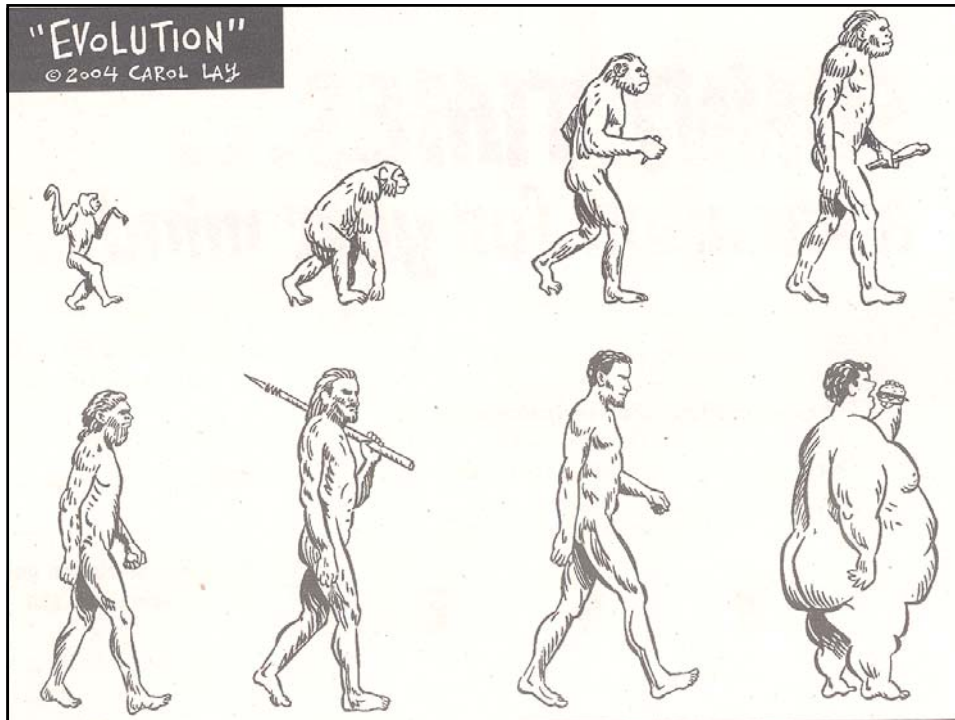


# The Global Scope of Obesity and Co-Morbidities

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Diabetes University of Virginia  
Health System

## Outline

- Global obesity trends and weight
- Importance of abdominal obesity and cardiometabolic risk
- Medical complications of obesity and diabetes
- What can we do?

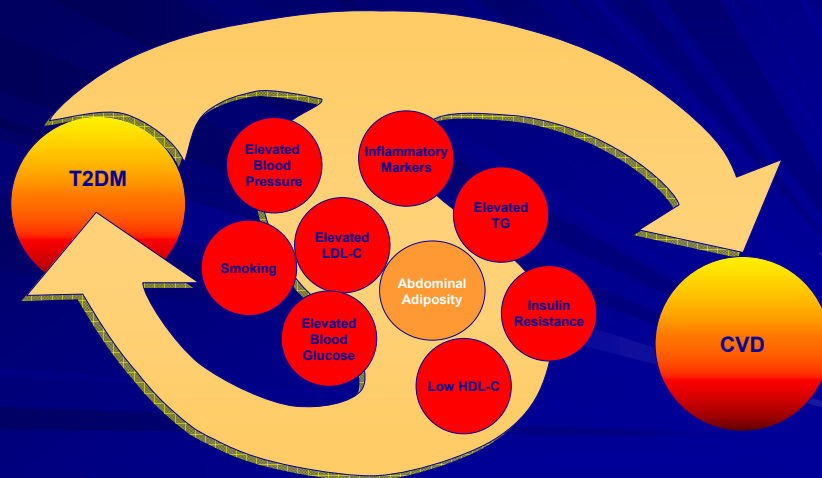


## Weight Classifications

- Normal weight
  - BMI 18.5-24.9 kg/m<sup>2</sup>
  - Asian: 18.5-23 kg/m<sup>2</sup>
- Overweight (ICD-9-CM code 278.02)
  - BMI 25-29.9 kg/m<sup>2</sup>
  - Asian: 23-27.5 kg/m<sup>2</sup>
- Obesity (ICD-9-CM code 278.00)
  - BMI ≥30 kg/m<sup>2</sup>
  - Asian: ≥27.5 kg/m<sup>2</sup>

