춘계당뇨병학회, 9th, May, 2015

Is metabolically healthy obesity (MHO)

Contents

- **What is MHO?**

Contents

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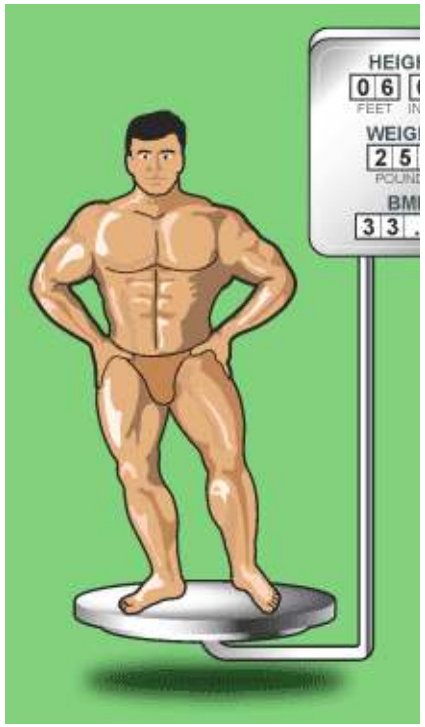
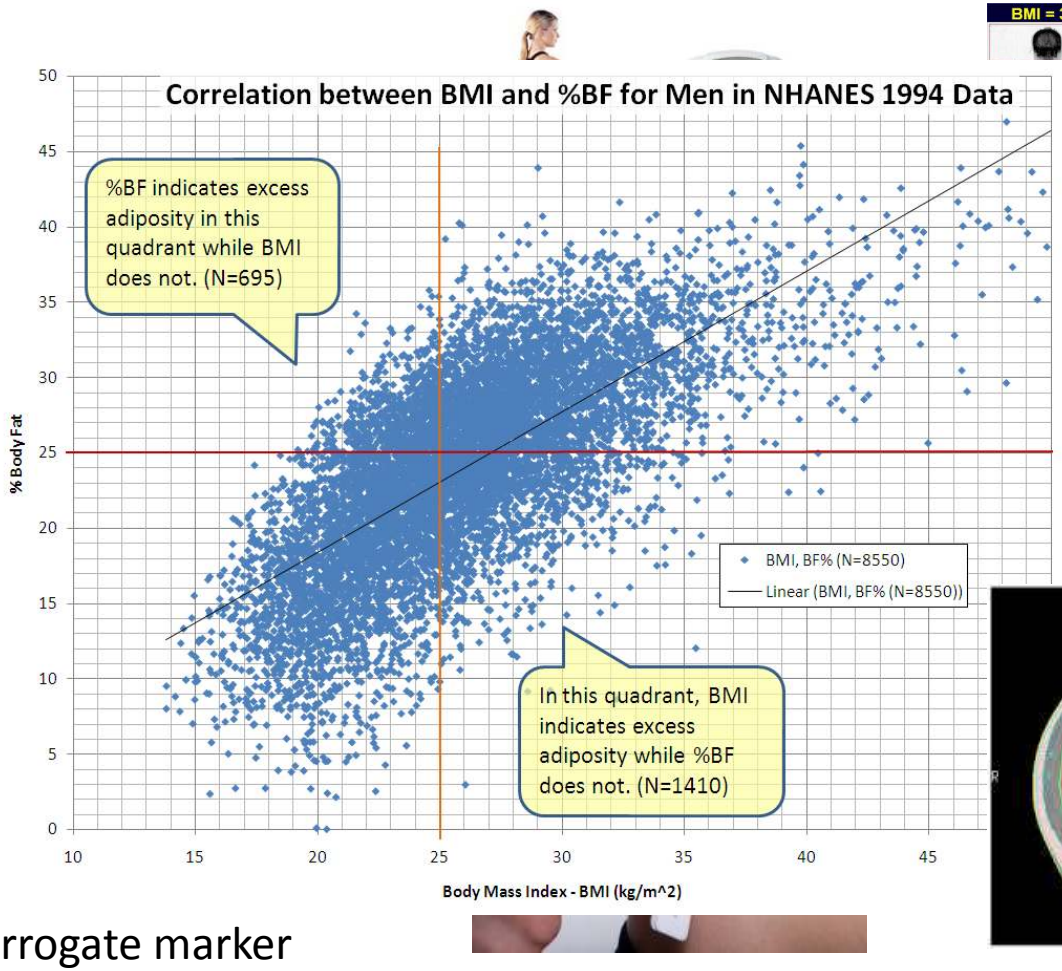
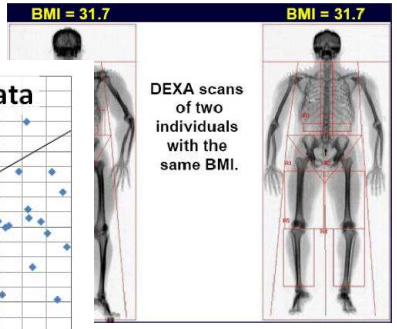
What is ‘Obesity’?

