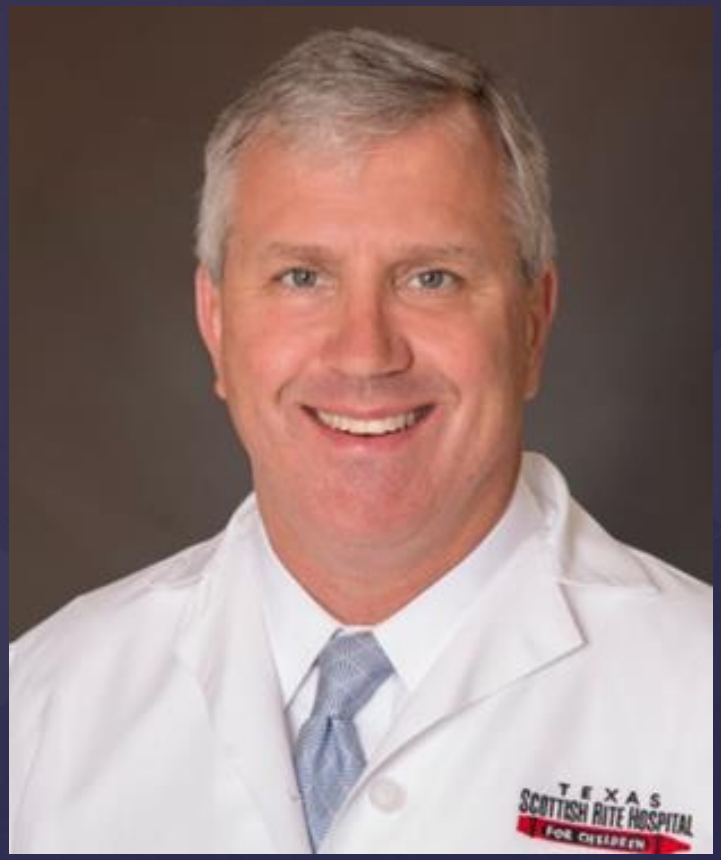
First Panel: Medical Issues Surrounding Childhood Obesity



Dr. Karl Rathjen, M.D.,
Texas Scottish Rite Hospital &
UT Southwestern, Orthopedics

Musculoskeletal Effects of Childhood Obesity

Karl Rathjen, M.D.

TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN

UT Southwestern Medical Center

Musculoskeletal Effects of Childhood Obesity

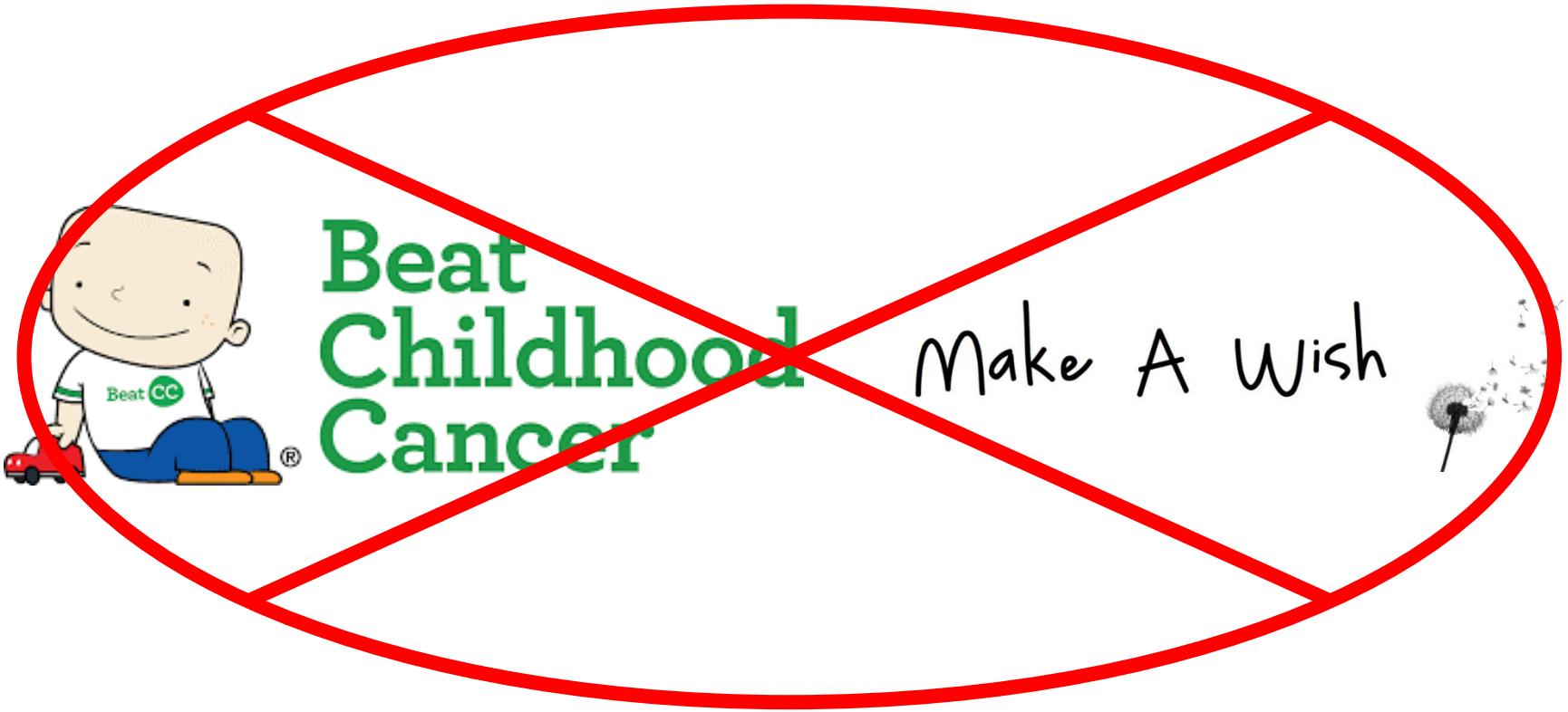
- Musculoskeletal:
  - Bones
  - Joints
  - Muscles

Musculoskeletal Effects of Childhood Obesity

- Musculoskeletal:
  - Bones
  - Joints
  - Muscles

- Orthopaedics:
  - “Save Lifestyles not Lives”

