

# Educational Attainment is Associated with Biomarkers for Cardiovascular Disease – What is the Public Health Relevance?

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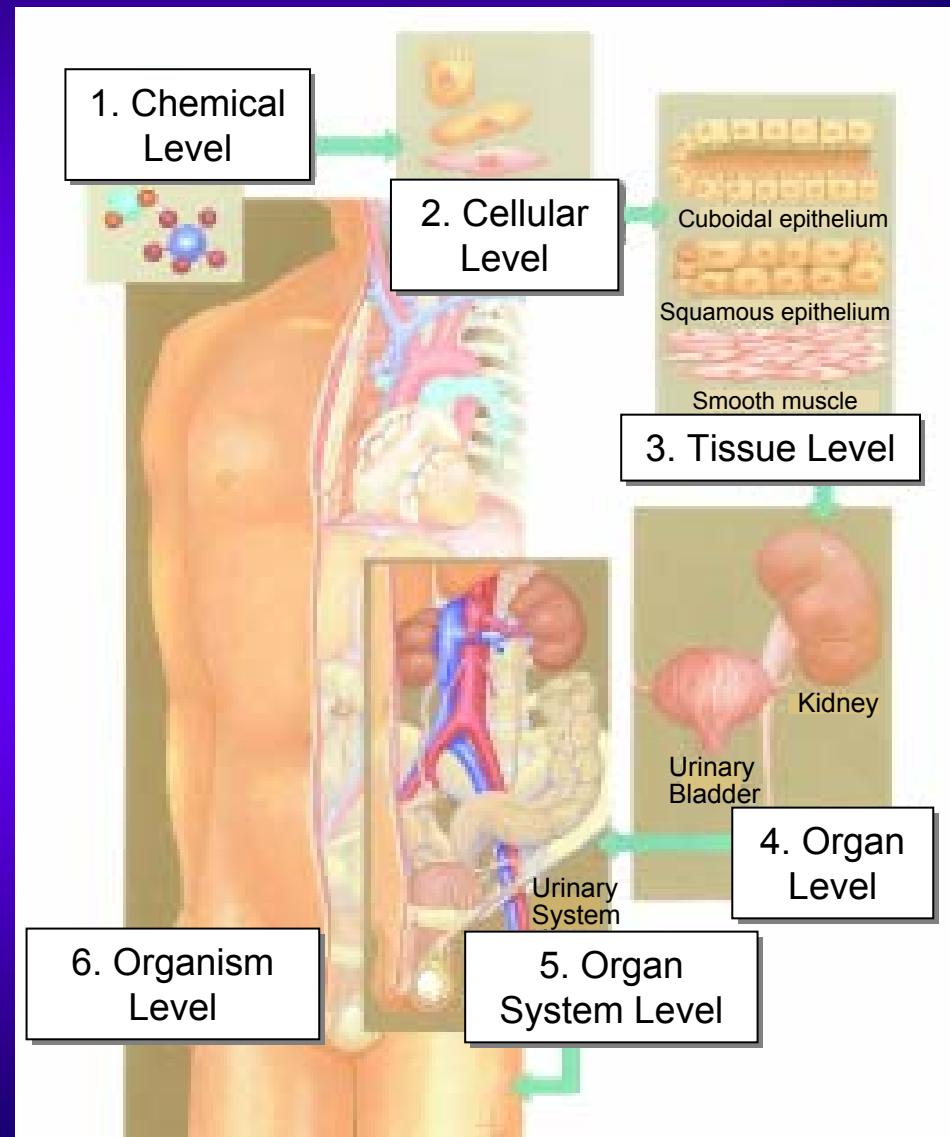
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**McGill** Faculty of  
Medicine



# Levels of Organization of the Body

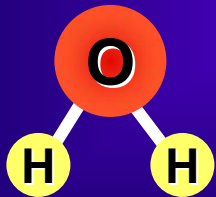


Adapted from: Scanlon V and Sanders T. Essentials of Anatomy and Physiology. 2003, pg. 5.

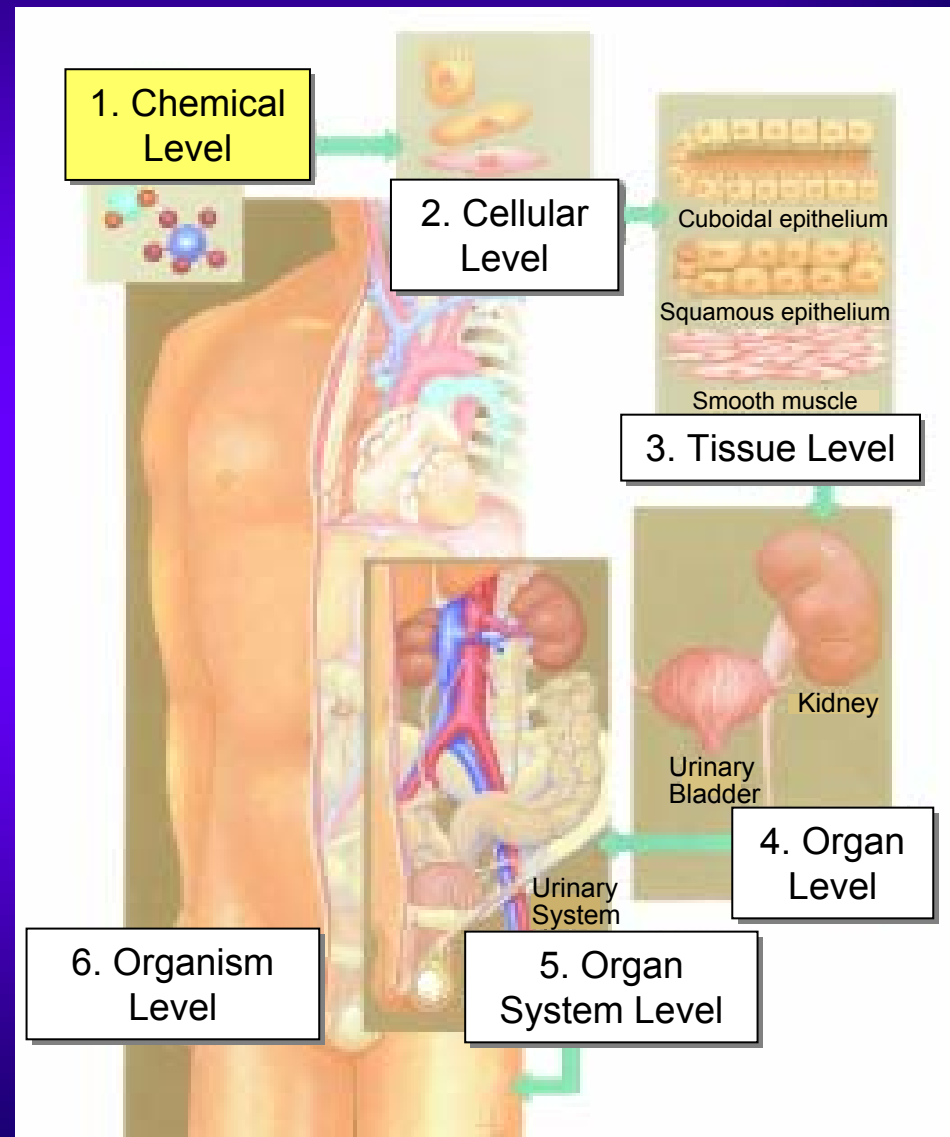
# Levels of Organization of the Body

## 1. Chemical (Molecular) Level

- the units of matter that form all chemical substances are called atoms
- each type of atom (e.g. carbon, hydrogen, oxygen) is called a chemical element
- two or more atoms bonded together make up a molecule



e.g. water  
(H<sub>2</sub>O)



