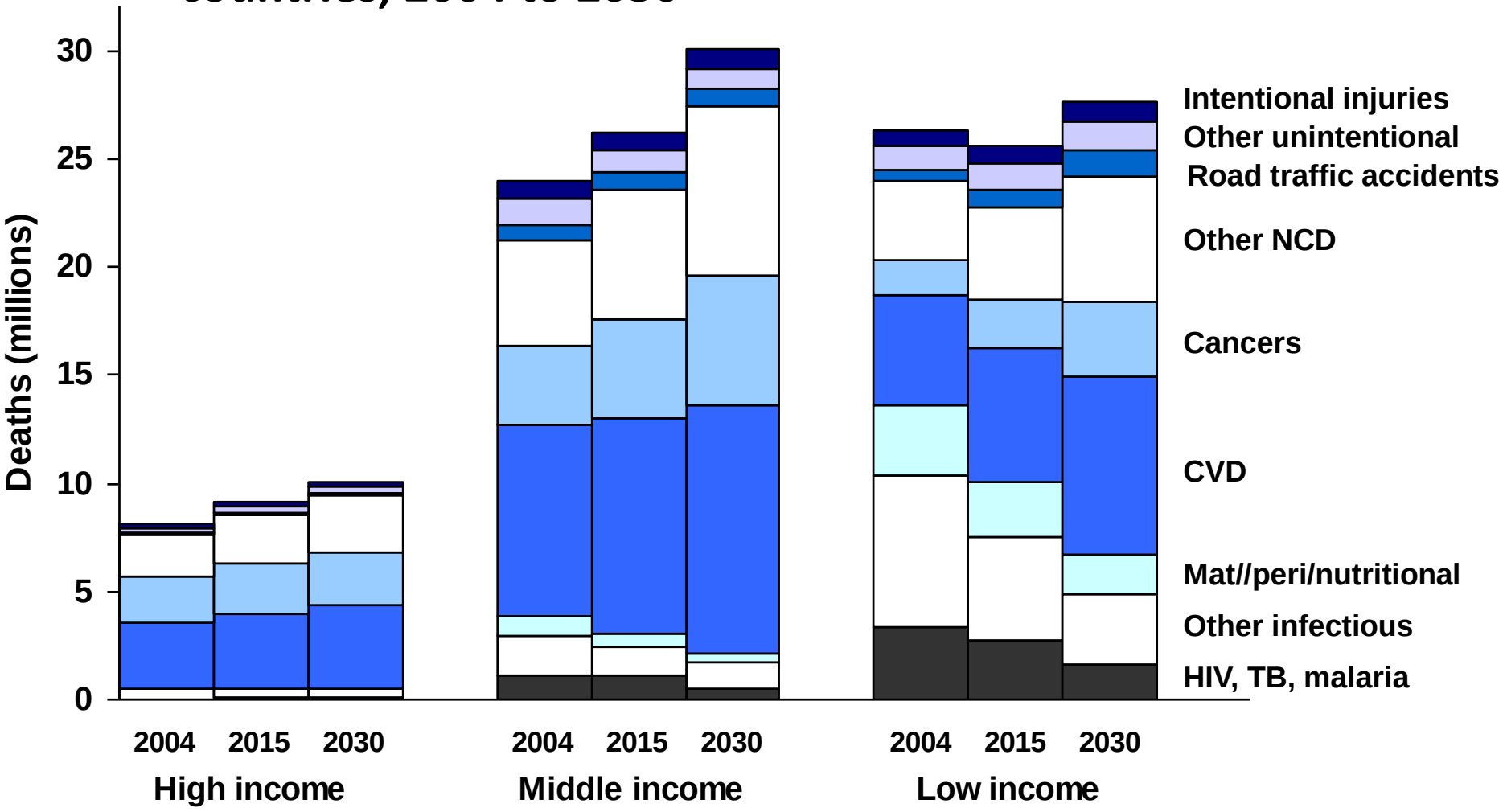
Modifiable Risk Factors of Cardiovascular Disease in Children and Adults – the Role of Nutrition

Richard J. Deckelbaum MD, CM, FRCP(C))
Departments of Pediatrics and Epidemiology
Institute of Human Nutrition
Columbia University Medical Center

May 27, 2014

Projected deaths by cause in high, middle, and low income countries, 2004 to 2030



Global Burden of Disease 2004 Update, WHO

Risk factors for CVD

Non-Modifiable

Genes
Age
Sex

Modifiable

Lifestyle
- **Diet**
- Smoking
- Physical activity
- Behaviour and stress

Air Pollution

Health conditions
- Obesity
- Diabetes
- Hypertension
- Dyslipidemia
- Dental disease
- ……, ……, …..