- **Overweight and obesity** are defined as abnormal or excessive fat accumulation that may impair health. (WHO)

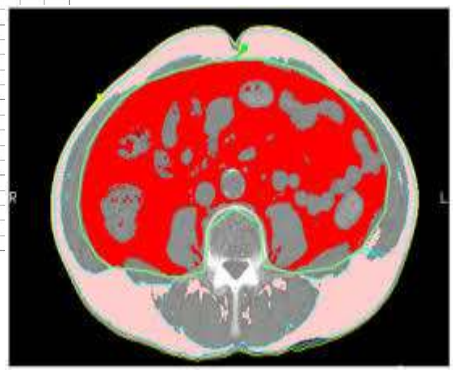
Body Fatness (Adiposity)







DEXA



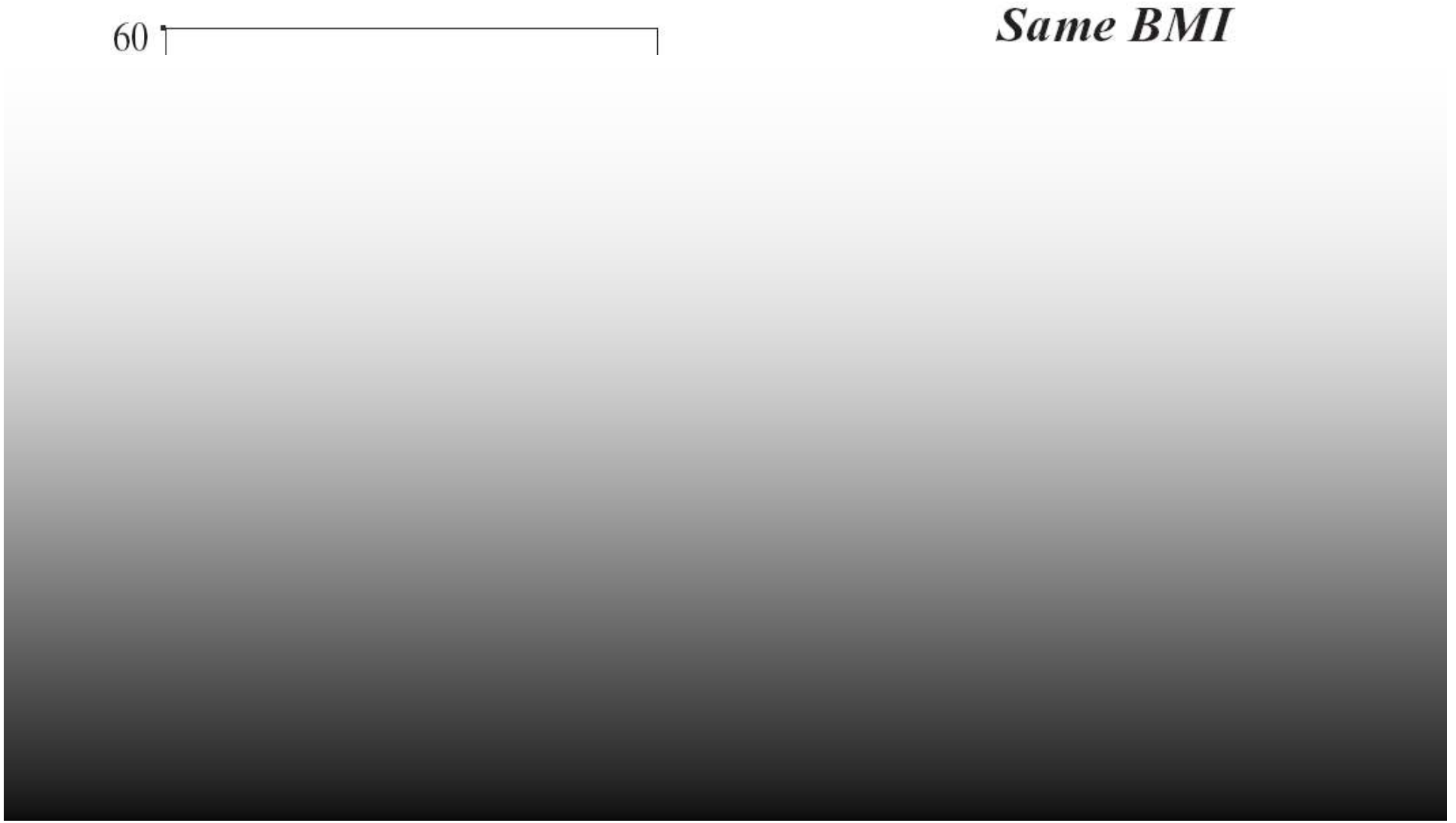
CT

BMI: not a direct fatness, but a surrogate marker

