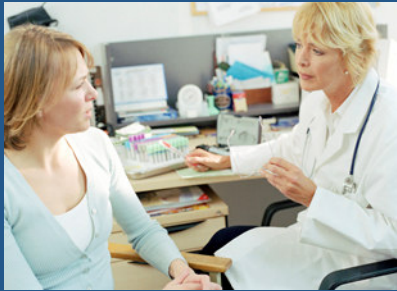




KnowYourNumber™
The Key To Proactive Good Health



2001 APHA Annual Meeting



2001 APHA Annual Meeting

Development and Validation of a New Evidence-Based Coronary Heart Disease (CHD) Mortality Prediction Model

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The new predictive model – Synthesis AnalysisSM

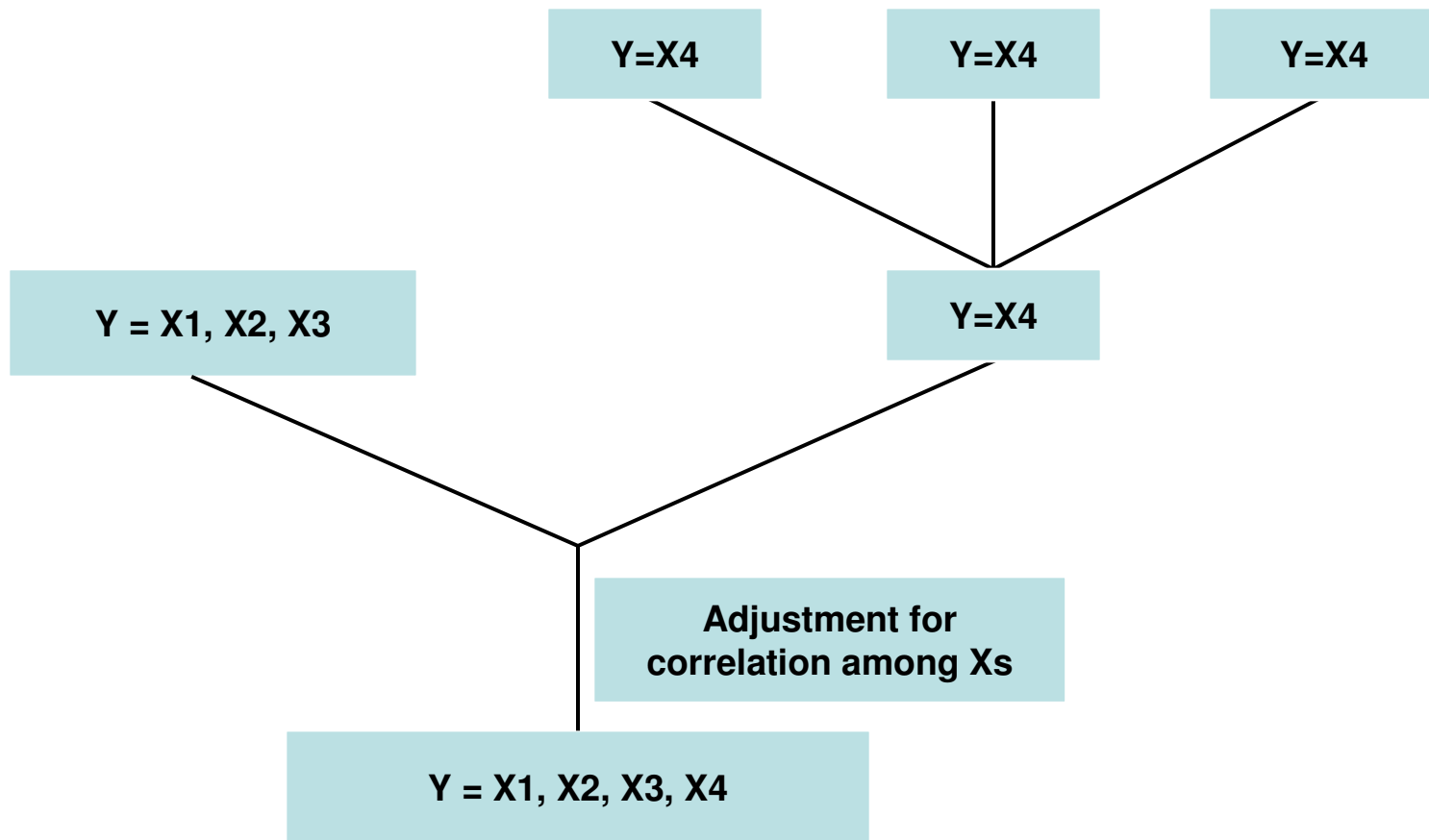
- What is Synthesis Analysis (SYN)
 - Patents
 - Development
 - Disease-specific model
- Validation
 - Relative validity
 - Absolute validity
- Application

