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## BACKGROUND

- Economic prosperity combined with an increase in sedentary lifestyles has led to an estimated 120 million adults currently classified as overweight or obese.
- While still unclear in the literature, obesity is thought to be a significant risk factor for peri-operative morbidity and mortality with CABG.
- Risk factors for coronary artery disease (Diabetes, Hypertension, Hypercholesterolemia) are prevalent in this population.
- Results from the NHANES III Study of 1988-94 (National Health and Nutrition Examination Survey) indicate that the prevalence of various risk factors increases with increasing BMI for both men and women.

| Medical Condition      | Body Mass Index      |            |            |       |
|------------------------|----------------------|------------|------------|-------|
|                        | 18.5 to 24.9         | 25 to 29.9 | 30 to 34.9 | ≥ 40  |
|                        | Prevalence Ratio (%) |            |            |       |
| Type 2 Diabetes        | 2.03                 | 4.93       | 10.10      | 10.65 |
| Coronary Heart Disease | 8.84                 | 9.60       | 16.01      | 13.97 |
| High Blood Pressure    | 23.47                | 34.16      | 48.95      | 64.53 |
| Osteoarthritis         | 2.59                 | 4.55       | 4.66       | 10.04 |

Source: NHANES III, 1988 - 1994.

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|------------------------|----------------------|------------|------------|-------|
|                        | 18.5 to 24.9         | 25 to 29.9 | 30 to 34.9 | ≥ 40  |
|                        | Prevalence Ratio (%) |            |            |       |
| Type 2 Diabetes        | 2.38                 | 7.12       | 7.24       | 19.89 |
| Coronary Heart Disease | 6.87                 | 11.13      | 12.56      | 19.22 |
| High Blood Pressure    | 23.26                | 38.77      | 47.95      | 63.16 |
| Osteoarthritis         | 5.22                 | 8.51       | 9.94       | 17.19 |

Source: NHANES III, 1988 - 1994.

## ABSTRACT

Placeholder for abstract content.

## OBJECTIVE

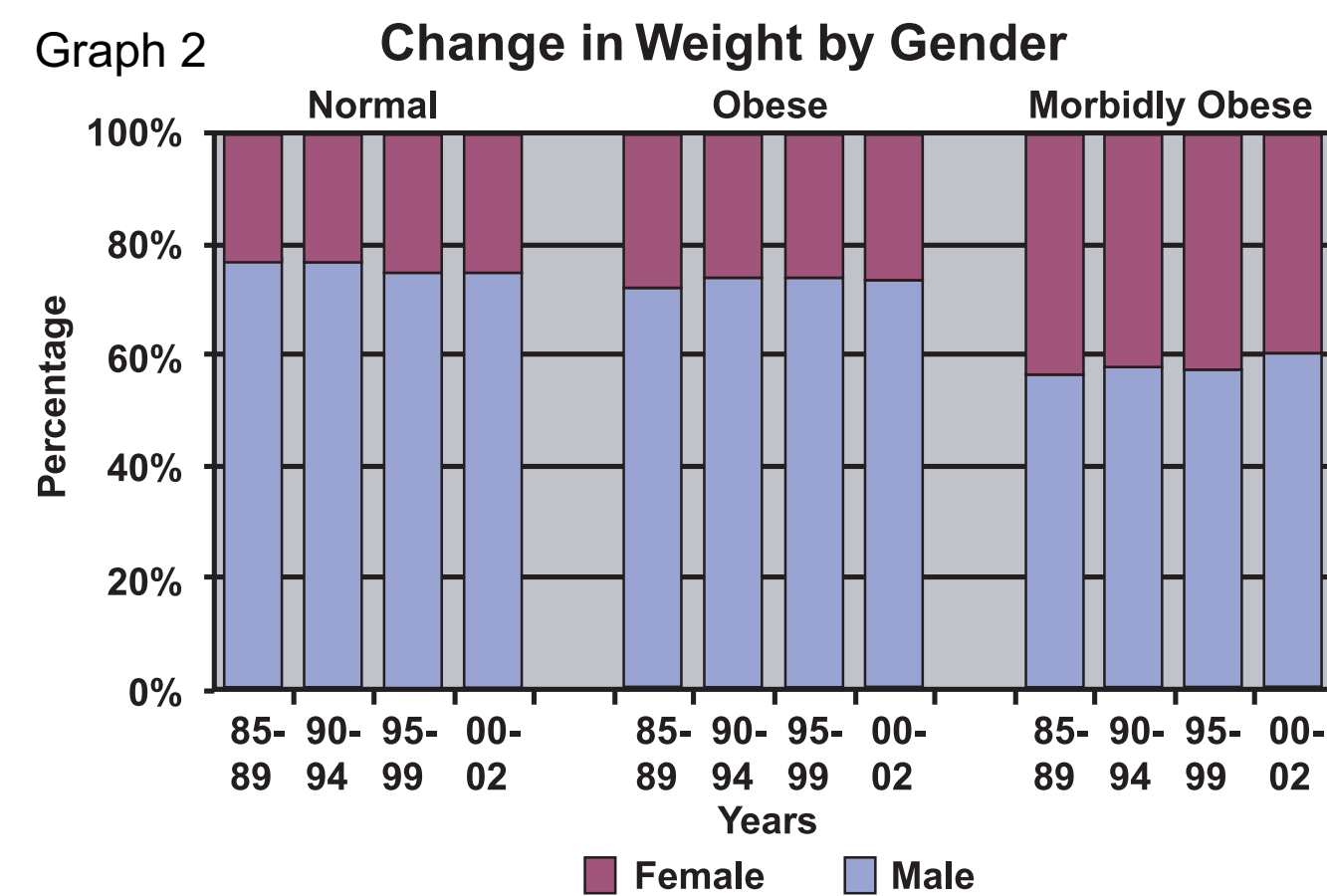
This study examines the trend of increasing obesity in the cardiac surgical population and its impact on outcomes.