Risk factors for CVD

Non-Modifiable

Genes
Age
Sex

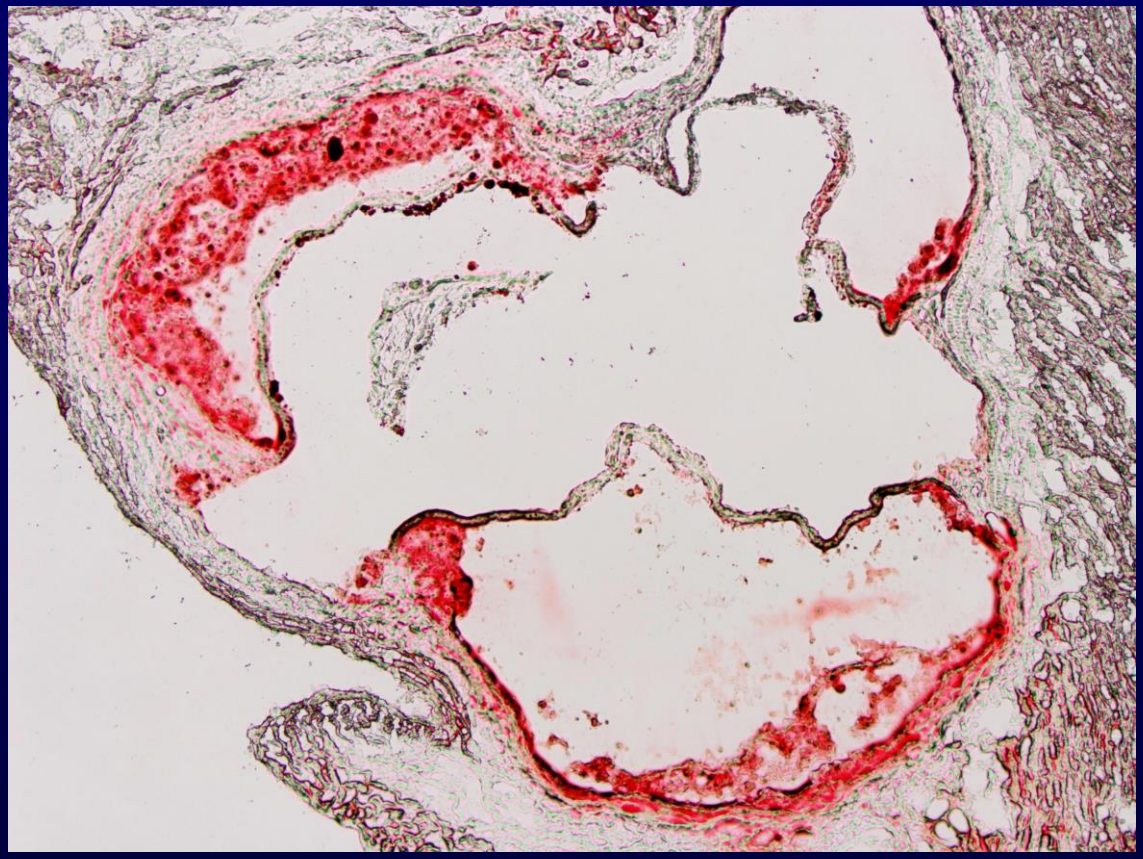
Modifiable

Lifestyle
- **Diet**
- Smoking
- Physical activity
- Behaviour and stress

Air Pollution

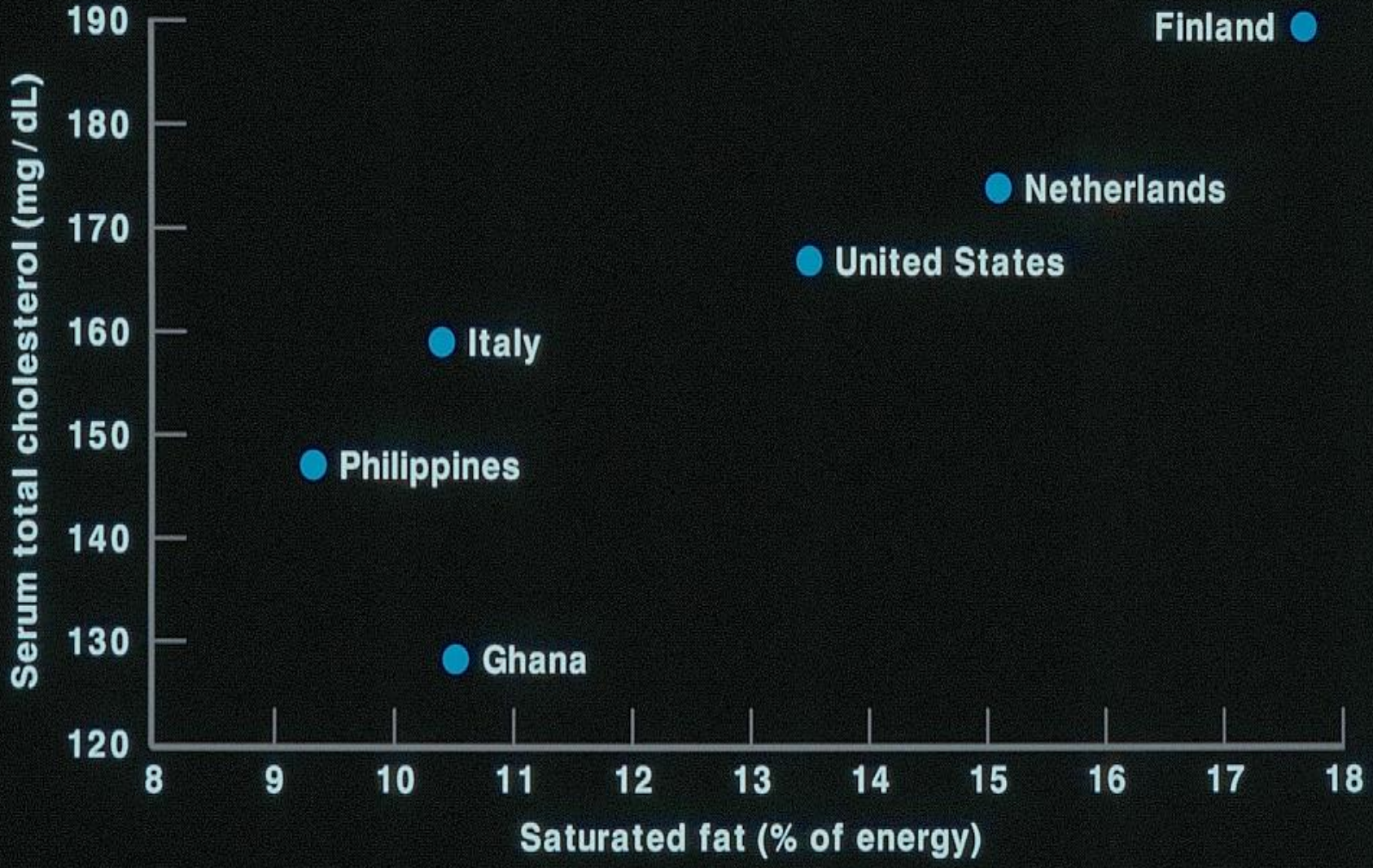
Health conditions
- Obesity
- Diabetes
- Hypertension
- Dyslipidemia
- Dental disease
-