A Unique Approach to Develop Evidence-Based Models

- Step 1: Meta-analysis for each risk factor
- Step 2: Synthesis Analysis of multiple risk factors

Synthesis Analysis

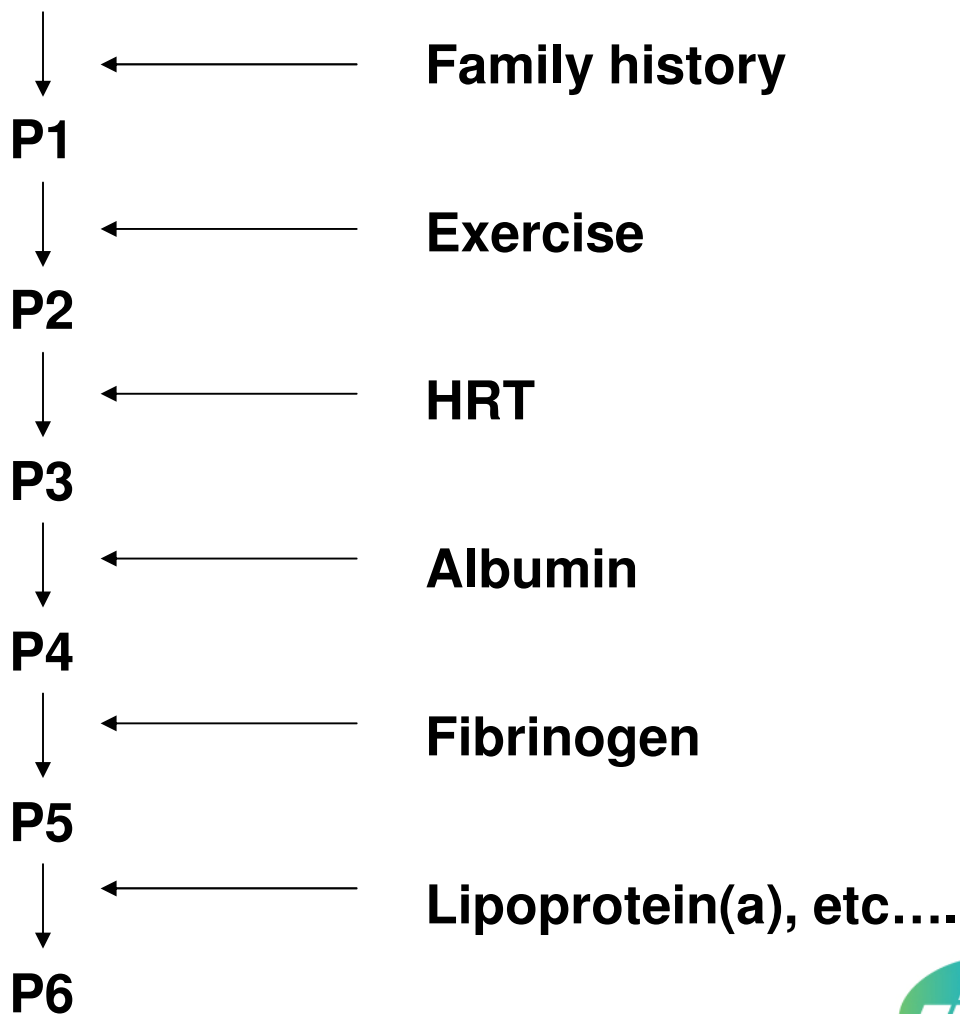
U.S. Patent # 6,110,109



CHD Predictive Model

Step 2: Synthesis Analysis

Framingham P



Validation

- Acquire a longitudinal data set containing baseline risk assessment and outcomes follow up
- Compare risk discrimination power of SYN with currently used algorithm (relative validity)
- Compare the SYN predicted probability with observed mortality ratio (absolute validity)

Data: NHANES I

- National survey
- 32,000 individuals, ages 1-74 (12,000 ages 25-74)
- Certain risk factors assessed at the baseline
- Mortalities assessed through 20 years follow-up

