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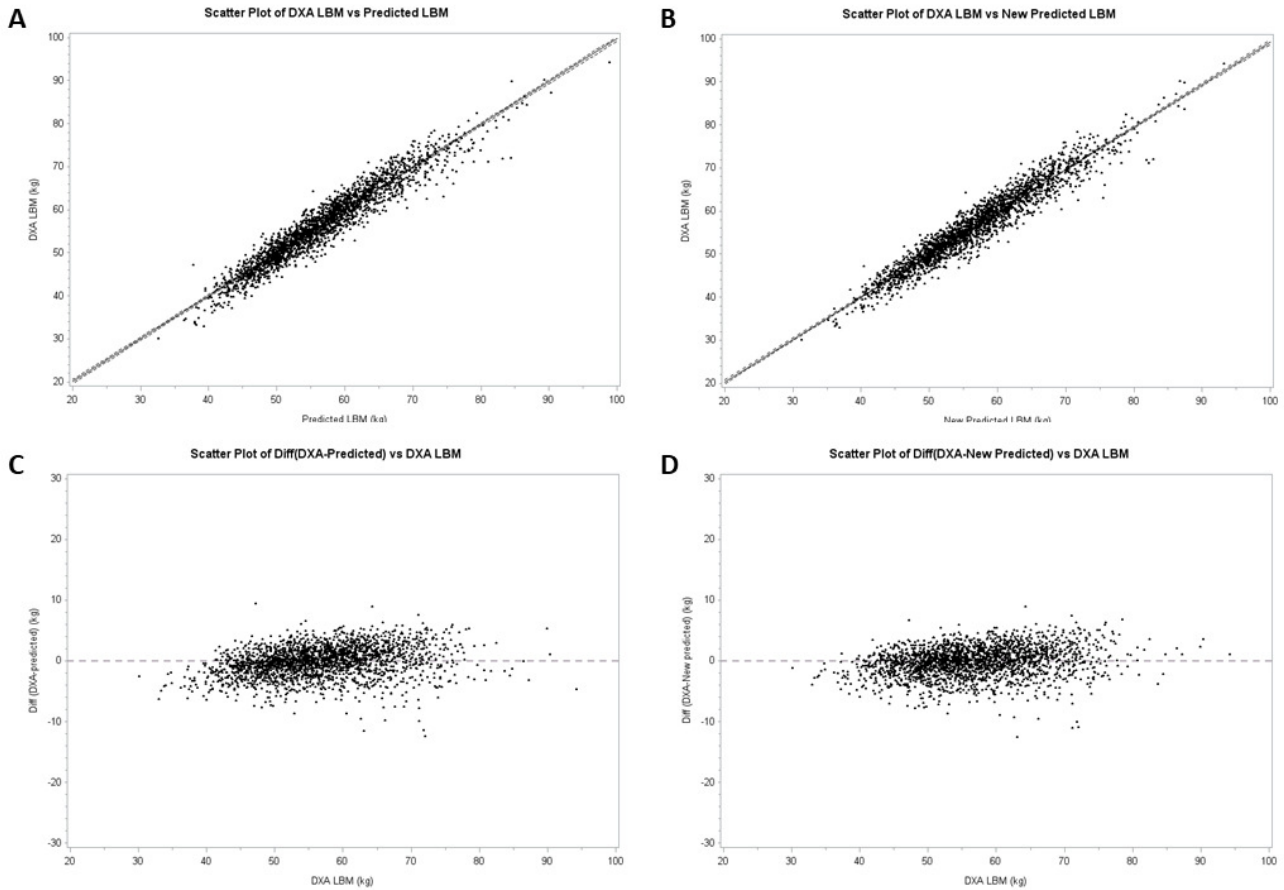
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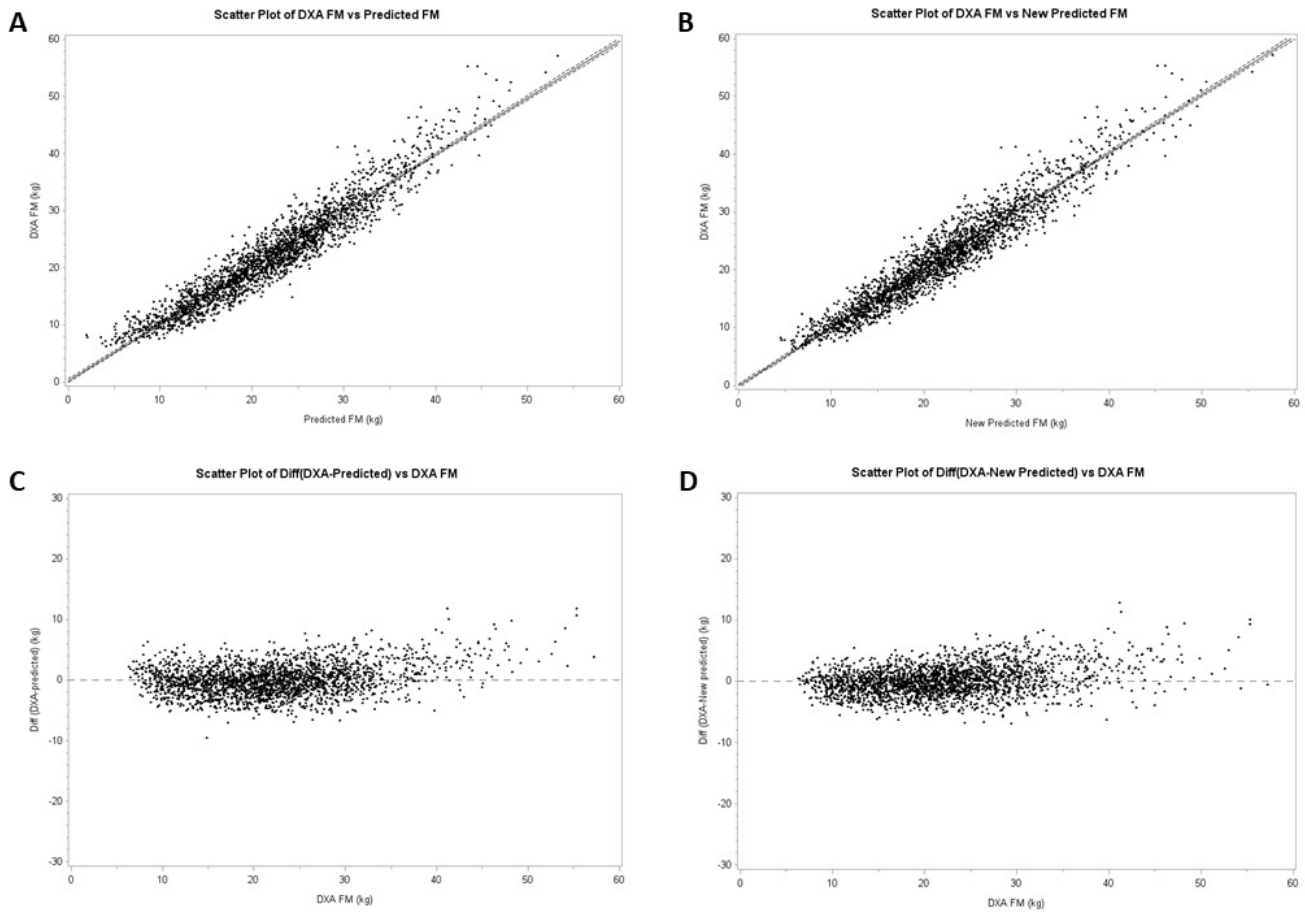
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This supplementary material has been provided by the authors to give readers additional information about their work.