IDF. [www.idf.org](http://www.idf.org)  
NCHS. [www.cdc.gov/nchs](http://www.cdc.gov/nchs).  
WHO. *Lancet*. 2004;363:157.

## Abdominal Adiposity as a Component of Cardiometabolic Risk



# Cardiometabolic Risk Parameters

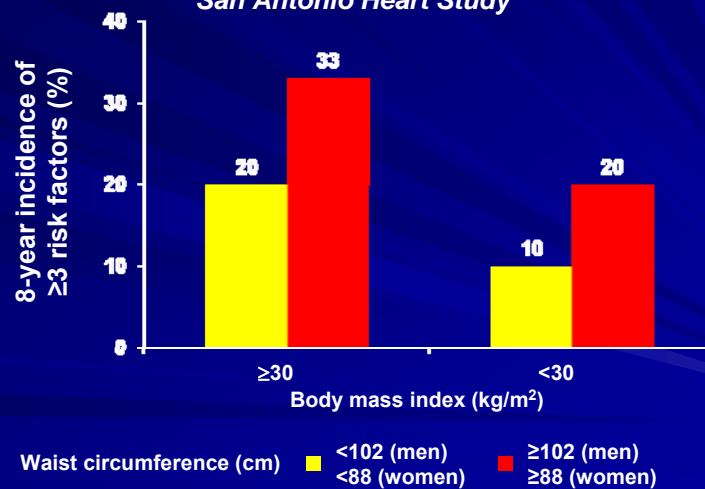
<b>Adiposity</b>	WC: Men $\geq 40$ ( $\geq 35$ Asian) WC: Women $\geq 35$ ( $\geq 31$ Asian)
<b>Hypertension</b>	BP $\geq 130/85$ mm Hg
<b>Dysglycemia</b>	FG $\geq 100$ mg/dL
<b>↑LDL-C</b>	$>100$ mg/dL
<b>↓HDL-C</b>	Men $<40$ mg/dL Women $<50$ mg/dL
<b>↑TG</b>	$\geq 150$ mg/dL

WC = waist circumference (in)  
FG = fasting glucose

Grundy SM. *J Am Coll Cardiol.* 2006;47:1093.  
Smith SC Jr et al. *Circulation* 2006;113:2363.

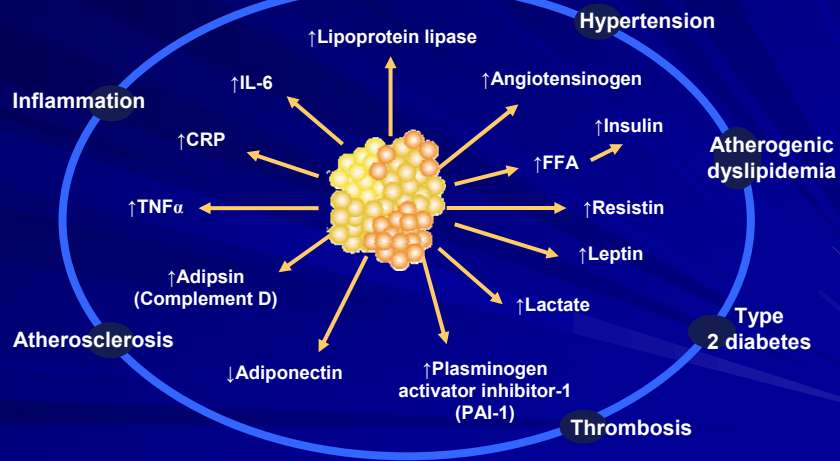
# Abdominal Obesity Predicts Risk Factor Clustering

