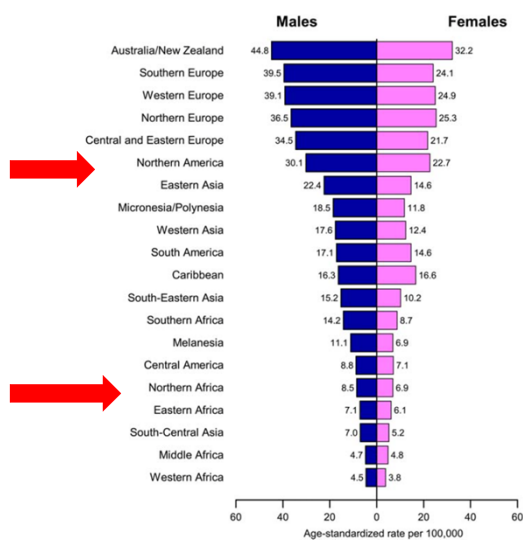
CDC, accessed on 2/28/18

U.S. CRC incidence trends by race/ethnicity: Males



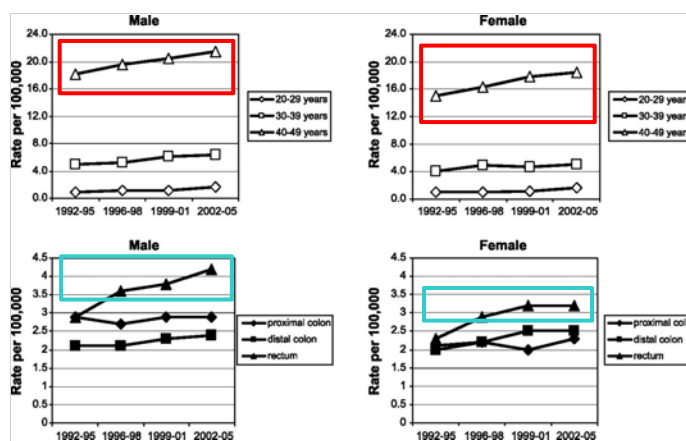
CDC, accessed on 2/28/18

Global CRC estimates



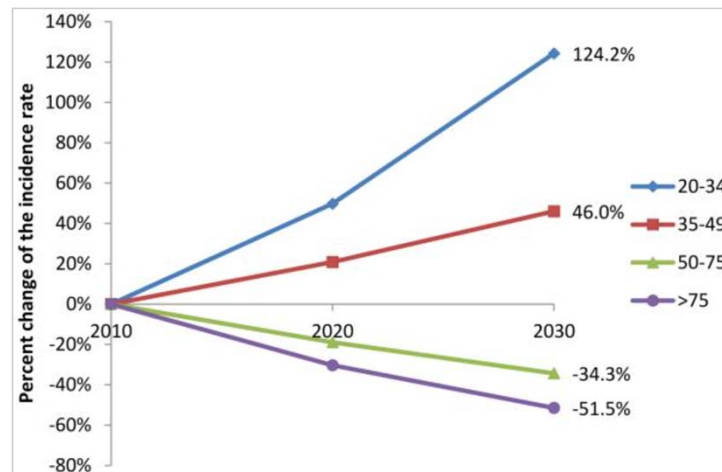
Torre LA et al. CA Cancer J Clin. 2015 Mar;65(2):87-108.

The U.S.: CRC incidence trends among young adults, 1992 to 2005



Siegel RL, Cancer Epidemiol Biomarkers Prev. 2009 Jun;18(6):1695-8

Predicted recto-sigmoid CRC incidence rate in 2030 by age compared to in 2010



Bailey CE et al. JAMA Surg. 2015 Jan;150(1):17-22.

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Summary: Colorectal cancer risk

- Higher in 2017 compared to the distant past
- Higher risk in industrialized countries and NHB
- Increasing in patients < 50 y/o