Skin Fold Calipers

Int J Obesity. 2008;32(6):959-956

Same BMI ≠ Same Fat

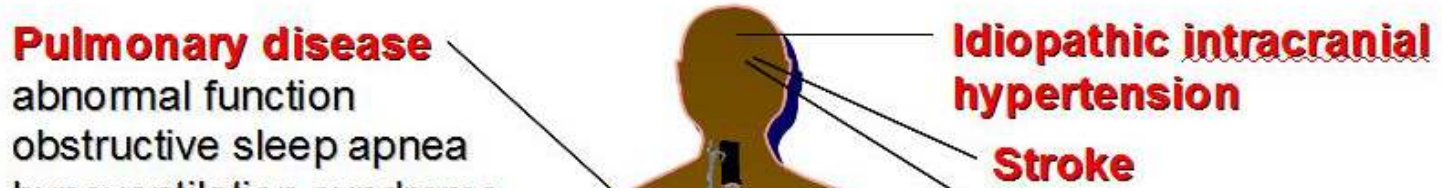


Obesity in Asian
: Y-Y Paradox

BMI: Proposed Asian Criteria

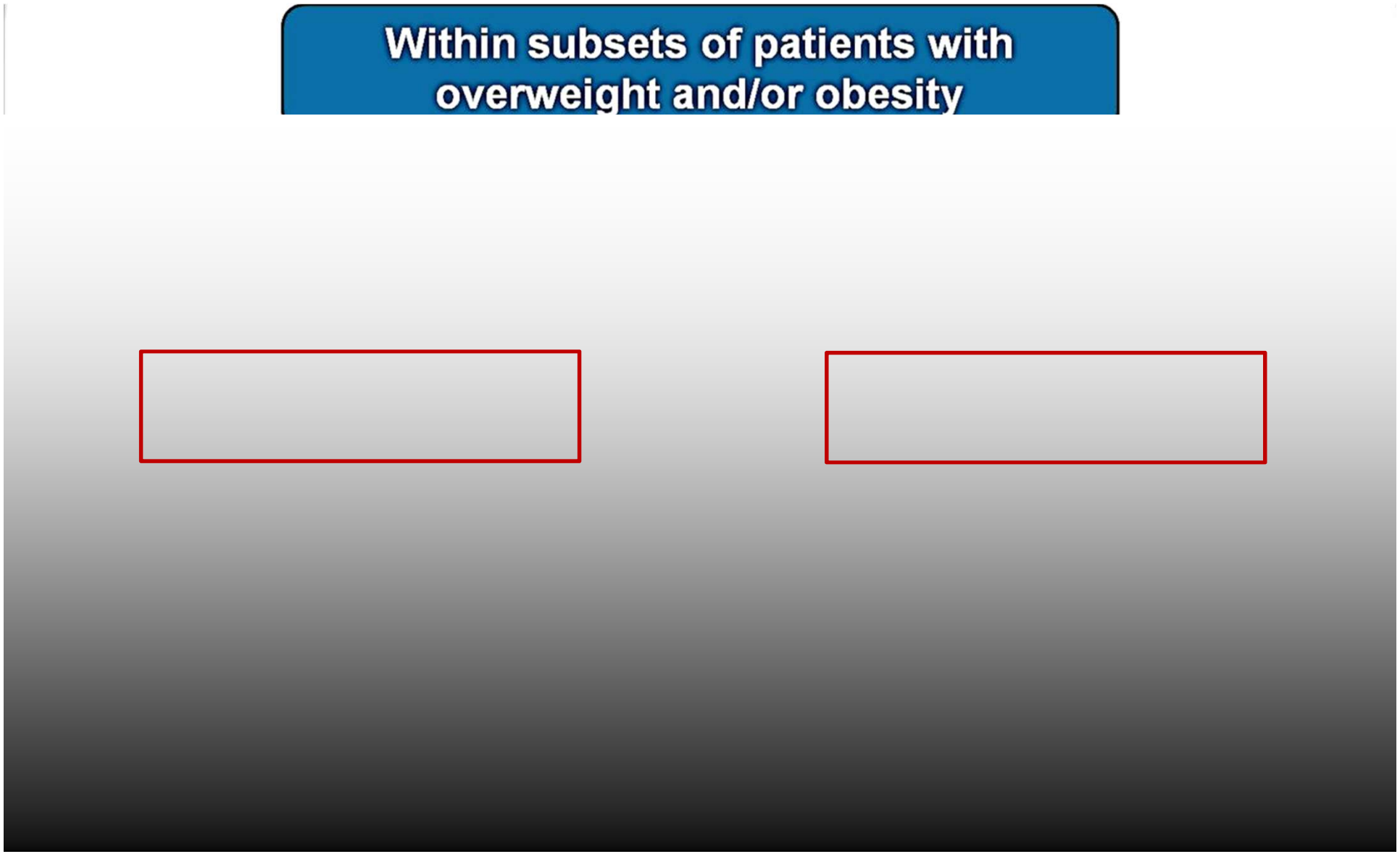
Classification of obesity	BMI (kg/m^2)