# Levels of Organization of the Body

## 1. Chemical (Molecular) Level

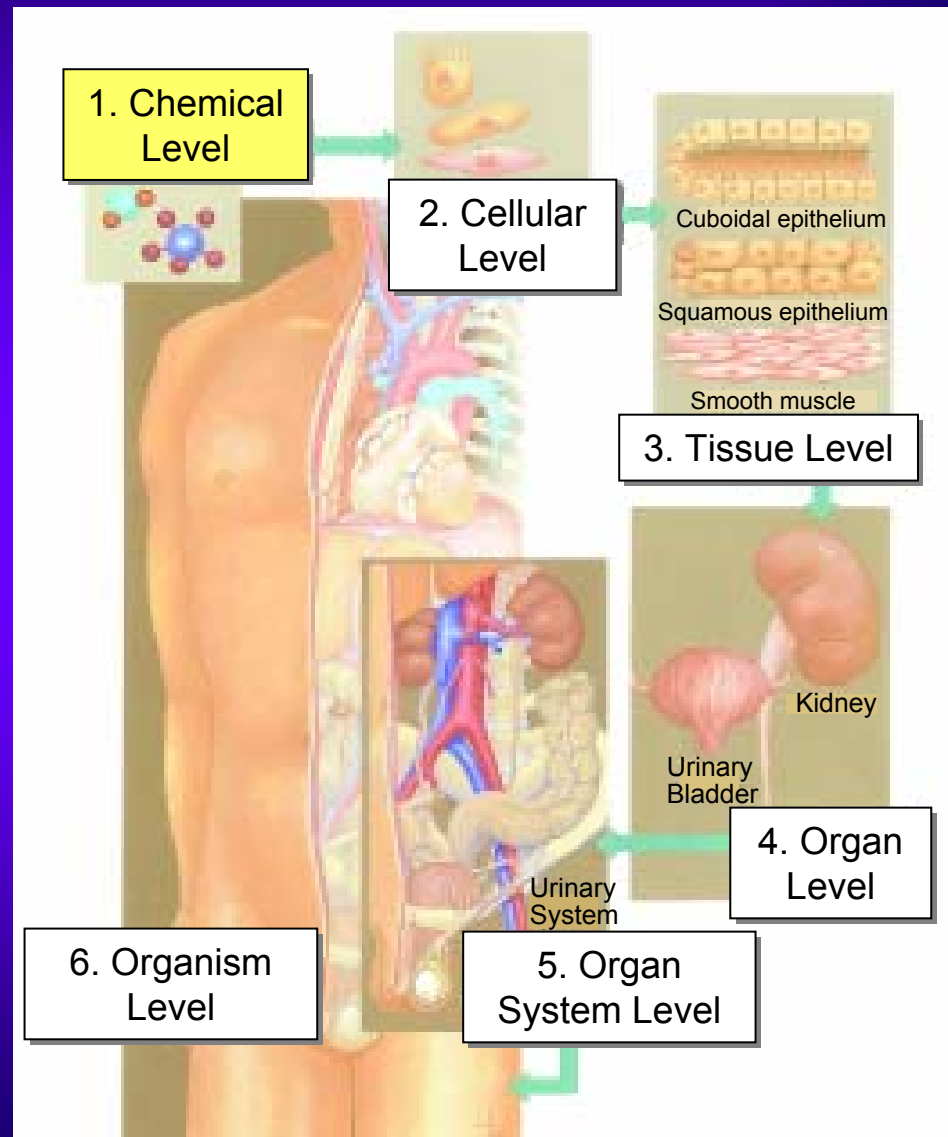
### Two Major Categories:

#### (a) Inorganic Chemicals

- usually simple molecules made up of one or two chemical elements other than carbon
- e.g. water (H<sub>2</sub>O), oxygen (O<sub>2</sub>), sodium (Na), calcium (Ca)

#### (b) Organic Chemicals

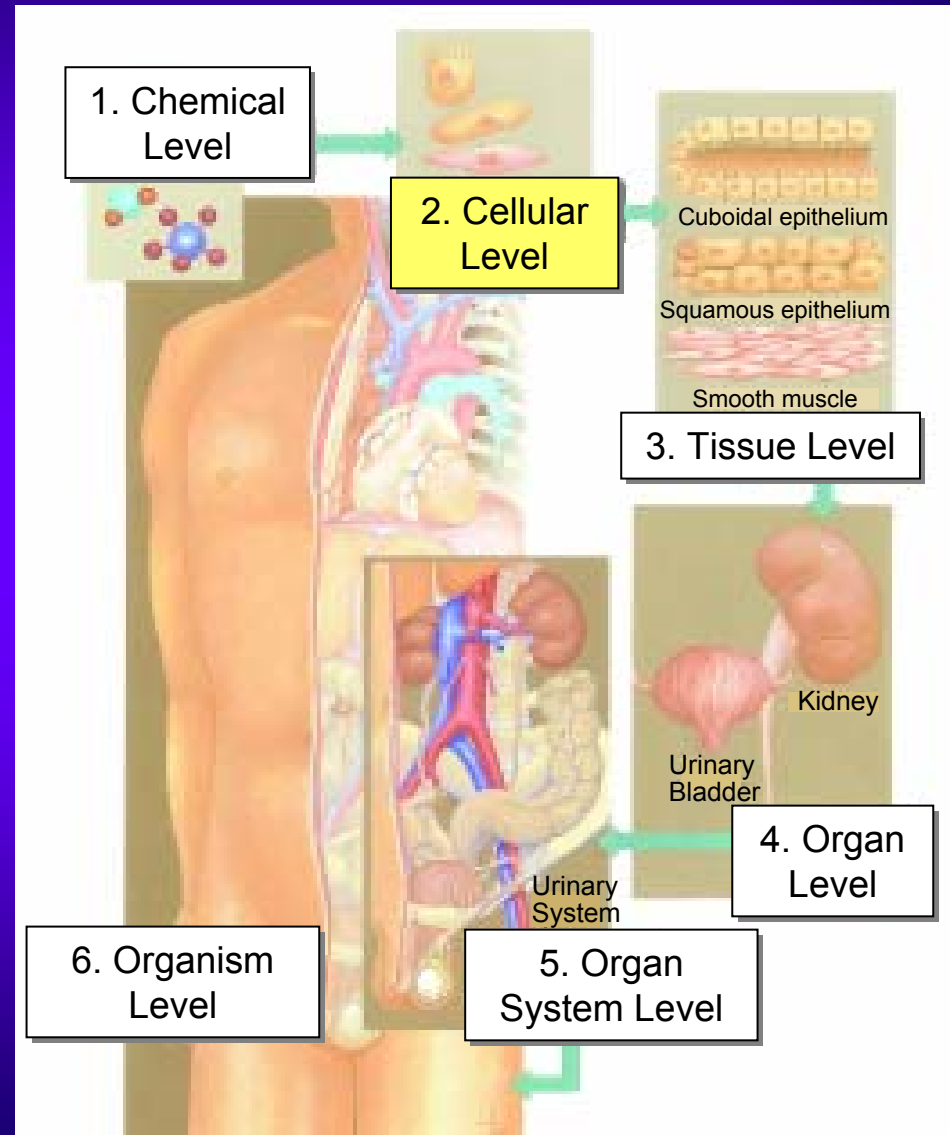
- often complex molecules
- always contain the chemical elements carbon and hydrogen
- e.g. proteins, carbohydrates, fats and nucleic acids



# Levels of Organization of the Body

## 2. Cellular Level

- the smallest living units of structure and function are cells
- each cell is made up of chemicals and carries out specific chemical reactions
- there are many different types of cells, e.g. red blood cells, epithelial cells, brain cells, etc.