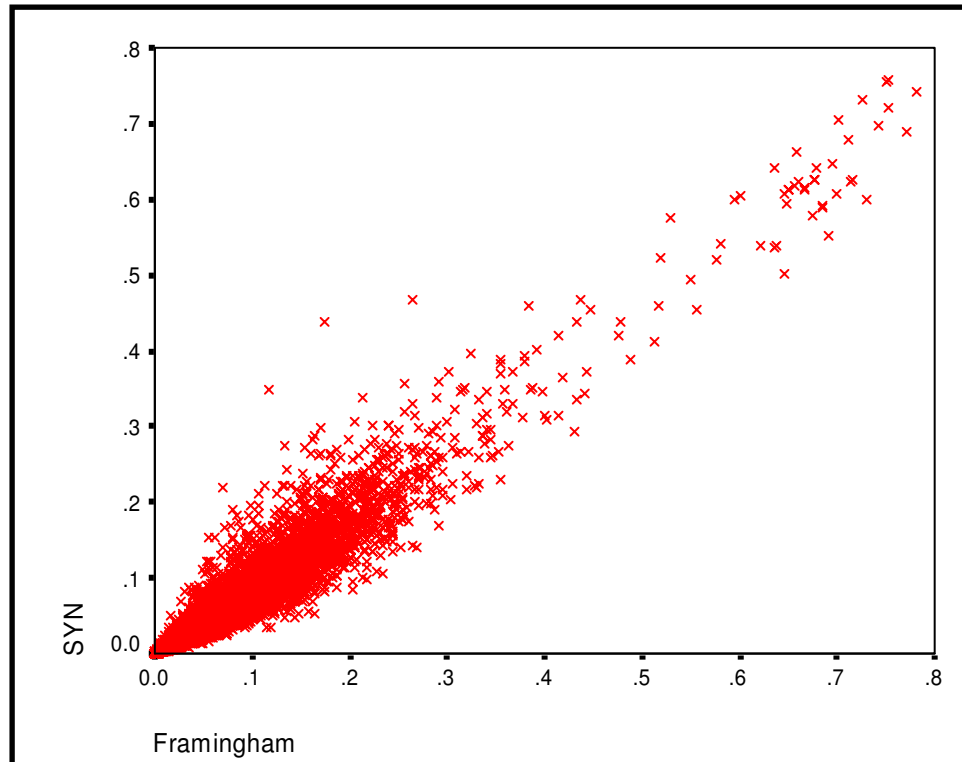
Variables Available in NHANES I Data

- Risk factors used
 - Body mass index (BMI)
 - Smoking history
 - Cholesterol / HDL
 - Albumin
 - SBP and BP medication
 - Physical activity
 - Other CVD history
 - Left ventricular hypertrophy
 - Prophylactic aspirin
- Risk factors not used
 - Lipoprotein(a)
 - Fibrinogen
 - C-reactive protein (CRP)
 - Homocysteine
 - HRT
 - Family history

Relative Validity

- Compare risk discrimination power of SYN with Framingham Model

Correlation between Framingham and SYN Models



Correlation coefficient = 0.962

Sensitivity vs. Specificity

Count		CHD Death		Total
		No	Yes	
SYN	Low	10,439	138	10,557
	High	1,098	77	1,175
Total		11,537	215	11,752

Count		CHD Death		Total
		No	Yes	
Framingham	Low	10,430	147	10,577
	High	1,107	68	1,175
Total		11,537	215	11,752

Sensitivity = No. predicted as high risk / Total number of death
SYN = 83 / 215 = 0.36 **Framingham = 68 / 215 = 0.31**