Supplementary figure A. Scatter plots for LBM in an independent validation group from the NHANES 1999-2006 (n=2292). Scatter plots of DXA measured LBM (y-axis) against predicted LBM (x-axis) (A. Original equations and B. Equations with polynomial terms). Scatter plots of difference between DXA and predicted LBM (y-axis) against DXA measured LBM (x-axis) (C. Original equation and D. Equations with polynomial terms). For A and B, solid lines represent regression and dotted lines represent 95% CI. For C and D, dotted lines represent mean difference of 0. DXA=dual energy x ray absorptiometry; LBM=lean body mass; NHANES=National Health and Nutrition Examination Survey.



Supplementary figure B. Scatter plots for FM in an independent validation group from the NHANES 1999-2006 (n=2292). Scatter plots of DXA measured FM (y-axis) against predicted FM (x-axis) (A. Original equations and B. Equations with polynomial terms). Scatter plots of difference between DXA and predicted FM (y-axis) against DXA measured FM (x-axis) (C. Original equation and D. Equations with polynomial terms). For A and B, solid lines represent regression and dotted lines represent 95% CI. For C and D, dotted lines represent mean difference of 0. DXA=dual energy x ray absorptiometry; FM=fat mass; NHANES=National Health and Nutrition Examination Survey.



Supplementary table A. Anthropometric prediction equations for lean body mass and fat mass in men†