# Levels of Organization of the Body

## 3. Tissue Level

**tissue** – a group of cells with similar structures and functions

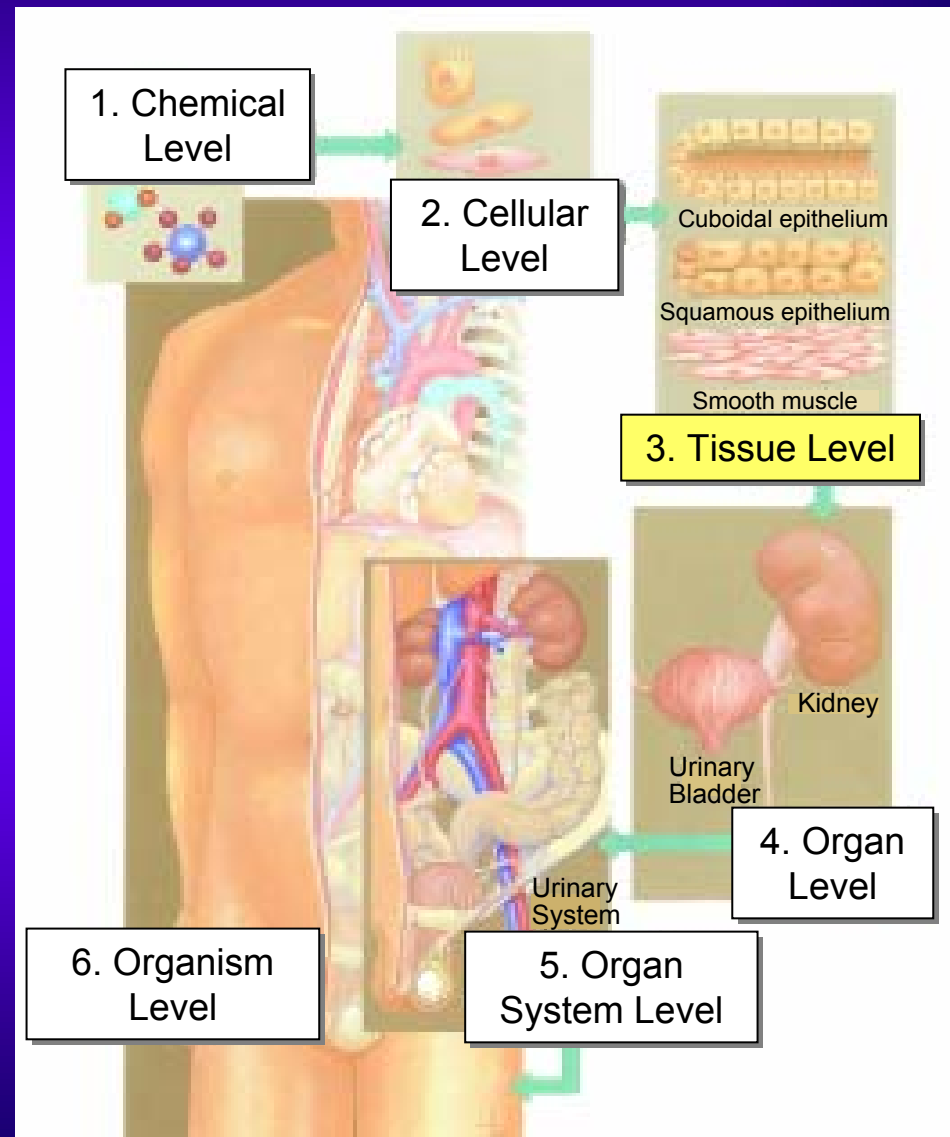
### Four Major Categories:

#### (a) Epithelial Tissues

- cover body surfaces
- e.g. outer layer of the skin, inner layer of blood vessel walls

#### (b) Connective Tissues

- connect and support parts of the body
- e.g. blood, bone, cartilage



# Levels of Organization of the Body

## 3. Tissue Level... continued

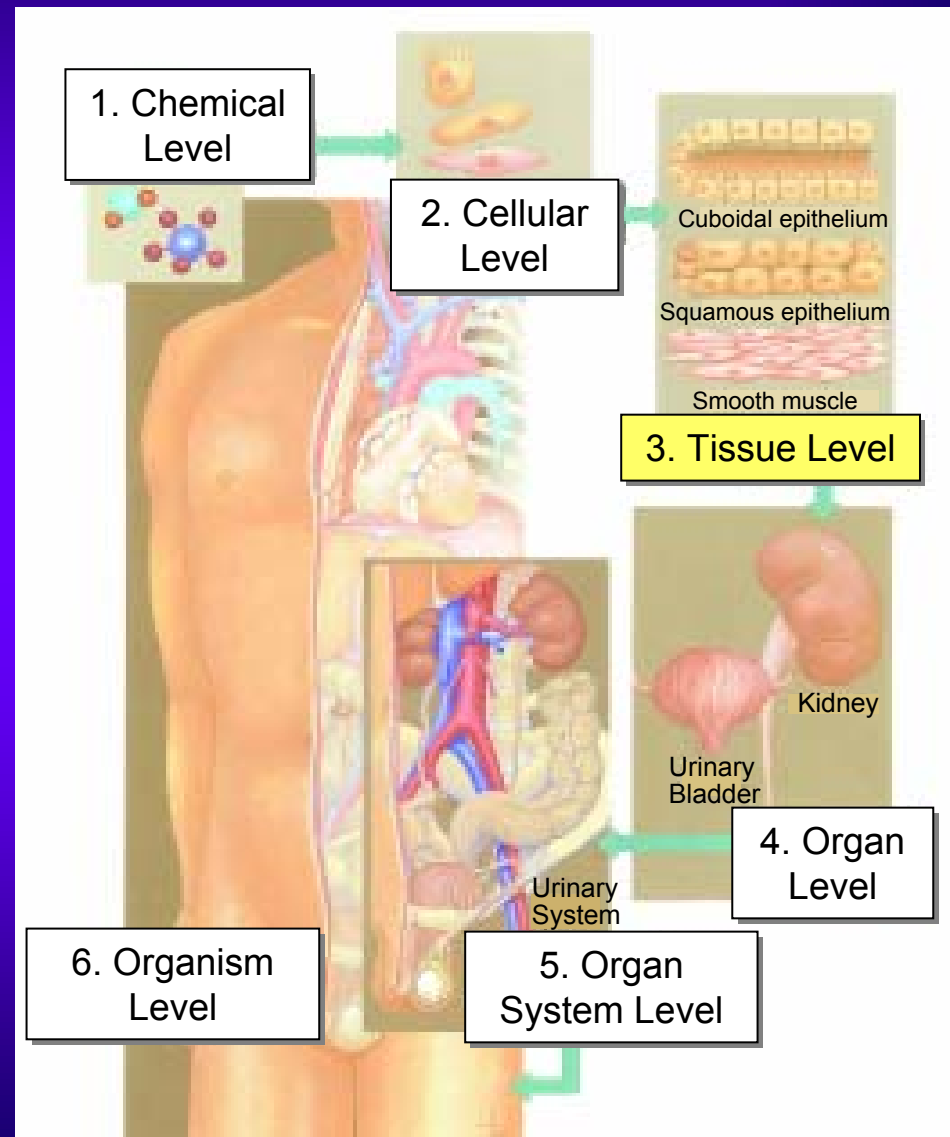
### Four Major Categories:

#### (c) Muscle Tissues

- perform contraction, which brings about movement
- e.g. skeletal muscles, heart, and smooth muscle tissue

#### (d) Nerve Tissues

- generate and transmit electrochemical impulses that regulate body functions
- e.g. brain and optic nerves

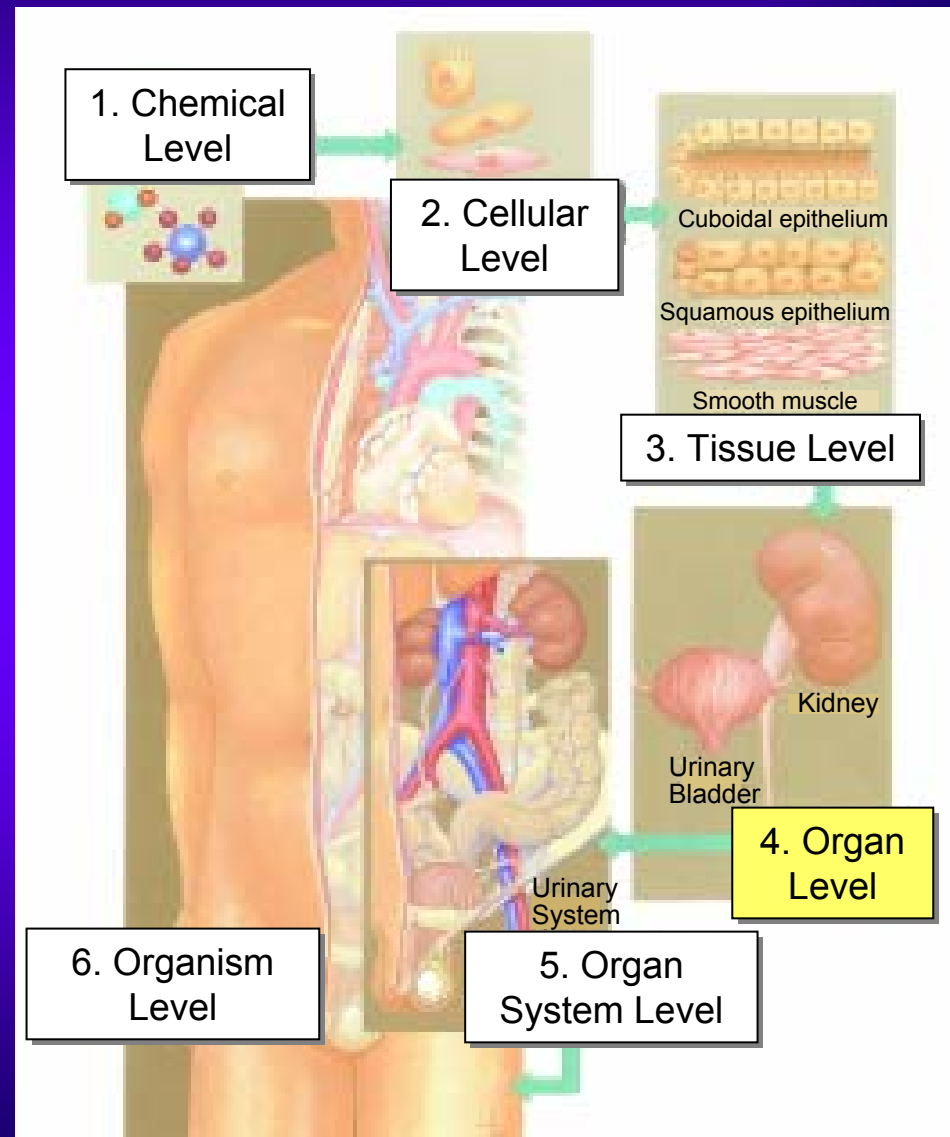


# Levels of Organization of the Body

## 4. Organ Level

organ – a group of tissues precisely arranged so as to accomplish specific functions