Risk factors for colorectal cancer

- Alcohol, Tobacco
- Red and processed meat
- High fat diet
- Obesity

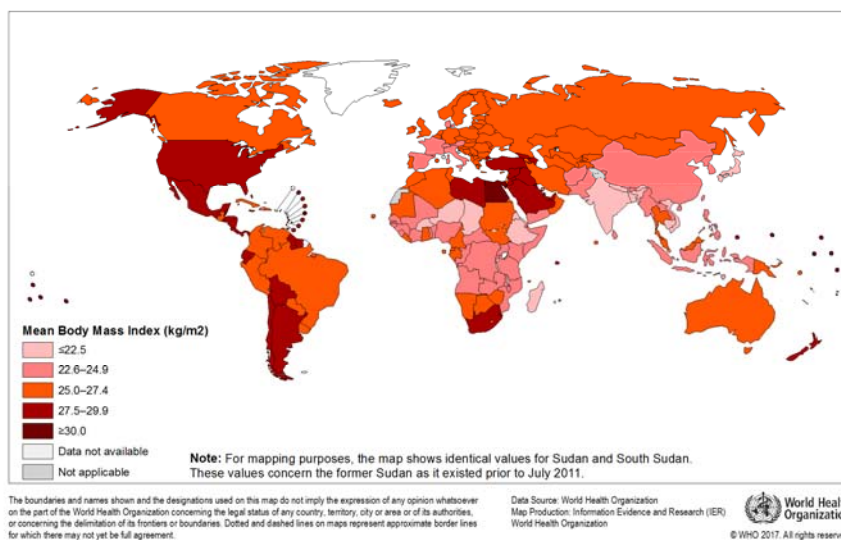
Can obesity explain the increased CRC risk and the racial disparity?

Obesity, CRC risk, and racial disparity



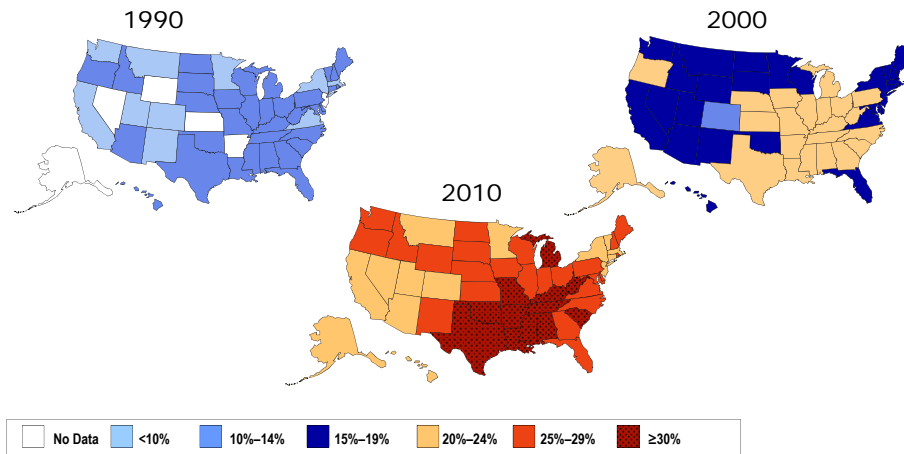
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Global prevalence of obesity 2016



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The U.S: Increasing prevalence of Obesity



Source: BRFSS

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Obesity is one of the strongest risk factors for CRC especially in men

5 units increase in BMI is associated with :

- ✦ 20% increase in risk of colorectal adenomas
- ✦ Increased CRC risk: 30% men, 12% women

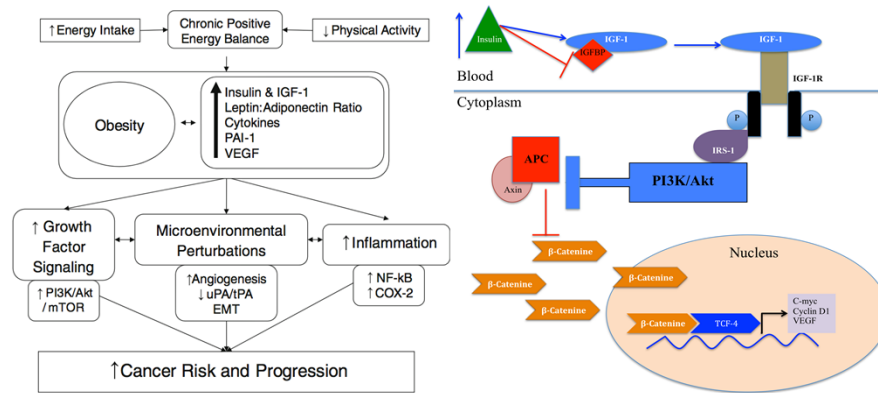
Mechanism:

1. Increased Insulin resistance and IGF-1
2. Low grade inflammation
3. Increased Leptin: Adiponectin ratio

Larsson SC, J Clin Nutr. 2007 Sep;86(3):556-65
 Ben, Q. Gastroenterology. 2012 Apr;142(4):762-72
 Ma, Y., PLoS One, 2013. 8(1): p. e53916
 Okabayashi, Am J Gastroenterol. 2012 Aug;107(8):1175-8