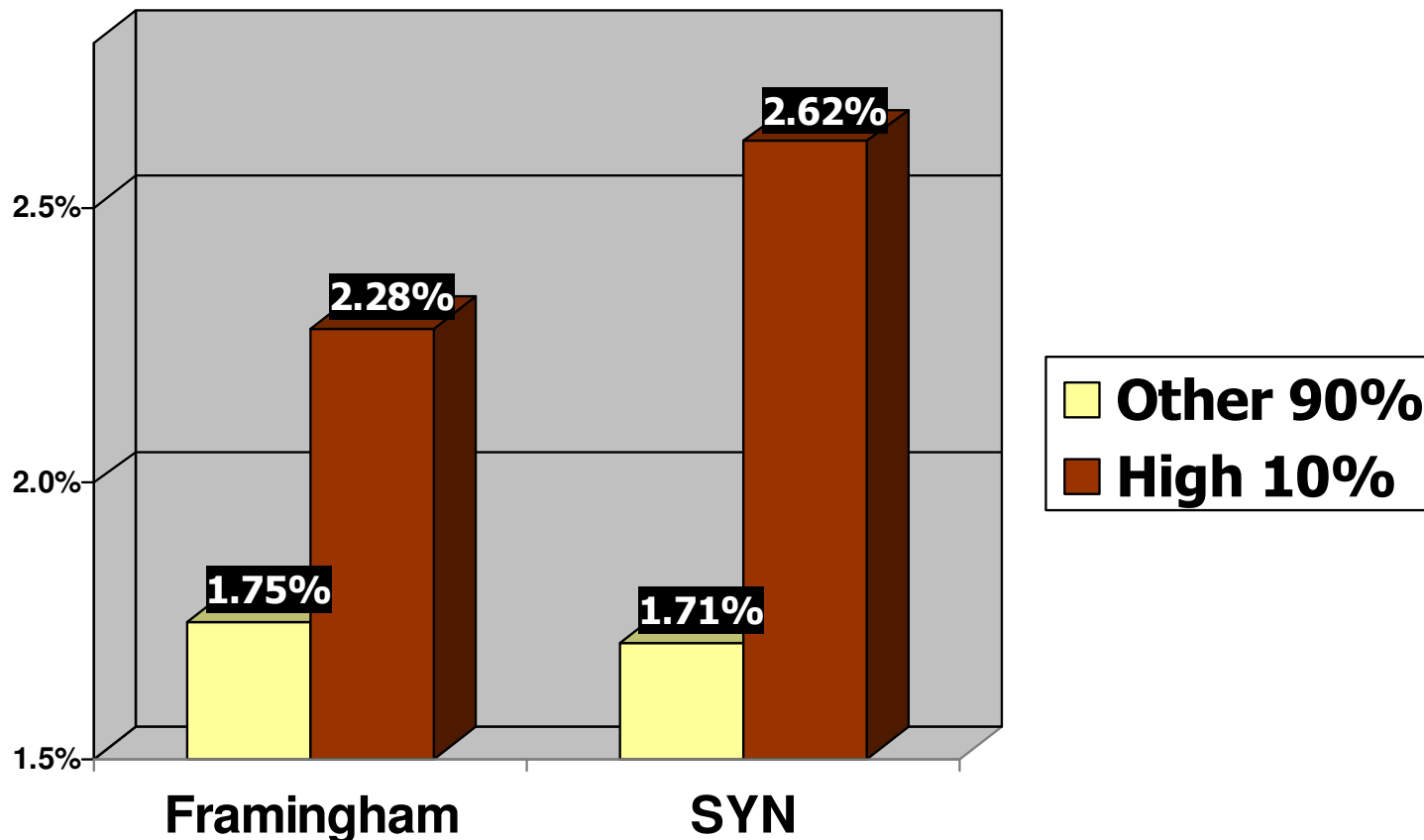
Specificity = No. predicted as low risk / Total number of non-death
SYN = 10,445 / 11,537 = 0.91 **Framingham = 10,430 / 11,537 = 0.90**

5 Year Age, Gender Adjusted CHD Mortalities

Count (Mortality)		Framingham		Total
		Low	High	
SYN	Low	10,323 (1.72%)	254 (1.11%)	10,577 (1.71%)
	High	254 (2.61%)	921 (2.66%)	1,075 (2.62%)
Total		10,577 (1.75%)	1,075 (2.28%)	11,752 (1.8%)