- e.g. kidneys, liver, lungs, stomach

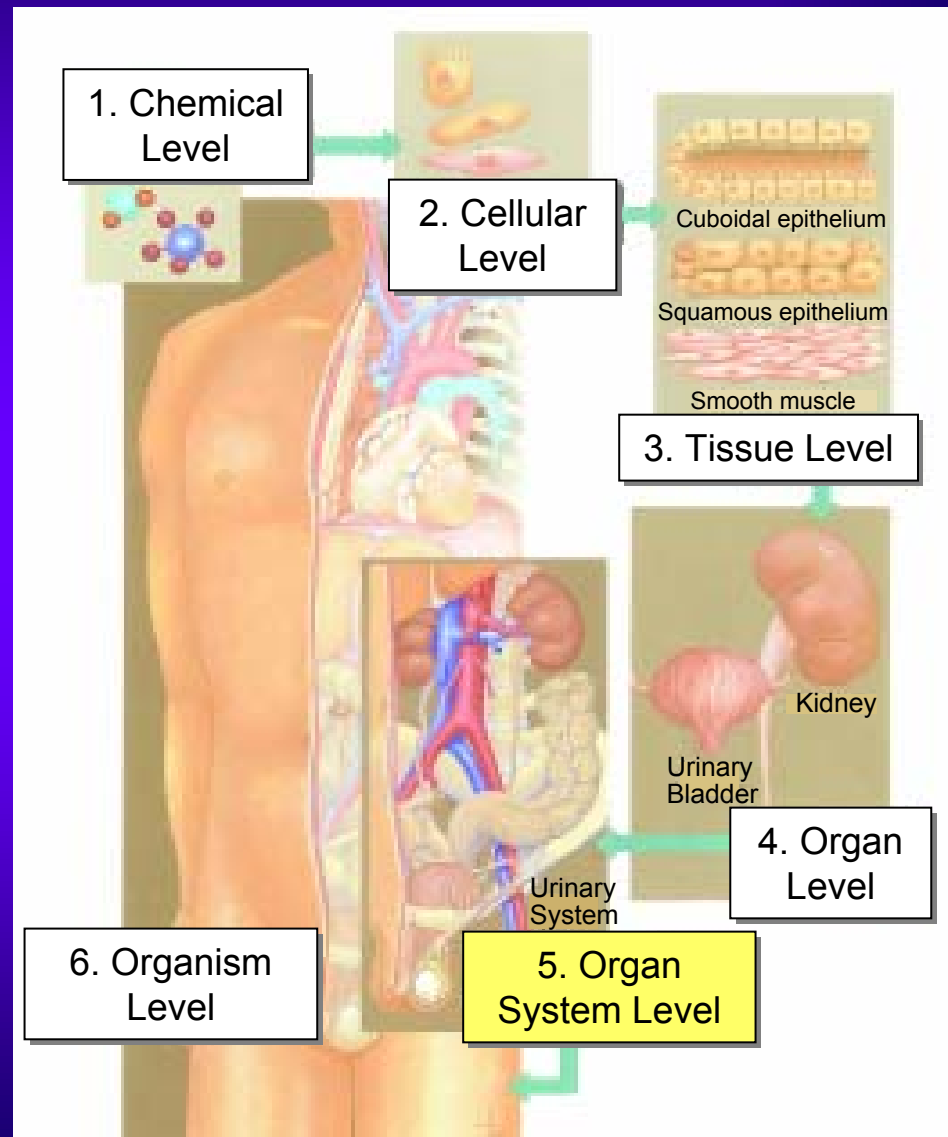


# Levels of Organization of the Body

## 5. Organ System Level

organ system – a group of organs that all contribute to a particular function

- e.g. urinary system, digestive system, respiratory system

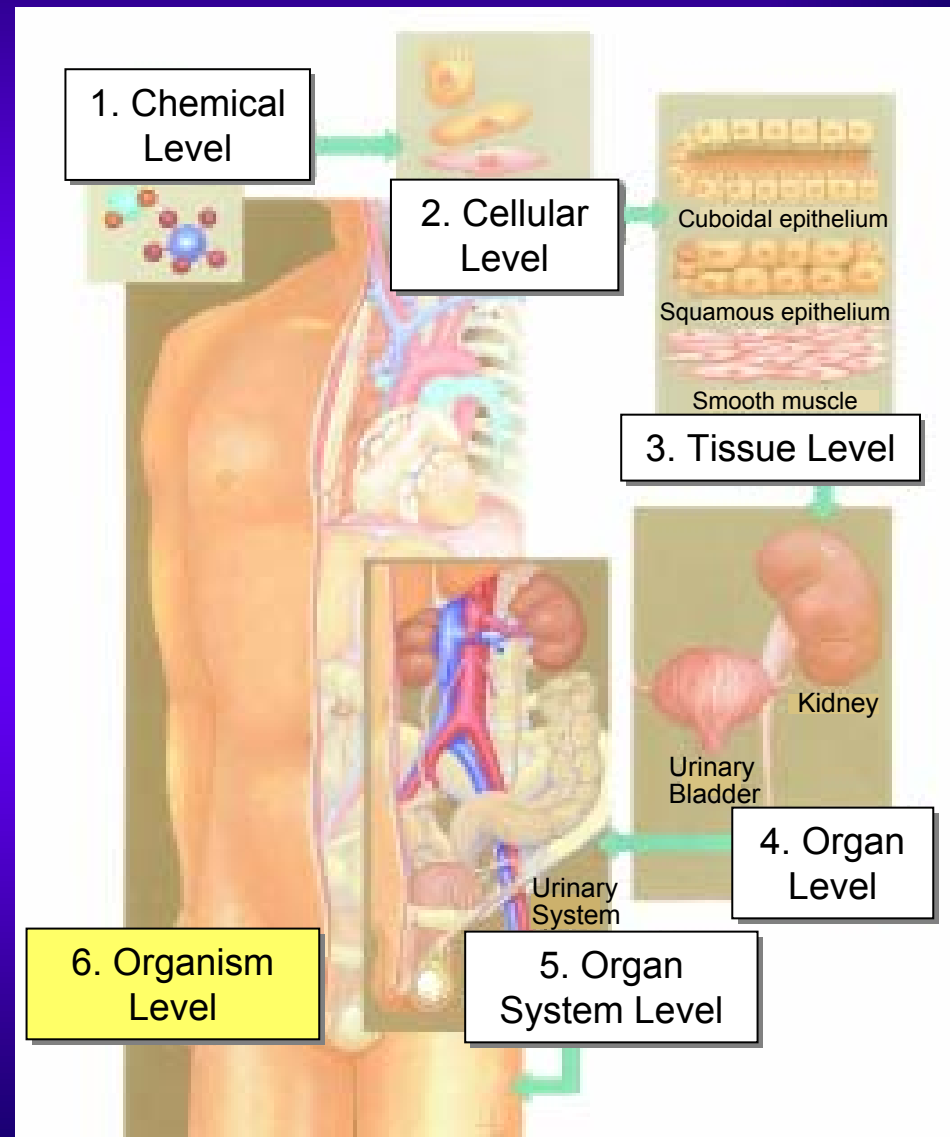


# Levels of Organization of the Body

## 6. Organism Level

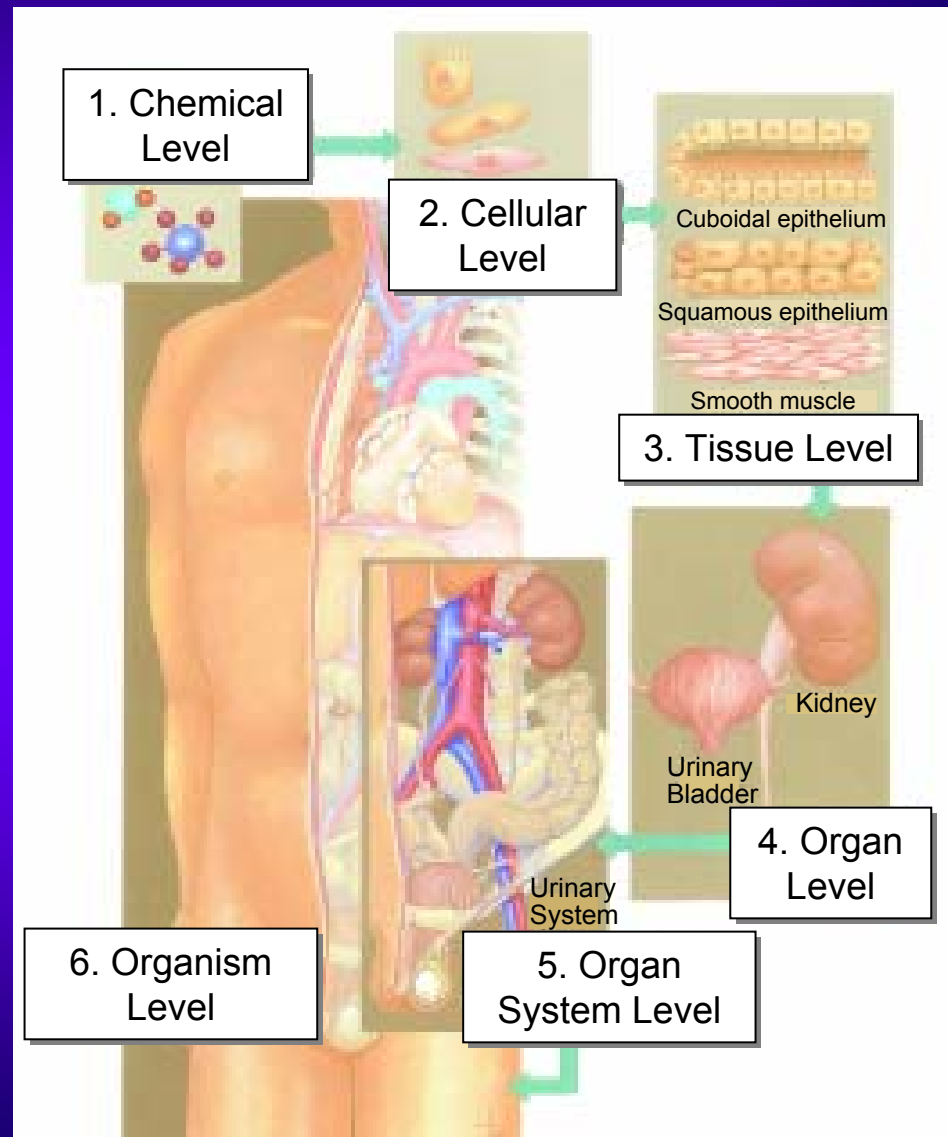
= the human body!

The human body can be viewed as a complex society of different cells working together to carry out the functions essential to the survival of the entire organism



# Levels of Organization of the Body

1. Chemical Level
2. Cellular Level
3. Tissue Level
4. Organ Level
5. Organ System Level
6. Organism Level



# Influences on Physiology: A Population Perspective

## 9. Place & Time

Natural Environment  
e.g. environmental contaminants

Cultural Context  
e.g. norms and values

Political Context  
e.g. public policies and laws

## 8. Context

Built Environment  
e.g. housing, workplace

Health Services  
e.g. structure, quality

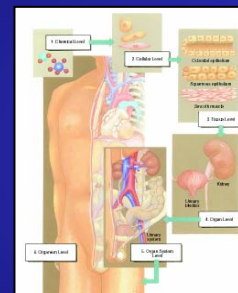
Economic  
e.g. employment, education

## 7. Community Attributes

Biological Characteristics  
e.g. genetic make-up

Social  
e.g. cohesion, influence, networks, support

1. Chemical Level
2. Cellular Level
3. Tissue Level
4. Organ level
5. Organ System Level
6. Organism Level



Population-Based Health Programs  
e.g. water supply, public health programs

