•Disclosure of no affiliations with research, work or products that we mention.
•Disclosure of no contractual relationships with works mentioned.

Barbara Ann Graves, PhD, RN
Associate Professor
Susan J. Appel, PhD, APRN-BC, CCRN, FAHA, FAANP
Professor

THE UNIVERSITY OF ALABAMA
CAPSTONE COLLEGE OF NURSING

Comparison of cardiometabolic risk between African-American & Caucasian women in a worksite wellness program

Barbara Ann Graves, PhD, RN

Susan Appel, PhD, APRN-BC, CCRN, FAHA, FAANP

THE UNIVERSITY OF ALABAMA
CAPSTONE COLLEGE OF NURSING

Objective

- The learner will be able to:
  - Describe the racial differences in cardiometabolic risk (CMR) among women within a university worksite wellness program.
  - Discuss comparisons of CMR, or the interplay of risk for diabetes leading to heart disease, between African-American and Caucasian women.

Background

- Cardiovascular disease (CVD)- Leading cause of death & chronic illness.
  - Obesity, poor glycemic control, mixed dyslipidemia, hyperinsulinemia, uncontrolled blood pressure and high levers of c-reactive protein (hs-CRP) are CMR factors.
  - CMR factors are strongly associated with inflammation in the blood vessels that predispose to excessive blood clot formation.
- Worksite health and wellness program focused on advancing the health and well-being of employees can reduce health risk and prevent CVD disease.

Common Definitions of MetS

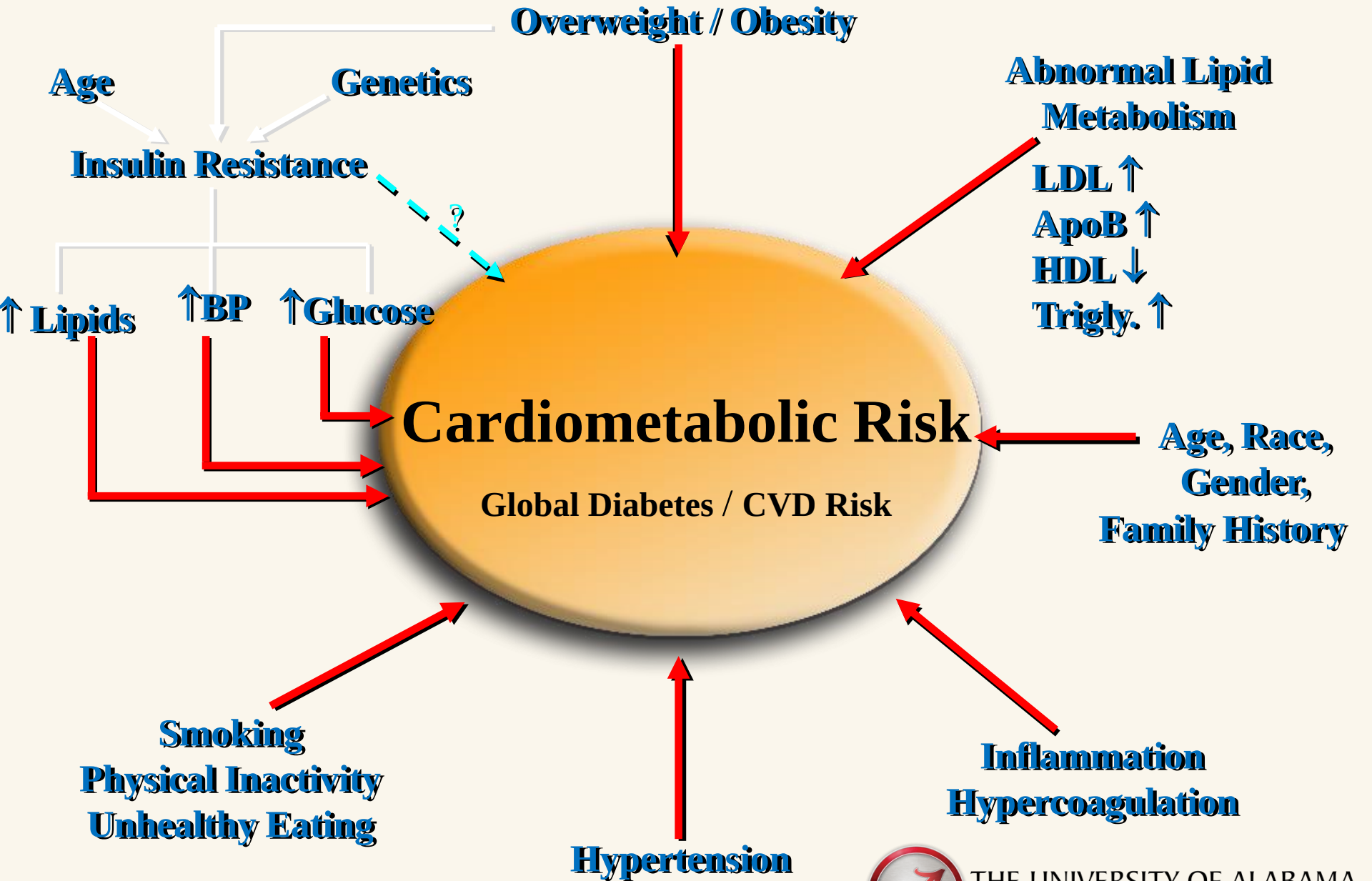
National Cholesterol Education Program Adult Treatment Panel III	International Diabetes Federation
Any 3 or more of the following Abdominal obesity: waist circumference >40 in (102 cm) in men and >35 in (88 cm) in women Triglycerides ≥150 mg/dL HDL-C <40 mg/dL in men and <50 mg/dL in women Blood pressure ≥130/85 mm Hg Fasting glucose ≥100 mg/dL	Abdominal obesity: waist circumference for Asians (only): >94 cm for men and >80 cm for women Must have either central obesity or an increased BMI plus 2 of the following: Triglycerides ≥150 mg/dL HDL-C <40 mg/dL in men & <50 mg/DL in women Blood pressure ≥130/85 mm Hg Fasting glucose ≥100 mg/dL or previously diagnosed diabetes

