

Metabolic Syndrome and Cardiovascular Risk in Long-Term Cancer Survivors

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- All contributors

Background

- Late medical effects after systemic treatment vary widely, as documented in cross-sectional surveys of cancer survivors
- Little research has investigated the prevalence or characteristics of late cardiovascular effects of high dose chemotherapy and hematopoietic stem cell transplantation (HSCT) for malignancies using standardized, objective tests

Metabolic Syndrome

- A constellation of risk variables
 - Hypertension (BP \geq 130/85 mm Hg)
 - Hyperlipidemia (HDL $<$ 40 or 50 mg/dL, triglycerides \geq 150 mg/dL)
 - Abdominal obesity (waist circumference $>$ 102 or 88 cm)
 - Insulin resistance (fasting glucose \geq 100 mg/dL)
- Metabolic syndrome increases risk of cardiovascular disease and diabetes
- Prevalence typically increases with age
- Rates of metabolic syndrome in long-term cancer survivors are not well-defined

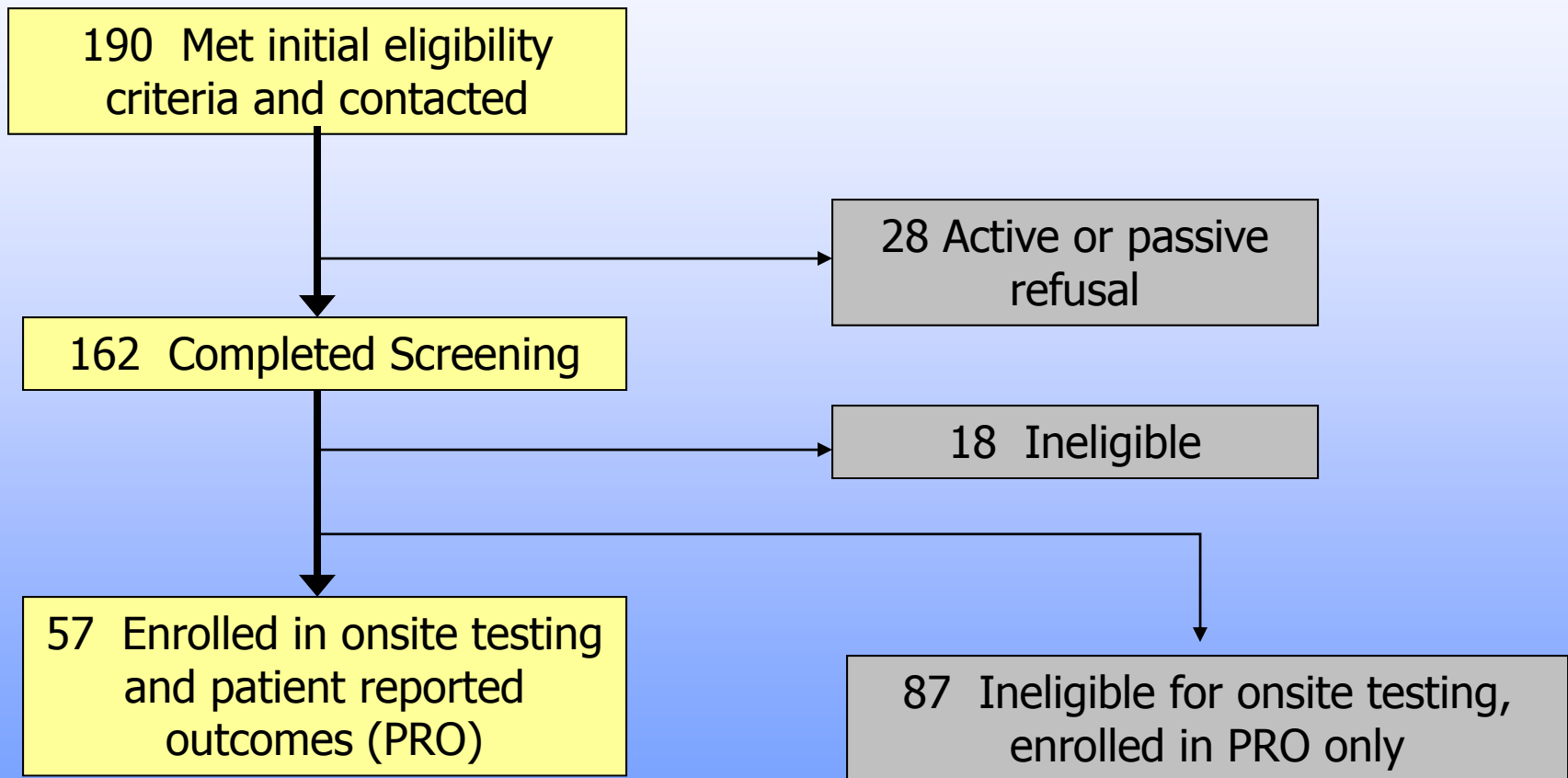
Method: Participants

- All locally residing HSCT survivors who met eligibility criteria for screening were approached and screened by phone
- Eligible survivors completed on-site physiological testing at the Hutchinson Center