## METHODS

- Retrospective analysis of data collected from 1985 -2002, analyzed in 5 year intervals
- Standardized definitions from Society of Thoracic Surgeons (STS)
- 23,555 isolated coronary artery bypass grafts (CAB) only cases 17,696 (75.1%) were male
- Patients were classified as normal weight (BMI <30), obese (BMI 30-39), or morbidly obese (BMI ≥ 40)
- 23 pre-operative risk factors and 19 outcomes reviewed using chi-square univariate analysis

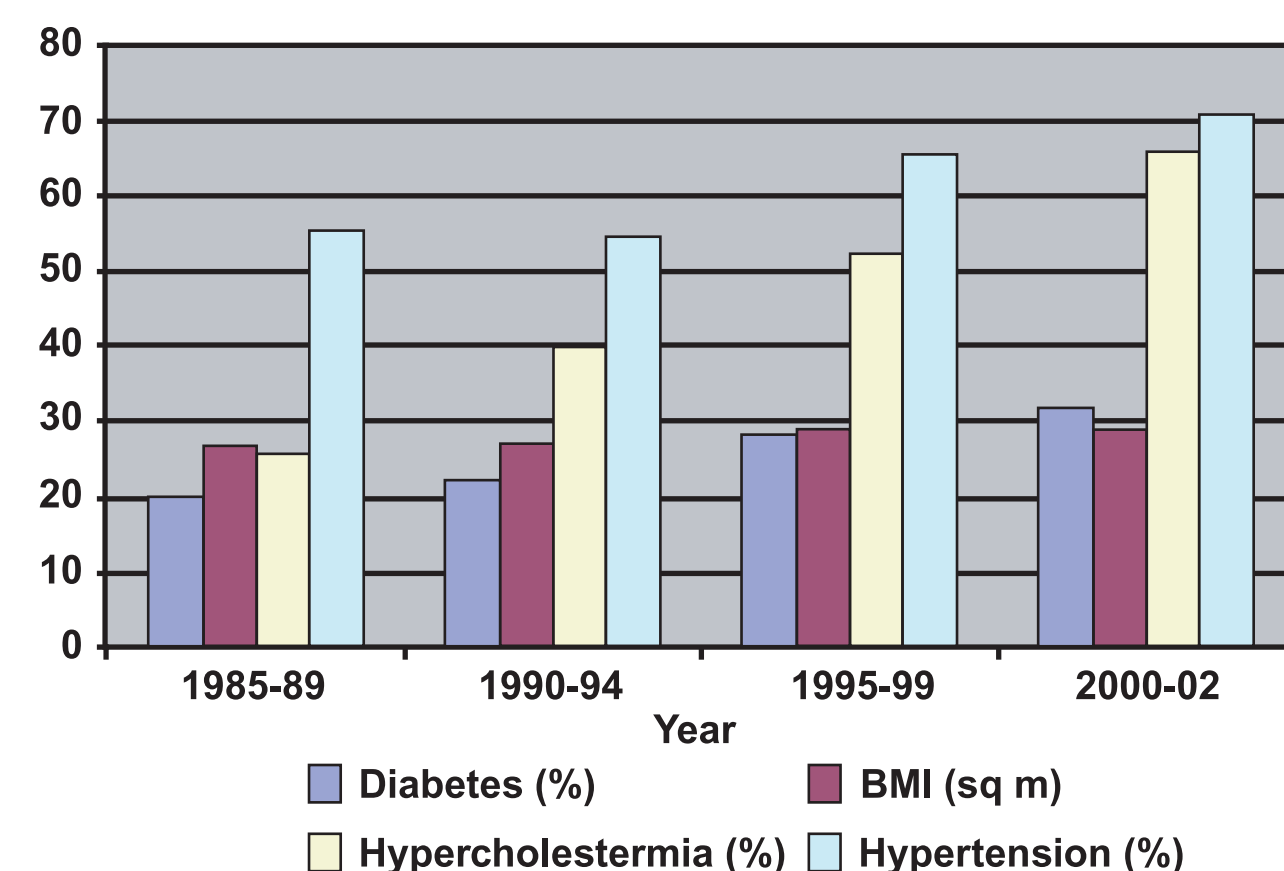
## RESULTS

- The incidence of obese and morbidly obese patients undergoing CABG significantly increased from 15.7% in 1985 to 30.4% in 2002 (p=0.004). Graph 1 shows the breakdown by 5 year intervals over that time.
- Ratio of females to males in each weight group did not change over the time period studied. (Graph 2)



- Increases in some of the major cardiac risk factors were measured over the study period, although the overall risk of mortality remained constant.