Original equations		
LBM (kg)	$= 19.363 + 0.001 \cdot \text{age (yr)} + 0.064 \cdot \text{height (cm)} + 0.756 \cdot \text{weight (kg)} - 0.366 \cdot \text{waist (cm)} - 0.066 \cdot \text{Mexican} + 0.231 \cdot \text{Hispanic} + 0.432 \cdot \text{Black} - 1.007 \cdot \text{Other ethnicity}$	R ² =0.91 SEE=2.55 kg
FM (kg)	$= -18.592 - 0.009 \cdot \text{age (yr)} - 0.080 \cdot \text{height (cm)} + 0.226 \cdot \text{weight (kg)} + 0.387 \cdot \text{waist (cm)} + 0.080 \cdot \text{Mexican} - 0.188 \cdot \text{Hispanic} - 0.483 \cdot \text{Black} + 1.050 \cdot \text{Other ethnicity}$	R ² =0.90 SEE=2.60 kg
Equations with polynomial terms		
LBM (kg)	$= 12.052 - 0.003 \cdot \text{age (yr)} + 0.049 \cdot \text{height (cm)} + 1.133 \cdot \text{weight (kg)} - 0.486 \cdot \text{waist (cm)} - 0.112 \cdot \text{Mexican} + 0.135 \cdot \text{Hispanic} + 0.359 \cdot \text{Black} - 0.849 \cdot \text{Other ethnicity} - 0.006 \cdot (\text{weight (kg)} \cdot \text{waist (cm)}) + 0.001 \cdot (\text{weight (kg)})^2 + 0.003 \cdot (\text{waist (cm)})^2$	R ² =0.92 SEE=2.50 kg
FM (kg)	$= -14.321 - 0.005 \cdot \text{age (yr)} - 0.064 \cdot \text{height (cm)} - 0.236 \cdot \text{weight (kg)} + 0.639 \cdot \text{waist (cm)} + 0.112 \cdot \text{Mexican} - 0.099 \cdot \text{Hispanic} - 0.363 \cdot \text{Black} + 0.888 \cdot \text{Other ethnicity} + 0.008 \cdot (\text{weight (kg)} \cdot \text{waist (cm)}) - 0.002 \cdot (\text{weight (kg)})^2 - 0.005 \cdot (\text{waist (cm)})^2$	R ² =0.91 SEE=2.54 kg

FM=fat mass; LBM=lean body mass; SEE=standard error of estimate.

Race variables are binary variables (1 if yes, 0 if no), and white is the reference group.

†Equations were developed and validated using the National Health and Nutrition Examination Survey 1999-2006.

Supplementary table B. Validation of predicted LBM with DXA measured LBM in an independent validation group from the NHANES 1999-2006 (n=2292)

Mean (SD)	Tenth of DXA measured LBM									
	1	2	3	4	5	6	7	8	9	10
DXA measured LBM (kg)	42.70 (2.85)	47.70 (0.98)	50.40 (0.72)	52.78 (0.64)	54.91 (0.58)	57.25 (0.69)	59.69 (0.70)	62.32 (0.82)	65.80 (1.21)	72.60 (4.20)
Original equations										
Predicted LBM (kg)	44.37 (2.76)	48.64 (2.38)	50.96 (2.21)	52.95 (2.34)	54.78 (2.11)	57.23 (2.13)	59.31 (2.52)	61.62 (2.75)	65.16 (2.95)	71.96 (5.44)
Diff (DXA-predicted) (kg)	-1.67 (1.98)	-0.94 (2.14)	-0.56 (2.13)	-0.18 (2.28)	0.13 (2.02)	0.02 (2.12)	0.39 (2.41)	0.70 (2.53)	0.64 (2.69)	0.64 (3.18)
Equations with polynomial terms										
Predicted LBM (kg)	43.83 (3.06)	48.50 (2.37)	50.97 (2.28)	53.06 (2.37)	54.94 (2.16)	57.46 (2.18)	59.57 (2.51)	61.86 (2.74)	65.36 (2.82)	71.85 (5.03)
Diff (DXA-predicted) (kg)	-1.13 (1.95)	-0.80 (2.09)	-0.57 (2.19)	-0.28 (2.30)	-0.04 (2.06)	-0.21 (2.18)	0.13 (2.41)	0.47 (2.52)	0.44 (2.56)	0.75 (2.97)

DXA=dual energy x ray absorptiometry; LBM=lean body mass; NHANES=National Health and Nutrition Examination Survey; SD=standard deviation.

Supplementary table C. Validation of predicted FM with DXA measured FM in an independent validation group from the NHANES 1999-2006 (n=2292)

Mean (SD)	Tenth of DXA measured FM									
	1	2	3	4	5	6	7	8	9	10
DXA measured FM (kg)	9.80 (1.32)	13.21 (0.87)	15.93 (0.73)	18.34 (0.67)	20.55 (0.62)	22.46 (0.57)	24.52 (0.65)	27.00 (0.82)	30.28 (1.14)	38.55 (5.42)
Original equations										
Predicted FM (kg)	9.63 (2.71)	13.79 (2.22)	16.39 (2.38)	18.82 (2.34)	21.10 (2.24)	22.79 (2.31)	24.77 (2.39)	26.74 (2.76)	29.63 (2.70)	36.38 (4.84)
Diff (DXA-predicted) (kg)	0.17 (2.17)	-0.59 (2.03)	-0.47 (2.30)	-0.49 (2.15)	-0.54 (2.14)	-0.33 (2.27)	-0.25 (2.34)	0.26 (2.59)	0.65 (2.57)	2.17 (3.07)
Equations with polynomial terms										
Predicted FM (kg)	10.22 (2.24)	13.95 (2.00)	16.40 (2.15)	18.73 (2.15)	20.86 (2.13)	22.45 (2.18)	24.40 (2.36)	26.40 (2.85)	29.33 (2.79)	36.71 (5.56)
Diff (DXA-predicted) (kg)	-0.42 (1.76)	-0.75 (1.84)	-0.48 (2.07)	-0.39 (1.97)	-0.30 (2.03)	0.01 (2.14)	0.12 (2.32)	0.60 (2.67)	0.95 (2.66)	1.84 (3.17)

DXA=dual energy x ray absorptiometry; FM=fat mass; NHANES=National Health and Nutrition Examination Survey; SD=standard deviation.