Participants

- Inclusion criteria
 - 5-20 years post-transplant for hematologic malignancy
 - Current age 18-49
 - Able to travel to the Hutchinson Center
 - Able to walk without assistance or aids
- Exclusion criteria
 - Relapse of cancer post-transplant or second cancer
 - Hepatitis C, HIV or AIDS
 - Pulmonary disease or emphysema
 - Arthritis, muscle, joint, or nerve disease
 - Autoimmune disease
 - On immunosuppressive medications
 - Diabetes requiring insulin
 - Uncontrolled cardiovascular disease or cardiac problems
 - Thyroid or electrolyte imbalance not controlled with medication
 - Smoking, alcohol >2/day, or recreational drug use
 - Physician advice not to exercise
 - Unable to read and understand English

Flow Diagram



Method: Procedure

- **Physiological tests included:**
 - Blood pressure
 - Lipid panel
 - Waist circumference
 - Blood glucose level
 - C-reactive protein (CRP)
 - DXA scan for body fat percent
- **Participants paid \$100**

Demographic Characteristics of Survivors (N=57)

<u>Age, M ± SD</u>	39.6 ± 9.2
<u>Gender, n (%)</u>	
Female	31 (54%)
<u>Ethnicity, n (%)</u>	
Not Hispanic or Latino	53 (93%)
<u>Race, n (%)</u>	
Caucasian	49 (85%)
<u>Educational status, n (%)</u>	
High school degree/GED only	7 (9%)
<u>Family income, n (%)</u>	
<\$40,000	13 (23%)
>\$80,000	31 (54%)
<u>Marital status, n (%)</u>	
Married/living with a partner	38 (67%)

Clinical Characteristics of Survivors (N=57)

Diagnosis, n (%)

Chronic Myeloid Leukemia	19 (33%)
Acute Lymphocytic Leukemia	7 (12%)
Acute Myeloid Leukemia	6 (11%)
Hodgkin Disease	6 (11%)
Non-Hodgkin Lymphoma	5 (9%)
Myelodysplastic Syndrome	5 (9%)
Other	9 (15%)

Type of transplant, n (%)

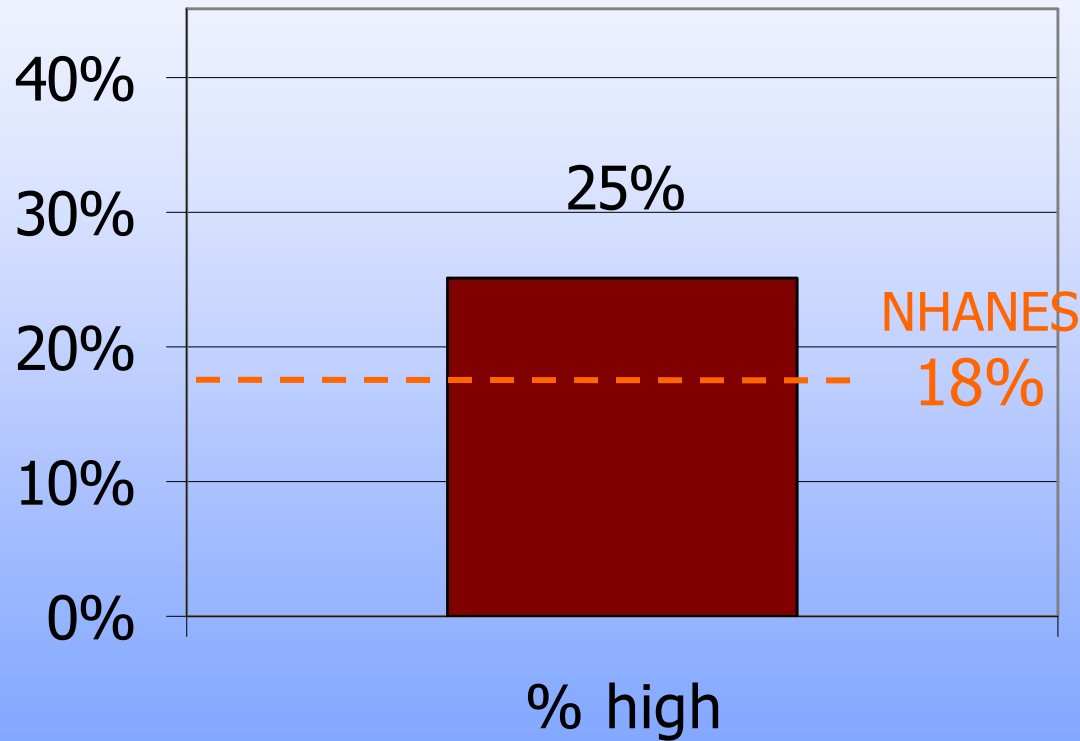
Allogeneic	45 (79%)
Autologous	12 (21%)