Collective Lifestyles and Health Practices  
e.g. diet, physical activity, smoking

**The Relation Between  
Socioeconomic Position and  
Risk for Cardiovascular Disease**

# SOCIOECONOMIC POSITION (SEP)

## Socioeconomic position –

- an aggregate concept that includes both resource-based and prestige-based measures, as linked to both childhood and adult social class position.
- resource-based measures refer to material and social resources and assets, including income, wealth, educational credentials; terms used to describe inadequate resources include “poverty” and “deprivation”.
- prestige-based measures refer to individual’s rank or status in a social hierarchy, typically evaluated with reference to people’s access to and consumption of goods, services, and knowledge, as linked to their occupational prestige, income, and education level.

Krieger N et al. *Annu Rev Public Health*. 1997: 341–78

# SOCIOECONOMIC POSITION (SEP)

**SEP can be measured in several ways. The three most common measures are:**

1. Education
2. Income
3. Occupation

**Other methods to measure SEP include:**

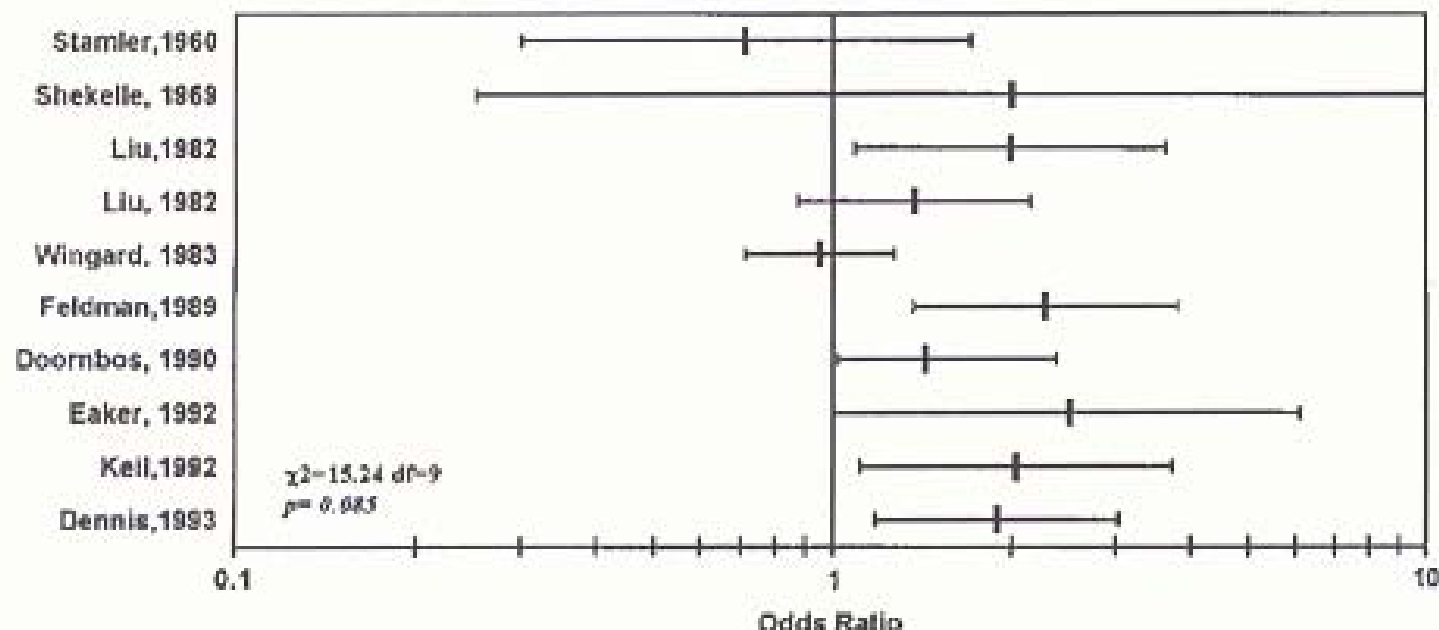
- wealth
- employment status
- living conditions (e.g. ownership of a house, automobile, television)
- life course socioeconomic circumstances (can include measures of childhood SEP and adulthood SEP)
- area-based measures – e.g. census tracts, counties or other geographic units can be characterized according to income, education, occupation, crowding value of homes, etc.