Supplementary table D. Hazard ratio (95% CI) of all cause mortality according to body mass index in men (exclusion of low fat mass)

	No of deaths	IR /100000 person years	Hazard ratio (95% CI)					
			Model 1*	Model 2*	Model 3†	Model 4‡	Model 5§	
BMI								
<18.5	53	2883	1.74 (1.33 to 2.28)	1.65 (1.25 to 2.16)	2.24 (1.16 to 4.32)	1.66 (0.75 to 3.71)	1.75 (0.79 to 3.91)	
18.5-20.4	269	1754	1.16 (1.03 to 1.32)	1.09 (0.96 to 1.24)	1.14 (0.96 to 1.35)	1.13 (0.91 to 1.39)	1.43 (1.04 to 1.95)	
20.5-22.4	1358	1464	1.01 (0.95 to 1.08)	1.03 (0.97 to 1.09)	1.03 (0.96 to 1.09)	1.03 (0.96 to 1.10)	1.09 (1.01 to 1.18)	
22.5-24.9	3740	1472	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	
25.0-27.4	3986	1638	1.09 (1.04 to 1.14)	1.04 (0.99 to 1.09)	1.04 (0.99 to 1.09)	1.04 (0.99 to 1.09)	1.04 (1.00 to 1.09)	
27.5-29.9	1753	1845	1.31 (1.24 to 1.39)	1.21 (1.14 to 1.28)	1.21 (1.14 to 1.28)	1.21 (1.15 to 1.29)	1.22 (1.15 to 1.29)	
30.0-34.9	1001	1913	1.48 (1.38 to 1.59)	1.31 (1.22 to 1.41)	1.31 (1.22 to 1.41)	1.32 (1.22 to 1.41)	1.32 (1.23 to 1.42)	
≥35.0	196	2368	2.28 (1.98 to 2.64)	2.01 (1.74 to 2.33)	2.02 (1.75 to 2.33)	2.02 (1.75 to 2.34)	2.03 (1.76 to 2.35)	
P value for trend			<0.001	<0.001	<0.001	<0.001	<0.001	

BMI=body mass index; IR=incidence rate.

*Model 1 adjusted for age. Model 2 adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths).

†Additionally, excluded participants with fat mass below 2.5th centile. For exclusion analyses, height adjusted fat mass was used after regression out of variation due to height.

‡Additionally, excluded participants with fat mass below 5th centile. For exclusion analyses, height adjusted fat mass was used after regression out of variation due to height.

§Additionally, excluded participants with fat mass below 10th centile. For exclusion analyses, height adjusted fat mass was used after regression out of variation due to height.

Supplementary table E. Hazard ratio (95% CI) of all cause mortality according to body mass index, predicted fat mass, lean body mass, and body mass by different lag times

	Hazard ratio (95% CI)			
	No lag	4+ years	8+ years	12+ years
No of deaths	12356	10726	8214	5982
IR/100000 person years	1619	1784	1882	2021
Fifth of fat mass*				
1 (lowest)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
2	0.98 (0.93 to 1.04)	1.03 (0.97 to 1.10)	1.04 (0.96 to 1.12)	1.02 (0.93 to 1.11)
3	0.95 (0.89 to 1.01)	0.99 (0.93 to 1.06)	1.02 (0.94 to 1.10)	1.02 (0.93 to 1.12)
4	1.04 (0.98 to 1.11)	1.11 (1.04 to 1.19)	1.12 (1.04 to 1.22)	1.14 (1.03 to 1.25)
5 (highest)	1.22 (1.13 to 1.31)	1.29 (1.19 to 1.40)	1.38 (1.26 to 1.51)	1.36 (1.22 to 1.51)
P value for trend	<0.001	<0.001	<0.001	<0.001
Fifth of lean body mass*				
1 (lowest)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
2	0.87 (0.83 to 0.92)	0.87 (0.83 to 0.93)	0.90 (0.84 to 0.96)	0.93 (0.86 to 1.01)
3	0.84 (0.80 to 0.89)	0.88 (0.83 to 0.94)	0.88 (0.82 to 0.94)	0.93 (0.85 to 1.01)
4	0.85 (0.80 to 0.91)	0.89 (0.83 to 0.95)	0.90 (0.84 to 0.97)	0.93 (0.85 to 1.02)
5 (highest)	0.90 (0.84 to 0.97)	0.95 (0.88 to 1.03)	0.94 (0.87 to 1.03)	1.00 (0.91 to 1.11)
P value for trend	0.001	0.21	0.21	0.91
BMI				
<18.5	2.33 (2.00 to 2.71)	1.45 (1.11 to 1.90)	1.46 (1.06 to 2.02)	1.55 (1.06 to 2.27)
18.5-20.4	1.41 (1.28 to 1.54)	1.14 (1.01 to 1.29)	1.10 (0.95 to 1.27)	1.00 (0.84 to 1.20)
20.5-22.4	1.14 (1.08 to 1.21)	1.04 (0.98 to 1.11)	1.00 (0.93 to 1.08)	0.99 (0.90 to 1.08)
22.5-24.9	1 (reference)	1 (reference)	1 (reference)	1 (reference)
25.0-27.4	0.94 (0.90 to 0.99)	0.98 (0.93 to 1.03)	1.01 (0.95 to 1.07)	1.03 (0.97 to 1.10)
27.5-29.9	1.09 (1.03 to 1.15)	1.16 (1.09 to 1.23)	1.17 (1.09 to 1.26)	1.24 (1.14 to 1.35)
30.0-34.9	1.20 (1.12 to 1.29)	1.28 (1.19 to 1.38)	1.35 (1.24 to 1.46)	1.36 (1.22 to 1.50)
≥35.0	1.64 (1.44 to 1.87)	1.61 (1.39 to 1.86)	1.65 (1.39 to 1.95)	1.92 (1.58 to 2.34)
P value for trend	0.62	<0.001	<0.001	<0.001