Age at transplant, M \pm SD 28.1 \pm 10.7

Years since transplant, M \pm SD 11.5 \pm 4.2

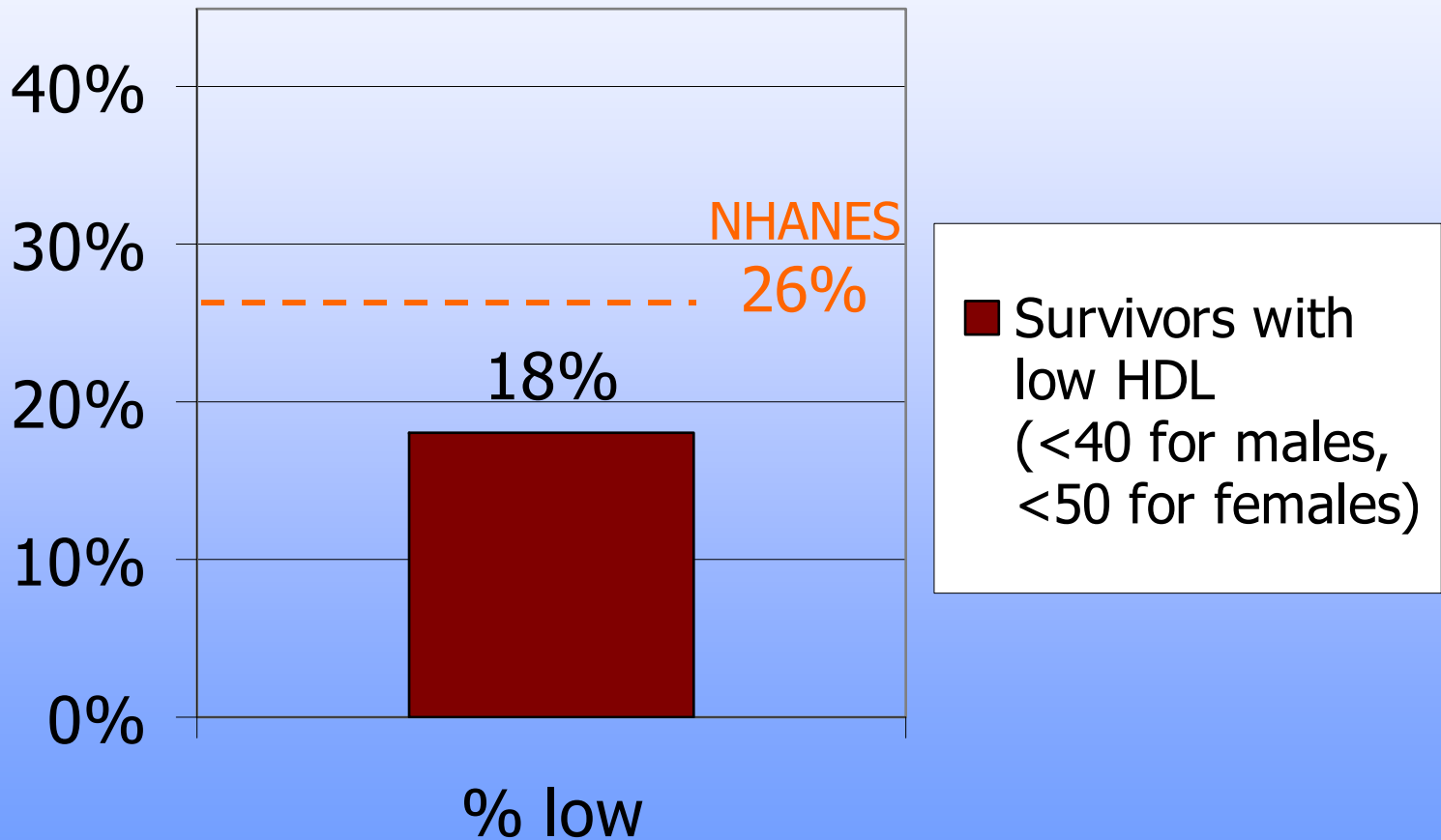