Musculoskeletal Effects of Childhood Obesity



Musculoskeletal Effects of Childhood Obesity

- Obesity decreases the *quality* of the life it limits
  - Remember I am only talking about the *physical* effects – there are significant emotional / cognitive effects

Musculoskeletal Effects of Childhood Obesity

- Conditions it is known to be causative
  - Blount's Disease (Bowed Legs = Bad knees)
  - Slipped Capital Femoral Epiphysis (Hip arthritis)

- Conditions it is known to complicate the treatment
  - Scoliosis (Twisted spine)
  - Perthes (Abnormal hip)

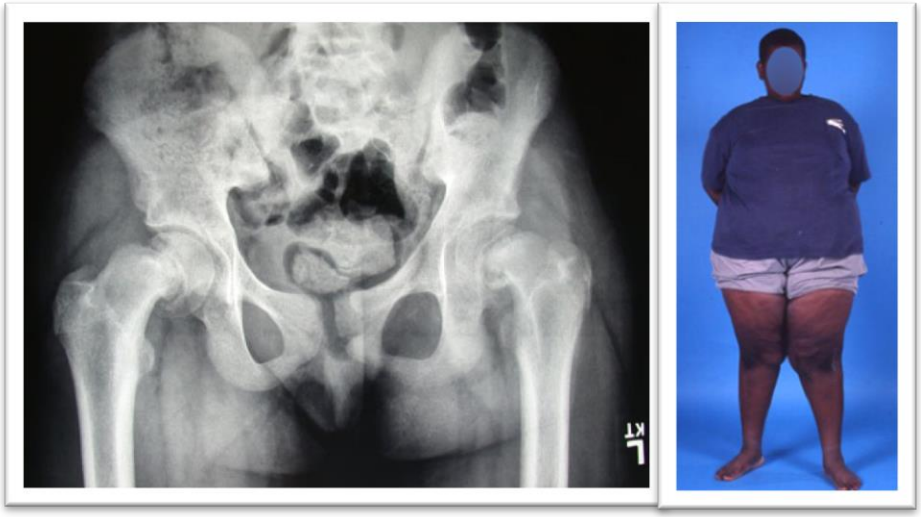
“Blount’s Disease”

- Excess weight overwhelms the growth plate and leads to "bowed legs”
- Can occur in either “growth spurt”

  (First 2 years of life or adolescence)
- Multiple operations to cut / straighten bones

Slipped Capital Femoral Epiphysis

- Excess weight overwhelms the growth plate and deforms the “ball and socket”

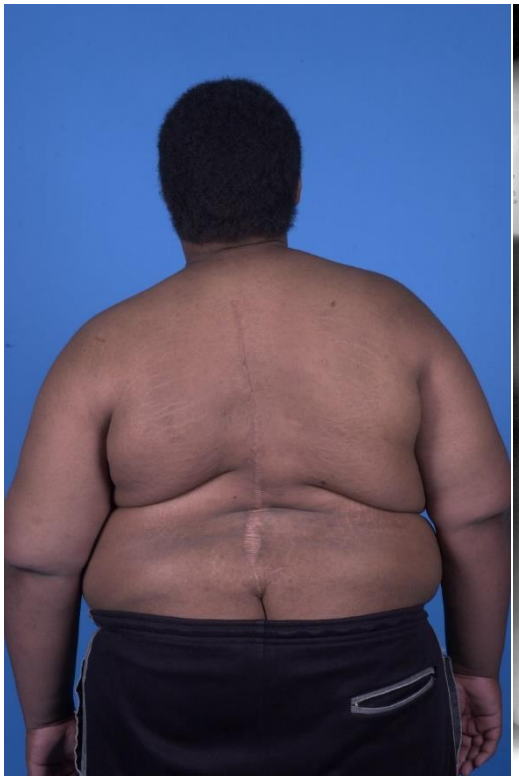


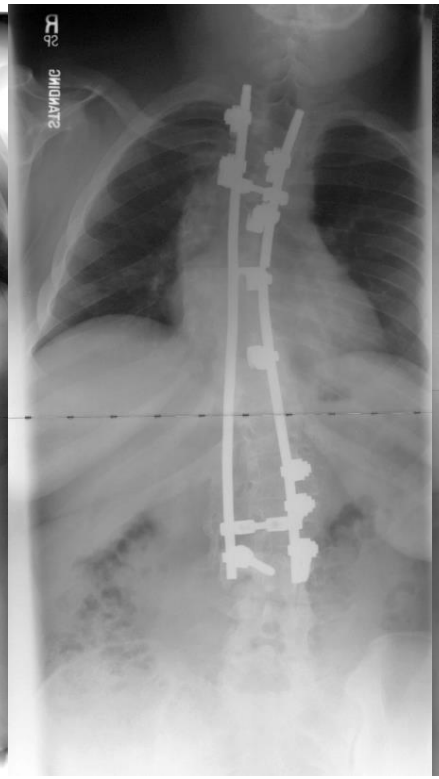
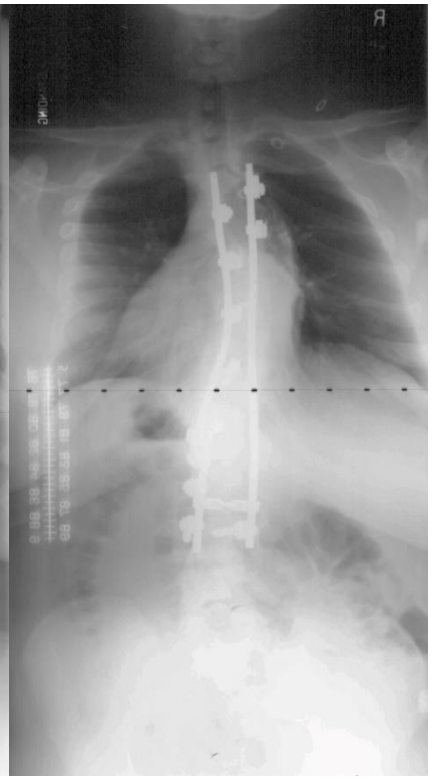
Slipped Capital Femoral Epiphysis