Literature

- A quarter of the world's adults have MetS
- People with MetS are 2X as likely to die from, and 3X as likely to have a MI or stroke compared with people without MetS
- People with MetS have a five-fold greater risk of developing type 2 diabetes (T2D)
- Up to 80% of the 200 million people with diabetes globally will die of CVD
- Ahead of HIV/AIDS in morbidity and mortality; yet the problem is not as well recognized (IDF, 2007)

Literature

- Recommendations from Healthy People 2020: identify the need to eradicate racial health disparities in CVD
- AA women experience
  - higher prevalence of obesity, hypertension, coronary heart disease, stroke, T2D compared to other groups of women
  - higher BMI; Increased levels of circulating insulin; lower insulin sensitivity; higher acute response of insulin to glucose compared with white women


Overweight / Obesity
Age
Genetics
Insulin Resistance
?
Abnormal Lipid Metabolism
LDL ↑
ApoB ↑
HDL ↓
Trigly. ↑
↑ Lipids
↑BP
↑Glucose
Cardiometabolic Risk
Global Diabetes / CVD Risk
Age, Race, Gender, Family History
Smoking
Physical Inactivity
Unhealthy Eating
Hypertension
Inflammation
Hypercoagulation

Method

- **Purpose**: Examine racial differences in CMR among women from a worksite wellness program, "WellBAMA," at the University of Alabama.
- **Specific aims**:
  - **1:** Determine the relative importance of the racial differences of CMR factors and insulin resistance (e.g., calculation of a Homeostatic Model of Assessment – insulin resistance).
    - (HOMA-ir = Fasting :Glucose x Insulin/ 22.5 {Molar units: mmol/L}), dyslipidemia, central obesity, C-reactive protein, hypertension, A1c and acanthosis nigricans score.
  - **2:** Ascertain the best markers of insulin resistance
    - insulin, HOMA-ir or acanthosis nigrican score.