Medical Complications of Obesity



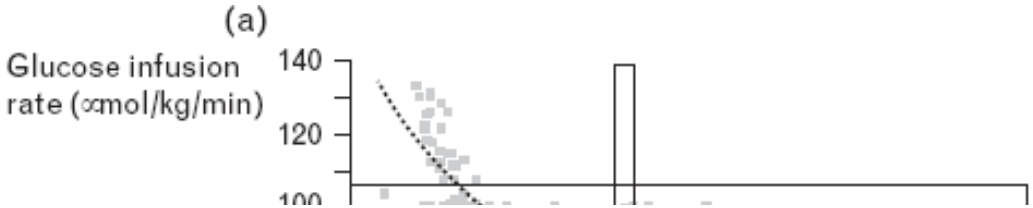
How Obesity Causes Disease: Adipose Tissue as an Endocrine Organ

Sick Fat Disease + Fat Mass Disease

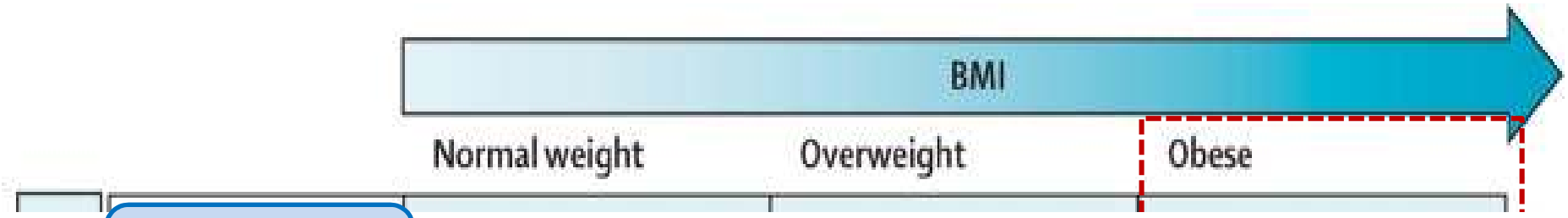


Can Obesity Be Healthy?
(Sick Fat Disease)

The Heterogeneity Despite Same BMI



Classification

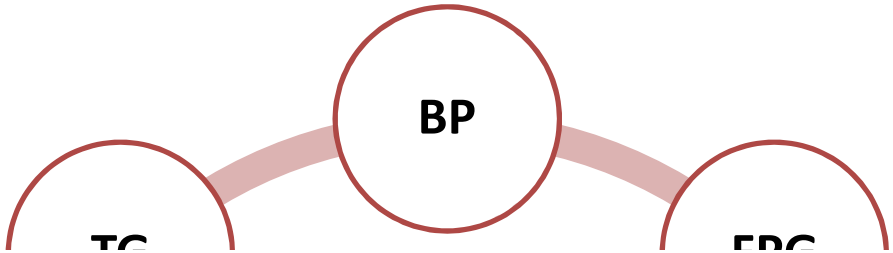


Insulin sensitive

Insulin resistant

Prevalence of MHO

Prevalence of MHO: Definition Dependent



The Definition of MHO: Not Standardized

	Aguilar-Salinas	Karelis	Meigs	Wildman	NCEP ATP III
BP	O	-	O	O	O

The Prevalence of MHO
: Definition-dependent

The Prevalence of MHO in “Korea” : Definition-dependent

Contents

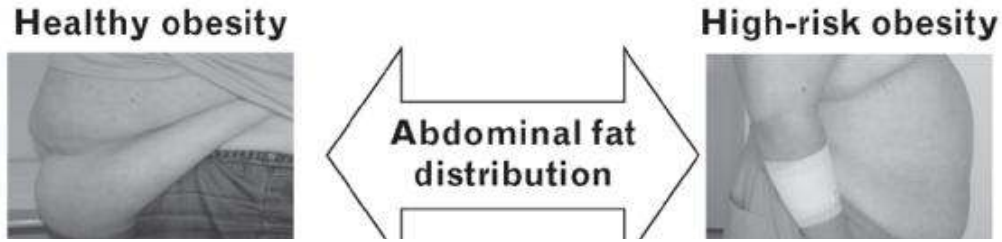
- What is MHO?