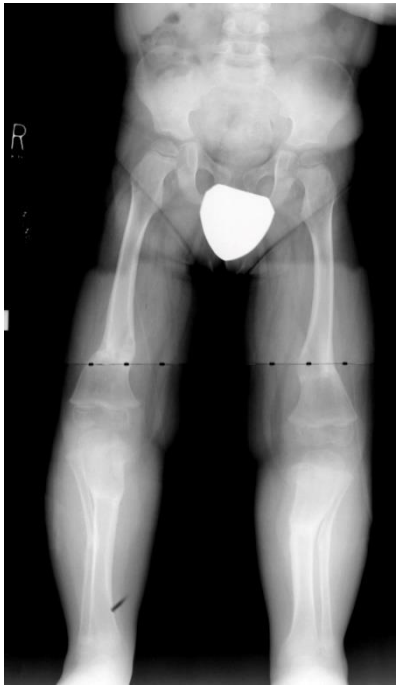
- If neglected it can happen suddenly and cause hip problems in adolescence

Pressure to move from *"Volume"* to *"Value"*

- Value = Outcome / Cost
- "Risk stratification"
  - Are some patients predisposed to have poorer outcomes ?
  - Which patients consume more resources ?
- Pediatric subspecialists "catching up with adult colleagues"
  - Scoliosis
  - Perthes' (Hip Condition)

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30
IN TRAINING

Thank You

Dallas | Plano | Frisco (Opening Late 2018)

SCOTTISH RITE FOR CHILDREN™

UT Southwestern Medical Center

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@TxScottishRite

Youtube.com/tsrhchildren

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CHILDHOOD OBESITY TYPE 2 DIABETES AND ENDOCRINOLOGY

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PRESIDENT, AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS
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CHILDHOOD OBESITY: SCOPE OF THE PROBLEM

- PREVALENCE – 18.5%
- STABLE TREND IN OBESITY AND SEVERE OBESITY FOR CHILDREN WHILE ADULTS INCREASED FROM 33.7% TO 39.6% OVER THE LAST 8 YEARS
- CONSEQUENCES OF CHILDHOOD OBESITY- INCREASED INCIDENCE OF TYPE 2 DM IN CHILDHOOD- 20% OF NEW DIABETES DIAGNOSIS IN PUBERTY

TYPE 2 DIABETES IN CHILDHOOD

- RISK FACTORS- FAMILY HISTORY OF TYPE 2 DM, ETHNIC GROUPS (NATIVE AMERICANS, AFRICAN-AMERICANS, ASIAN-AMERICANS
- DIAGNOSIS- FASTING BLOOD GLUCOSE
- INSULIN RESISTANCE- ASSOCIATED WITH EXCESS MALE HORMONE IN FEMALES- PCOS-

LIFESTYLE TREATMENT OF OBESITY IN CHILDREN WITH TYPE 2 DIABETES

CALORIC RESTRICTION- MILD

ELIMINATION OF CARBONATED AND SUGARY DRINKS, REDUCE INTAKE OF FATS AND HIGH GLYCEMIC FOODS

BALANCED DIET OF VEGETABLES, FRUITS, GRAINS

EXERCISE- CHILDREN GAIN WEIGHT WHEN THEY START TO SCHOOL,

FUN, AGE SPECIFIC AND TAILORED TO FITNESS LEVEL

GENETIC CAUSES OF OBESITY

- SINGLE GENE –LEPTIN AND GENES ASSOCIATED WITH THE PATHWAY
- GENETIC SYNDROMES- PRADER WILLI AND BARDET-BIEDEL SYNDROMES

A FEW STRATEGIES FOR PREVENTION OF OBESITY

- ENCOURAGE BREAST FEEDING
- DECREASE SCREEN TIME AND ENCOURAGE ACTIVE PLAY TIME
- PHYSICAL ACTIVITY AT SCHOOL- 30-45 MINUTES FOR 3-5 TIMES WEEKLY
- ENCOURAGE FAMILY FRIENDLY PLAY FACILITITES
- MORE BICYCLE, JOGGING AND WALKING PATHS.

Dr. Rick Snyder, M.D.,
Heart Place, Cardiology
Former President Texas Chapter of
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CARDIOVASCULAR IMPACT OF OBESITY

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Hypertension

Dyslipidemia

Diabetes

Heart attack

Heart failure

Cardiovascular Mortality

THE LANCET

Articles

Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study

Prof Salim Yusuf, DPhil, Steven Hawken, MSc, Stephanie Ôunpuu, PhD, Tony Dans, MD, Alvaro Avezum, MD, Fernando Lanas, MD, Matthew McQueen, FRCP, Andrzej Budaj, MD, Prem Pais, MD, John Varigos, BSc, Liu Lisheng, MD on behalf of the INTERHEART Study Investigators

Published: 11 September 2004

PlumX Metrics

DOI: https://doi.org/10.1016/S0140-6736(04)17018-9

Article Info

15,152 cases of first heart attacks and 14,820 age and sex matched controls worldwide

Nine modifiable risk factors:

- dyslipidemia,
- smoking,
- hypertension,
- diabetes,
- abdominal obesity,
- psychosocial factors,
- consumption of fruits and vegetables,
- alcohol use,
- regular physical activity

Account for over 90% of the risk of first heart attack

Combination Reported ORs and PARs

- **All risk factors**: OR 129 (99% CI 90-185); PAR 90.4% (99% CI 88.1-92.4)
- **All risk factors, current smokers only (no ex-smokers), extremes of obesity and ApoB/A1 ratio**: OR 333.7 (99% CI 230.2-483.9)
- **ApoB/A1 ratio and smoking**: PAR 66.8% (99% CI 62.8-70.6)
- **All lifestyle**: PAR 54.6%
- **Smoking, Hypertension, Diabetes**: OR 13.1 (99% CI 10.69-15.83); PAR 53%
- **Smoking, Hypertension, Diabetes, ApoB/ApoA1 Ratio**: OR 42.3 (99% CI 33.2-54.0); PAR 75.8% (99% CI 72.7-78.6)
- **Smoking, Hypertension, Diabetes, ApoB/ApoA1 Ratio, Abdominal Obesity**: PAR 80.2% (77.5-82.7)

