

**DIAGNOSIS OF THE METABOLIC  
SYNDROME ADDS NOTHING TO THE  
CARE OF THE PATIENT WITH OR AT  
RISK OF TYPE 2 DIABETES MELLITUS  
AND CVD**

**Con: KGMM Alberti**

# THE "ORIGINAL" SYNDROME X

- Resistance to insulin-stimulated glucose uptake
- Glucose intolerance
- Hyperinsulinaemia
- Increased VLDL-triglyceride
- Decreased HDL-cholesterol
- Hypertension

*Reaven, 1988*

# SYNONYMS

- Syndrome X      METABOLIC  
                                 SYNDROME
- Metabolic Syndrome X
- Plurimetabolic Syndrome
- Dysmetabolic Syndrome, etc.
- Insulin Resistance Syndrome

N.B.

- » Subtle shift from insulin resistance
- » More focus on obesity

# METABOLIC SYNDROME

A cluster of risk factors for  
diabetes and cardiovascular  
disease

- greater than by chance alone

# THE PROBLEM

Diagnostic criteria

# Major Definitions of the MetS

	WHO	EGIR	NCEP
IR	Clamp*	F-insulin*	
IGT	√		
IFG	≥6.1	6.1-6.9	≥6.1
High-BP	140/90	140/90	130/85
TG≥1.7	√	√	√
Low-HDL	<0.9 (1.0)	<1.0	<1.04 (<1.29)
Waist		≥94 (≥80)	>102 (>88)
WHR/BMI	√		
Albuminuria			

\*prerequisite

# IDF CONSENSUS MEETING 2004

## Aims

1. To bring together individuals with different viewpoints
2. To establish a unified working diagnostic tool
3. To highlight areas where more knowledge is needed

**N.B.** Not just yet another definition



# Underlying risk factors for Metabolic Syndrome

Which is dominant?

Obesity

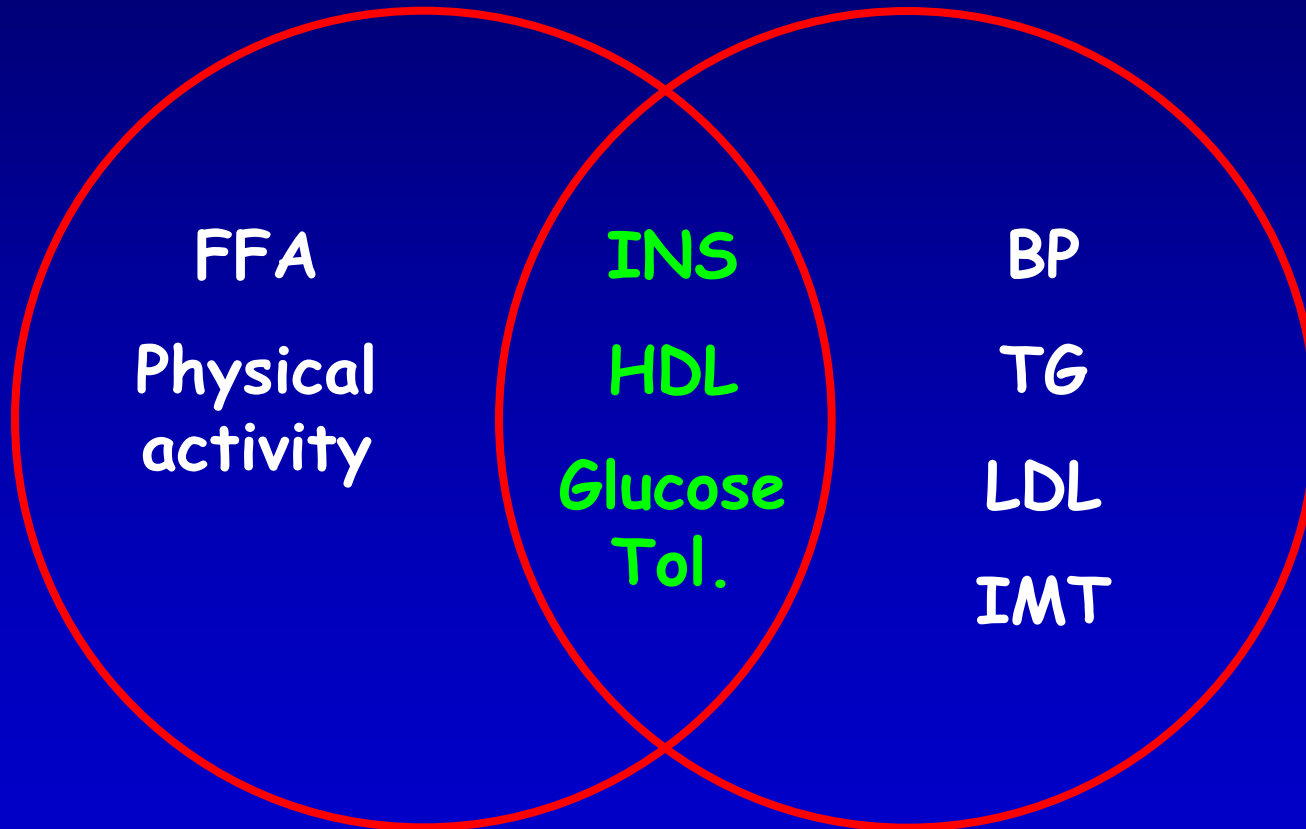
(esp. abdominal obesity)