The Atherosclerotic Lesion

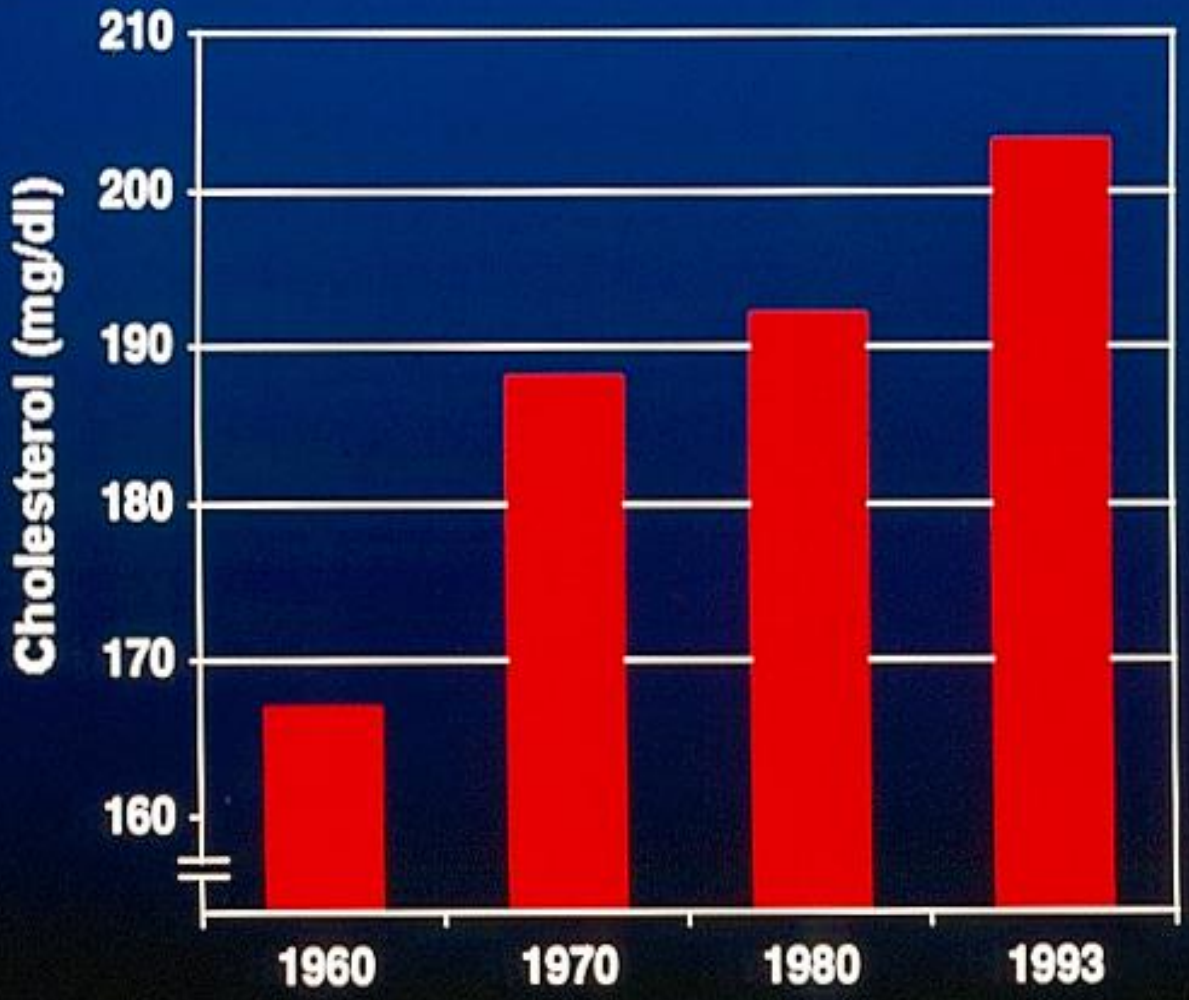


Coronary heart disease is very uncommon in populations with low plasma cholesterol levels

DIETARY SATURATED FAT AND SERUM TOTAL CHOLESTEROL IN BOYS (Ages 7-9) IN SIX COUNTRIES

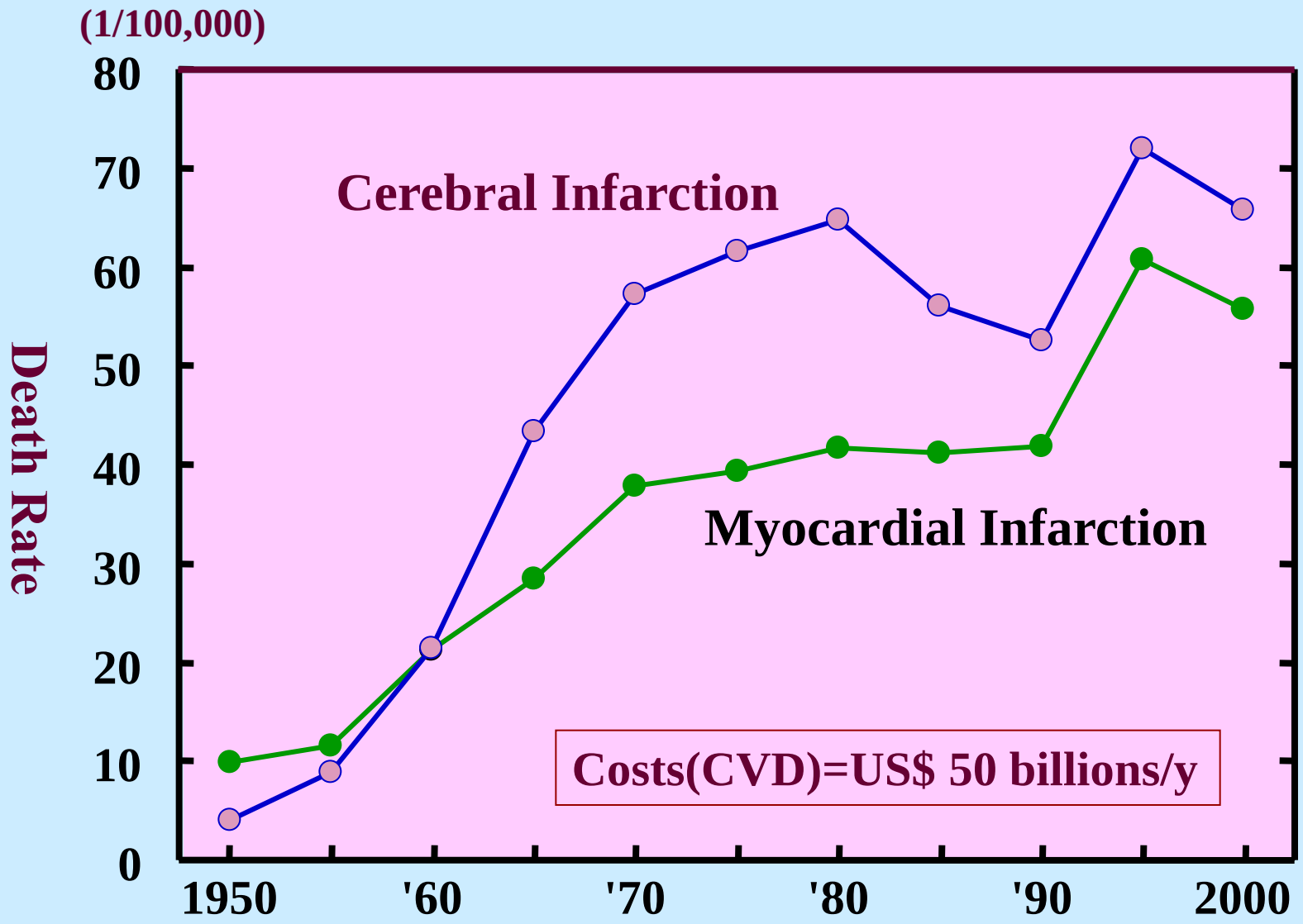


Changes in Serum Total Cholesterol (Japan: men 30-39 yr.)