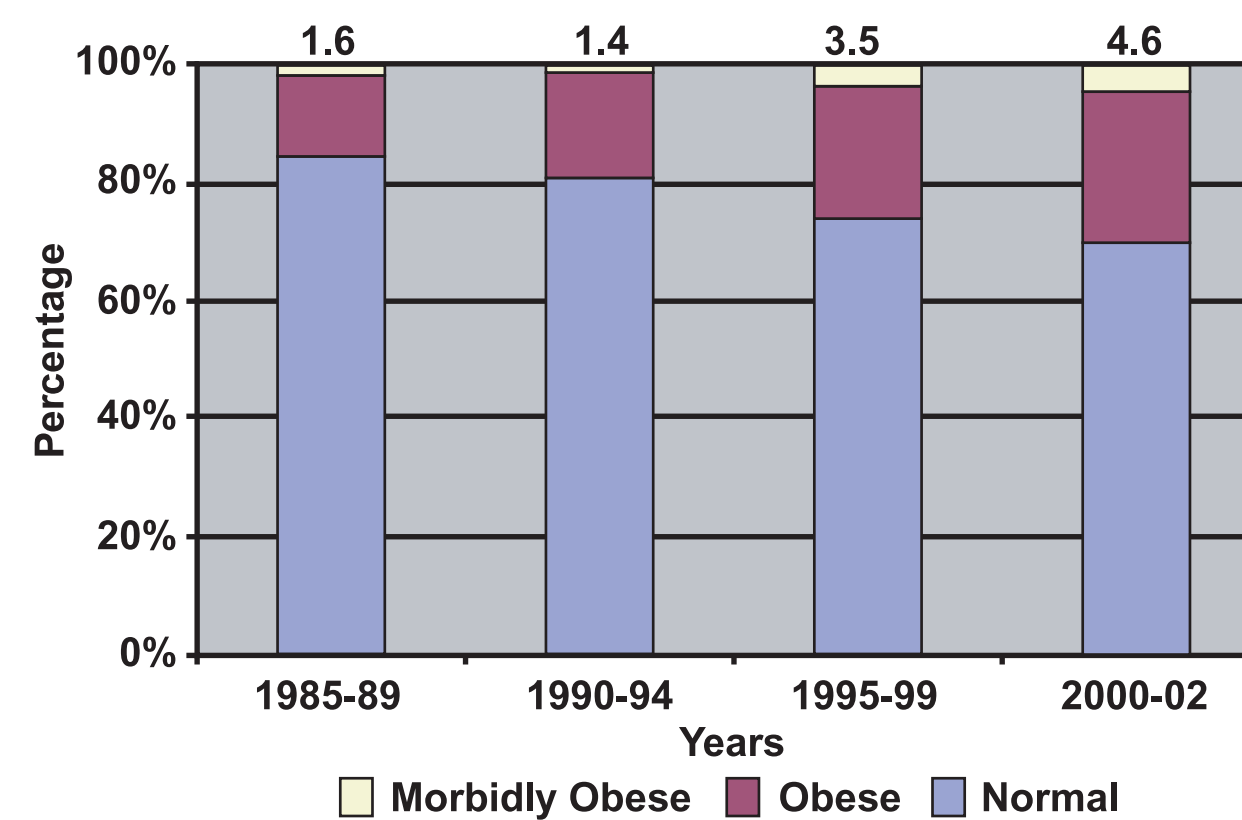
Risk Factors from 1985 - 2002