or

Insulin resistance

# RISC STUDY CORRELATIONS

(Ferranini et al)



Insulin Resistance

Abdominal Obesity

## Loadings of 13 age-adjusted variables related to CVD on 4 factors rotated and extracted with factor analysis in Finnish men

Factors	<i>Metabolic syndrome</i>	Factor 2	Factor 3	Factor 4
Variance explained, %	21	14	11	8
Body mass index, kg/m <sup>2</sup>	<u>0.76</u>	-0.28	0.18	-0.05
Waist-to-hip ratio	<u>0.69</u>	-0.18	0.19	0.00
Fasting serum insulin, mU/L	<u>0.74</u>	-0.20	-0.05	-0.17
Fasting glucose, mmol/L	<u>0.45</u>	-0.15	<u>0.33</u>	-0.06
Serum triglycerides, mmol/L	<u>0.58</u>	0.01	<u>-0.42</u>	0.02
HDL cholesterol, mmol/L	<u>-0.48</u>	-0.01	<u>0.67</u>	0.03
Systolic blood pressure, mmHg	<u>0.36</u>	-0.10	<u>0.35</u>	0.18
Smoking, cigarettes/day	0.14	<u>0.78</u>	0.08	-0.01
Alcohol, g/wk	0.20	0.29	<u>0.57</u>	0.17
LDL cholesterol, mmol/L	0.21	0.14	<u>-0.34</u>	<u>0.59</u>
Ischemic heart disease in family	-0.01	-0.14	0.06	<u>0.76</u>
Fibrinogen, g/l	0.26	<u>0.60</u>	0.07	0.01
White blood cells, x 10 <sup>9</sup> /mL	0.28	<u>0.72</u>	-0.03	-0.08

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Variables with loadings on factors  $\geq 0.30$  are in bold and underlined.