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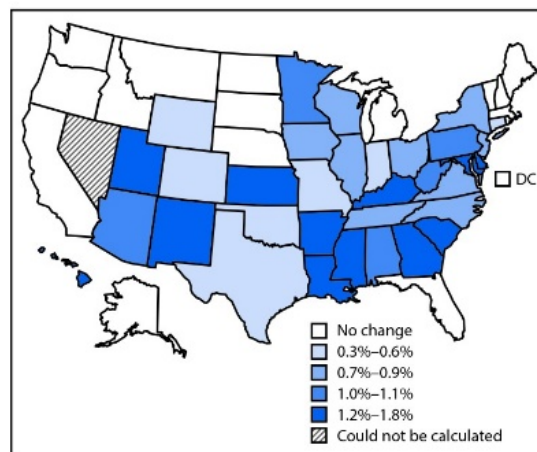
Obesity and CRC: Review of mechanisms



Zappia et al. Advances in nutrition and cancer 2014

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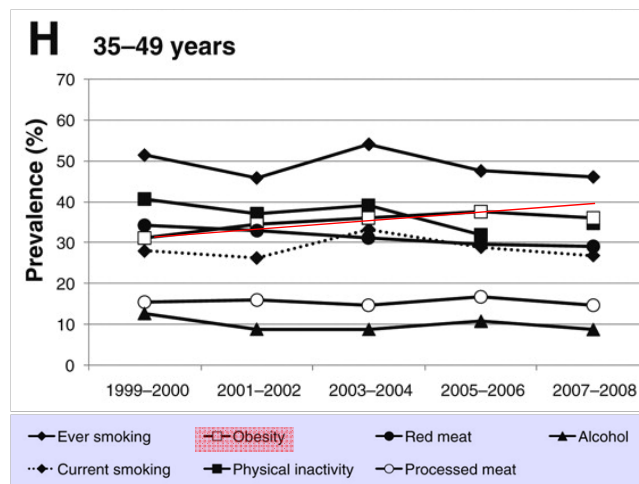
The incidence of obesity-related cancer: 2005-2014 is increasing



Steele CB. MMWR Morb Mortal Wkly Rep. 2017 Oct 3;66(39):1052-1058.

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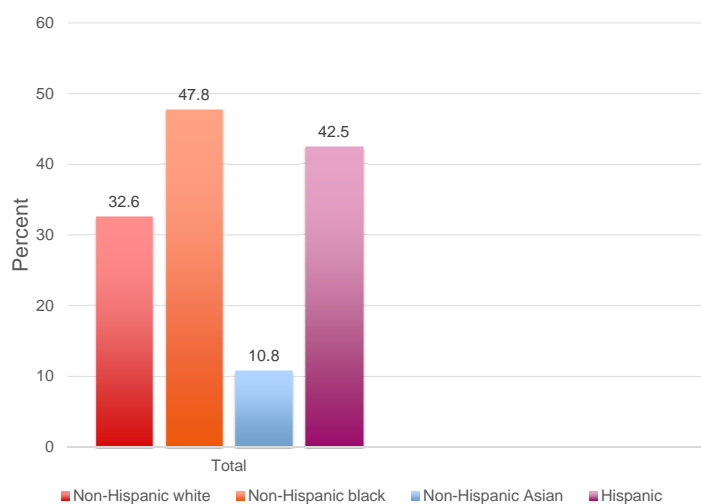
CRC risk factors trend in young adults, 1999 to 2008



Joshu CE et al. Cancer Prev Res January 1, 2012 5:138-145

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Obesity is higher in NHB and Hispanics



Ogden CL. NCHS Data Brief. 2013 Oct;(131):1-8.

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The metabolic influence of obesity is similar regardless of race/ethnicity

- ✦ BMI is associated with IGF1 levels similarly in all race/ethnicity
- ✦ Non-hispanic black have higher IGF-1 levels compared to white women
- ✦ The higher CRC risk in NHB no significant after adjustment for IGF-1

Jung SY. Menopause. 2017 Mar;24(3):288-298

Fowke JH. Endocr Relat Cancer. 2010 Jan 29;17(1):51-60



Racial disparity and risk of CRC: Relation to diet of obese individuals

- ✦ Obese non-hispanic black report eating less fruits/vegetables and more fast food
- ✦ Western diet x 2 weeks to Native Africans: Increases in colonic biomarkers and microbiome associated with CRC
- ✦ BMI and Health behaviors combined account for 43.9% of the association of education 36.2% of the association of neighborhood SES with risk of CRC.

Doubeni CA. J Natl Cancer Inst. 2012 Sep

19;104(18):1353-62.

Sorkin DH. Health Educ Behav. 2012 Dec;39(6):737-44.