Risk Factor	Controls (%)	Cases (%)	PAR 1 (99% CI)	PAR 2 (99% CI)
ApoB/apoA1 (5 vs 1)	20.0	33.5	54.1 (49.6-58.6)	49.2 (43.8-54.5)
Current smoking	26.8	45.2	36.4 (33.9-39.0)	35.7 (32.5-39.1)
Diabetes	7.5	18.5	12.3 (11.2-13.5)	9.9 (8.5-11.5)
Hypertension	21.9	39.0	23.4 (21.7-25.1)	17.9 (15.7-20.4)
Abdominal obesity (3 vs 1)	33.3	46.3	33.7 (30.2-37.4)	20.1 (15.3-26.0)
Psychosocial	-	-	28.8 (22.6-35.8)	32.5 (25.1-40.8)
Daily consumption of vegetables and fruit	42.2	35.8	12.9 (10.0-16.6)	13.7 (9.9-18.6)
Exercise	19.3	14.3	25.5 (20.1-31.8)	12.2 (5.5-25.1)
Alcohol intake	24.5	24.0	13.9 (9.3-20.2)	6.7 (2.0-20.2)
Combined	-	-	90.4 (88.1-92.4)	90.4 (99.1-92.4)

Region	Lifestyle factors					Other risk factors					
	Smoking (%)	Fruits and vegetables (%)	Exercise (%)	Alcohol (%)	All lifestyles (%)	Hypertension (%)	Diabetes (%)	Abdominal obesity (%)	All psychosocial (%)	Lipids (%)	All nine risk factors (%)
Men and women											
West Europe	29·3	12·4	38·4	18·7	67·6	21·9	15·0	63·4	38·9	44·6	93·9
Central and eastern Europe	30·2	10·2	11·3	12·9	49·6	24·5	9·1	28·0	4·9	35·0	72·5
Middle East	45·5	7·3	4·2	-1·0	47·6	9·2	15·5	25·9	41·6	70·5	95·0
Africa	38·9	4·8	10·1	26·6	63·4	29·6	16·7	58·4	40·0	74·1	97·4
South Asia	37·4	18·3	27·1	-5·5	56·6	19·3	11·8	37·7	15·9	58·7	89·4
China	35·9	18·0	20·3	5·7	62·3	22·1	10·0	5·5	35·4	43·8	89·9
Southeast Asia and Japan	36·2	11·2	31·4	27·9	69·9	38·4	21·0	58·0	26·7	67·7	93·7
Australia and New Zealand	44·8	11·1	23·8	18·6	66·0	22·6	7·2	61·3	28·9	43·4	89·5
South America	38·3	6·6	27·6	-3·7	56·6	32·7	12·7	45·5	35·6	47·6	89·4
North America	26·1	19·8	25·6	25·5	59·9	19·0	8·0	59·5	51·4	50·5	98·7
Overall 1	36·4	12·9	25·5	13·9	62·9	23·4	12·3	33·7	28·8	54·1	90·4*
Overall 2	35·7	13·7	12·2	6·7	54·6	17·9	9·9	20·1	32·5	49·2	90·4*

PAR estimates in women in some countries are based on small numbers and so they are less reliable . Overall 1= adjusted for age, sex, and smoking, Overall 2=adjusted for all risk factors. An extended version of this table with 99% CIs is shown in webtable 3 (http://image.thelancet.com/extras/04art8001webtable3.pdf). *Saturated model, no difference between adjusted and unadjusted models. †Non-estimatable.

February 28, 2018

Association of Body Mass Index With Lifetime Risk of Cardiovascular Disease and Compression of Morbidity

Sadiya S. Khan, MD, MS[1,2]; Hongyan Ning, MD, MS[2]; John T. Wilkins, MD, MS[1,2]; et al

» Author Affiliations | Article Information

JAMA Cardiol. Published online February 28, 2018. doi:10.1001/jamacardio.2018.0022

Key Points

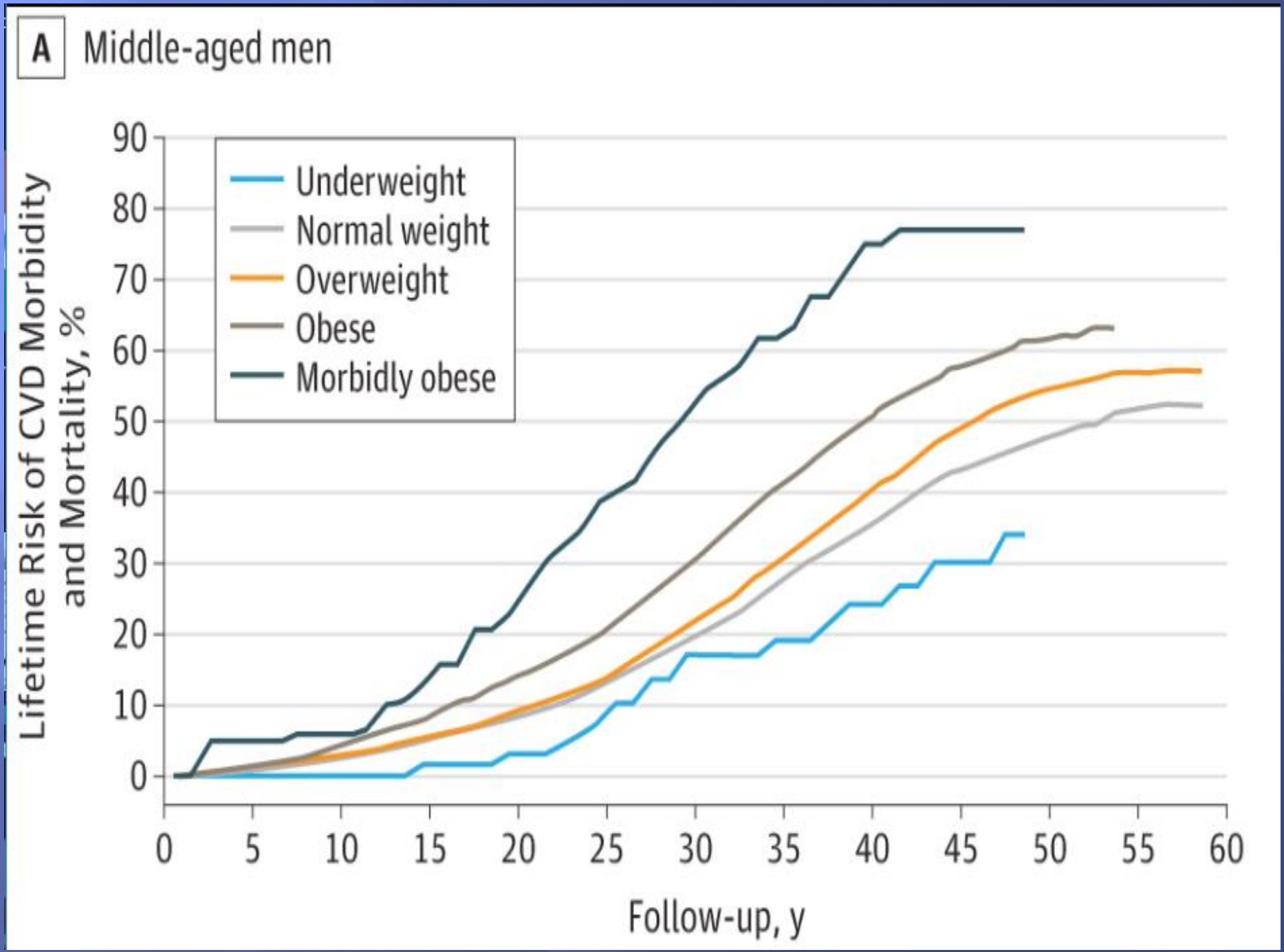
Question What is the association of body mass index with cardiovascular disease (CVD) morbidity and mortality?