Proposed Features of MHO

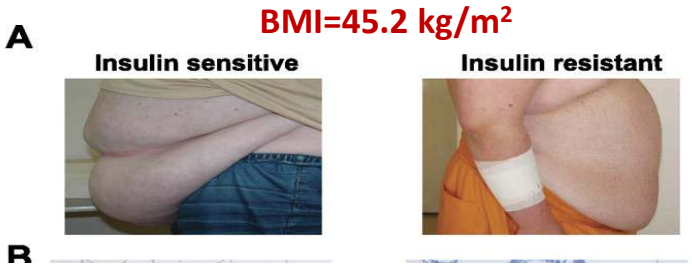
↑Aerobic fitness

Healthier lifestyle

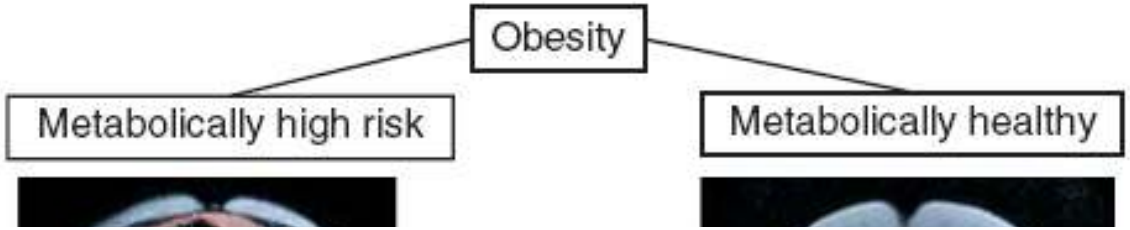
Proposed Mechanisms underlying MHO



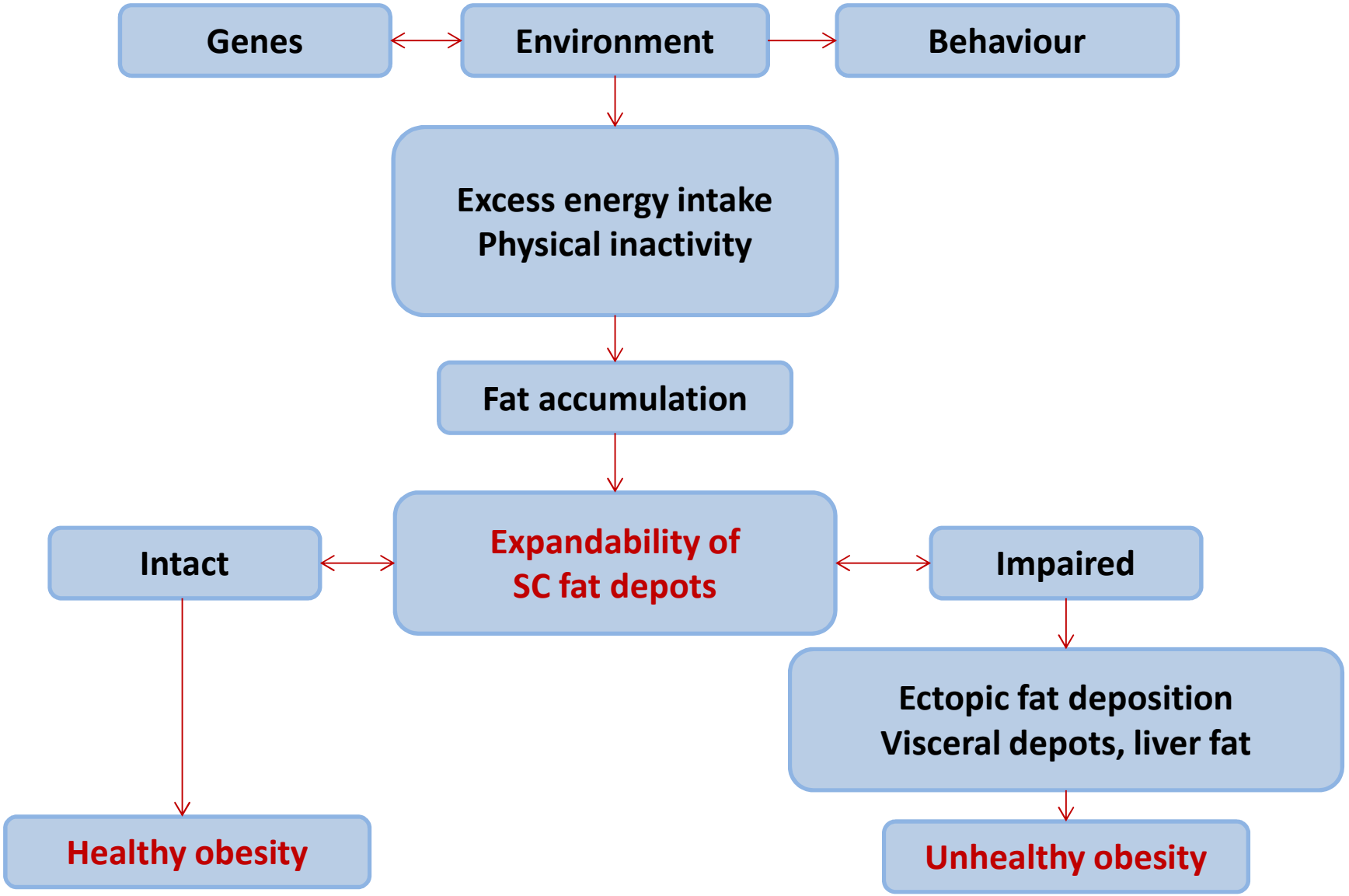
Difference in Adipose Tissue



Potential Adipose Tissue-Related Mechanisms

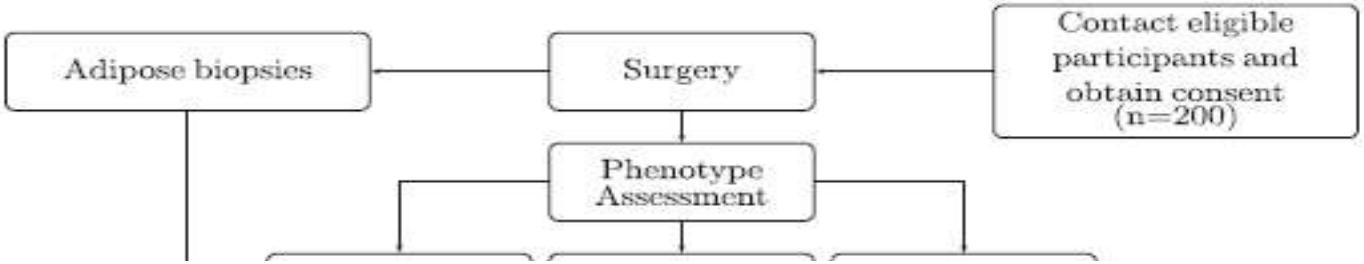


Potential Adipose Tissue-Related Mechanisms



Endocrinol Metab. 2014;29:427-434
Curr Opin Lipidol 2010;21:38-43.

Fat Expandability: Biomarker?