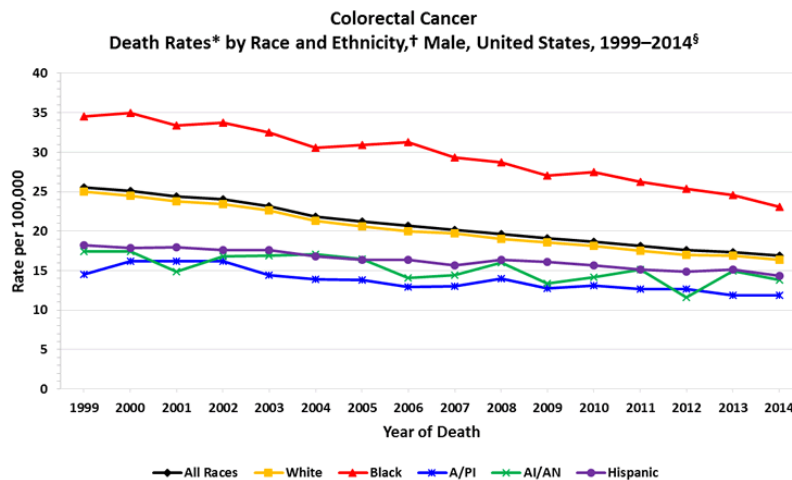


Summary: Obesity

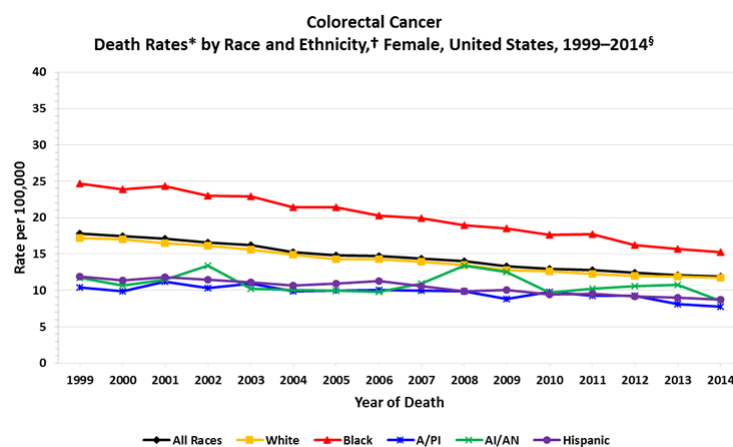
- ✦ Strongest risk factor for CRC
- ✦ Rising in the U.S. and worldwide, especially north America
- ✦ Rising in patients less than 50 years of age
- ✦ Higher in Hispanic and NHB
- ✦ Potentially responsible for the rising risk of CRC in industrialized countries and patients less than 50
- ✦ Partly responsible for the racial disparity in CRC

CRC outcomes: The obesity paradox and disparity

CRC death trends by race/ethnicity: Males



CRC death trends by race/ethnicity: Females



CRC peri-operative mortality and obesity

- Morbid obesity is higher in NHB compared to Hispanic and NHW.
- After adjustment for race/other confounders MO is associated with 80% higher CRC mortality risk
- Trend towards improved CRC mortality in mild-moderate obesity
- Improved CRC mortality after bariatric surgery irrespective of race

Roland Sturm. Int J Obes (Lond). 2013 Jun; 37(6): 889–891.
 Hussan, World J Surg. 2016 Apr;40(4):987-94
 Hussan, Obes Surg. 2017 Apr;27(4):1047-1055.



CRC long term mortality and obesity

- Pre- CRC diagnosis BMI > 30 is associated with 50% increased risk of mortality.
- Post-CRC diagnosis obesity was not associated with increased mortality
- CRC survivors have improved insulin resistance, likely due to significant weight loss in the peri-CRC period

Obi, Hussan et al. Current Problems in Cancer
 Campbell PT, J Clin Oncol. 2012 Jan 1;30(1):42-52



CRC outcomes and the obesity paradox

- Association between BMI and CRC survival is U- or J-shaped
- Most favorable outcomes in overweight or class I obesity
- Possible relationship to fat distribution: Subcutaneous vs. visceral fat

Campbell PT, J Clin Oncol. 2012 Jan 1;30(1):42-52
Hussan, World J Surg. 2016 Apr;40(4):987-94

Summary: CRC outcomes

- ✦ Increased CRC mortality in morbidly obese patients
- ✦ Mortality is not increased in mild obesity or in patients with obesity after diagnosis
- ✦ Obesity can partially explain racial disparity when it comes to mortality



THANK YOU!
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