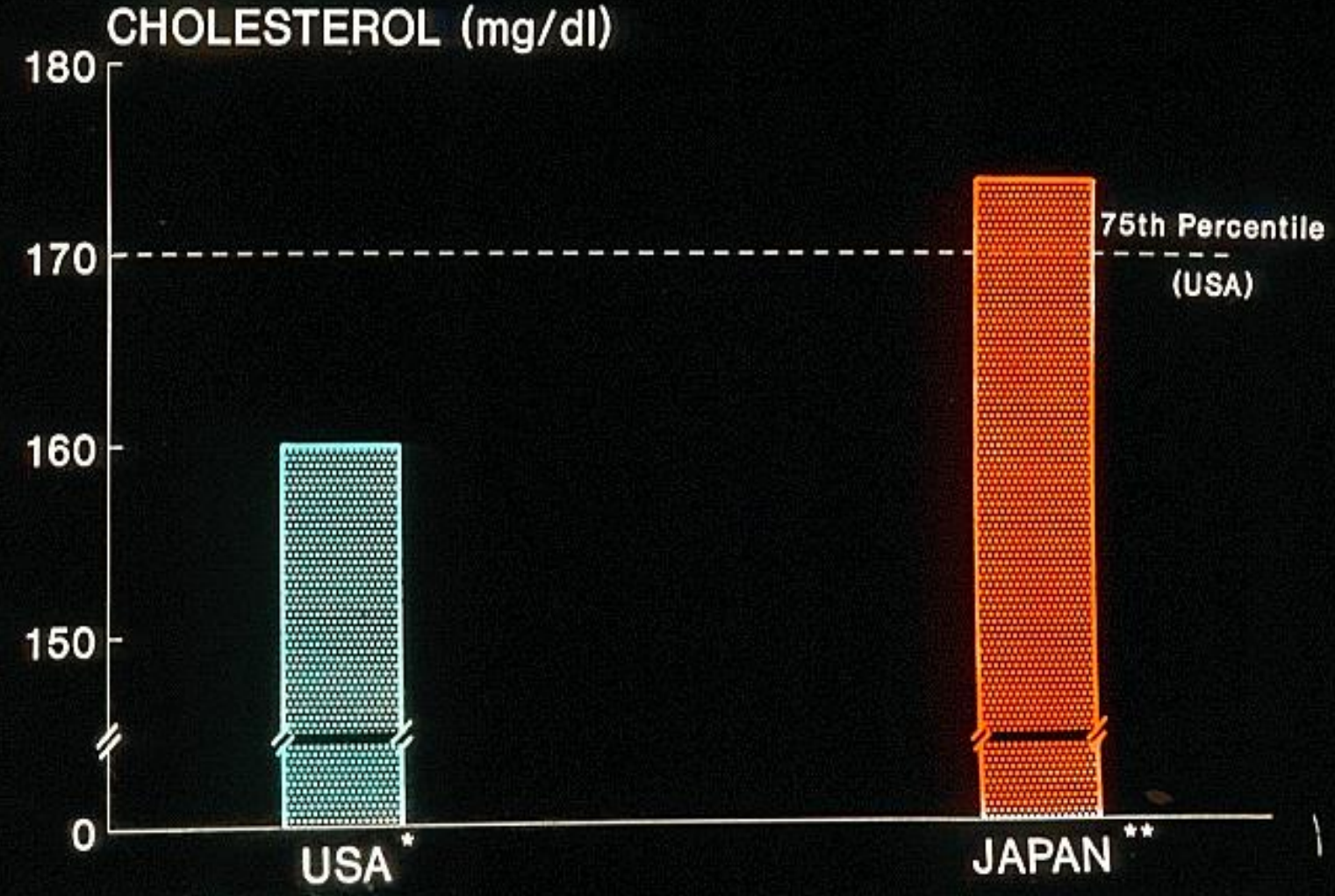


Ministry of Health and Welfare of Japan, 1965, 1973, 1983, 1993

Death from Myocardial and Cerebral Infarctions in Japan



MEAN SERUM CHOLESTEROL LEVELS IN BOYS
(age 10-12 years)



* LRC Prevelance Study (1980)
** Shinjo district (1984)

A. Yamamoto et al, Prev. Med. (1988)

Hypothesis – “Thrifty Genes”

Increasing total caloric, total fat, and saturated fat intakes in populations not previously exposed will lead to greater and more adverse changes in CVD risk factors than in populations long adapted to “Western” diets.

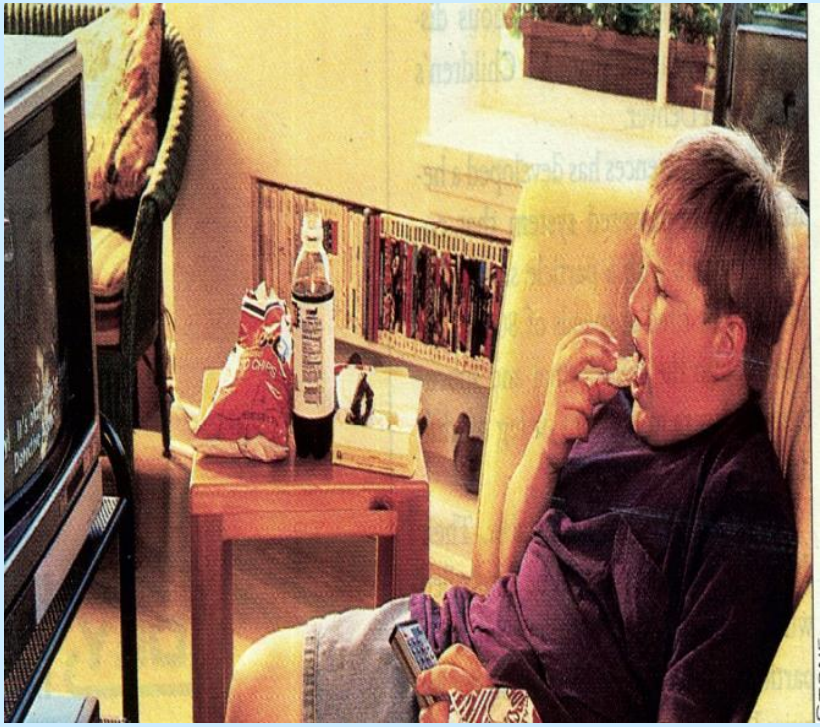
The “New” Dangers for CVD

- Obesity
- Insulin resistance
- Metabolic syndrome
- Type 2 Diabetes

Role of the Nutrition Transition: Genes and…??