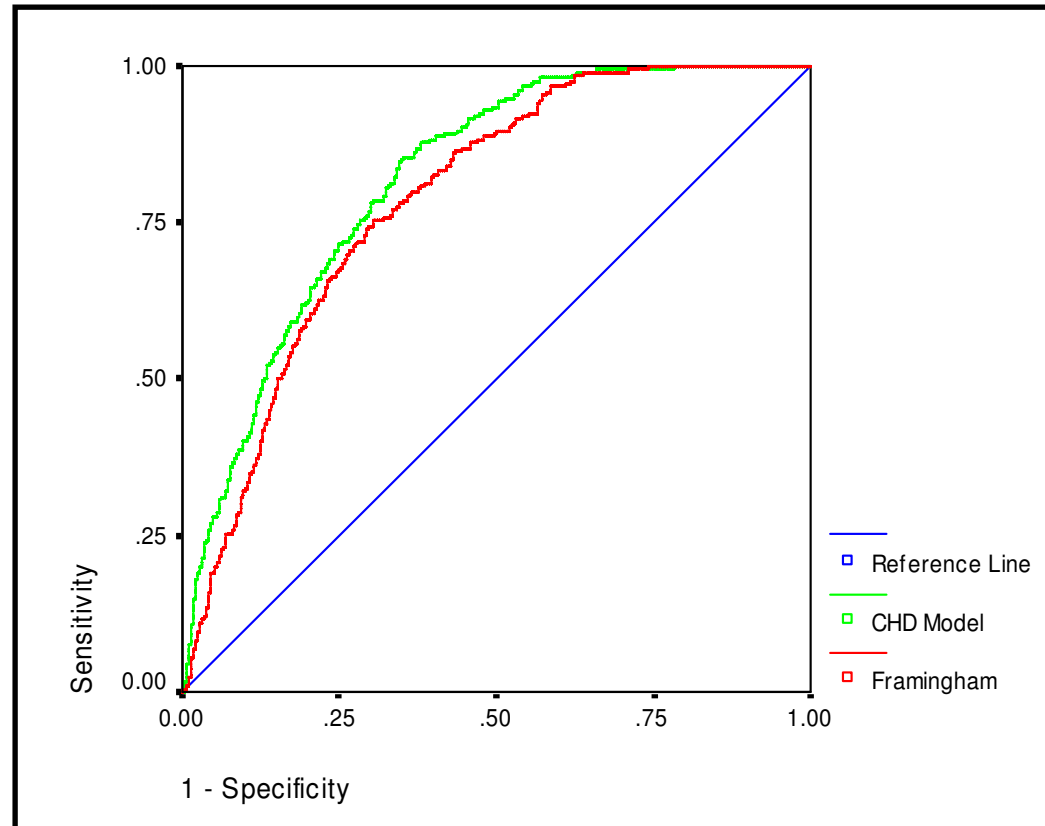
Calculated based on Cox hazards model

5 Year CHD Mortalities by Risk Groups



Calculated based on Cox hazards model

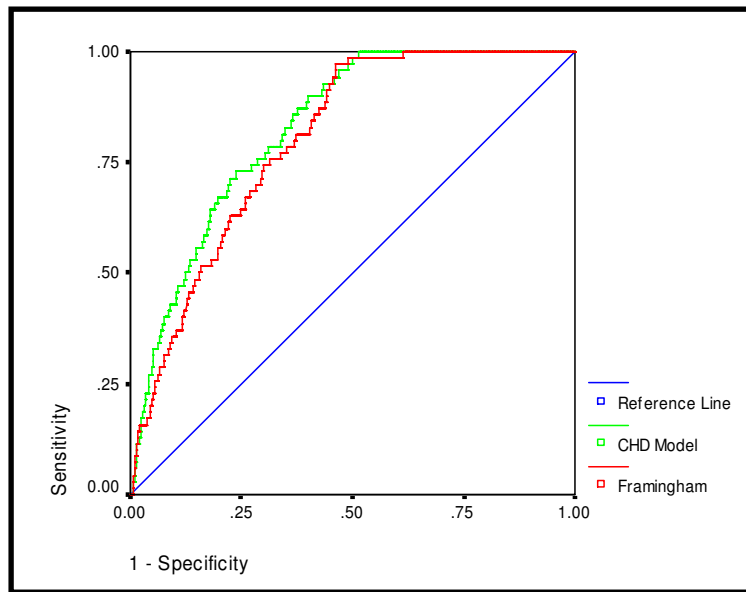
ROC Curve



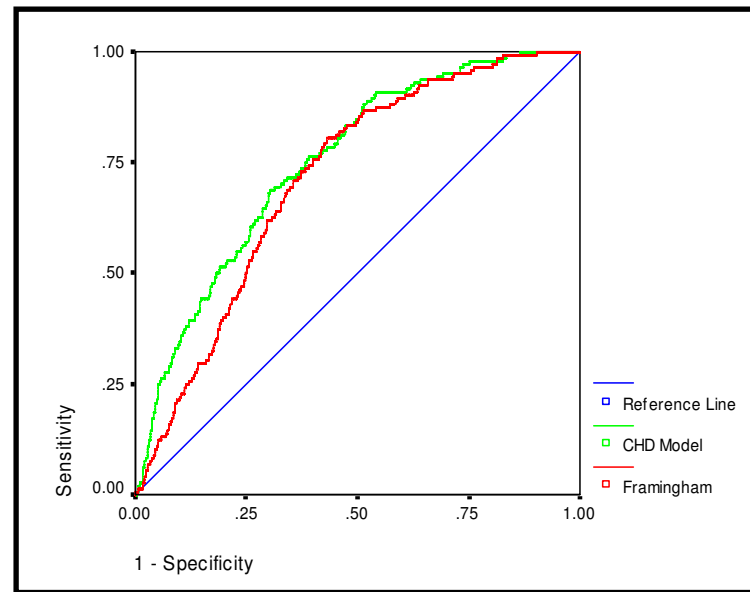
AUC: **SYN = 0.803** **Framingham = 0.787**