BMI=body mass index; IR=incidence rate.

All models were adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths). Fat mass and lean body mass were mutually adjusted in the model.

*Derived from validated anthropometric prediction equations. Height was adjusted by inclusion as continuous variable for fat mass and by regression out of variation due to height for lean body mass.

Supplementary table F. Hazard ratio (95% CI) of all cause mortality according to predicted fat mass, lean body mass, and body mass stratified by smoking status

	Hazard ratio (95% CI)		
	Never smokers	Past smoker	Current smoker
No of deaths	6791	4947	618
IR/100000 person years	1660	1561	1670
Fifth of fat mass*			
1 (lowest)	1 (reference)	1 (reference)	1 (reference)
2	1.06 (0.97 to 1.15)	1.14 (1.03 to 1.26)	0.95 (0.72 to 1.26)
3	1.01 (0.93 to 1.11)	1.02 (0.92 to 1.13)	0.92 (0.68 to 1.24)
4	1.17 (1.07 to 1.28)	1.16 (1.04 to 1.29)	1.22 (0.90 to 1.65)
5 (highest)	1.40 (1.26 to 1.54)	1.34 (1.19 to 1.51)	1.17 (0.84 to 1.65)
P value for trend	<0.001	<0.001	0.19
Fifth of lean body mass*			
1 (lowest)	1 (reference)	1 (reference)	1 (reference)
2	0.95 (0.88 to 1.02)	0.91 (0.83 to 0.99)	0.66 (0.50 to 0.86)
3	0.90 (0.83 to 0.98)	0.94 (0.86 to 1.03)	0.72 (0.54 to 0.94)
4	0.92 (0.85 to 1.00)	0.94 (0.85 to 1.03)	0.81 (0.61 to 1.08)
5 (highest)	0.97 (0.89 to 1.07)	0.98 (0.88 to 1.10)	0.86 (0.63 to 1.19)
P value for trend	0.46	0.97	0.61
BMI			
<18.5	1.57 (1.08 to 2.29)	1.67 (1.07 to 2.61)	1.96 (0.78 to 4.94)
18.5-20.4	1.01 (0.85 to 1.19)	1.23 (1.00 to 1.51)	1.24 (0.78 to 1.98)
20.5-22.4	1.01 (0.93 to 1.10)	1.01 (0.91 to 1.13)	1.35 (1.04 to 1.76)
22.5-24.9	1 (reference)	1 (reference)	1 (reference)
25.0-27.4	1.05 (0.99 to 1.11)	1.02 (0.95 to 1.10)	1.15 (0.92 to 1.42)
27.5-29.9	1.23 (1.14 to 1.33)	1.20 (1.10 to 1.31)	1.24 (0.95 to 1.63)
30.0-34.9	1.32 (1.19 to 1.45)	1.27 (1.14 to 1.42)	1.56 (1.12 to 2.17)
≥35.0	2.02 (1.65 to 2.48)	2.06 (1.66 to 2.56)	1.89 (0.86 to 4.14)
P value for trend	<0.001	<0.001	0.18

BMI=body mass index; IR=incidence rate.

All models were adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths). Fat mass and lean body mass were mutually adjusted in the model.

*Derived from validated anthropometric prediction equations. Height was adjusted by inclusion as continuous variable for fat mass and by regression out of variation due to height for lean body mass.