Findings In this population-based study, overweight and obesity were associated with significantly increased risk for CVD. Obesity was associated with shorter longevity and a greater proportion of life lived with CVD; overweight was associated with similar longevity as normal weight but at the expense of a greater proportion of life lived with CVD.

Design, Setting, and Participants In this population-based study, we used pooled individual-level data from adults (baseline age, 20-39, 40-59, and 60-79 years) across 10 large US prospective cohorts, with 3.2 million person-years of follow-up from 1964 to 2015. All participants were free of clinical CVD at baseline with available BMI index and CVD outcomes data. Data were analyzed from October 2016 to July 2017.

Table 1. Baseline Characteristics and Body Mass Index Categories Among Men and Women According to Index Age Group

	No. (%)					
	Young (20-39 y)		Middle-aged (40-59 y)		Older (60-79 y)	
Demographic Characteristics	Men (n = 14 790)	Women (n = 12 072)	Men (n = 21 390)	Women (n = 51 100)	Men (n = 13 657)	Women (n = 77 663)
Follow-up, person-years	461 648	382 792	472 519	856 523	179 397	893 702
African American	1998 (13.5)	3113 (25.8)	2762 (12.9)	6700 (13.1)	1807 (13.2)	6951 (9.0)


A
Middle-aged men
Lifetime Risk of CVD Morbidity and Mortality, %
90
80
70
60
50
40
30
20
10
0
Underweight
Normal weight
Overweight
Obese
Morbidly obese
0
5
10
15
20
25
30
35
40
45
50
55
60
Follow-up, y

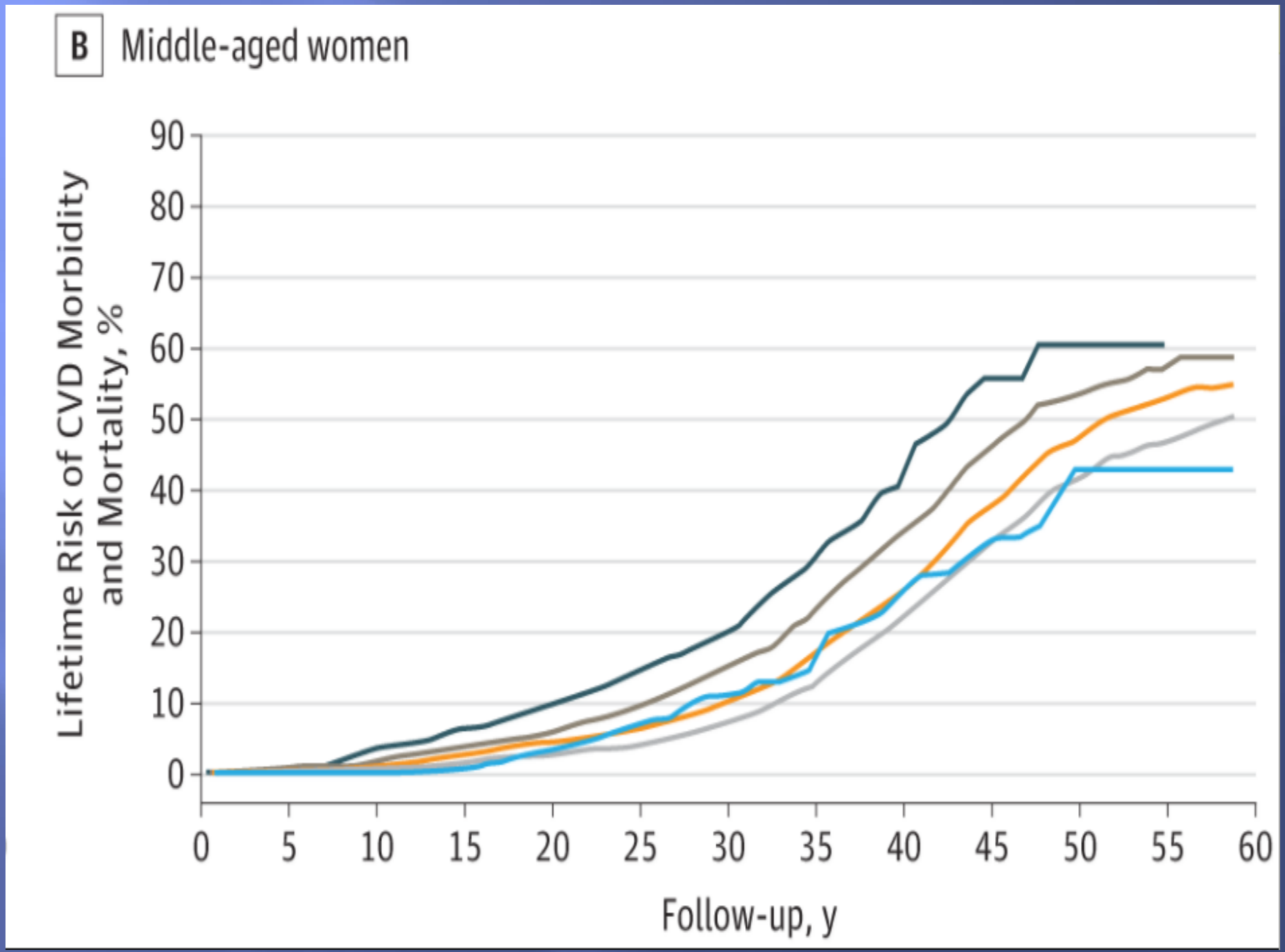

B
Middle-aged women
Lifetime Risk of CVD Morbidity and Mortality, %
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Follow-up, y