CMR Profile/Variables

- Dyslipidemia = HDL, LDL, triglycerides
- Central obesity = waist circumference, BMI
- Degree of inflammation = hs-C-reactive protein
- Hypertension = blood pressure
- Glycemic status = glucose and A1c
- Insulin resistance =
  - Insulin level
  - Homeostatic Model of Assessment – insulin resistance (HOMA-ir) = Fasting :Glucose x Insulin/ 22.5 9Molar units: mmol/L)
  - Acanthosis nigricans score

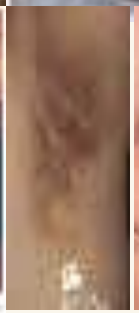
Methods (cont)

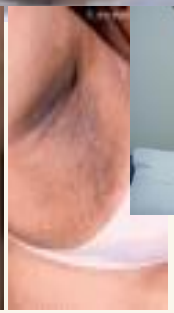
- Sample: Cross-sectional design
- Analysis of CMR profiles –N=50 women
  - Inclusion: n=25 African-American/ 25 Caucasian women; participants in WellBAMA
  - Exclusion: CVD, diabetes, on diabetic meds, steriods
- Power calculations: A sample size of 46 achieves 81% power to detect an R-Squared of 0.15 variable(s) using an F-Test with a significance level (alpha) of 0.05.
- Recruitment: Women at annual WellBAMA employee health screenings sessions

Data Collection

- Demographic/ Clinical characteristics and CMR factors
  - Personal data
    - Age, race, smoking status, hormone use
  - Anthropomorphic/ Phyisologic measures
    - weight & height (BMI calculation), waist circumference, and blood pressure
  - Biochemical parameters
    - WellBAMA data: BP, glucose, lipids (fasting fingerstick)
    - Blood draw @ UMC (fasting): insulin, A1c, glucose, lipids, hs-CRP

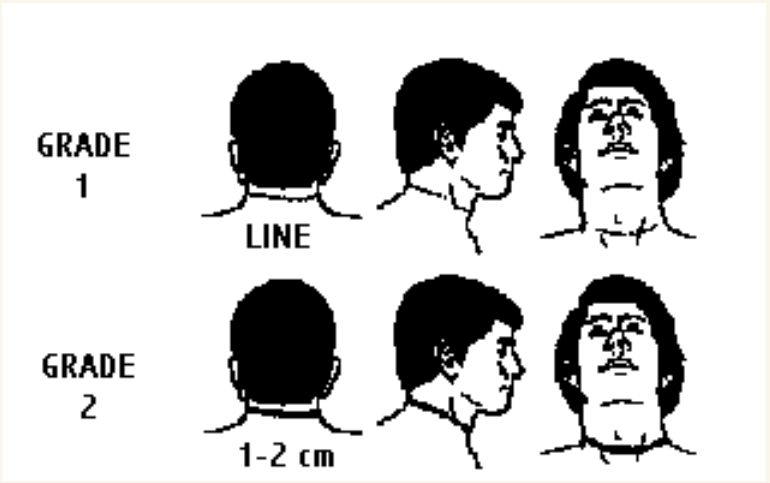
Acanthosis Nigricans

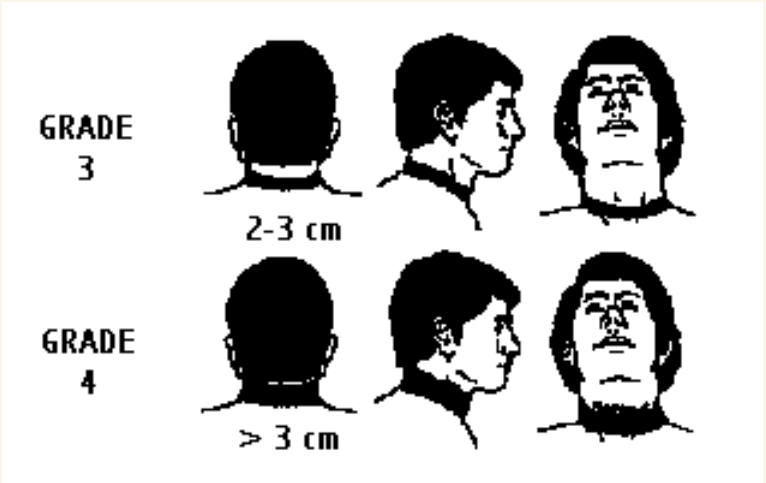




THE UNIVERSITY OF ALABAMA
CAPSTONE COLLEGE OF NURSING

Grading: Acanthosis Nigricans





Excellent Proxy for **Hyperinsulinemia** or **Insulin Resistance** precursor to frank Type 2 Diabetes and a major risk factor for CVD (Appel, 2009).