Supplementary table G. Hazard ratio (95% CI) of all cause mortality according to predicted fat mass, lean body mass, and body mass stratified by age

	Hazard ratio (95% CI)		
	Age <70 years	Age 70-84 years	Age ≥85 years
No of deaths	2406	6845	3105
IR/100000 person years	475	2952	12120
Fifth of fat mass*			
1 (lowest)	1 (reference)	1 (reference)	1 (reference)
2	1.14 (0.99 to 1.31)	1.08 (0.99 to 1.18)	1.02 (0.91 to 1.15)
3	0.95 (0.81 to 1.11)	1.01 (0.93 to 1.10)	1.03 (0.91 to 1.16)
4	1.22 (1.04 to 1.42)	1.17 (1.07 to 1.28)	1.10 (0.97 to 1.25)
5 (highest)	1.52 (1.28 to 1.80)	1.39 (1.25 to 1.53)	1.15 (0.99 to 1.33)
P value for trend	<0.001	<0.001	0.04
Fifth of lean body mass*			
1 (lowest)	1 (reference)	1 (reference)	1 (reference)
2	0.85 (0.73 to 0.97)	0.92 (0.85 to 0.99)	0.97 (0.88 to 1.07)
3	0.87 (0.76 to 1.01)	0.90 (0.83 to 0.97)	0.94 (0.84 to 1.05)
4	0.94 (0.81 to 1.09)	0.88 (0.81 to 0.96)	1.03 (0.91 to 1.16)
5 (highest)	0.98 (0.84 to 1.15)	0.92 (0.84 to 1.01)	1.05 (0.90 to 1.22)
P value for trend	0.55	0.08	0.58
BMI			
<18.5	1.80 (0.96 to 3.38)	1.69 (1.19 to 2.39)	1.45 (0.80 to 2.63)
18.5-20.4	1.28 (0.96 to 1.71)	1.13 (0.95 to 1.34)	0.94 (0.74 to 1.20)
20.5-22.4	1.01 (0.87 to 1.17)	1.03 (0.94 to 1.12)	1.04 (0.93 to 1.17)
22.5-24.9	1 (reference)	1 (reference)	1 (reference)
25.0-27.4	1.12 (1.00 to 1.24)	1.03 (0.97 to 1.09)	1.02 (0.94 to 1.12)
27.5-29.9	1.37 (1.21 to 1.56)	1.18 (1.09 to 1.27)	1.18 (1.04 to 1.33)
30.0-34.9	1.59 (1.38 to 1.84)	1.28 (1.16 to 1.40)	1.12 (0.94 to 1.34)
≥35.0	2.33 (1.80 to 3.03)	2.05 (1.70 to 2.47)	1.29 (0.79 to 2.13)
P value for trend	<0.001	<0.001	0.04

BMI=body mass index; IR=incidence rate.

All models were adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths). Fat mass and lean body mass were mutually adjusted in the model.

*Derived from validated anthropometric prediction equations. Height was adjusted by inclusion as continuous variable for fat mass and by regression out of variation due to height for lean body mass.

Supplementary table H. Sensitivity analysis of predicted fat mass, lean body mass, and body mass in relation to all cause mortality in men

	Hazard ratio (95% CI)			
	Model 1	Model 2	Model 3	Model 4
Fifth of fat mass*				
1 (lowest)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
2	1.09 (1.02 to 1.16)	1.09 (1.02 to 1.16)	1.09 (1.02 to 1.17)	1.08 (1.01 to 1.14)
3	1.02 (0.96 to 1.09)	1.03 (0.96 to 1.10)	0.99 (0.92 to 1.07)	1.02 (0.96 to 1.09)
4	1.19 (1.11 to 1.27)	1.18 (1.10 to 1.26)	1.18 (1.09 to 1.27)	1.15 (1.08 to 1.23)
5 (highest)	1.41 (1.31 to 1.51)	1.37 (1.27 to 1.47)	1.41 (1.30 to 1.53)	1.36 (1.26 to 1.46)
P value for trend	<0.001	<0.001	<0.001	<0.001
Fifth of lean body mass*				
1 (lowest)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
2	0.91 (0.86 to 0.96)	0.92 (0.87 to 0.97)	0.90 (0.84 to 0.95)	0.90 (0.86 to 0.95)
3	0.89 (0.84 to 0.95)	0.90 (0.85 to 0.96)	0.89 (0.83 to 0.95)	0.89 (0.84 to 0.94)
4	0.91 (0.86 to 0.97)	0.92 (0.86 to 0.98)	0.90 (0.84 to 0.96)	0.91 (0.86 to 0.97)
5 (highest)	0.96 (0.90 to 1.03)	0.98 (0.91 to 1.05)	0.95 (0.88 to 1.02)	0.96 (0.90 to 1.03)
P value for trend	0.33	0.62	0.27	0.29
BMI				
<18.5	1.68 (1.28 to 2.20)	1.36 (1.00 to 1.84)	1.85 (1.39 to 2.46)	1.48 (1.14 to 1.92)
18.5-20.4	1.10 (0.97 to 1.25)	1.08 (0.95 to 1.22)	1.17 (1.01 to 1.35)	1.12 (1.00 to 1.26)
20.5-22.4	1.03 (0.96 to 1.09)	1.02 (0.95 to 1.08)	1.02 (0.95 to 1.10)	1.03 (0.97 to 1.09)
22.5-24.9	1 (reference)	1 (reference)	1 (reference)	1 (reference)
25.0-27.4	1.05 (1.00 to 1.10)	1.03 (0.99 to 1.08)	1.04 (0.99 to 1.10)	1.03 (0.99 to 1.08)
27.5-29.9	1.23 (1.16 to 1.31)	1.21 (1.14 to 1.28)	1.23 (1.15 to 1.31)	1.21 (1.14 to 1.28)
30.0-34.9	1.35 (1.26 to 1.45)	1.31 (1.22 to 1.41)	1.35 (1.25 to 1.46)	1.32 (1.23 to 1.41)
≥35.0	2.10 (1.81 to 2.42)	2.04 (1.76 to 2.36)	2.09 (1.79 to 2.43)	1.86 (1.61 to 2.14)
P value for trend	<0.001	<0.001	<0.001	<0.001