# EDUCATIONAL ATTAINMENT AND CARDIOVASCULAR DISEASE

**Does educational attainment influence  
cardiovascular disease?**

# EDUCATIONAL ATTAINMENT AND CARDIOVASCULAR DISEASE

## (a) Primary versus college education



**Figure 1** Ischaemic heart disease odds ratios (OR) and 95% confidence intervals by education. Studies are shown in order of author and year of publication.  $\chi^2$ :  $\chi^2$  of inter-study heterogeneity. In Skekelle's study<sup>30</sup> the upper limit of the OR is 15.96 in Figure 1b, and 32.95 in Figure 1c

# EDUCATIONAL ATTAINMENT AND CARDIOVASCULAR DISEASE

**TABLE 4. Adjusted and Age-Standardized Rate Ratios of First MI Events (Incidence) and First Events That Were Fatal at Different Time Points After the Infarction by Taxable Income and Education Among Men and Women Aged 35 to 64 Years in the FINMONICA MI Register Study During 1983 to 1992**

	Incidence	Prehospital Deaths	Deaths at 0 to 28-d	Deaths at 0 to 365-d
<b>Men</b>				
Income				
Low	1.67 (1.57–1.78)	3.39 (2.96–3.88)	3.18 (2.82–3.58)	3.18 (2.84–3.55)
Middle	1.84 (1.73–1.95)	2.33 (2.03–2.68)	2.30 (2.04–2.59)	2.34 (2.09–2.62)
High	1	1	1	1
Education				
Basic	1.48 (1.40–1.55)	2.00 (1.79–2.24)	1.92 (1.74–2.11)	1.87 (1.71–2.05)
Secondary or higher	1	1	1	1
<b>Women</b>				
Income				
Low	1.52 (1.38–1.68)	2.09 (1.58–2.75)	2.17 (1.76–2.68)	2.15 (1.77–2.62)
Middle or high	1	1	1	1
Education				
Basic	1.65 (1.48–1.83)	2.81 (2.02–3.91)	2.43 (1.91–3.09)	2.34 (1.88–2.92)
Secondary or higher	1	1	1	1

Rate ratios are adjusted for study area and urban or rural residence with 95% CIs in parentheses. Because of small numbers, the middle- and high-income categories were combined among women.

Salomaa V et al. *Circulation*. 2000; 1913-1918

**Overall, there is consistent evidence that educational attainment predicts coronary heart disease incidence and mortality in observational studies**

# Socioeconomic Position

What are the biological pathways that may link socioeconomic position to cardiovascular outcomes?

## Biological Processes

e.g.

blood pressure

cholesterol

triglycerides

adiposity

metabolic syndrome

inflammatory markers

## Cardiovascular Outcomes

e.g.

Mortality

Coronary Artery Disease

Myocardial Infarction

# Socioeconomic Position

## Health Behaviors

e.g. diet, physical activity, smoking, medication adherence

## Social Parameters

e.g. social resources and supports

## Physical Environment

e.g. work place-, and home/neighborhood-exposure to pathogens, carcinogens and other environmental hazards

## Psychological Parameters

e.g. depression, anxiety, stress

## Access to Health Care

## Biological Processes

e.g.

blood pressure

cholesterol

triglycerides

adiposity

metabolic syndrome

inflammatory markers

## Cardiovascular Outcomes

e.g.

Mortality

Coronary Artery Disease

Myocardial Infarction

**TABLE 1. Age- and sex-adjusted characteristics\* of the Framingham Offspring Study, United States (1984–1987, 1998–2001)**

	Total sample (n = 2,729)		Educational level								p value†
			≤High school (n = 1,536)		Associate's degree (n = 295)		Bachelor's degree (n = 537)		Master's/doctorate degree (n = 361)		
	PE	95% CI‡	PE	95% CI	PE	95% CI	PE	95% CI	PE	95% CI	
Age (years)	62.1	61.8, 62.5	63.7	63.2, 64.1	60.6	59.5, 61.7	60.2	59.4, 61.0	59.9	58.9, 60.8	0.0001
Systolic blood pressure (mmHg)	127.0	126.3, 127.7	128.3	127.4, 129.2	126.5	124.4, 128.7	125.1	123.5, 126.7	124.8	122.8, 126.7	0.0003
Diastolic blood pressure (mmHg)	73.8	73.5, 74.2	73.3	72.8, 73.8	73.7	72.6, 74.8	74.5	73.7, 75.4	75.1	74.1, 76.1	0.003
Total:HDL‡ cholesterol ratio	4.1	4.0, 4.1	4.1	4.0, 4.1	4.1	3.9, 4.2	4.0	3.9, 4.1	4.1	4.0, 4.2	0.87
Body mass index (kg/m <sup>2</sup> )	28.1	27.9, 28.3	28.4	28.2, 28.7	27.9	27.3, 28.5	28.0	27.5, 28.4	27.5	26.9, 28.0	0.009
Current smoker (%)	11.9	10.7, 13.1	14.1	12.5, 15.8	14.2	10.6, 17.9	8.0	5.3, 10.7	6.4	3.0, 9.7	0.0001
Lipid-lowering medication (%)	21.3	19.7, 22.8	23.6	21.5, 25.6	22.7	18.1, 27.4	16.9	13.5, 20.4	16.6	12.4, 20.8	0.001
Antihypertensive medication (%)	34.4	32.6, 36.2	39.2	36.9, 41.6	36.6	31.2, 42.0	25.7	21.7, 29.7	24.9	20.1, 29.8	0.0001
Prevalent CVD‡ (%)	13.5	12.2, 14.8	16.0	14.3, 17.7	13.9	10.0, 17.8	10.4	7.5, 13.3	6.9	3.4, 10.4	0.0001
Depressive symptoms (CES-D‡ score)	5.4	5.1, 5.6	5.8	5.5, 6.2	5.0	4.2, 5.8	4.9	4.3, 5.5	4.4	3.7, 5.1	0.0003
Annual family income (\$000s)§	41.0	40.2, 41.9	36.3	35.2, 37.3	41.5	39.2, 43.9	45.7	44.4, 47.4	51.4	49.4, 53.4	0.0001

\* Unless otherwise noted, all point estimates (PE) are expressed as the mean.

† Derived from regression analyses adjusted for age and sex.

‡ CI, confidence interval; HDL, high density lipoprotein; CVD, cardiovascular disease; CES-D, Center for Epidemiologic Studies Depression.

§ Annual family income is given in thousands of US dollars during 1984–1987.

**TABLE 2. Age- and sex-adjusted mean concentrations of inflammatory markers, by educational level, in the Framingham Offspring Study, United States (1984–1987, 1998–2001)**

	Total sample ( <i>n</i> = 2,729)		Educational level								<i>p</i> value*
			≤High school ( <i>n</i> = 1,536)		Associate's degree ( <i>n</i> = 295)		Bachelor's degree ( <i>n</i> = 537)		Master's/doctorate degree ( <i>n</i> = 361)		
	Mean	95% CI†	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	
C-reactive protein (mg/liter)	4.2	4.0, 4.4	4.7	4.5, 4.9	4.7	4.5, 4.9	3.6	3.4, 3.7	3.2	3.0, 3.3	0.0001
IL-6† (pg/ml)	3.7	3.6, 3.8	3.9	3.8, 4.0	3.8	3.7, 3.9	3.4	3.3, 3.5	3.3	3.2, 3.4	0.0001
sICAM-1† (ng/ml)	256	250, 262	260	254, 266	258	251, 264	250	244, 255	244	239, 251	0.0001
MCP-1†(pg/ml)	329	320, 337	335	327, 343	313	305, 321	325	317, 333	319	311, 326	0.002
P-selectin (ng/ml)	38.3	37.4, 39.3	38.6	37.6, 39.6	38.6	37.6, 39.5	38.5	37.5, 39.4	36.9	36.0, 37.8	0.23

\* Derived from regression analyses adjusted for age and sex.

† CI, confidence interval; IL-6, interleukin-6; sICAM-1, soluble intercellular adhesion molecule-1; MCP-1, monocyte chemoattractant protein-1.