Data Analysis

- Significant multivariate main effect of race, Wilks' $\Lambda = .58$, $F\,(10, 32) = 2.28$, $p = .04$
  - suggesting significant differences between AA and Caucasian participants on measures of CMR
- Stepwise regression revealed overall model was significant, $R^2 = .57$, $F\,(6, 38) = 8.36$, $p < .001$ for predicting insulin resistance.
  - Indicating that BMI, fasting triglycerides, fasting HDL, and fasting hemoglobin A1c were significant predictors of insulin resistance.

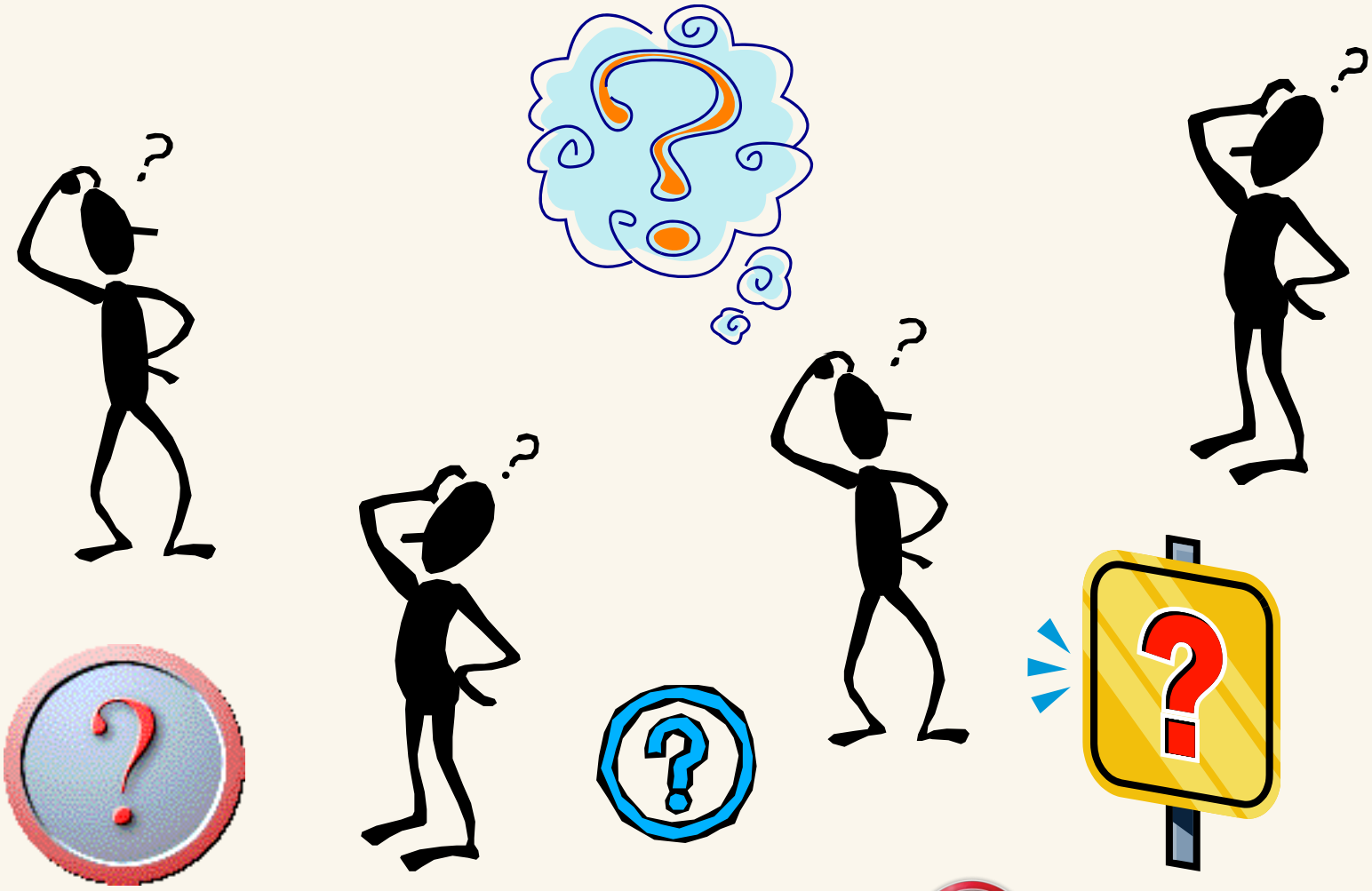
Conclusions

- Findings from this study provided valuable insights to guide the early identification of CMR among women which differ by race.
  - AA women manifested significant higher levels of insulin resistance or predisposition toward development of T2DM.
  - Caucasian women were less insulin resistant but manifested higher levels of mixed dyslipidemia (e.g., hypertriglyceridemia and low HDL-c).
- Findings inform providers how to tailor assessments and screening among AA versus Caucasian women, as risks for heart disease and stroke have been found to differ by race.

Acknowledgement

- Funded by the University of Alabama Research Grants Committee
- Special thanks to Joseph Dean Elmore for providing statistical data analysis

Questions



References

- American Diabetes Association (ADA)(2006). http://www.diabetes.org/newsroom/press-releases/2013/many-people-at-risk-for-type-2-dont-think-they-are-at-risk.html
- Appel SJ. (2009). Acanthosis and HOMA-ir as early markers of cardiometabolic risk among African-American women: Homeostatic model of assessment-insulin resistance. *Southern Online Journal of Nursing Research* 2009; 9(2):1p.