Summary 1

- **Some obese subjects are insulin-sensitive, i.e., metabolically**

Contents

- What is MHO?

MHO & Mortality: Pros (1)

- 15 yr f/up
- HOMA criteria (2.5)
- Italy

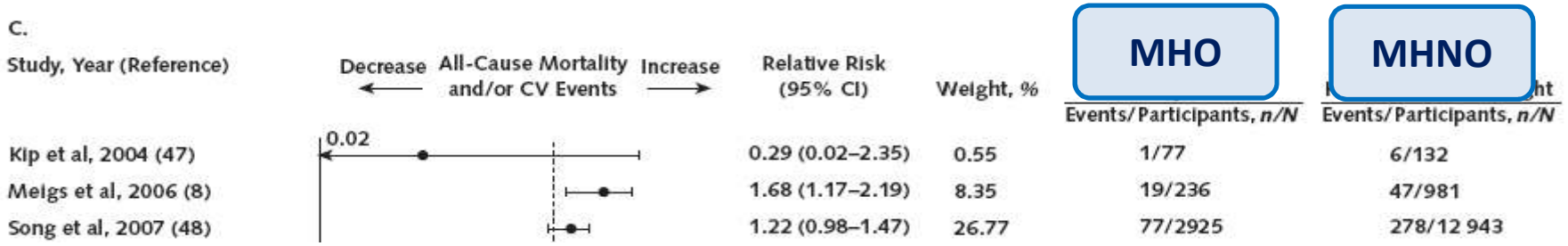
MHO & Mortality: Pros (2)

	Cases/n	Age- and sex-adjusted HR (95% CI)	Fully adjusted HR (95% CI)[a]
Whole sample			
Metabolically healthy nonobese	225/12716	1.00 (referent)	1.00

MHO & Mortality: Cons Definition Matters?

MHO & Mortality: Meta-analysis

C.