**TABLE 3. Linear regression analyses for the association between years of education and concentrations of inflammatory markers, Framingham Offspring Study, United States (1984–1987, 1998–2001)**

	Model adjustment								
	Age and sex			Age, sex, and income			Clinical risk factors*		
	$\beta$ †	95% CI‡	<i>p</i> value	$\beta$	95% CI	<i>p</i> value	$\beta$	95% CI	<i>p</i> value
C-reactive protein (ln mg/liter)	-0.058	-0.077, -0.038	<0.0001	-0.054	-0.077, -0.032	<0.0001	-0.034	-0.051, -0.016	0.0002
IL-6‡ (ln pg/ml)	-0.026	-0.038, -0.016	<0.0001	-0.020	-0.034, -0.006	0.004	-0.011	-0.022, 0.001	0.07
sICAM-1‡ (ln ng/ml)	-0.011	-0.016, -0.007	<0.0001	-0.010	-0.015, -0.005	<0.0001	-0.006	-0.010, -0.001	0.01
MCP-1‡ (ln pg/ml)	-0.011	-0.016, -0.005	0.0004	-0.011	-0.018, -0.005	0.0006	-0.008	-0.014, -0.002	0.01
P-selectin (ln ng/ml)	-0.007	-0.013, 0.000	0.04	-0.006	-0.013, 0.002	0.12	-0.003	-0.009, 0.004	0.40

\* Included were age, sex, smoking, systolic blood pressure, diastolic blood pressure, total cholesterol:high density lipoprotein cholesterol ratio, body mass index, lipid-lowering medication, antihypertensive medication, prevalent cardiovascular disease, and depression.

† Each regression coefficient ( $\beta$ ) represents the amount of change in concentration of the inflammatory marker (logarithmic) for each year increase in education.

‡ CI, confidence interval; IL-6, interleukin-6; sICAM-1, soluble intercellular adhesion molecule-1; MCP-1, monocyte chemoattractant protein-1.

Table 3—Multivariable RRs of baseline characteristics and incident metabolic syndrome

	Total	Men		Women	
		Black	White	Black	White
Age (per 5 years)	1.26 (1.11–1.42)	1.18 (0.88–1.58)	1.09 (0.83–1.44)	1.31 (1.07–1.61)	1.53 (1.14–2.05)
Race					
Black	0.73 (0.60–0.87)				
White	1.00 (referent)				
Sex					
Men	1.55 (1.28–1.88)				
Women	1.00 (referent)				
Education					
High school or less	1.52 (1.24–1.87)	1.10 (0.67–1.83)	1.34 (0.94–1.93)	1.84 (1.20–2.82)	1.63 (1.05–2.52)
More than high school	1.00 (referent)	1.00	1.00	1.00	1.00
BMI (per 4.7 kg/m <sup>2</sup> )	1.89 (1.77–2.00)	2.44 (2.06–2.88)	2.95 (2.37–3.67)	1.63 (1.50–1.77)	2.18 (1.89–2.51)
Physical activity (per 299.5 units)	0.95 (0.86–1.05)	0.99 (0.82–1.20)	0.92 (0.77–1.11)	1.08 (0.88–1.32)	0.93 (0.72–1.21)
Smoking status					
Current	1.18 (0.97–1.45)	1.52 (0.93–2.47)	1.14 (0.75–1.73)	1.28 (0.91–1.79)	0.99 (0.62–1.56)
Former	1.02 (0.79–1.33)	0.73 (0.33–1.64)	1.45 (0.91–2.31)	1.12 (0.69–1.82)	0.76 (0.44–1.31)
Never	1.00 (referent)	1.00	1.00	1.00	1.00
Alcohol intake					
No drinks/day	1.36 (1.11–1.66)	1.40 (0.88–2.23)	2.05 (1.34–3.13)	1.06 (0.76–1.48)	1.46 (0.92–2.30)
One to three drinks/day	1.00 (referent)	1.00	1.00	1.00	1.00
More than three drinks/day	1.24 (0.83–1.85)	1.04 (0.45–2.42)	1.26 (0.68–2.32)	2.10 (0.78–5.70)	1.58 (0.47–5.35)
Carbohydrate intake (% energy)					
Q1 (25–41%)	1.00 (referent)	1.00	1.00	1.00	1.00
Q2 (41–45%)	1.28 (0.96–1.70)	1.30 (0.69–2.45)	1.13 (0.67–1.89)	1.56 (0.87–2.82)	1.15 (0.57–2.29)
Q3 (45–48%)	1.30 (0.94–1.80)	1.25 (0.61–2.56)	1.10 (0.58–2.07)	2.10 (1.11–3.97)	0.79 (0.37–1.68)
Q4 (48–52%)	1.85 (1.30–2.65)	2.41 (1.09–5.32)	1.91 (0.95–3.86)	2.56 (1.28–5.12)	0.99 (0.46–2.13)
Q5 (52–85%)	1.63 (1.06–2.51)	1.98 (0.70–5.55)	1.22 (0.48–3.14)	2.17 (0.98–4.81)	1.16 (0.50–2.70)
Crude fiber (g)					
Q1: F (0.3–2.7)/M (0.6–3.6)	1.12 (0.86–1.47)	1.73 (0.90–3.33)	0.88 (0.50–1.53)	0.88 (0.55–1.40)	1.53 (0.81–2.88)
Q2: F (2.8–3.8)/M (3.6–5.0)	1.14 (0.87–1.49)	1.43 (0.74–2.78)	1.23 (0.73–2.07)	1.02 (0.63–1.66)	1.01 (0.55–1.88)
Q3: F (3.8–5.0)/M (5.0–6.4)	1.00 (0.76–1.32)	0.95 (0.45–1.97)	1.24 (0.74–2.08)	0.97 (0.60–1.57)	1.05 (0.57–1.90)
Q4: F (5.0–6.9)/M (6.4–8.5)	0.92 (0.69–1.22)	0.80 (0.37–1.75)	0.93 (0.54–1.59)	0.95 (0.58–1.55)	1.14 (0.61–2.11)
Q5: F (6.9–33)/M (8.6–29.8)	1.00 (referent)	1.00	1.00	1.00	1.00
Total fat intake (% energy)					
Q1 (11–33%)	1.00 (0.71–1.41)	1.37 (0.58–3.24)	1.23 (0.62–2.46)	0.96 (0.51–1.80)	0.85 (0.44–1.62)
Q2 (33–36%)	1.18 (0.89–1.57)	1.70 (0.83–3.46)	1.21 (0.67–2.18)	1.37 (0.84–2.25)	0.81 (0.44–1.47)
Q3 (36–39%)	1.00 (referent)	1.00	1.00	1.00	1.00
Q4 (39–42%)	1.04 (0.77–1.39)	1.19 (0.61–2.35)	1.18 (0.67–2.09)	1.17 (0.68–2.01)	0.32 (0.14–0.73)
Q5 (42–59%)	1.64 (1.19–2.25)	2.15 (1.08–4.31)	2.09 (1.12–3.87)	1.60 (0.86–2.99)	1.02 (0.51–2.04)

Data are RR (95% CI). Q, quintile.

Carnethon MR et al.  
Diabetes Care.  
2004; 27:2707

Table 3—Age- and center-adjusted odds ratios of metabolic syndrome for household income, educational level, and accommodation status by sex

	Men		Women		P interaction with sex
	Odds ratio (95% CI)	P trend	Odds ratio (95% CI)	P trend	
Household income (%)					
No income tax	Ref.	0.12	Ref.	<0.0001	0.0004
<760 euros	1.16 (0.78–1.72)		0.66 (0.44–0.99)		
760–2,300 euros	0.91 (0.64–1.13)		0.52 (0.36–0.76)		
>2,300 euros	0.82 (0.58–1.16)		0.38 (0.25–0.57)		
Educational level (%)					
Primary	Ref.	0.0003	Ref.	<0.0001	0.011
Intermediate, technical	0.74 (0.54–1.01)		0.61 (0.44–0.84)		
University	0.52 (0.37–0.73)		0.33 (0.22–0.51)		
Accommodation status (%)					
Owners	Ref.	0.0023		0.0045	0.89
Tenants	1.54 (1.16–2.03)		1.54 (1.12–2.10)		
Occupational category (%)					
Unskilled manual	Ref.	0.0071	Ref.	0.0004	0.056
Employee	1.20 (0.82–1.75)		0.71 (0.48–1.05)		
Middle executive	0.89 (0.67–1.74)		0.52 (0.34–0.81)		
Senior executive	0.50 (0.33–0.75)		0.36 (0.18–0.73)		
Psychotropic drug use (%)					
No	Ref.	0.22	Ref.	0.0009	0.18
Yes	1.37 (0.89–2.11)		1.94 (1.36–2.77)		

Logistic regression analysis was used for statistical analyses with age, center, physical activity, alcohol consumption, smoking habit, and household composition and each variable separately.