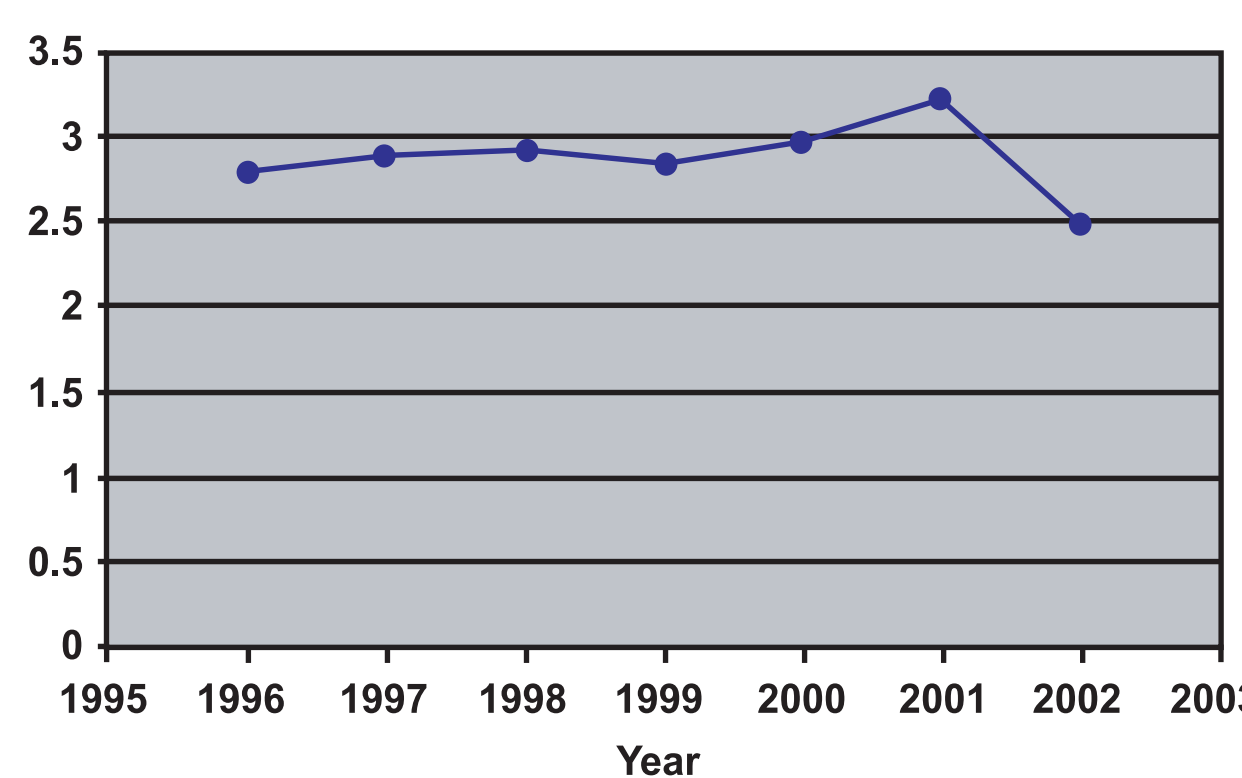
Changes in Risk Factors During Study Period