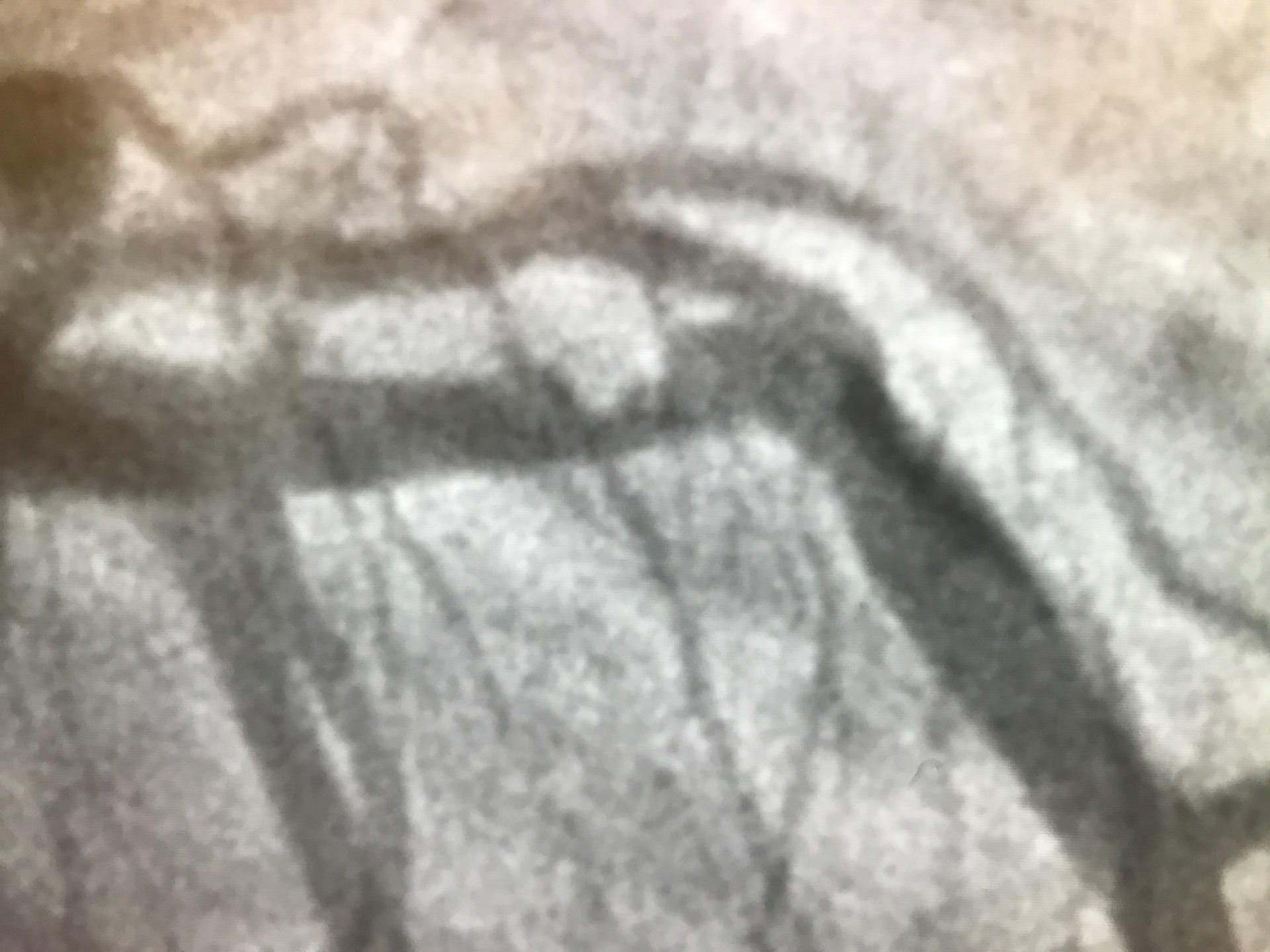
Table 3. Adjusted Competing Hazard Ratios[a] for First Event Among Middle-aged Men and Women According to Body Mass Index Strata[b]

Category	Body Mass Index, Hazard Ratio (95% CI)[c]				
	Underweight (<18.5)	Normal (18.5-24.9)	Overweight (25.0-29.9)	Obesity (30.0-39.9)	Morbid Obesity (≥40)
Male					
Non-CVD death	2.01 (1.38-2.92)	1 [Reference]	0.87 (0.81-0.93)	0.85 (0.78-0.94)	0.61 (0.39-0.97)
CVD event	0.68 (0.42-1.10)	1 [Reference]	1.21 (1.14-1.28)	1.67 (1.55-1.79)	3.14 (2.48-3.97)
Fatal and nonfatal MI	0.69 (0.36-1.32)	1 [Reference]	1.18 (1.09-1.28)	1.42 (1.29-1.56)	1.98 (1.42-2.78)
Fatal and nonfatal stroke	0.20 (0.02-1.44)	1 [Reference]	1.08 (0.94-1.23)	1.20 (1.02-1.41)	0.75 (0.35-1.60)
CHF	1.48 (0.64-3.40)	1 [Reference]	1.22 (1.07-1.40)	1.95 (1.68-2.27)	5.26 (3.65-7.57)
CVD death	0.54 (0.07-3.87)	1 [Reference]	1.23 (1.01-1.51)	1.55 (1.22-1.96)	1.52 (0.62-3.73)
Female					
Non-CVD death	1.53 (1.25-1.87)	1 [Reference]	1.02 (0.95-1.09)	1.01 (0.92-1.10)	1.15 (0.95-1.40)
CVD event	1.15 (0.92-1.43)	1 [Reference]	1.32 (1.24-1.40)	1.85 (1.72-1.99)	2.53 (2.20-2.91)
Fatal and nonfatal MI	1.35 (0.99-1.88)	1 [Reference]	1.42 (1.29-1.57)	1.75 (1.56-1.96)	1.80 (1.41-2.30)
Fatal and nonfatal stroke	1.01 (0.67-1.51)	1 [Reference]	1.11 (0.99-1.25)	1.28 (1.12-1.46)	1.01 (0.73-1.39)
CHF	1.09 (0.70-1.69)	1 [Reference]	1.37 (1.21-1.55)	2.28 (2.00-2.60)	4.32 (3.39-5.19)
CVD death	0.87 (0.41-1.86)	1 [Reference]	1.04 (0.84-1.27)	1.09 (0.85-1.40)	1.75 (1.10-2.78)