# A SINGLE FACTOR UNDERLIES THE METABOLIC SYNDROME

## A confirmatory Factor Analysis

Pladevall et al. Diabetes Care 2006; 29: 113-122

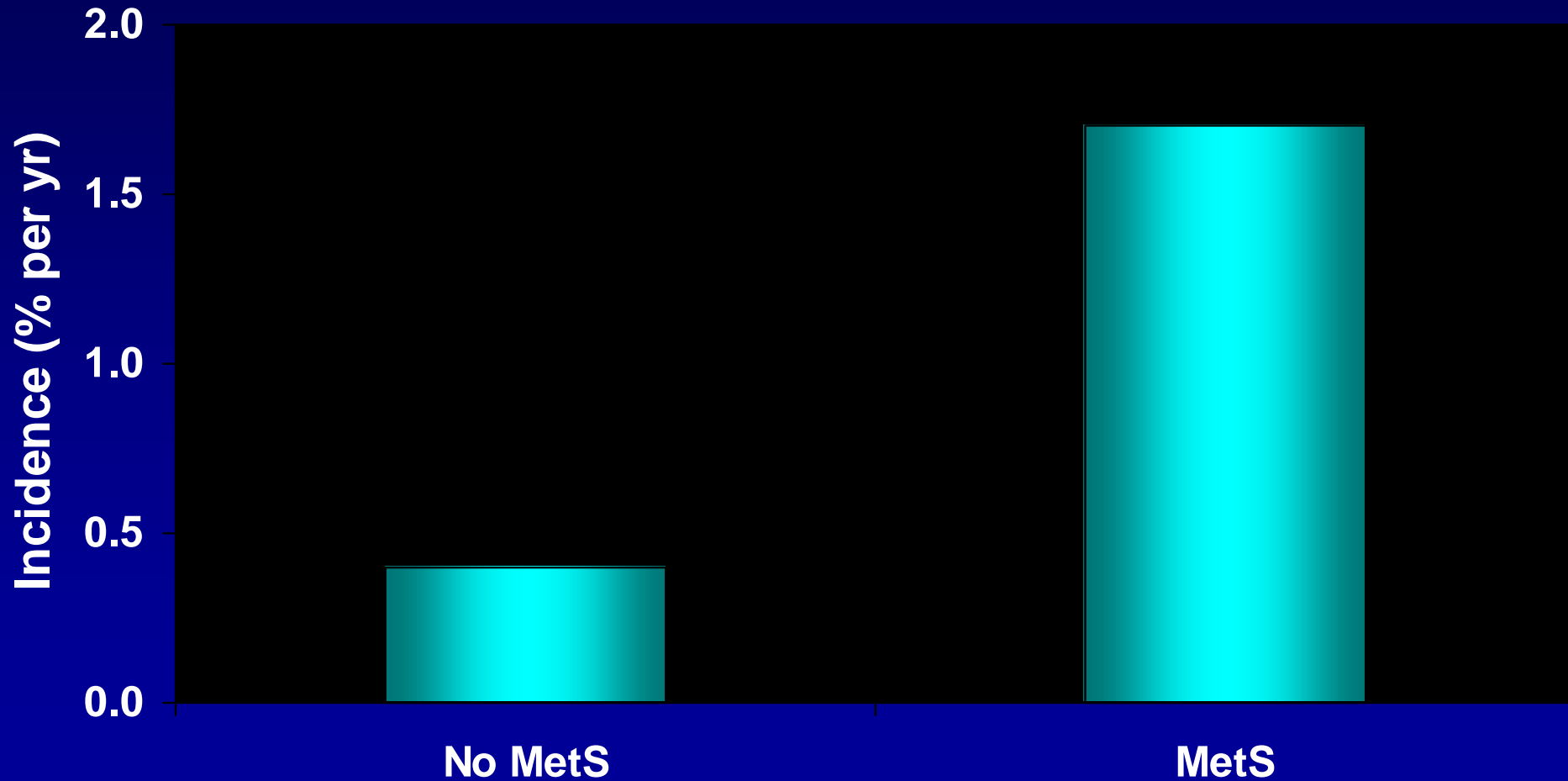
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\*prerequisite

Does the metabolic syndrome  
give indication of risk?