ROC Curves by Gender

Female



Male



Area Under Curve (AUC)

SYN: 0.835
Framingham: 0.807

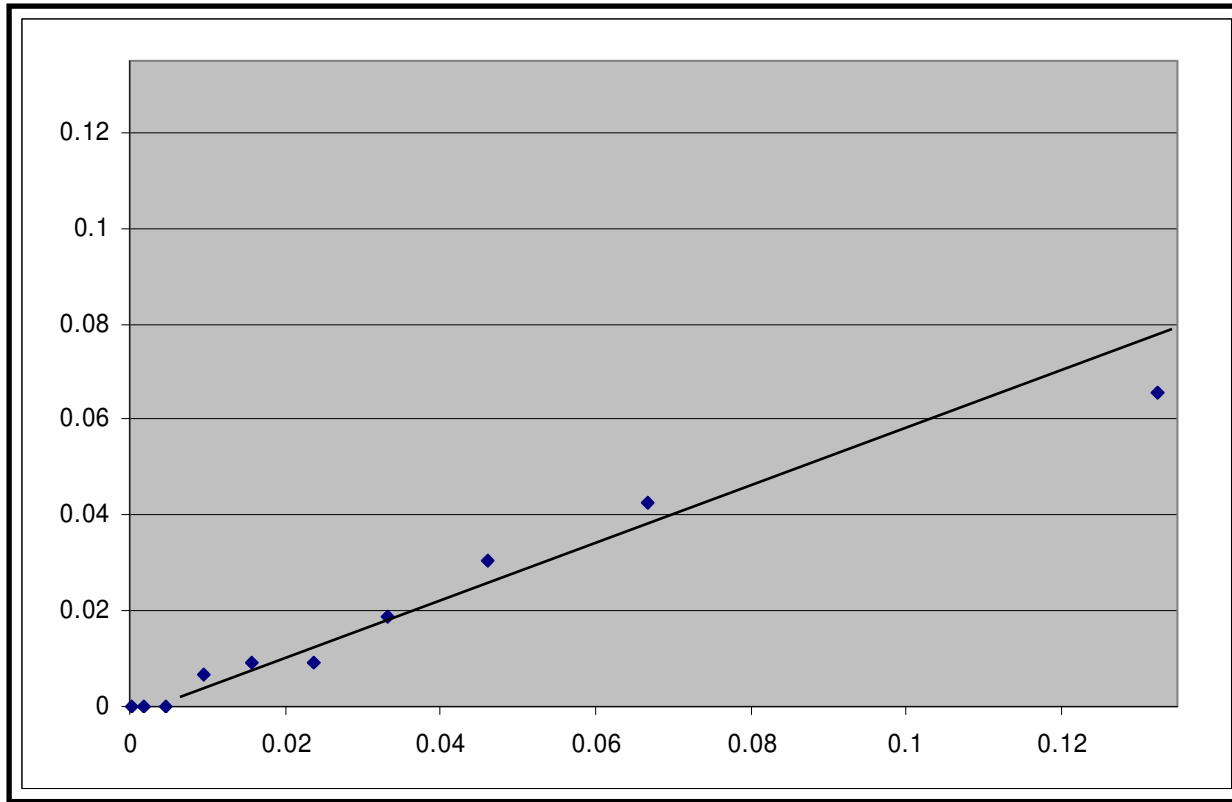
0.727
0.718

Absolute Validity

- Compare SYN with observed mortality (OMR).
 - Rank order of NHANES I population by SYN and classify groups by deciles
 - $OMR = \text{mortality} / \text{expected mortality}$
 - Correlation analysis of SYN vs. OMR

SYN vs. OMR

OMR



Correlation coefficient = 0.905

SYN

Summary

- Synthesis Analysis (SYN) is a new technology with which to build evidence-based predictive models
- SYN CHD model is a validated model that has a higher predictive power than the Framingham model