- ***Diet and Physical Activity…***

  … the primary "Environmental" influences on obesity.



Overweight/Obesity in Young Children Linked to Indices of CVD Risk

- **CRP**
- **Interleukin-6**
- **TNFα**
- **Fibrinogen**

- **Fasting insulin**
- **Low HDL**
- **High triglyceride**
- **Small LDL/HDL**

Shea,Deckelbaum et al, ‘99 – ‘13

Co-morbidities of Obesity

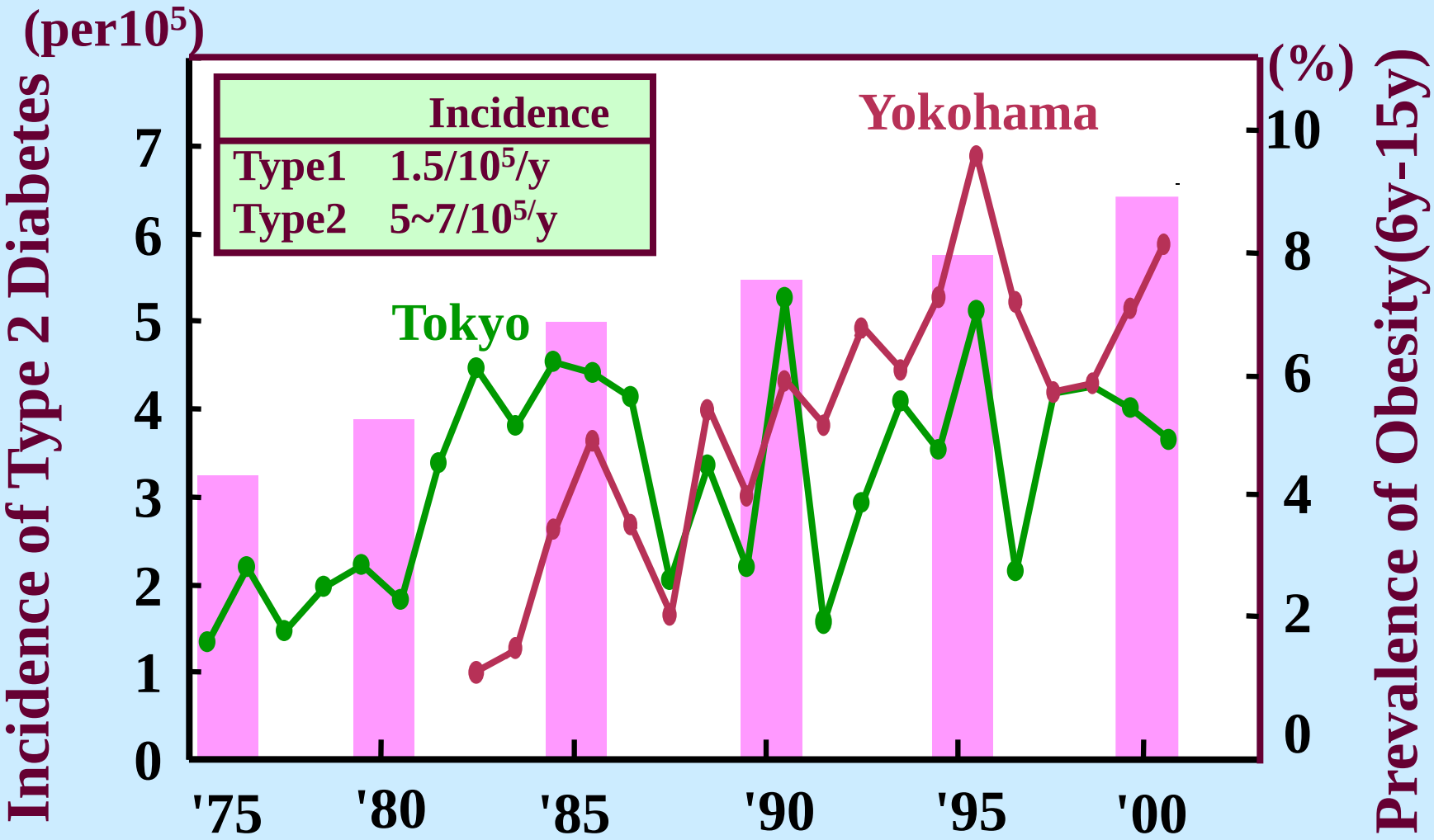
Cardiovascular Disease Risk Factors
= Insulin Resistance

- *Elevated blood pressure*
- *Abnormal blood lipids*
- *Elevated fasting Glucose, Insulin*
- ***Type 2 Diabetes***