San Antonio Heart Study



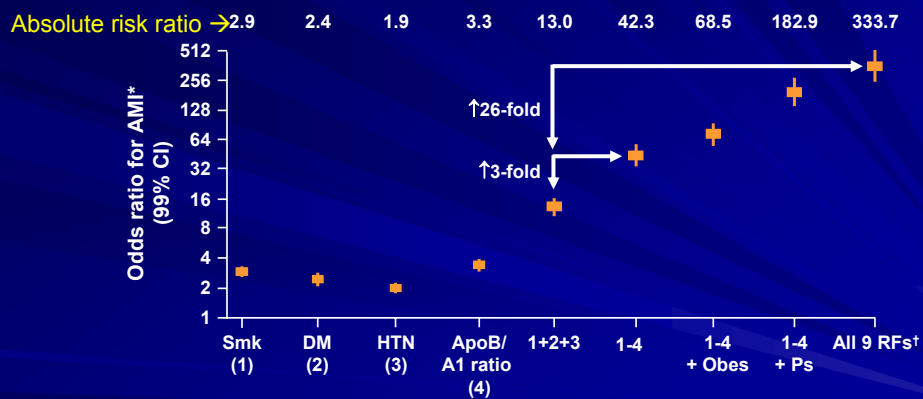
Han TS et al. *Obes Res.* 2002;10:923.

# Adverse Cardiometabolic Effects of Adipocyte Products



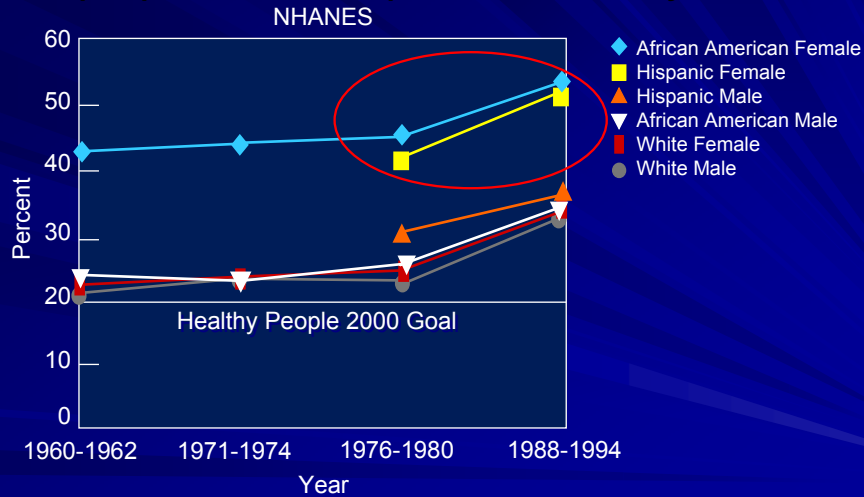
CRP = C-reactive protein, FFA = free fatty acids, IL = interleukin, TNF = tumor necrosis factor  
 Calabro P, Yeh ET. *Curr Hypertens Rep.* 2008; Eckel RH et al. *Lancet.* 2005; Napolitano A et al. *Int J Obes Relat Metab Disord.* 1994; Sandqvist MM et al. *Diabetes.* 2001.