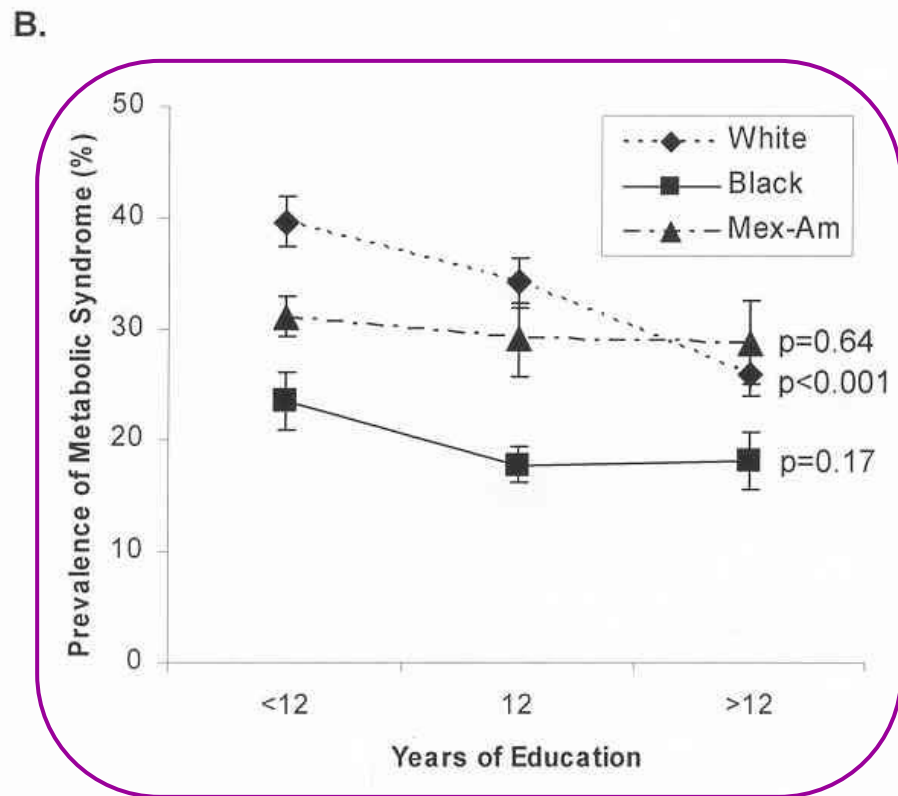
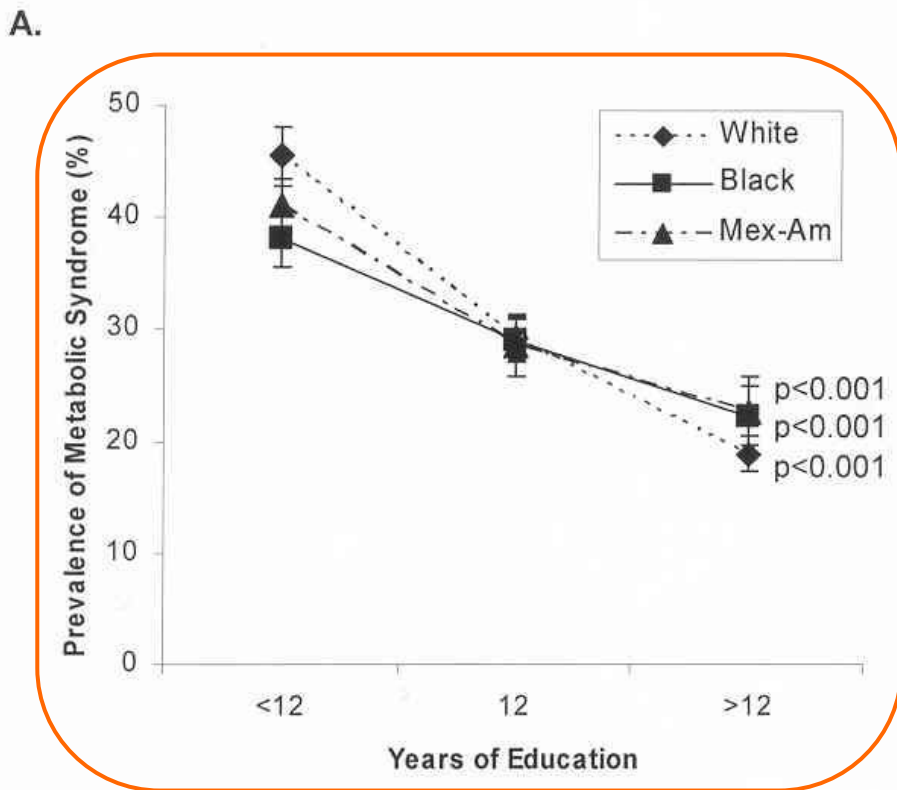


Figure 1. Prevalence of the metabolic syndrome in relation to years of education for specific races/ethnicities in (A) **women** and (B) **men** National Health and Nutrition Examination Survey (NHANES III), 1988-1994. Errors bars represent standard error of the mean. p values are derived from chi-squared tests.

**Table 2.** Odds ratios of having the metabolic syndrome according to education level, stratified by gender and race/ethnicity. National Health and Nutrition Examination Survey (NHANES III), 1988-1994.

Model Adjustment		Years of Education				
		<12		12		>12
		OR	95% CI	OR	95% CI	OR
<b>Women*</b>						
All	Age, R/E	<b>2.25</b>	1.74, 2.91	<b>1.67</b>	1.31, 2.12	1.00
	Age, R/E, health behaviors	<b>1.85</b>	1.42, 2.41	<b>1.54</b>	1.21, 1.97	1.00
	Age, R/E, health behaviors & parity <sup>†</sup>	<b>1.77</b>	1.39, 2.24	<b>1.46</b>	1.16, 1.84	1.00
White	Age & menopause	<b>2.36</b>	1.74, 3.20	<b>1.58</b>	1.20, 2.08	1.00
	Age, & health behaviors	<b>1.77</b>	1.29, 2.42	<b>1.40</b>	1.06, 1.85	1.00
	Age, health behaviors & parity <sup>†</sup>	<b>1.68</b>	1.26, 2.23	<b>1.35</b>	1.03, 1.77	1.00
Black	Age	1.22	0.75, 1.97	<b>1.42</b>	1.04, 1.94	1.00
	Age & health behaviors	1.21	0.75, 1.95	<b>1.48</b>	1.10, 1.99	1.00
	Age, health behaviors & parity <sup>†</sup>	1.10	0.68, 1.78	<b>1.42</b>	1.06, 1.90	1.00
Mex-Am	Age & menopause	<b>1.78</b>	1.17, 2.70	1.28	0.90, 1.82	1.00
	Age & health behaviors	<b>1.67</b>	1.03, 2.71	1.31	0.90, 1.92	1.00
	Age, health behaviors & parity <sup>†</sup>	<b>1.66</b>	1.04, 2.64	<b>1.36</b>	0.95, 1.94	1.00
<b>Men</b>						
All	Age & R/E	<b>1.33</b>	1.04, 1.70	<b>1.40</b>	1.13, 1.77	1.00
	Age, R/E & health behaviors	1.27	0.97, 1.66	<b>1.32</b>	1.04, 1.68	1.00
White	Age	1.36	1.00, 1.85	<b>1.52</b>	1.17, 1.98	1.00
	Age & health behaviors	1.20	0.87, 1.66	<b>1.37</b>	1.04, 1.81	1.00
Black	Age	0.93	0.59, 1.49	0.97	0.65, 1.43	1.00
	Age & health behaviors	1.01	0.63, 1.62	1.02	0.69, 1.51	1.00
Mex-Am	Age	0.90	0.68, 1.18	0.95	0.60, 1.51	1.00
	Age & health behaviors	0.75	0.54, 1.05	0.87	0.53, 1.45	1.00

\*All analyses in women additionally adjust for menopausal status

<sup>†</sup>Number of live born children is not available for men

Health behaviors include alcohol consumption, smoking, physical activity, and dietary consumption of carbohydrates, total fat and fiber.

R/E, race/ethnicity; Mex-Am, Mexican-American; CI, confidence interval

Sample sizes for education categories <12, 12 and >12 years are, for all women n=2166, 1941, 1659; white women n=718, 1012, 952; black women n=504, 553, 440; Mexican-American women n=849, 323, 186; all men n=2276, 1440, 1635; white men n=738, 700, 979; black men n=515, 423, 322; Mexican-American men n=952, 274, 250, respectively.

# OVERALL SUMMARY

- **educational attainment is associated with cardiovascular disease and many risk factors for cardiovascular disease**

# Implications

- Understanding the mechanisms by which socioeconomic position may influence cardiovascular disease and mortality helps to provide etiologic evidence of the relation of socioeconomic position with cardiovascular disease and mortality found in observational studies.
- This can inform policy makers of the potential impact of socioeconomic factors on health.
- Furthermore, understanding the physiologic mechanisms will aid in identifying potential physiologic targets for interventions in women and men who may be at higher risk for CVD and mortality due to their social circumstances.



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