BMI=body mass index.

All models were adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths). Fat mass and lean body mass were mutually adjusted in the model.

Model 1: no adjustment for physical activity (No of deaths/person years: 12356/763041).

Model 2: exclusion of deaths occurred in the early follow-up period (2 years) (No of deaths/person years: 11940/760100).

Model 3: exclusion of right censoring criteria for age (>85 years) (No of deaths/person years: 9764/743476).

Model 4: inclusion of baseline illness (No of deaths/person years: 13172/779628).

*Derived from validated anthropometric prediction equations. Height was adjusted by inclusion as continuous variable for fat mass and by regression out of variation due to height for lean body mass.

Supplementary table I. Hazard ratio (95% CI) of all cause and cause specific mortality according to fifths of body mass index in men

	Hazard ratio (95% CI)				
	All cause death	CVD death	Cancer death	Respiratory death	Other death
No of deaths	12356	4297	3726	960	3373
IR/100000 person years	1619	558	483	124	437
BMI					
1 (lowest)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
2	0.98 (0.93 to 1.04)	1.01 (0.91 to 1.12)	1.05 (0.95 to 1.17)	0.74 (0.61 to 0.90)	0.97 (0.87 to 1.09)
3	0.96 (0.91 to 1.02)	1.08 (0.98 to 1.20)	0.97 (0.87 to 1.07)	0.72 (0.60 to 0.88)	0.93 (0.83 to 1.03)
4	1.06 (1.00 to 1.12)	1.27 (1.15 to 1.40)	1.07 (0.97 to 1.19)	0.64 (0.53 to 0.78)	0.96 (0.87 to 1.07)
5 (highest)	1.25 (1.18 to 1.32)	1.60 (1.46 to 1.77)	1.19 (1.08 to 1.32)	0.71 (0.58 to 0.87)	1.11 (1.00 to 1.24)
P value for trend	<0.001	<0.001	<0.001	<0.001	0.04

BMI=body mass index; CVD=cardiovascular disease; IR=incidence rate.

All models were adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), and Alternate Healthy Eating Index (fifths).

Supplementary table J. Hazard ratio (95% CI) of all cause mortality according to tenths of predicted fat mass, lean body mass, and body mass index in men