Results

Hypertension

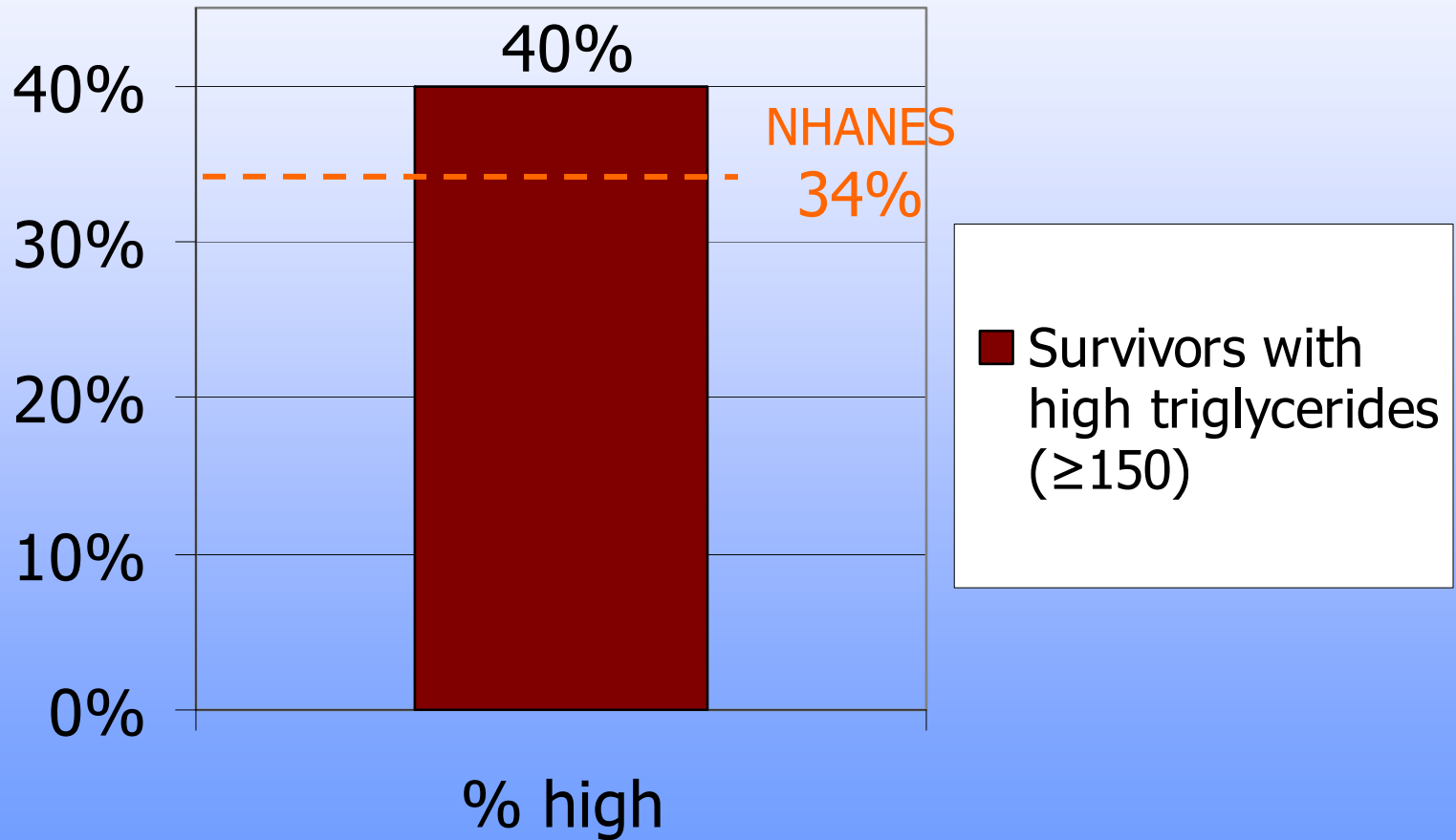


■ Survivors with high BP (systolic ≥ 130 , diastolic ≥ 85)