# INTERHEART: Exponential Rise in CV Disease with Added Risk Factors



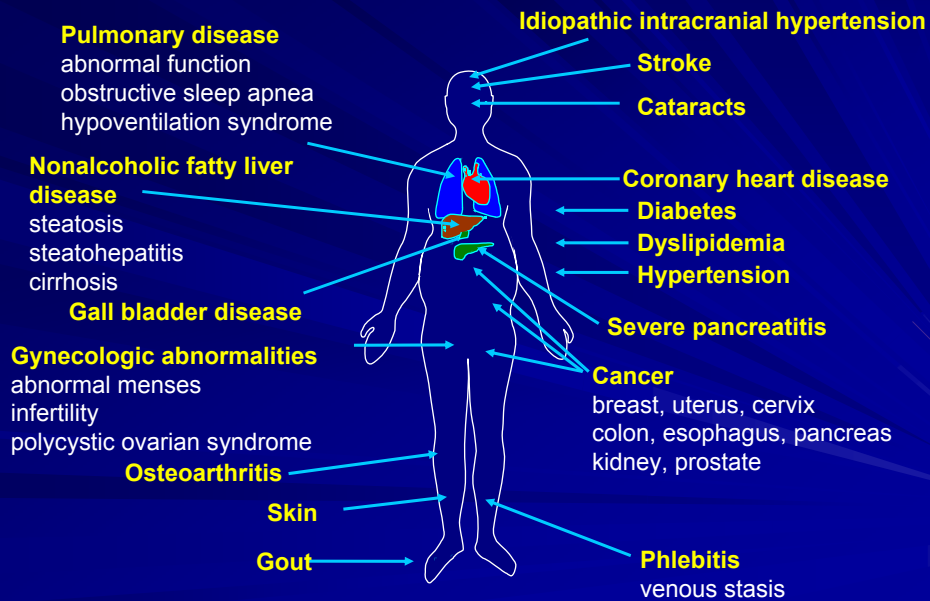
Smk = smoking, DM = diabetes, HTN = hypertension, Obes = obesity, Ps = psychosocial factors, RFs = risk factors  
 \*Plotted on a doubling scale, †All RFs shown + veg/fruit + exercise + alcohol  
 Yusuf S et al. *Lancet.* 2004;364:937.

## Overweight Adults Prevalence in US: *disproportionate impact on minority women*



NHANES = National Health and Nutrition Examination Survey.  
Flegal KM et al. *Int J Obes Relat Metab Disord.* 1998;22:39-47.

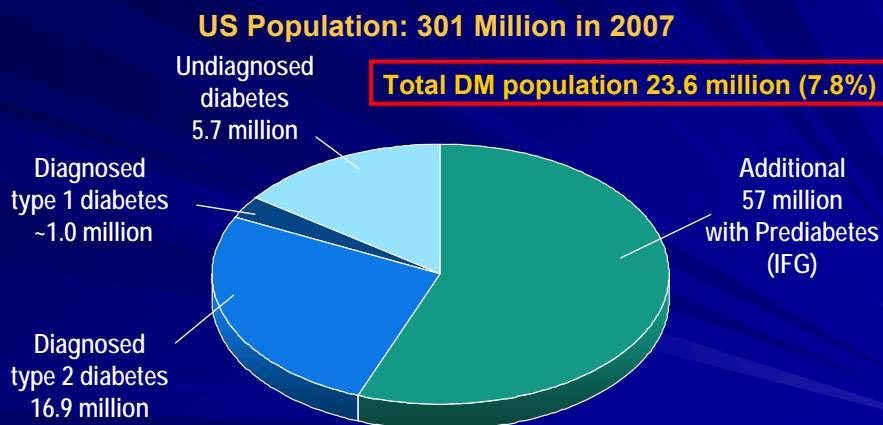
## Medical Complications of Obesity



## Obesity related health risks

- Premature death
- Insulin resistance, T2DM
- Hyperlipidemia
- Hypertension
- CHD
- CHF
- Stroke
- Some cancer (endometrial, colon, kidney, GB, breast)
- GERD
- Gallstones, GB disease
- Gout
- NAFLD
- Pregnancy complications
- Menstrual irregularities
- Bladder control problems, stress incontinence
- Osteoarthritis
- OSA, respiratory problems
- Infertility
- Psychological disorders (depression, eating disorders, distorted body image low self esteem)

## Prevalence of Glycemic Abnormalities in the United States



Centers for Disease Control. Available at:  
<http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm#3>;  
Harris MI. In: National Diabetes Data Group. *Diabetes in America*. 2nd ed. Bethesda, Md: NIDDK; 1995:15-36; U.S. Census Bureau Statistical Abstract of the U.S.; 2001

## Costs of Diabetes USA

- The total annual economic cost of diabetes in 2007 was estimated to be \$174 billion.
- Medical expenditures totaled \$116 billion
  - \$27 billion for diabetes care
  - \$58 billion for chronic complications
  - \$31 billion for excess general medical costs.
  - Indirect costs \$58 billion. **32% increase since 2002-- over \$8 billion more each year.**
- Annual costs of health care for people with diabetes is \$11,744 a year, of which \$6,649 (57%) is attributed to diabetes.
- One of five health care \$\$ is spent for those with diagnosed diabetes; one of 10 for DM per se.