- Appel SJ. (2005). Calculating insulin resistance in the primary care setting: Why should we worry about insulin levels in euglycemic patients? *Journal of the American Academy of Nurse Practitioners*2005 08; 17(8):331-6.
- Appel SJ. (2006). Minorities and metabolic syndrome. *Clinical Advisor* 2006; 9(1):11-.
- Appel SJ, Floyd NA, Giger JN, Weaver MT, Luo H, Hannah T, Ovalle F. (2005). African American women, metabolic syndrome, and national cholesterol education program criteria. *Nurs Res*. 54(5):339-46.
- Appel SJ, Oster RA, Floyd NA, Ovalle F. (2009). Cardiometabolic risk among African-American women: A pilot study. *J Cardiovasc Nurs*, 24(2):140-50.
- International Diabetes Federation (IDF)(2005). IDF worldwide definition of metabolic syndrome. http://www.idf.org/metabolic-syndrome

References

- Lorenzo, C., Williams, K., Hunt, K.J. & Haffner, S.M. (2007). The National Cholesterol Education Program –Adult Treatment Panel, International Diabetes Foundation, and World Health Organization definitions of metabolic syndrome as predictors of incidence cardiovascular disease and diabetes. *Diabetes Care 30:8-13*.
- Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, de Ferranti S, Després J-P, Fullerton HJ, Howard VJ, Huffman MD, Judd SE, Kissela BM, Lackland DT, Lichtman JH, Lisabeth LD, Liu S, Mackey RH, Matchar DB, McGuire DK, Mohler ER 3rd, Moy CS, Muntner P, Mussolino ME, Nasir K, Neumar RW, Nichol G, Palaniappan L, Pandey DK, Reeves MJ, Rodriguez CJ, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Willey JZ, Woo D, Yeh RW, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee (2015). Executive summary: heart disease and stroke statistics—2015 update: a report from the American Heart Association. *Circulation*: 131:434–441.
- NCEP. (2001) Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA.* 285:2486-97.


THE UNIVERSITY OF ALABAMA
CAPSTONE COLLEGE OF NURSING