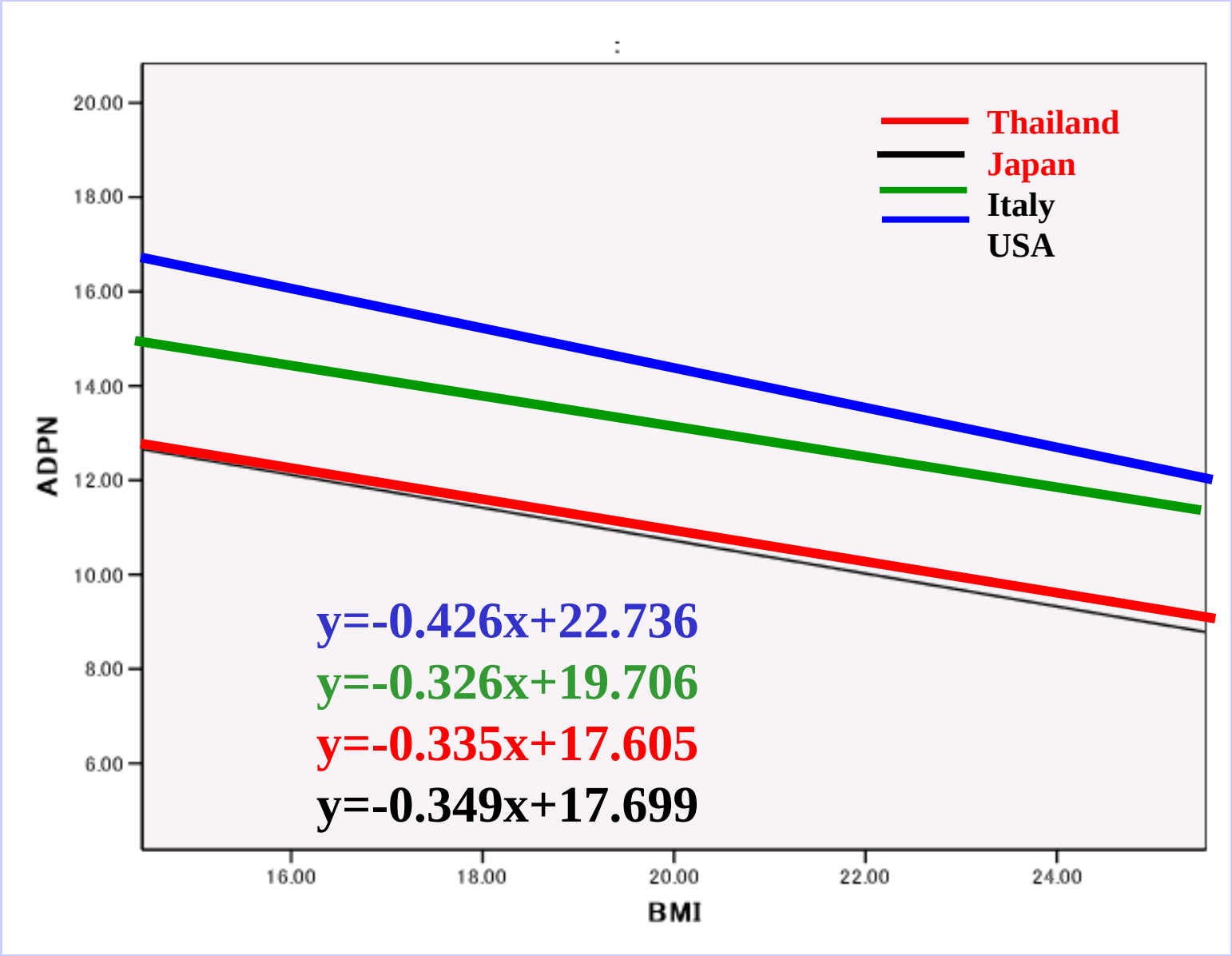
And……

- ***Liver disease***
- ***Respiratory disease***
- ***Mental health problems***
- ***HEART DISEASE***

Incidence of Childhood Type 2 diabetes in Japan



The Danone RISK Study
BMI vs Adiponectin (males)



Deaths from CVD/100,000 35-64yrs (2000)

	Males	Females
Brazil:	71	49
India:	81	56
S Africa:	97	68
China:	38	24
USA:	56	28

Adapted from Leeder S et al, Race Against Time, 2004

Genes vs Environment ?

Genes and Environment

Why is Armenia at high risk?

(Ichevan Polyclinic Lab Records…2011)

SOLUTIONS
????

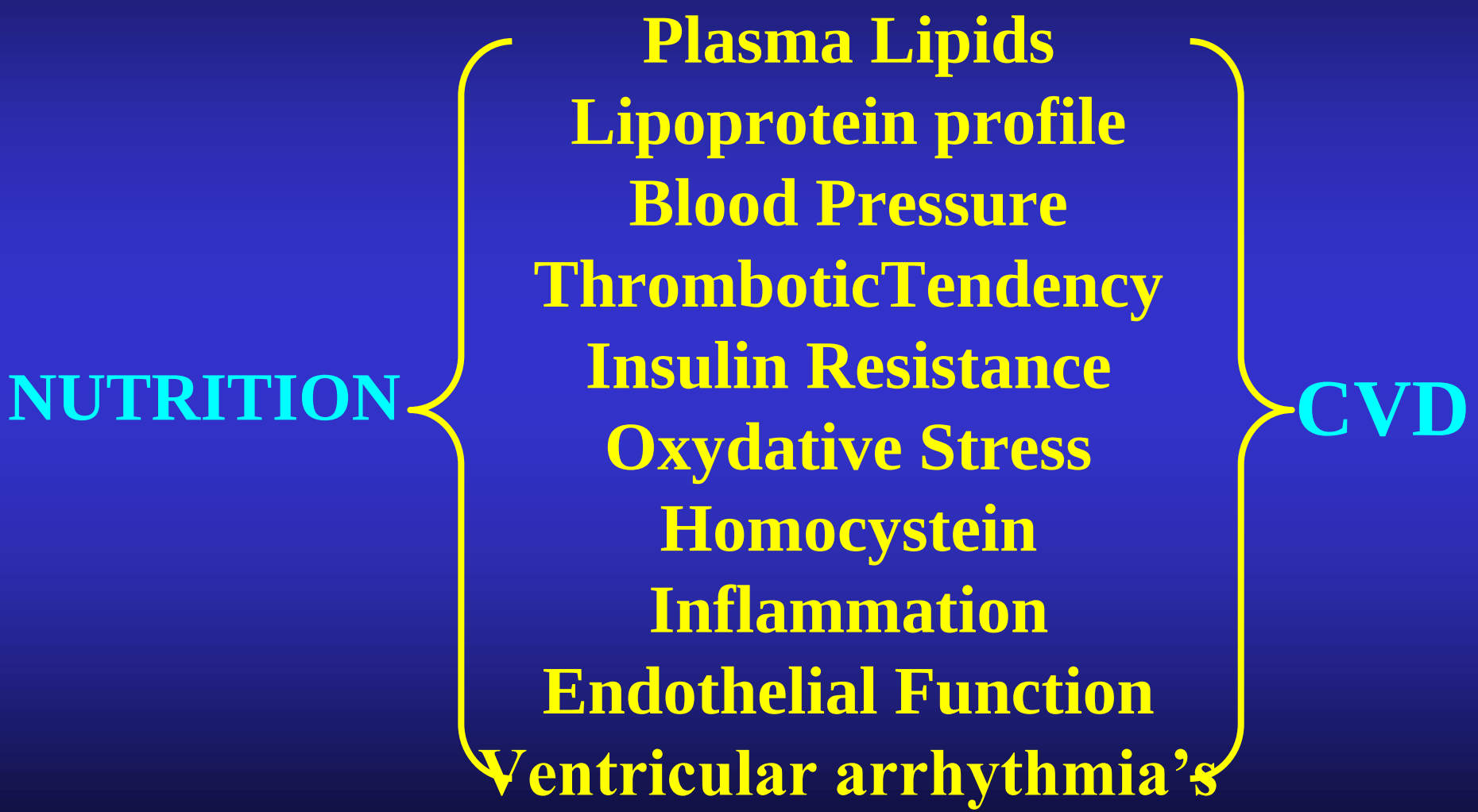
Diet and Physical Activity are the Cornerstone Population Approaches

- "Diet, weight control and increased physical activity are the first steps in the prevention and treatment of coronary artery disease."