## The canary in the mine?

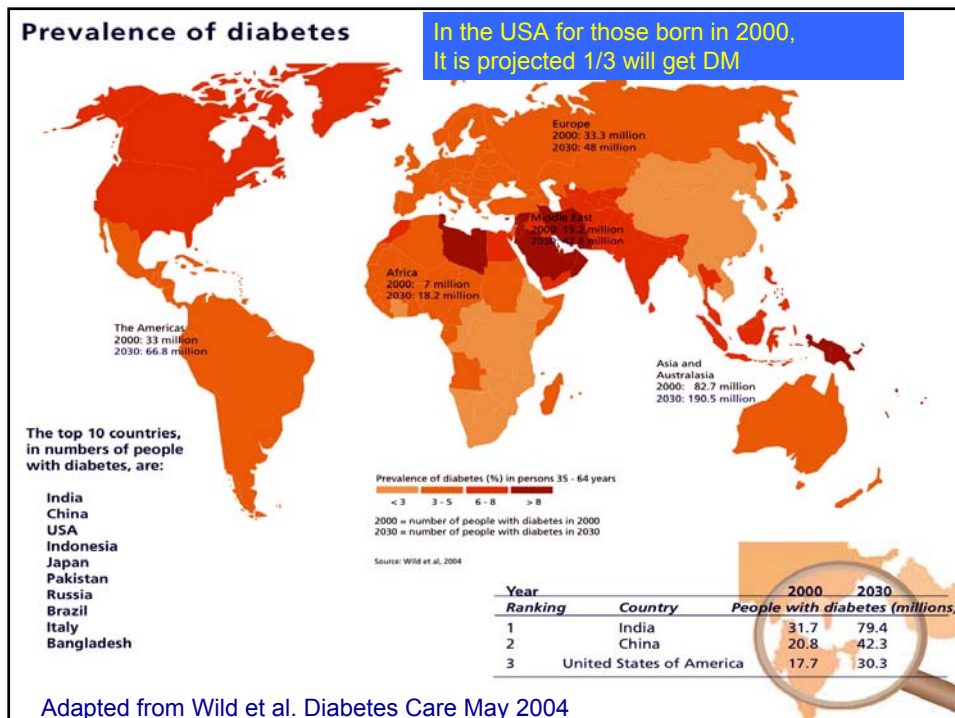
- A 26 y/o African American woman with a 6 year old daughter comes in for follow up. She has had T2DM since age 14. She weighed 340 lbs at that time, now 208.
- She has ischemic cardiomyopathy, an ICD for repeated Vent. Tach, peripheral neuropathy, intracranial bypass for cerebral atherosclerosis with some residual stroke damage. She is depressed and in consequence often omits her insulin. She has been taken off the heart transplant list because of poor glucose control.
- She appears to be an intelligent, well spoken woman, but has had persistent therapy adherence issues despite depression treatment and advice from a number of senior skilled physicians. Her A1c is 15.5%.

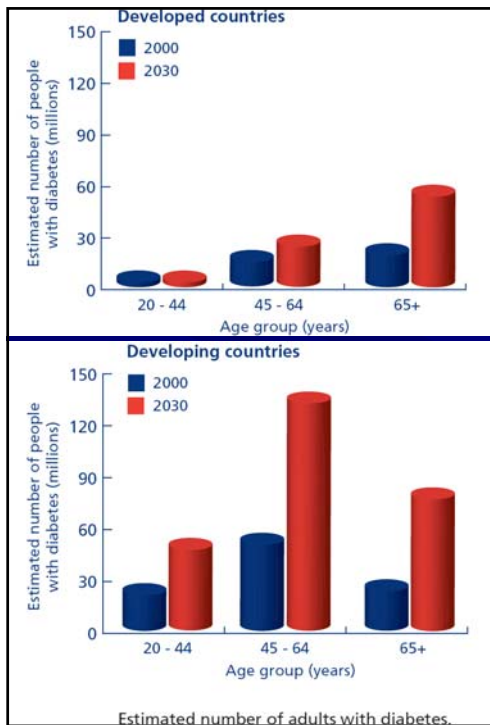
# Complications of diabetes in the United States