# The Metabolic Syndrome increases the Risks of Diabetes 4 times



# Metabolic Syndrome as a Risk Condition (Framingham Heart Study)

## Cardiovascular disease

- Men: RR 2.50 x increased
- Women: RR 1.58 x increased

## Type 2 Diabetes

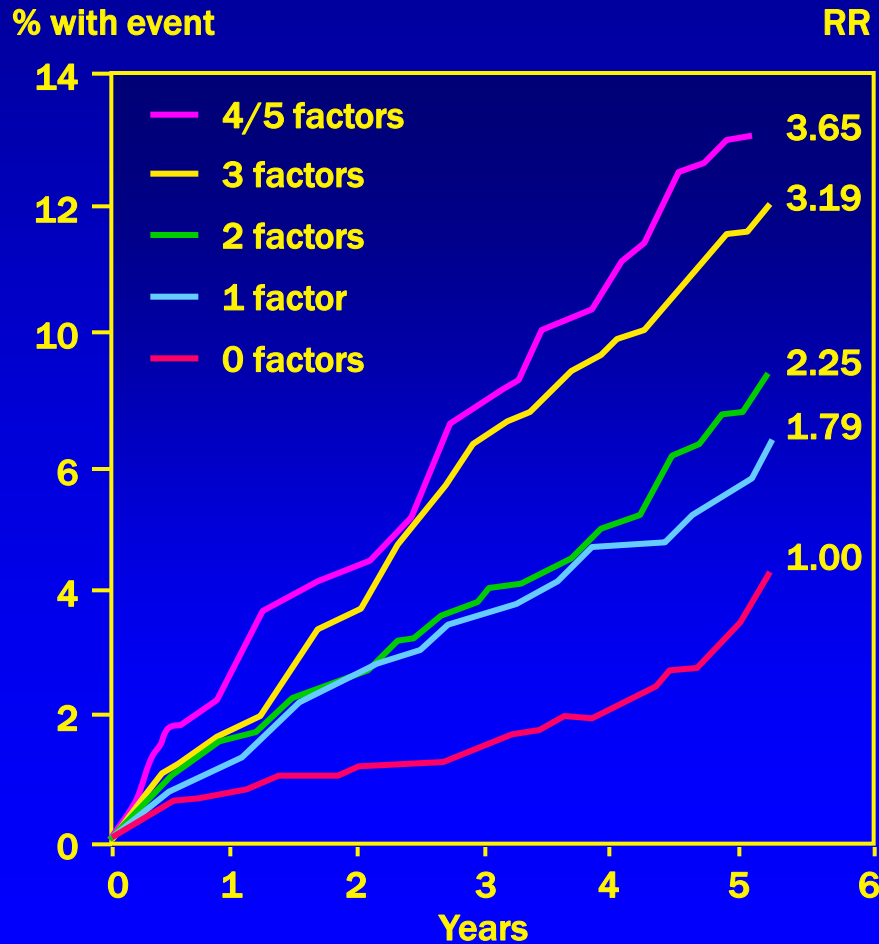
- Men: RR 4.76 x increased
- Women: RR 5.66 x increased