ATP, JNC, and Evidence Reports from NHLBI

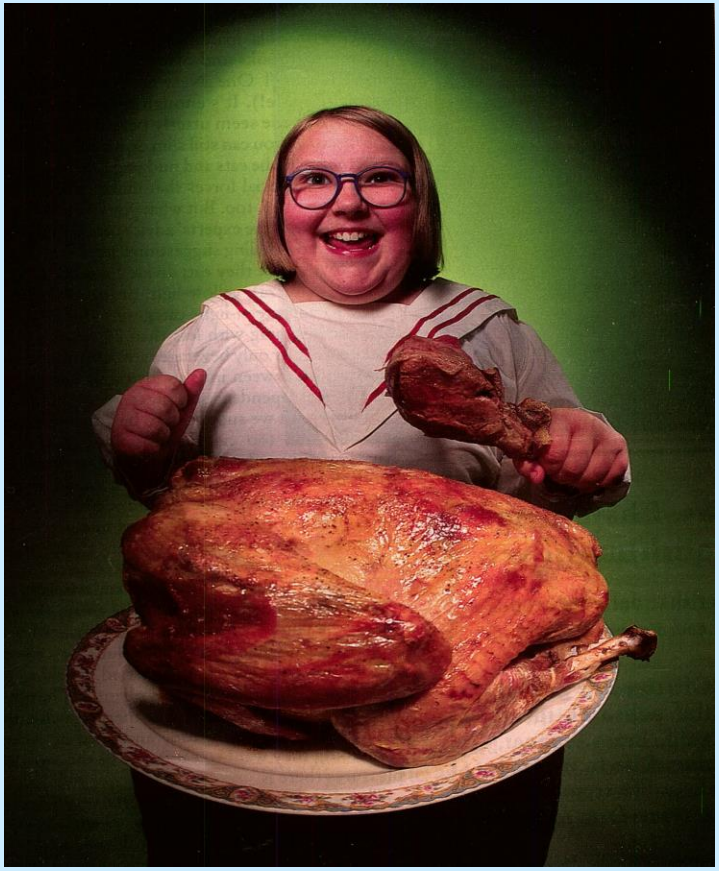
.....and smoking cessation!!