## Heart disease and stroke- In 2004

- Heart disease was on 68% and stroke on 16% of death certificates--diabetes  $\geq$  65.
- Adults with diabetes have heart disease death rates and stroke risk about 2 to 4 times higher than adults without diabetes.
- 71,000 amputations per year
- Up to 24,000 blinded per year
- 44% of all end stage kidney disease

National Diabetes Fact Sheet 2007 ADA online

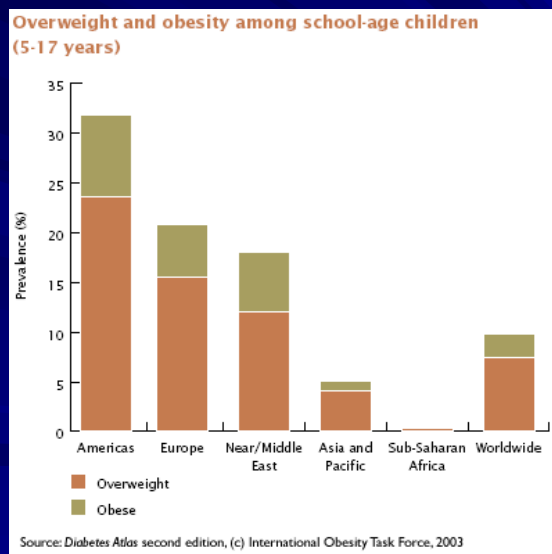




### QUICK DIABETES FACTS

- Diabetes causes about 5% of all deaths globally each year.
- 80% of people with diabetes live in low and middle income countries.
- Most people with diabetes in low and middle income countries are middle-aged (45-64), not elderly (65+).
- Diabetes deaths are likely to increase by more than 50% in the next 10 years without urgent action.