eTable 8. Adjusted* competing hazard ratios for first event (CVD event or non-CVD death) among young men and women (index age, 20-39 years) according to body mass index strata[a]

	Underweight (BMI <18.5 kg/m^2)	Normal (BMI 18.5-24.9 kg/m^2) (Referent)	Overweight (BMI 25-29.9 kg/m^2)	Obesity (BMI 30-39.9 kg/m^2)	Morbid Obesity (BMI ≥40 kg/m^2)
Male					
Non-CVD death	1.65 (1.06-2.57)	1.00	0.83 (0.75-0.93)	0.99 (0.84-1.16)	1.64 (0.81-3.30)
CVD event	0.56 (0.22-1.44)	1.00	1.15 (1.03-1.29)	1.77 (1.53-2.06)	4.05 (2.27-7.25)
Fatal and nonfatal MI	0.19 (0.03-1.36)	1.00	1.19 (1.02-1.38)	1.73 (1.43-2.10)	2.84 (1.21-6.72)
Fatal and nonfatal stroke	1.18 (0.26-5.18)	1.00	1.00 (0.77-1.56)	1.07 (0.73-1.56)	**
CHF	1.39 (0.18-10.4)	1.00	1.29 (0.89-1.87)	2.76 (1.82-4.19))	13.7 (4.81-39.0)
CVD death	0.98 (0.13-7.21)	1.00	1.06 (0.75-1.51)	1.77 (1.17-2.70)	5.86 (1.82-18.9)
Female					
Non-CVD death	1.19 (0.91-1.56)	1.00	1.15 (0.98-1.34)	1.06 (0.83-1.36)	2.22 (1.40-3.51)
CVD event	1.14 (0.82-1.58)	1.00	1.35 (1.14-1.61)	2.45 (1.96-3.08)	2.83 (1.60-4.99)
Fatal and nonfatal MI	1.00 (0.56-1.77)	1.00	1.38 (1.03-1.84)	2.48 (1.73-3.56)	2.77 (1.17-6.57)
Fatal and nonfatal stroke	1.63 (1.00-2.66)	1.00	1.26 (0.93-1.69)	2.09 (1.42-3.06)	2.42 (0.97-6.07)
CHF	0.73 (0.13-1.37)	1.00	1.48 (1.05-2.09)	1.90 (1.16-3.12)	4.07 (1.67-9.92)
CVD death	1.06 (0.38-2.93)	1.00	0.96 (0.51-1.82)	2.56 (1.32-4.96)	**

*Adjusted for age, race/ethnicity, and smoking status; [a]Fine and Gray Method; **Insufficient data for robust estimate of hazards



Recommendations	NHLBI Grade	NHLBI ES	ACC/AHA COR	ACC/AHA LOE
Identifying Patients Who Need to Lose Weight (BMI and Waist Circumference)				
1a. Measure height and weight and calculate BMI at annual visits or more frequently.	E (Expert Opinion)	CQ2	I	C
1b. Use the current cutpoints for overweight (BMI 25.0–29.9 kg/m^2) and obesity (BMI $\geq$30 kg/m^2) to identify adults who may be at elevated risk of CVD and the current cutpoints for obesity (BMI $\geq$30 kg/m^2) to identify adults who may be at elevated risk of mortality from all causes.	A (Strong)	CQ2	I	B
1c. Advise overweight and obese adults that the greater the BMI, the greater the risk of CVD, type 2 diabetes, and all-cause mortality.	A (Strong)	CQ2	I	B
1d. Measure waist circumference at annual visits or more frequently in overweight and obese adults. Advise adults that the greater the waist circumference, the greater the risk of CVD, type 2 diabetes, and all-cause mortality. The cutpoints currently in common use (from either NIH/NHLBI or WHO/IDF) may continue to be used to identify patients who may be at increased risk until further evidence becomes available.	E (Expert Opinion)	CQ2	IIa	B

Body Mass Index (Quetelet's index)

$$BMI = (Weight/2.205) / (Height/39.37)^2$$

Input:

Height	69	in
Weight	175	lb

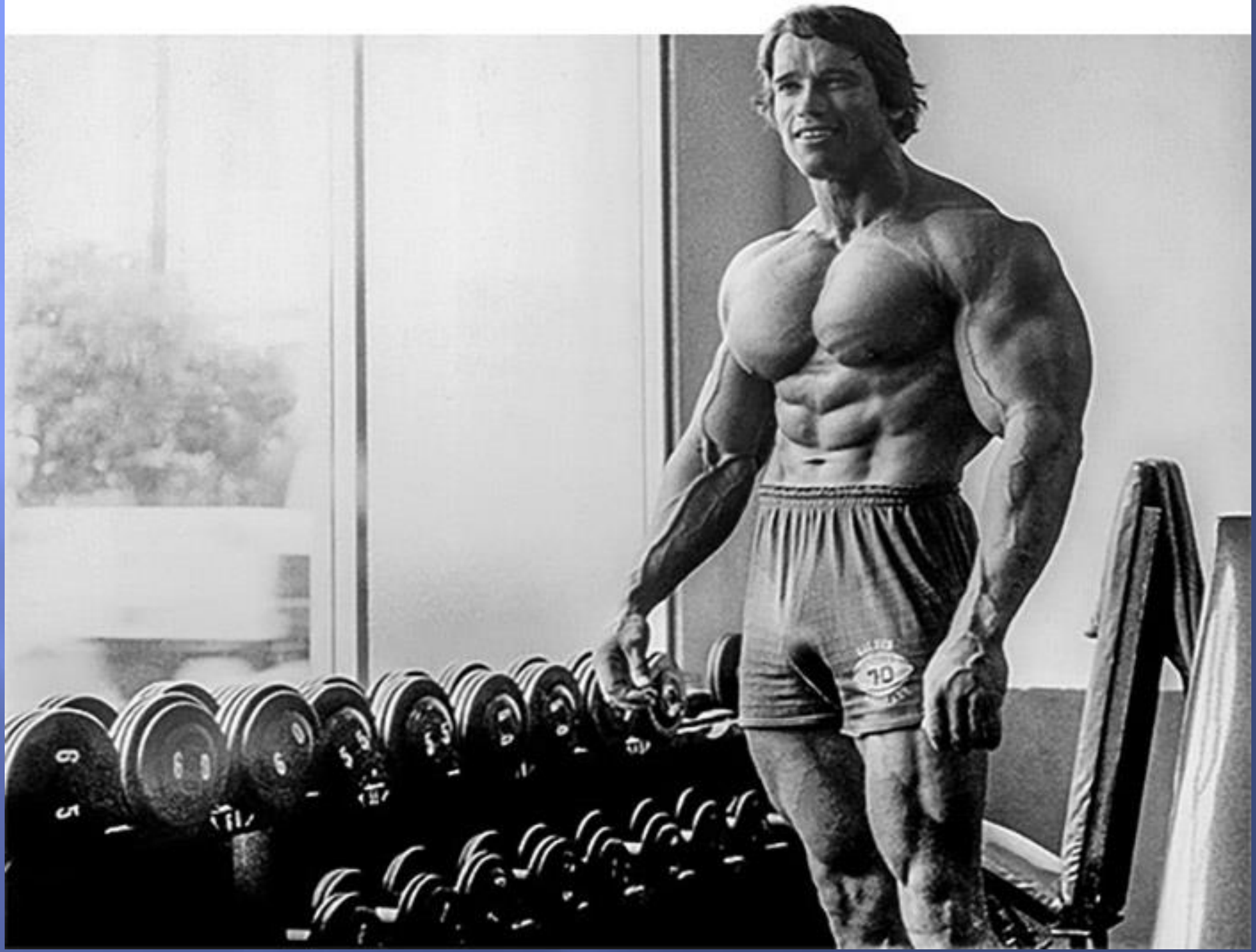
Result:

BMI 25.84 kg/m^2

Decimal Precision 2

Body Mass Index Interpretation

BMI < 18.5:	Below normal weight
BMI >= 18.5 and < 25:	Normal weight
BMI >= 25 and < 30:	Overweight
BMI >= 30 and < 35:	Class I Obesity
BMI >= 35 and < 40:	Class II Obesity
BMI >= 40:	Class III Obesity



	THE ROCK - Dwayne Johnson 	Arnold Schwarzenegger 
Height	190 cm 6'3"	186 cm 6'1"
Weight	107 kg 236 lbs	104 kg 229 lbs
Body Fat %	10.5%	7%
Muscle Index	10.8	13.1
Sexy Index	8	8.1
BMI	29.6	30.1
Daily Calorie Needs (?)	3399 kcal	3430 kcal
Shoulders-to-Waist Width Ratio	1.81	1.76
FFMI (?)	26.5	28
Lean Mass	95.8 kg 211 lbs	96.7 kg 213 lbs
Shoulders Span	57 cm 22 inches	67.7 cm 27 inches
Waist Span	31.5 cm 12 inches	38.5 cm 15 inches
Fat Mass	11.2 kg 25 lbs	7.3 kg 16 lbs
Age	41	29

Matching Treatment Benefits With Risk Profiles (Reduction in Body Weight Effect on Risk Factors for CVD, Events, Morbidity and Mortality)

2. Counsel overweight and obese adults with cardiovascular risk factors (high BP, hyperlipidemia, and hyperglycemia) that lifestyle changes that produce even modest, sustained weight loss of 3%–5% produce clinically meaningful health benefits, and greater weight losses produce greater benefits. a. Sustained weight loss of 3%–5% is likely to result in clinically meaningful reductions in triglycerides, blood glucose, hemoglobin A1c, and the risk of developing type 2 diabetes; b. Greater amounts of weight loss will reduce BP, improve LDL-C and HDL-C, and reduce the need for medications to control BP, blood glucose, and lipids as well as further reduce triglycerides and blood glucose.	A (Strong)	CQ1	I	A

ES6. In observational cohort studies, overweight and obese adults with type 2 diabetes who intentionally lost 9 kg to 13 kg had a 25% decrease in mortality rate compared with weight-stable controls.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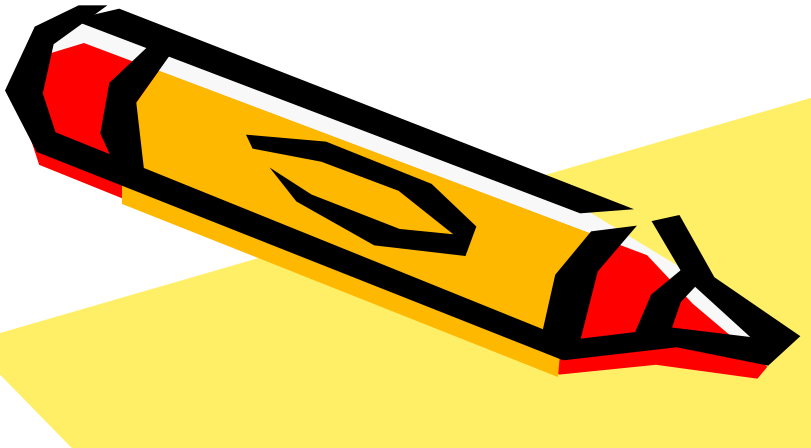
Dr. Lee Ann Pearse, M.D., Pediatrix Medical Group, Pediatric Cardiology



Pediatric Obesity

Pediatric Cardiologist Perspective

Pediatric Obesity

- Reason for referral
  - Hypertension
  - Chest pain
  - Lipid abnormality
  - Medication clearance
  - Other

Pediatric Obesity

- Medical/social history
  - Family
  - Genetic
  - Psychological
  - Endocrine
  - Cardiac