| Year                            | 1985-89     | 1990-94     | 1995-99     | 2000-02     |
|---------------------------------|-------------|-------------|-------------|-------------|
| N                               | 2421        | 6463        | 10,3443     | 4220        |
| Males (%)                       | 76.1        | 76.6        | 74.4        | 74.0        |
| Age (yr)                        | 60.1 ± 10.8 | 61.3 ± 10.7 | 62.7 ± 10.8 | 63.1 ± 10.8 |
| Peripheral Vascular Disease (%) | n/a         | 2.0         | 13.5        | 12.2        |
| CAB-redos (%)                   | 8.5         | 10.0        | 7.6         | 7.7         |
| Non-white patients (%)          | 5.2         | 6.0         | 8.1         | 10.8        |

Graph 1 Weight Distribution by Years CAB Patients



Predicted Risk of Mortality (STS)



## Mortality

- In the younger age groups, obese and morbidly obese patients had a significantly greater risk of operative mortality compared to normal weight patients.

| Age Group (Yrs) | MORTALITY(%)  |       |                | p Value |
|-----------------|---------------|-------|----------------|---------|
|                 | Normal Weight | Obese | Morbid Obesity |         |
| 50-59           | 1.6           | 2.6   | 2.5            | p=0.05  |
| 60-69           | 3.1           | 4.5   | 9.2            | p<0.001 |
| 70-79           | 6.3           | 6.7   | 6.3            | NS      |

## Post-operative Complications

- The morbidly obese were at greater risk for postoperative complications, particularly sternal wound infections, prolonged ventilation and renal failure.

|  | Normal Weight | Obese       | p-value (obese to normal) | Morbid Obesity | p-value (morbid to normal) | p-value (morbid to obese) |
|--|---------------|-------------|---------------------------|----------------|----------------------------|---------------------------|
| Length of Stay (days)                    | 7.83 ± 7.38   | 7.68 ± 6.78 | NS                        | 8.78 ± 10.05   | < 0.05                     | < 0.05                    |
| Sternal Wound Infection                  | 87 (0.5%)     | 48 (1.0%)   | <0.001                    | 10 (1.6%)      | 0.003                      | NS                        |
| Prolonged Ventilation                    | 1075 (6.4%)   | 391 (8.5%)  | <0.001                    | 79 (12.3%)     | <0.001                     | 0.002                     |
| Post-op Renal Failure requiring dialysis | 179 (1.1%)    | 62 (1.4%)   | NS                        | 14 (2.2%)      | 0.02                       | NS                        |

- The length of stay (LOS) was significantly different between obesity groups (df=2; F=6.3; p= 0.002) with the Morbid Obese group having a statistically significant longer LOS than either the Obese or Normal groups. The Obese to Normal groups difference was not statistically significant.

## CONCLUSIONS

- Patients presenting for surgical revascularization are increasingly obese or morbidly obese and are more likely to have risk factors predisposing to severe coronary artery disease.
- Obesity and morbid obesity significantly increase the risk of death in younger patients undergoing CABG.
- Morbidly obese patients are more likely to have increased length of stay, rates of sternal wound infection, prolonged ventilation and post-operative renal failure requiring dialysis, as compared to obese and normal weight patients.
- The morbidly obese patient has a longer LOS on average, which may lead to increased cost of care.