Eugenia Martinez Vallejo

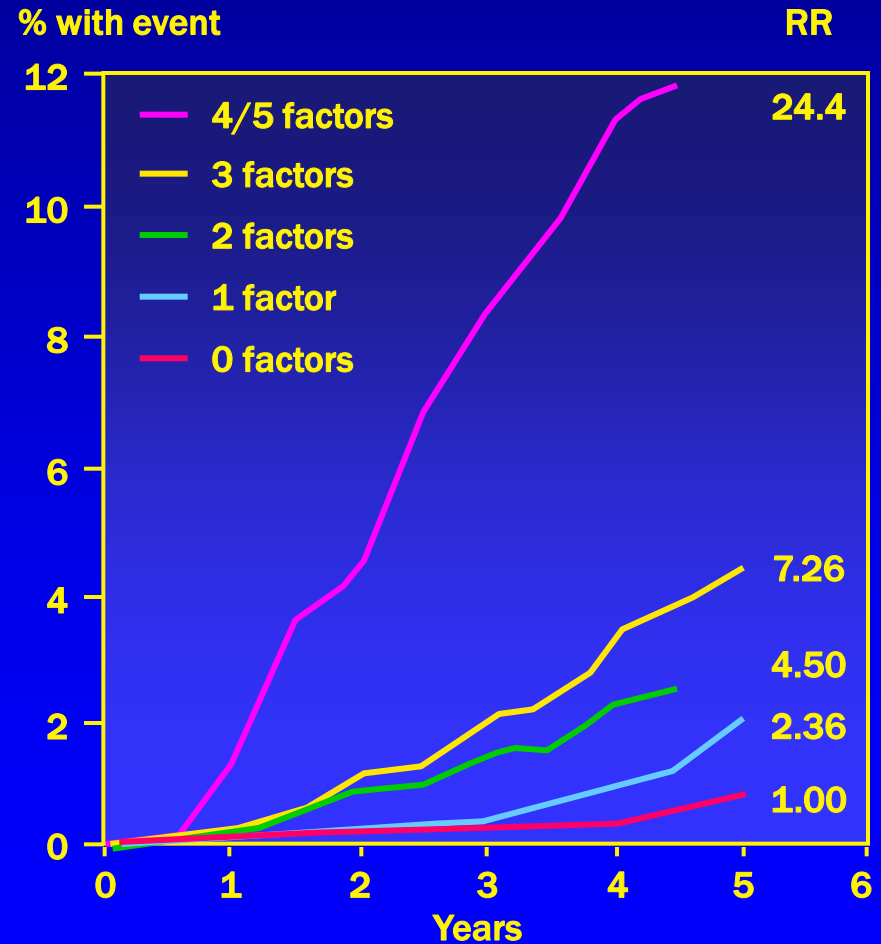


# Metabolic Syndrome as a predictor of CHD and Diabetes: WOSCOPS

## CHD Death/Non-fatal MI

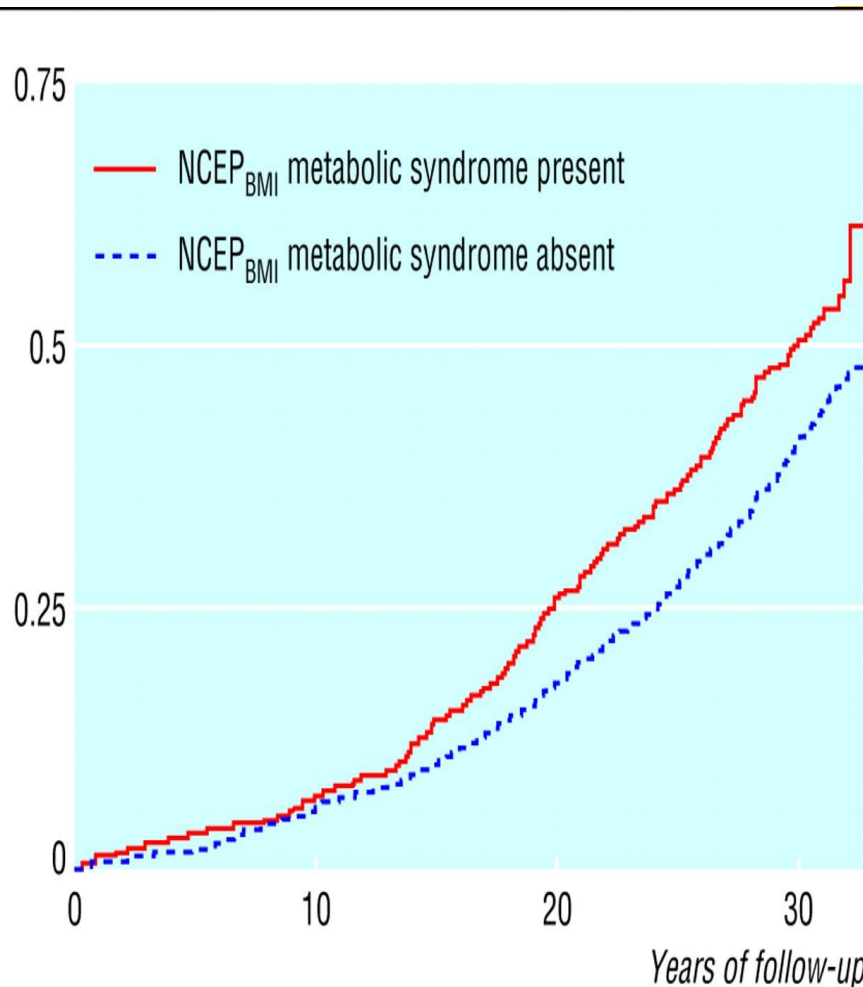


## Onset of New DM

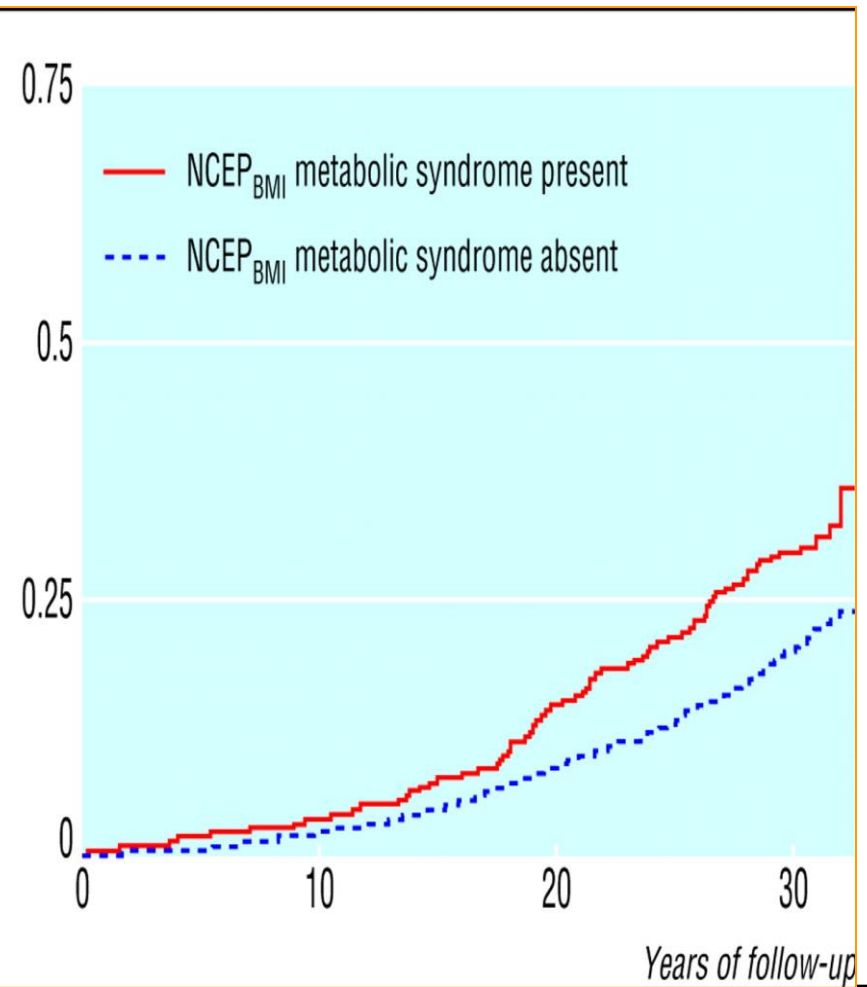


# Metabolic Syndrome and 30 year mortality in 50 year old Swedish men

Total mortality



CVD mortality

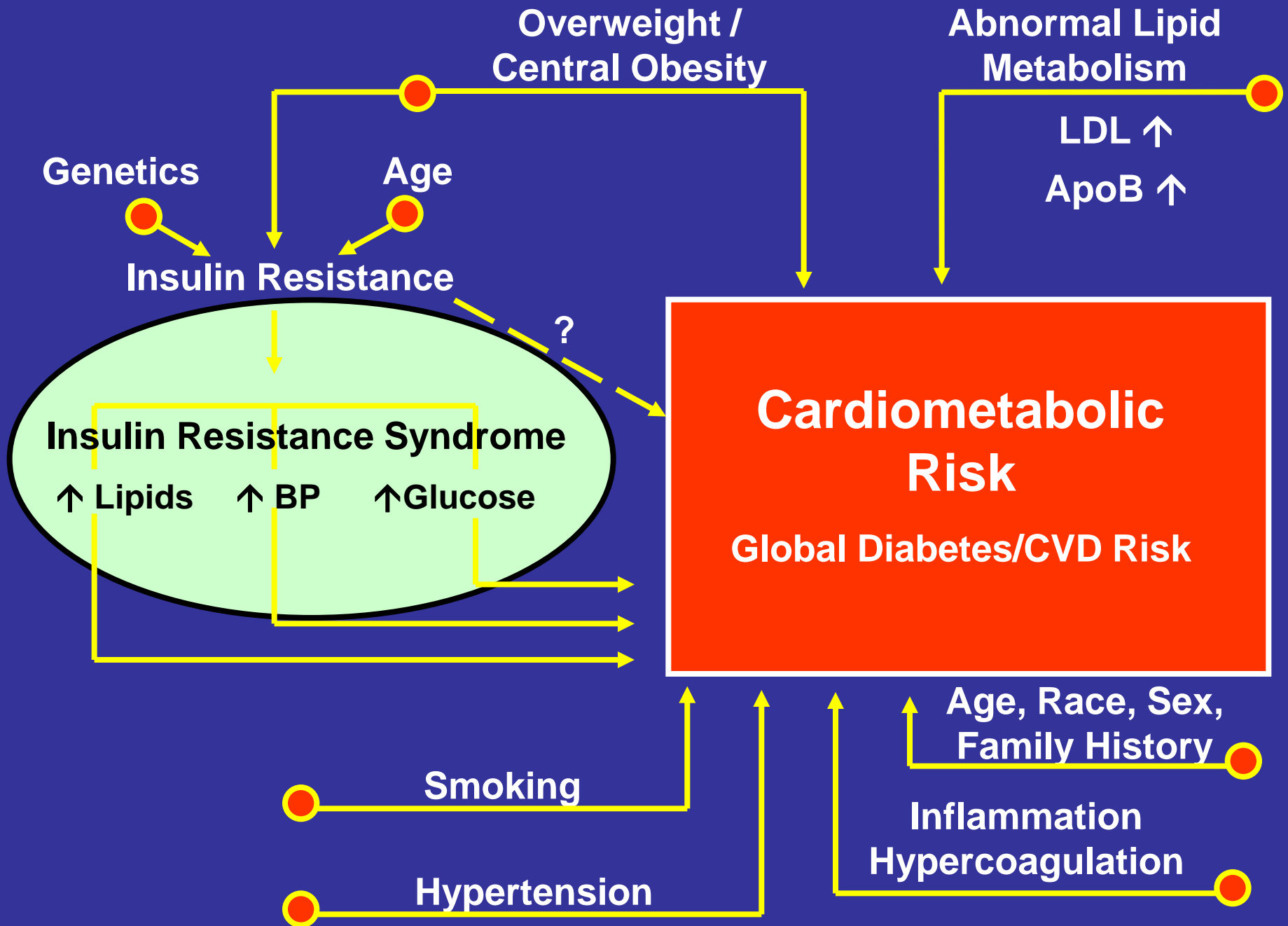