Nutrition and Cardiovascular Diseases



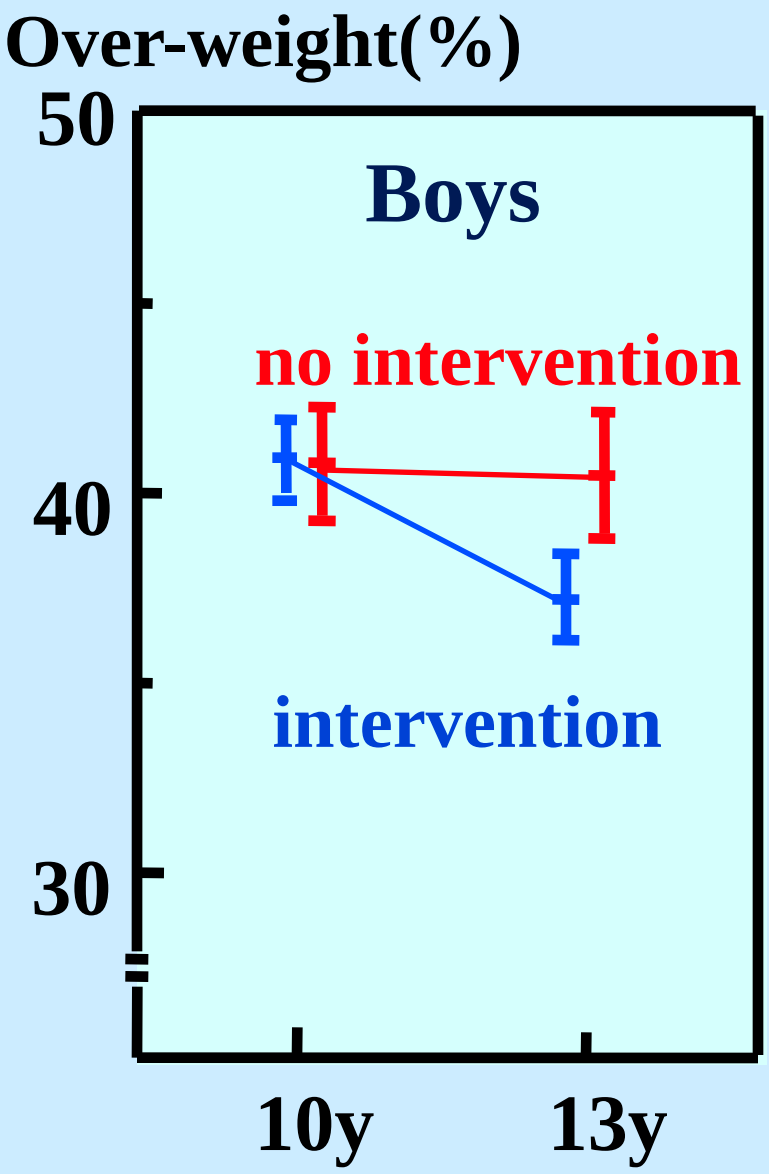
From WC Willett, 2004

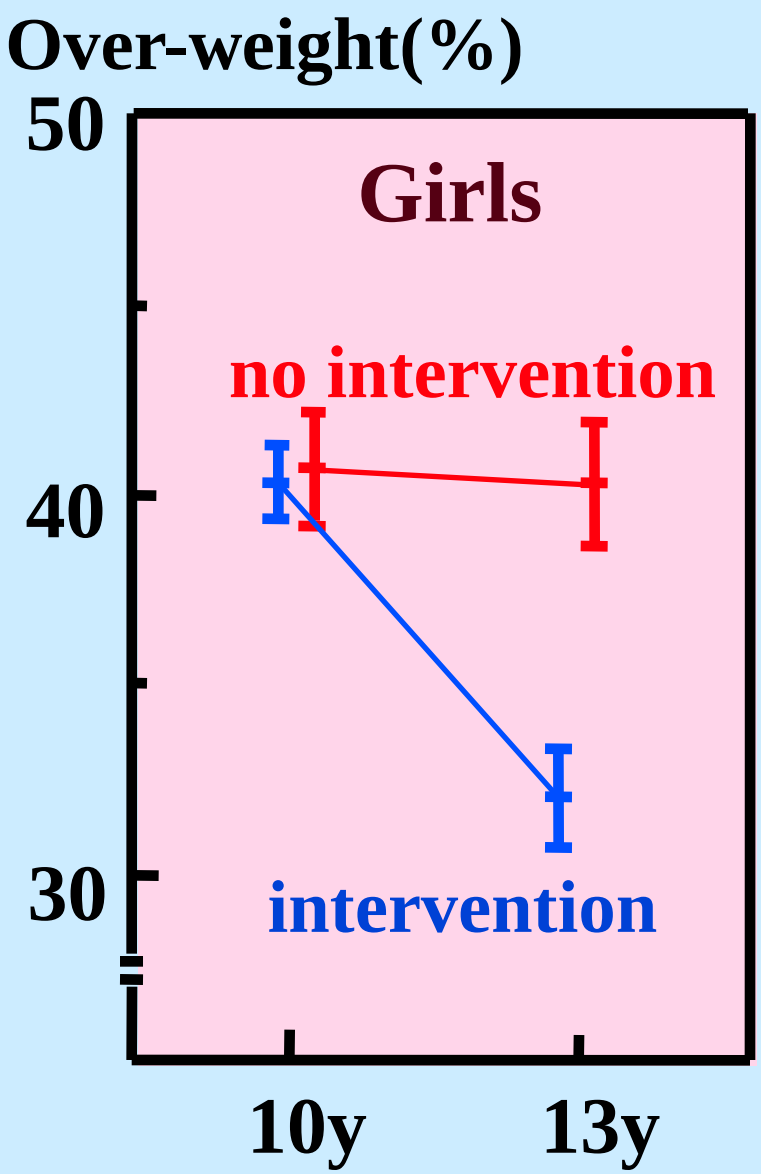
Cardiovascular Disease…and obesity



Can we prevent them?

Effects of Ehime School Program on Childhood Obesity

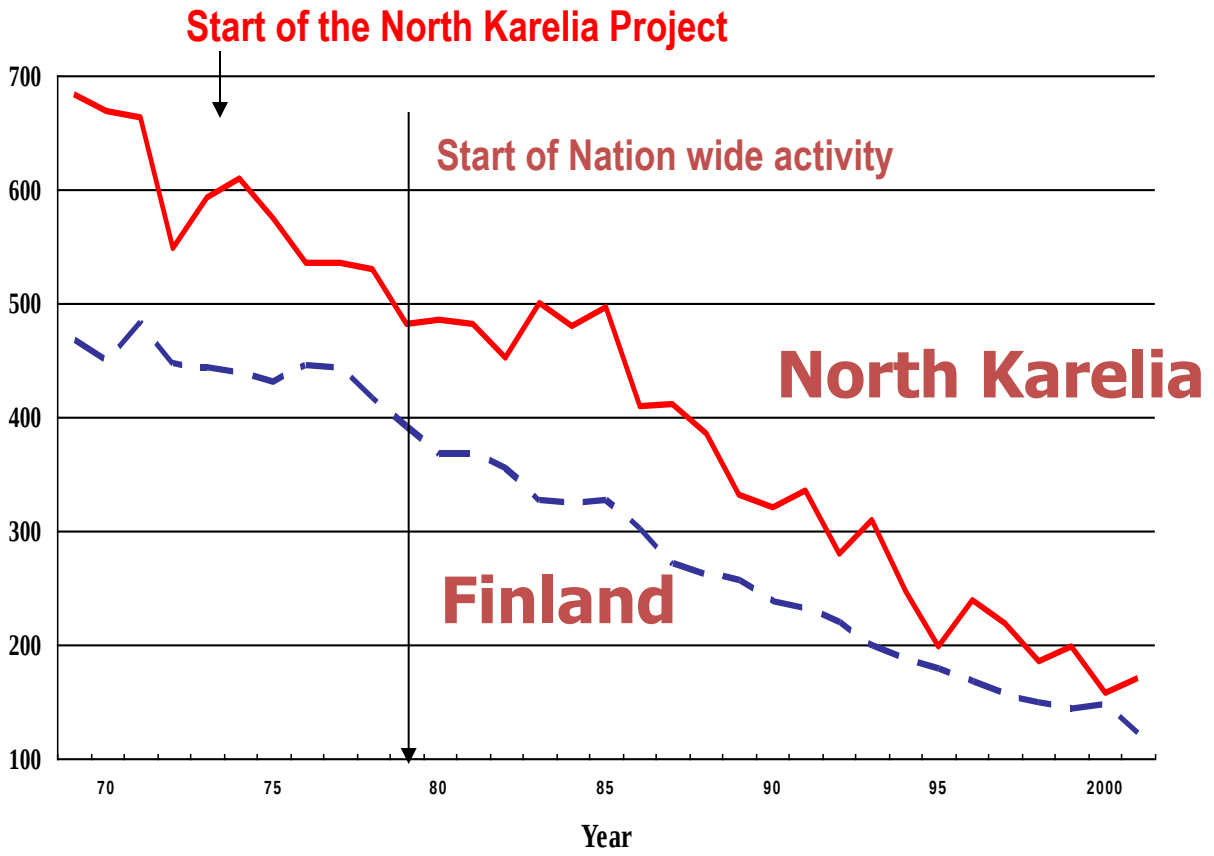




(Kida K et al: Preventive Nutr. 2000)

Prevention works

Age-adjusted mortality rates of coronary heart disease in North Karelia and the whole of Finland among males aged 35-64 years from 1969 to 2001



Mortality per 100 000 population

- ***Diet and Physical Activity…***

Lifestyle interventions work!!!!!