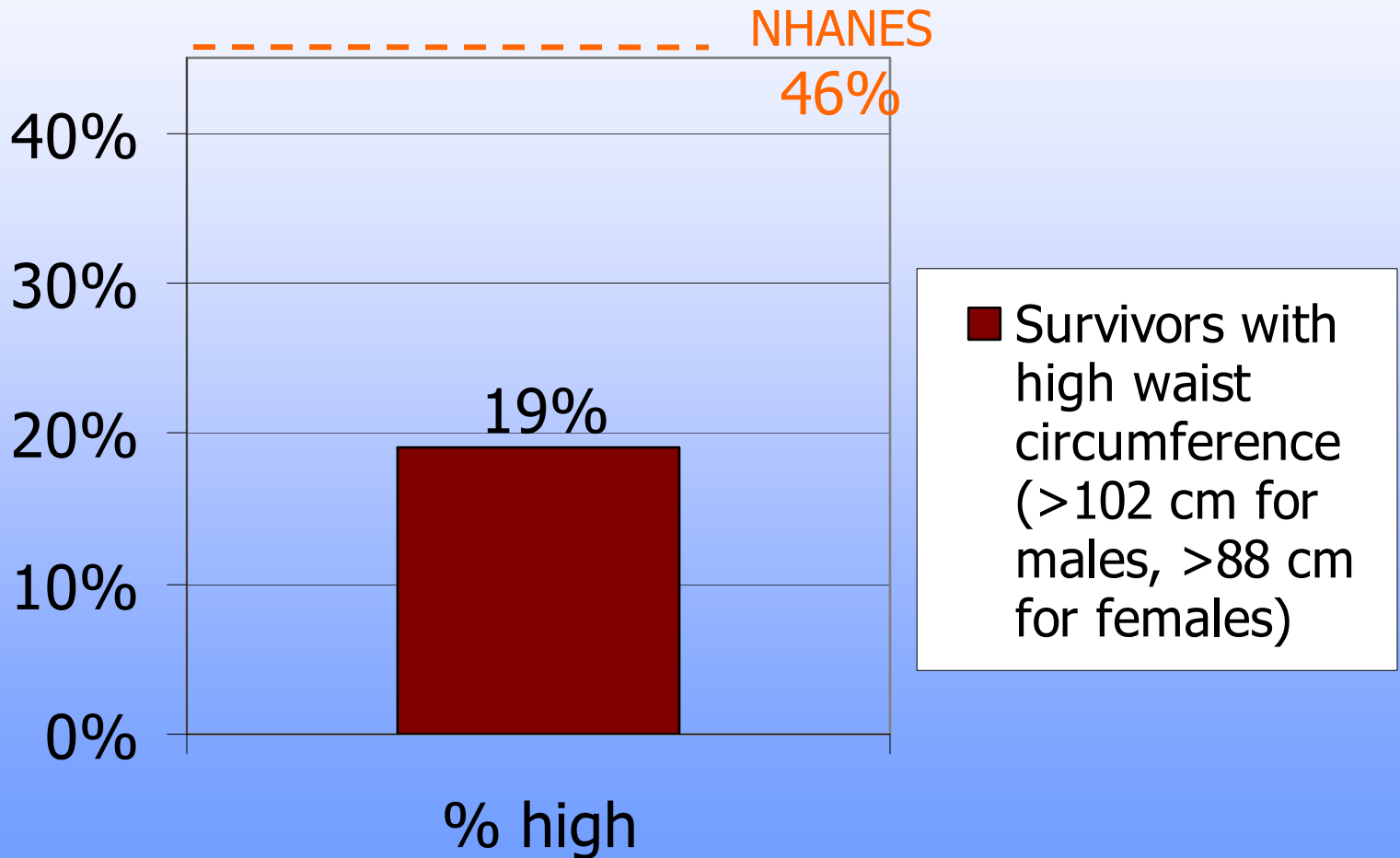
Hyperlipidemia: HDL



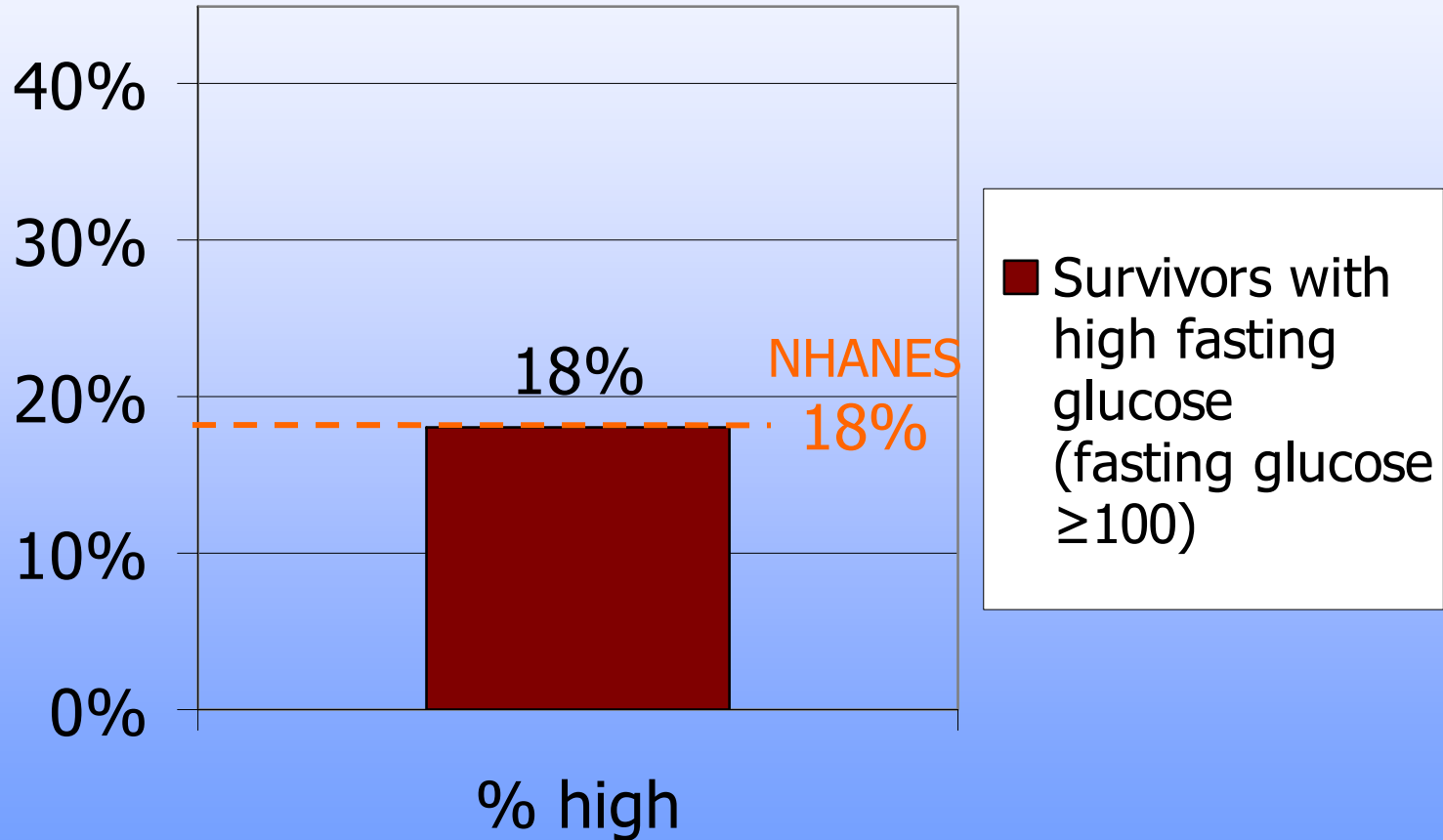
Hyperlipidemia: Triglycerides



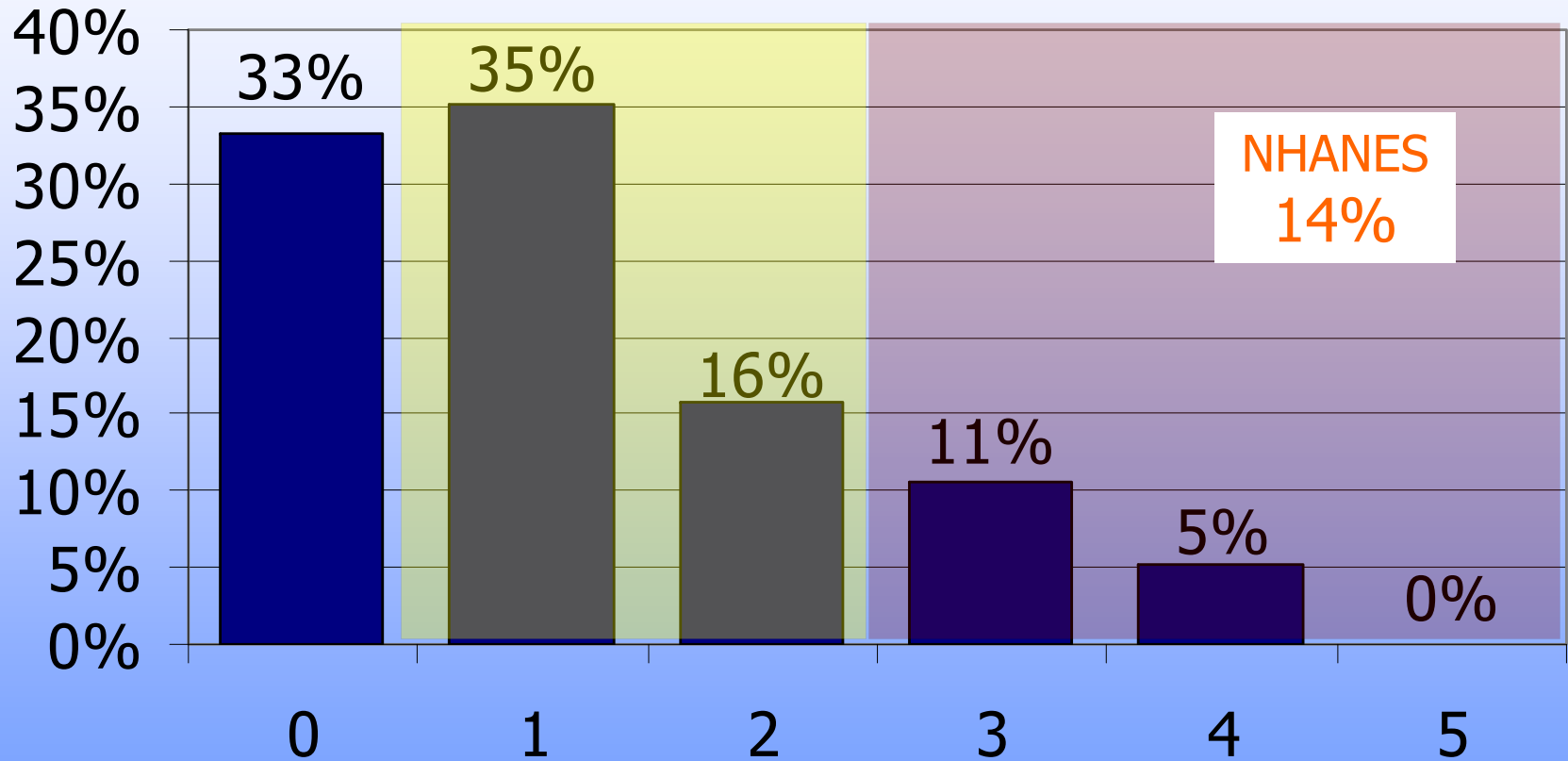
Abdominal Obesity



Insulin Resistance



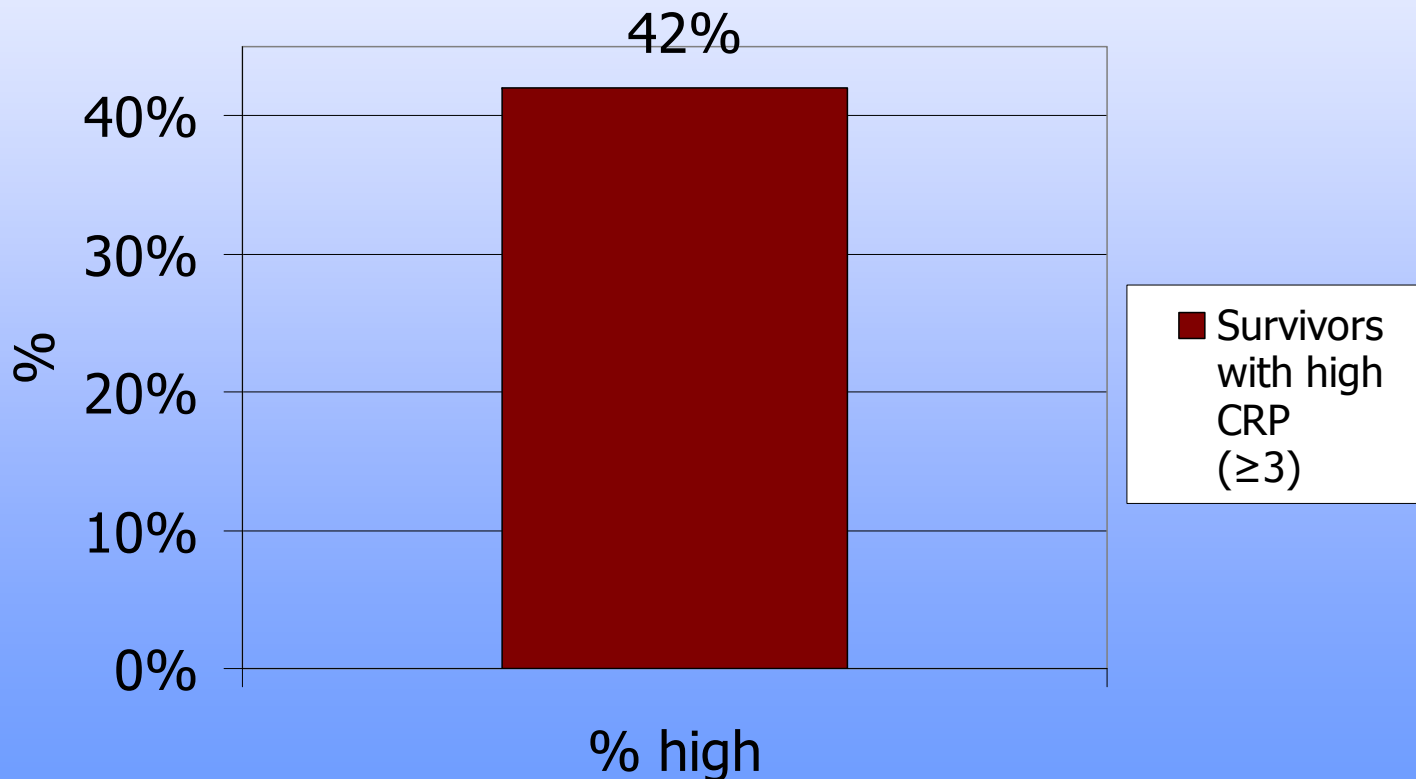
Metabolic Syndrome



■ Percent of healthy 18-50 year old survivors meeting criteria

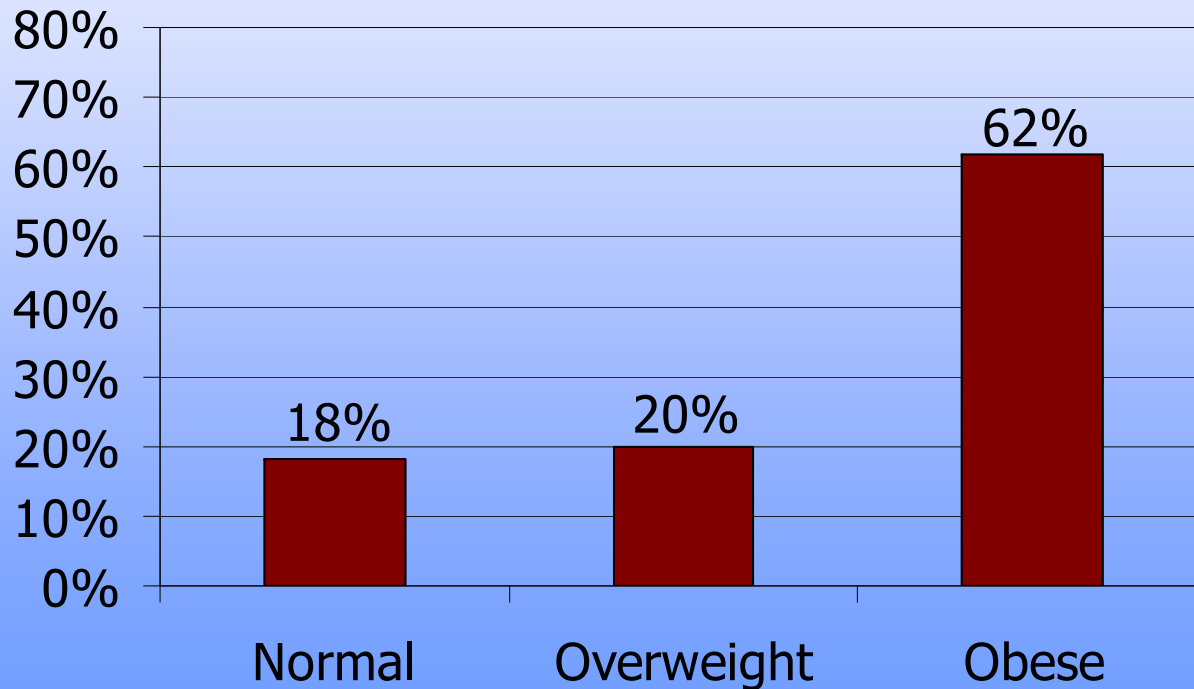
C-Reactive Protein

- 78% with metabolic syndrome also had elevated CRP ($\chi^2=5.58, P=.02$).



Body Fat Percent

- When BFP was substituted for waist circumference as a cardiac risk factor, 26% of survivors met criteria for metabolic syndrome



Limitations and Strengths

- Limitations
 - Small sample
 - Cross sectional study
 - Does not provide fully representative population-based cohort for determining prevalence
- Strengths
 - New information in HSCT survivor cohort
 - Standardized objective test results

Conclusions

- In these survivors cardiovascular risks were elevated despite young age and seemingly good health
 - 16% meet criteria for metabolic syndrome
 - 42% have elevated CRP
 - 62% are obese by body fat percent
- A significant number of survivors are at risk for developing later problems
 - 51% meet one or two of the criteria for metabolic syndrome
- These are underestimates of medical problems in HSCT survivor populations

Implications

- Primary care providers and patients need education
- Surveillance guidelines are needed
 - Expand list of recommended tests
 - Mandate routine testing at younger ages
- Behavioral methods to address cardiovascular risks, such as diet and exercise, are particularly important for these survivors
- Clinical trials need to target these complications