	FM (kg) Mean (SD)	LBM (kg) Mean (SD)	BMI (kg/m ²) Mean (SD)	No of deaths	Hazard ratio (95% CI)		
					Model 1*	Model 2†	Model 3‡
Tenth of fat mass§							
1 (lowest)	13.7 (1.5)	51.9 (3.3)	21.6 (1.4)	1009	1 (reference)	1 (reference)	1 (reference)
2	16.5 (0.5)	53.3 (3.2)	22.9 (1.2)	928	0.85 (0.78 to 0.93)	0.87 (0.79 to 0.95)	0.89 (0.81 to 0.98)
3	18.0 (0.4)	54.1 (3.3)	23.6 (1.3)	1094	0.97 (0.89 to 1.06)	0.95 (0.87 to 1.04)	0.99 (0.90 to 1.08)
4	19.3 (0.4)	54.6 (3.3)	24.1 (1.3)	1204	1.04 (0.96 to 1.14)	1.02 (0.94 to 1.11)	1.07 (0.98 to 1.17)
5	20.5 (0.4)	55.5 (3.5)	24.8 (1.4)	1147	0.94 (0.86 to 1.02)	0.89 (0.82 to 0.97)	0.94 (0.86 to 1.03)
6	21.8 (0.4)	56.0 (3.6)	25.3 (1.4)	1150	0.96 (0.88 to 1.04)	0.93 (0.85 to 1.01)	0.98 (0.90 to 1.08)
7	23.2 (0.5)	56.9 (3.7)	26.0 (1.5)	1303	1.08 (0.99 to 1.17)	1.00 (0.92 to 1.08)	1.06 (0.97 to 1.16)
8	25.0 (0.6)	57.8 (4.1)	26.7 (1.6)	1423	1.20 (1.10 to 1.30)	1.11 (1.02 to 1.20)	1.18 (1.07 to 1.29)
9	27.5 (1.0)	59.4 (4.3)	27.9 (1.8)	1515	1.28 (1.18 to 1.39)	1.17 (1.08 to 1.27)	1.24 (1.13 to 1.37)
10 (highest)	33.8 (4.5)	64.6 (6.3)	31.3 (3.2)	1583	1.52 (1.40 to 1.65)	1.32 (1.21 to 1.43)	1.36 (1.23 to 1.51)
P value for trend					<0.001	<0.001	<0.001
Tenth of lean body mass§							
1 (lowest)	17.4 (4.3)	48.5 (2.4)	21.5 (1.4)	1656	1 (reference)	1 (reference)	1 (reference)
2	18.3 (3.7)	51.6 (0.5)	22.8 (1.1)	1340	0.89 (0.83 to 0.96)	0.90 (0.84 to 0.97)	0.91 (0.84 to 0.97)
3	19.2 (3.7)	53.0 (0.4)	23.5 (1.1)	1242	0.88 (0.82 to 0.95)	0.89 (0.82 to 0.95)	0.88 (0.82 to 0.95)
4	20.0 (3.7)	54.2 (0.3)	24.2 (1.1)	1177	0.88 (0.82 to 0.95)	0.88 (0.82 to 0.95)	0.87 (0.81 to 0.94)
5	20.5 (3.7)	55.3 (0.3)	24.7 (1.1)	1163	0.87 (0.81 to 0.94)	0.87 (0.80 to 0.93)	0.85 (0.78 to 0.92)
6	21.3 (3.9)	56.4 (0.4)	25.3 (1.2)	1161	0.94 (0.87 to 1.01)	0.92 (0.85 to 0.99)	0.88 (0.81 to 0.95)
7	22.2 (3.8)	57.6 (0.4)	26.0 (1.2)	1099	0.92 (0.86 to 1.00)	0.91 (0.84 to 0.99)	0.85 (0.79 to 0.93)
8	23.5 (4.1)	59.1 (0.5)	26.8 (1.2)	1183	1.04 (0.96 to 1.12)	1.00 (0.93 to 1.08)	0.90 (0.83 to 0.98)
9	25.6 (4.5)	61.3 (0.9)	28.1 (1.4)	1137	1.08 (1.00 to 1.17)	1.03 (0.96 to 1.11)	0.88 (0.81 to 0.96)
10 (highest)	31.2 (6.3)	67.0 (4.4)	31.5 (3.1)	1198	1.33 (1.23 to 1.44)	1.20 (1.11 to 1.30)	0.94 (0.85 to 1.03)
P value for trend					<0.001	<0.001	0.08
BMI							
1 (lowest)	14.9 (2.6)	49.4 (2.7)	21.0 (0.9)	1221	1 (reference)	1 (reference)	NA
2	17.1 (2.2)	52.0 (1.8)	22.5 (0.3)	1112	0.93 (0.86 to 1.01)	0.95 (0.87 to 1.03)	NA
3	18.6 (2.4)	53.3 (1.9)	23.4 (0.2)	1188	0.96 (0.89 to 1.04)	0.97 (0.89 to 1.05)	NA
4	19.4 (2.4)	54.3 (1.9)	24.0 (0.2)	884	0.94 (0.86 to 1.03)	0.94 (0.86 to 1.02)	NA
5	20.7 (2.5)	55.2 (1.9)	24.6 (0.2)	1175	0.98 (0.90 to 1.06)	0.96 (0.89 to 1.04)	NA
6	21.6 (2.6)	56.2 (2.0)	25.3 (0.2)	1222	0.95 (0.87 to 1.02)	0.92 (0.85 to 0.99)	NA
7	22.9 (2.7)	57.3 (2.0)	26.0 (0.3)	1408	1.07 (0.99 to 1.16)	1.02 (0.94 to 1.10)	NA
8	24.3 (2.9)	58.8 (2.2)	27.0 (0.3)	1306	1.10 (1.02 to 1.19)	1.04 (0.96 to 1.13)	NA
9	26.7 (3.2)	60.8 (2.6)	28.3 (0.5)	1387	1.23 (1.14 to 1.33)	1.14 (1.06 to 1.24)	NA
10 (highest)	32.6 (5.4)	66.3 (5.0)	31.9 (2.8)	1453	1.46 (1.35 to 1.57)	1.29 (1.19 to 1.40)	NA
P value for trend					<0.001	<0.001	

BMI=body mass index; FM=fat mass; LBM=lean body mass; NA=not available; SD=standard deviation.

*Model 1: adjusted for age.

†Model 2: adjusted for age, race (white or non-white), family history of cardiovascular disease (yes or no), family history of cancer (yes or no), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, or >27 MET-h/week), alcohol consumption (0, 0.1-4.9, 5-9.9, 10-14.9, or ≥15 g/day), total energy intake (fifths), and smoking status (never, ever, 1-14, 15-24, or ≥25 cigarettes/day), Alternate Healthy Eating Index (fifths).

‡Model 3: additionally, mutually adjusted for predicted fat mass and predicted lean body mass.

§Derived from validated anthropometric prediction equations. Height was adjusted by inclusion as continuous variable for fat mass and by regression out of variation due to height for lean body mass.