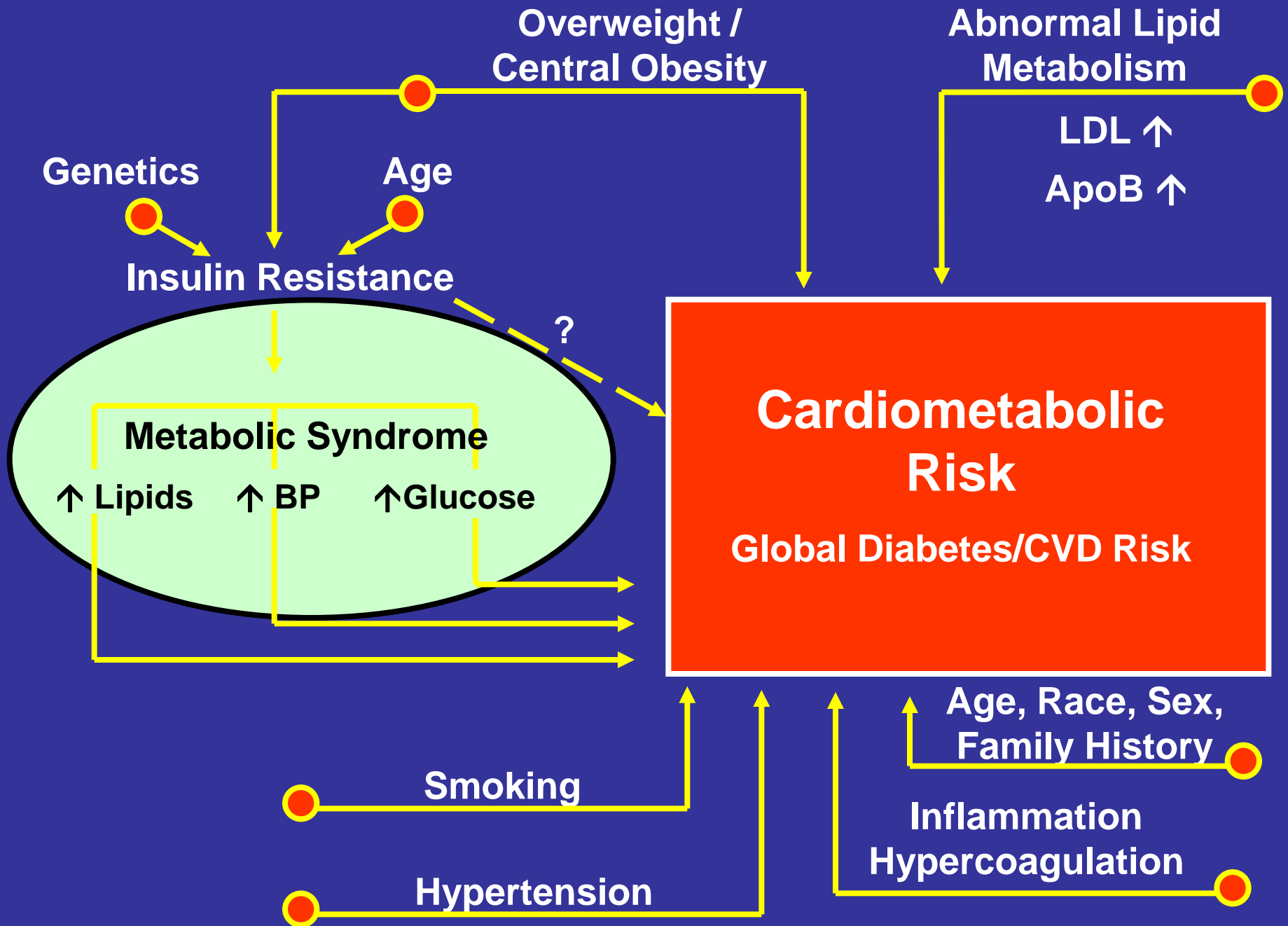
# THE METABOLIC SYNDROME

More than its components?

N.B.

Does not give **ABSOLUTE** risk but  
picks out those at high **RELATIVE**  
risk





# IDF POSITION

- A useful way of focusing on subjects at high risk of CVD and diabetes
- A simple diagnostic “set” capable of use in primary care world wide
- Strong need for long term detailed studies of other putative components

# The Basic Public Health Screening Tool





# THE METABOLIC SYNDROME

“whilst not a precise tool for determining global cardiovascular risk ... identifying those with the metabolic syndrome can help target them for more intensive therapies”

*Holman, 2006*

# WHAT DOES THE METABOLIC SYNDROME ADD?

- Awareness of high risk associated with central obesity, raised glucose, ↑TG, ↓HDL, raised BP
  - particularly in combination
- Hook to hang screening on for primary care
- Emphasis on diabetes for cardiologists
- Emphasis on cardiology for diabetologists
- Stimulus to research

Diagnosis of the Metabolic Syndrome  
adds nothing to the care of the patient  
with or at risk of Type 2 diabetes  
mellitus and CVD

**N.B.** They are not all patients

Yes it does

- in most health care settings