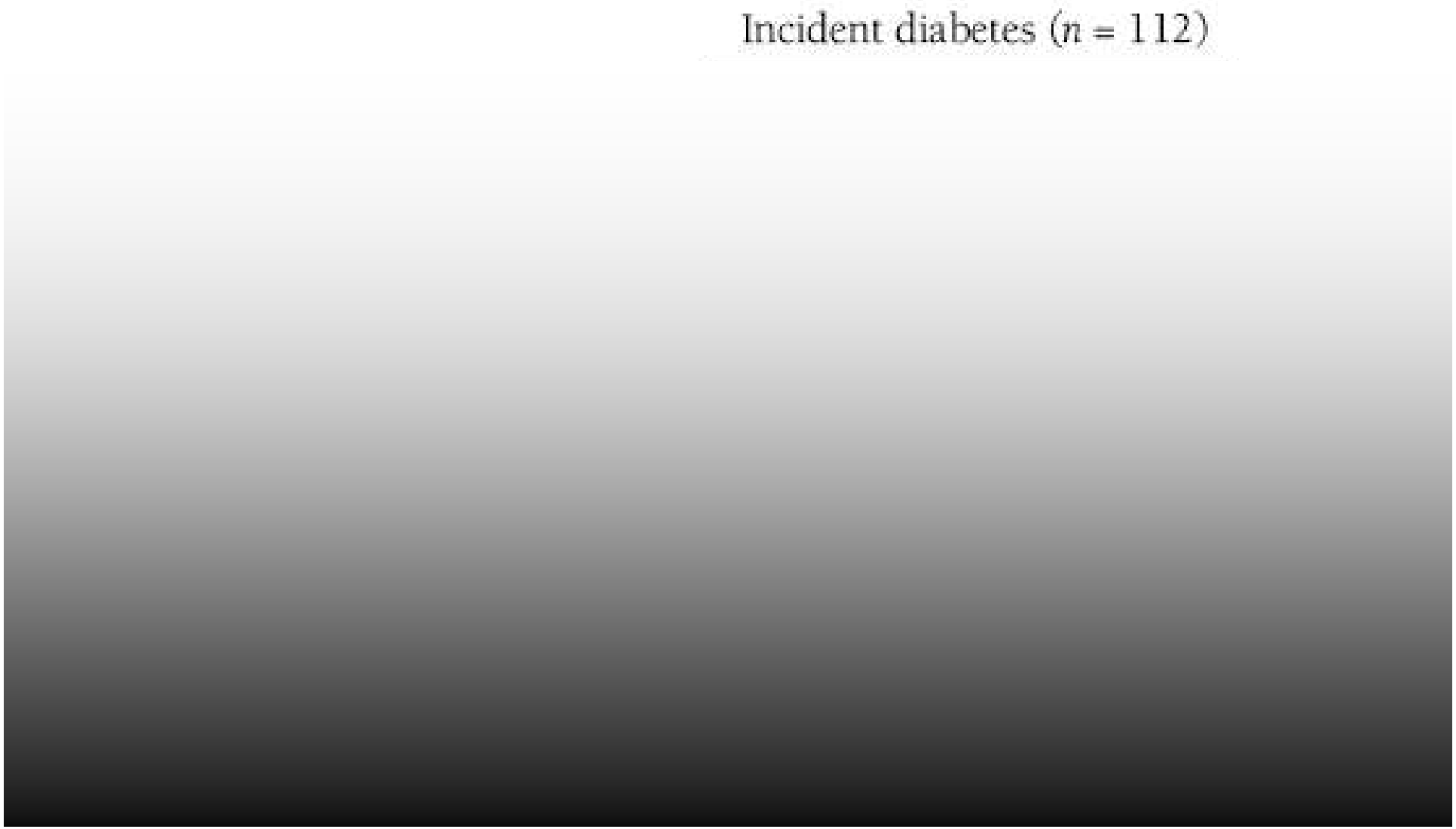


MHO & Atherosclerosis: Intermediate Profile

MHO & Atherosclerosis: Intermediate Profile

	Nonobese subjects	MHO	Insulin resistant obese subjects	P*	P†	P‡

MHO & Incident Type 2 Diabetes: Pros

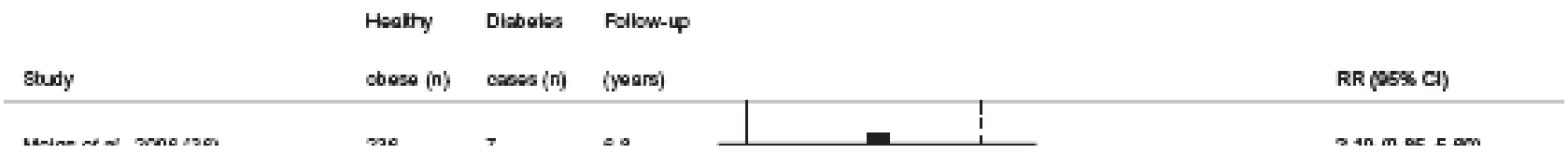


MHO & Incident Type 2 Diabetes: Cons

A *No ATP-III risk factors*

B *At least 3 ATP-III risk factors*

MHO & DM: Meta-analysis



Obesity Phenotype: Dynamic Phenotype?

