The effect of metabolic syndrome on cancer mortality among blacks and whites in the US

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Background

❖ A black-white disparity in total cancer death has been pervasive in the US despite the general decline in cancer mortality rates due to reduced tobacco smoking, more widespread cancer screening and testing, and improved therapies.
❖ One factor that might contribute to the racial differences in cancer death that has not been fully evaluated is metabolic syndrome (MS).
❖ MS is highly prevalent among US adults, especially in racial minorities, and it is associated with increased risks of many cancers and cancer mortality.
❖ Previous studies exploring MS or its components and cancer outcomes often aggregated racial groups, thereby masking possible differences in association by race.

Methods

❖ We used data from adult participants from NHANES III (1988-1994) (N=18,001).
❖ We ascertained cancer death from NHANES III mortality follow-up study, which linked with the National Death Index and provides follow-up from survey baseline through December 2006.
❖ MS was defined as ≥3 of 5 risk factors: elevated triglycerides (≥150 mg/dL), impaired fasting blood glucose (≥100 mg/dL), increased waist circumference (≥88 cm for women and ≥102 cm for men), elevated blood pressure (BP) (≥130 mmHg systolic BP or ≥85 mmHg diastolic BP) and reduced HDL (<50 mg/dL).
❖ The interaction between race and MS and its components against total cancer mortality was tested. We used Cox proportional hazards regression to estimate hazard ratios (HR) and 95% confidence intervals for cancer mortality in relation to MS, MS individual component, and MS category (≤1, 2, 3 or ≥4 components) in whites and blacks.

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Purpose

❖ This study sought to examine the association between MS and its individual components and total cancer mortality in whites vs. blacks, separately.

Table 1. Characteristics of the study population by race, NHANES III

	Non-Hispanic White [n=11081, % (SE)]	Non-Hispanic Black [n=4722, % (SE)]
Age		
≥20 to <30	20.90 (0.94)	26.25 (0.87)
≥30 to <40	23.81 (0.86)	26.76 (0.80)
≥40 to <50	20.62 (0.79)	20.57 (0.87)
≥50 to <60	12.79 (0.47)	10.77 (0.60)
≥60 to <70	11.64 (0.55)	8.71 (0.61)
≥70	10.22 (0.69)	6.93 (0.60)
Gender		
Male	48.84 (0.43)	44.90 (0.91)
Female	51.15 (0.43)	55.09 (0.94)
Poverty to income ratio		
≤1 (under poverty)	9.42 (0.70)	26.52 (1.73)
>1 to <3	38.32 (1.15)	43.67 (1.29)
≥3	52.27 (1.36)	29.80 (1.37)
Smoking		
Never	44.08 (0.91)	50.37 (1.09)
Former	27.52 (0.63)	16.10 (0.68)
Current	28.41 (0.92)	33.52 (1.04)
Insurance		
Yes	88.27 (0.75)	84.49 (1.48)
No	11.73 (0.75)	15.51 (1.48)
Metabolic syndrome (MS)		
Yes (≥3 components)	23.11 (0.82)	21.84 (0.58)
Central obesity	39.64 (0.82)	44.66 (1.09)
High blood pressure	10.33 (0.45)	17.77 (0.75)
Low HDL	36.01 (1.21)	26.86 (0.87)
High triglycerides	36.03 (1.14)	26.84 (0.81)
Impaired fasting glucose	28.30 (1.45)	33.53 (0.84)
Number of MS components		
≤1	54.71 (1.33)	53.78 (0.70)
2	22.18 (0.81)	24.38 (0.69)
3	15.16 (0.51)	14.55 (0.45)
≥4	7.95 (0.47)	7.29 (0.40)

Results

Table 2. Hazard ratios (HR) for cancer death by metabolic syndrome and MS components in non-Hispanic whites and non-Hispanic blacks, separately.

	Non-Hispanic White		Non-Hispanic Black	
	Crude Model HR (95% CI)	Adjusted Model HR (95% CI) [1]	Crude Model HR (95% CI)	Adjusted Model HR (95% CI) [1]
Metabolic syndrome (≥3 factors)				
No	Ref.	Ref.	Ref.	Ref.
Yes	2.22 (1.82-2.71)**	1.19 (0.99-1.44)	1.61 (1.24-2.11)**	0.88 (0.67-1.16)
Central obesity				
No	Ref.	Ref.	Ref.	Ref.
Yes	2.26 (1.83-2.81)**	1.29 (1.05-1.59)*	1.18 (0.94-1.49)	0.83 (0.62-1.04)
High blood pressure				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.55 (1.22-1.97)*	1.15 (0.91-7.91)	2.15 (1.68-2.75)**	1.41 (1.10-1.80)*
Low HDL				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.36 (1.12-1.63)*	1.26 (1.04-1.52)*	0.94 (0.70-1.24)	0.91 (0.69-1.20)
High triglycerides				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.57 (1.28-1.93)**	1.02 (0.84-1.23)	1.47 (1.11-1.94)**	0.91 (0.70-1.19)
Impaired fasting glucose				
No	Ref.	Ref.	Ref.	Ref.
Yes	2.40 (1.91-3.02)**	1.45 (1.19-1.76)*	1.66 (1.32-2.08)**	1.03 (0.80-1.32)
No. of MS factors				
≤1	Ref.	Ref.	Ref.	Ref.
2	2.00 (1.58-2.55)**	1.36 (1.07-1.73)*	1.30 (0.91-1.85)	1.01 (0.70-1.46)
3	2.57 (2.03-3.27)**	1.35 (1.05-1.72)*	1.61 (1.09-2.40)*	1.02 (0.68-1.51)
≥4	3.38 (2.35-4.86)**	1.60 (1.13-2.27)*	2.09 (1.36-3.21)*	1.00 (0.65-1.53)
P for trend –MS categories	<0.0001	0.01	<0.0001	0.91

**<0.005; *<0.05.

[1] Adjusted model included age, gender, income, insurance status, and smoking status; sampling weight has been considered in Cox-proportional hazards regression.

Conclusions/Discussion

❖ We found the effect of metabolic risk factors on total cancer mortality differed by race. High BP was significantly associated with total cancer death in blacks while in whites, central obesity, low HLD and impaired fasting glucose were positively associated with cancer death.
❖ The results highlight the importance of early detection and management of metabolic risks, esp. hypertension and prediabetes/diabetes, to prevent cancer death in blacks and whites, respectively.
❖ Active monitoring of BP throughout the period of cancer treatment is recommended for cancer patients, especially for black cancer patients with elevated BP. Awareness and management of the glycemic status should also be part of patients' cancer care plans, particularly for white cancer patients with prediabetes/diabetes.
❖ Further studies need to investigate 1) whether overall MS, or individual metabolic risk factors, is associated with death from certain types of cancer and 2) whether the association varies by race.