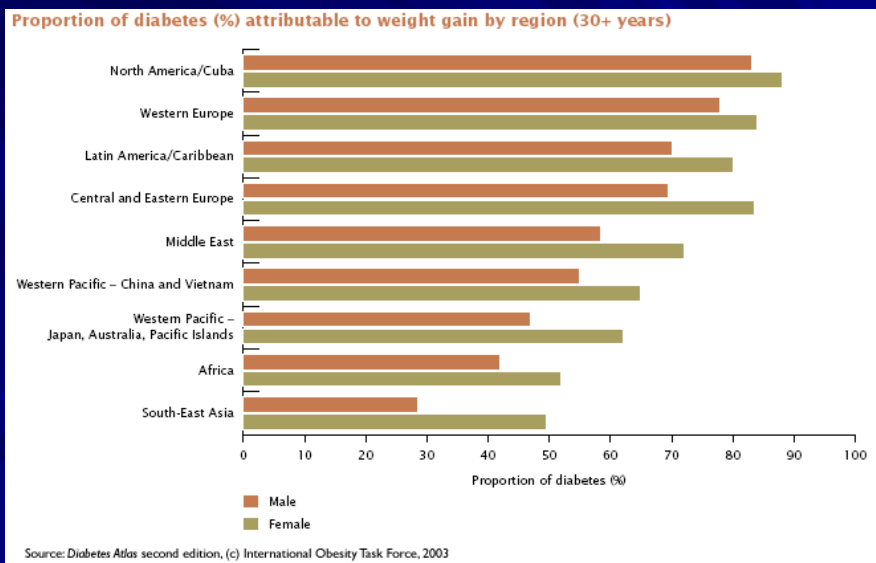
## Obesity in children-not just USA



## World costs of diabetes

- The annual direct healthcare costs of diabetes worldwide, for people in the 20-79 age bracket, are estimated to be **at least 153 billion** international dollars and may be **as much as 286 billion**.
- If predictions of diabetes prevalence are fulfilled, total direct healthcare expenditure on diabetes worldwide will be between **213 billion and 396 billion international dollars in 2025**. This would mean that the proportion of the **world's healthcare budget** being spent, in 2025, on diabetes care will be **between 7% and 13%** with high prevalence countries, such as Nauru, spending up to **40% of their budget**.

## Link between obesity & diabetes



## Global mortality of diabetes

- Excess mortality due to diabetes in the year 2000 was estimated to be 2.9 million deaths, equivalent to 5.2% of all deaths.
- Excess mortality attributable to diabetes accounted for 2–3% of deaths in poorest countries and over 8% in the U.S., Canada, and the Middle East.
- In people 35–64 years old, 6–27% of deaths were attributable to diabetes.
- Globally, diabetes is likely to be the fifth leading cause of death.

Roglic et al *Diab. Care* September 2005

## Denis Parsons Burkitt

### British physician investigated fiber and chronic diseases

- If people are constantly falling off a cliff, you could place ambulances under the cliff or build a fence on the top of the cliff. We are placing all too many ambulances under the cliff. Diseases can rarely be eliminated through early diagnosis or good treatment, but prevention can eliminate disease.
- Western doctors are like poor plumbers--. treat a splashing tube by cleaning up the water. ...inventing new, expensive, and refined methods of drying up water. Somebody should teach them how to close the tap.

## What shall we do to stem the epidemic of obesity & its morbidities?

- Additional research
  - Basic scientific work on appetite and obesity
  - Translational clinical work on applications of insights from basic work
  - Translational work to determine better ways to curtail the expansion of the obesity epidemic
- Public Health Initiatives
- Economics of prevention
- Education at public, professional and postgraduate levels, in person and web based.
- Many other things....

## UVA around the world with diabetes mellitus

- Our faculty have traveled to train providers in Ghana, middle East, Mexico, Korea, Taiwan and China on systems of care and teaching delivery of care to primary care providers
- Train the trainer—experts to primary care connection
- Implementing case based teaching and using a team approach to therapeutic lifestyle change
- Establishing standards of care
- Always dealing with DM in a broad context of obesity, cardiometabolic risk and the social environment and cultural mores of each place.



World Health  
Organization

## Diabetes Action Now

- **Increase awareness** of diabetes, its complications, and prevention, particularly for health policy makers in low- and middle-income countries and communities
- Generate and **disseminate new knowledge** on awareness about diabetes and its economic impact in low- and middle-income communities
- Produce and disseminate a **new scientifically-based review** on the prevention of diabetes and the complications of diabetes



World Health  
Organization

## Diabetes Action Now

- Produce up-to-date, **practical guidance** for policy makers in low- and middle-income countries on the contents, structure and implementation of national diabetes programmes
- Provide and maintain a web-based resource to help policy makers implement national diabetes programmes
- Why not similar focus on obesity?

## Physicians in training

- Need to learn to counsel and effect prevention against obesity, diabetes and cardiovascular risk.
- Need knowledge of nutrition, counseling skills, motivational interviewing in addition to that of research and medical treatment.
- Need to learn to form interdisciplinary teams to accomplish goals, lobby for better support for prevention, and how to educate the public and their patients.

## Practicing physicians

- Update their skills and competencies for recognition and prevention related to obesity, diabetes and cardiovascular disease.
- Promulgate national and international standards of care.
- Provide case based teaching and tools to enhance practice at the point of care.
- Develop a systems approach to support best practices.

## Other thoughts

- Prevention needs to be economically viable and given incentives to promote in clinical practice
- Interdisciplinary teaching and practices are likely to be more comprehensive and thus more effective in prevention
- Translational research using models that can be adopted into primary care practice in different communities are badly needed.

Thank you.

Questions or comments?