Predictors of MHO -> MUO

- 85 Japanese Americans with MHO (mean age 49.8 yrs)
- F/up at 2, 5, 5, and 10 yrs

MHO & Outcomes: A Matter of Time?

	6-y Follow-up				
Baseline	MHNO	MNHNO	MHO	MNHO	Total Baseline

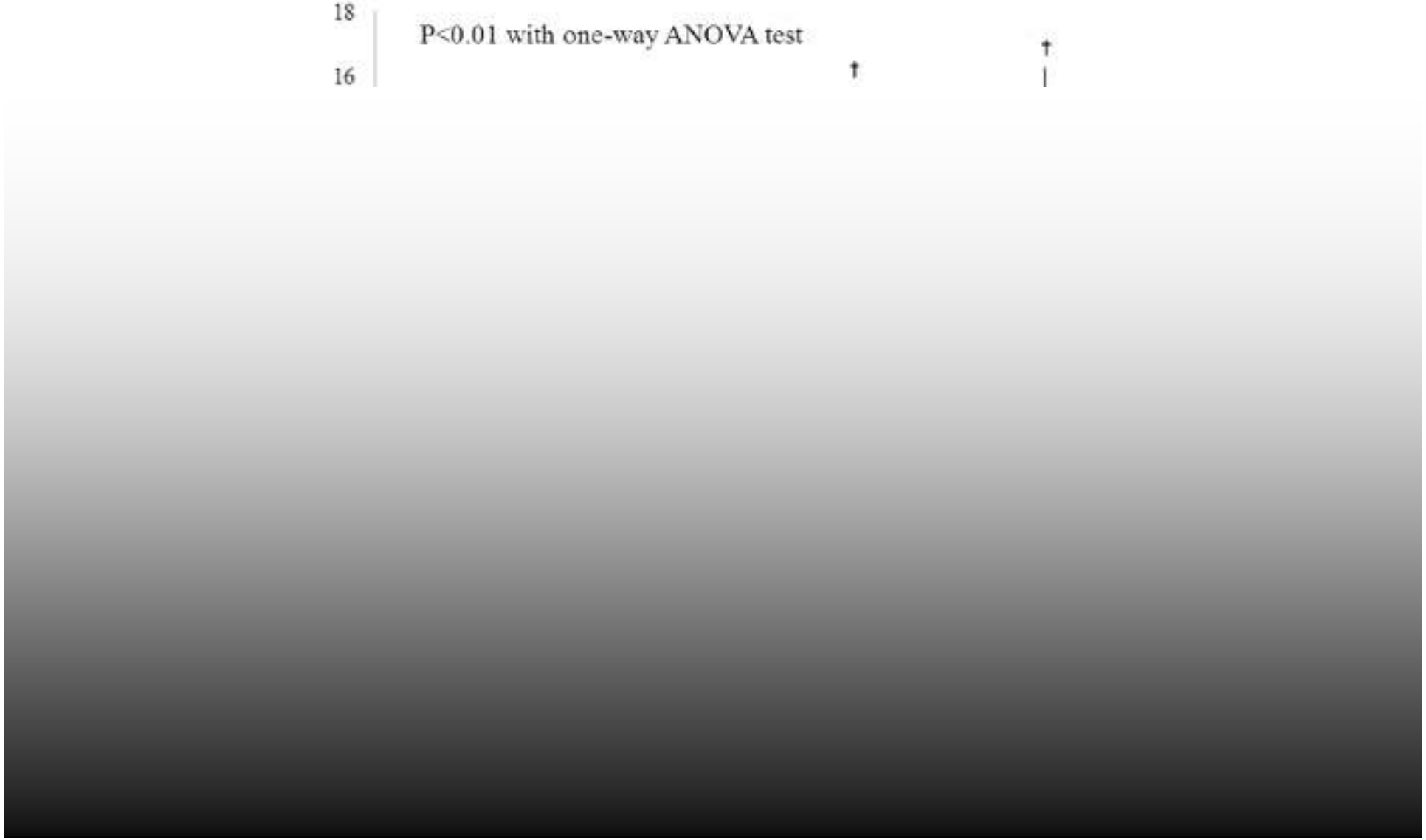
Summary 2

- The **prognostic value of MHO** has been the subjects of much

Contents

- What is MHO?

MHO & Subclinical Coronary Atherosclerosis



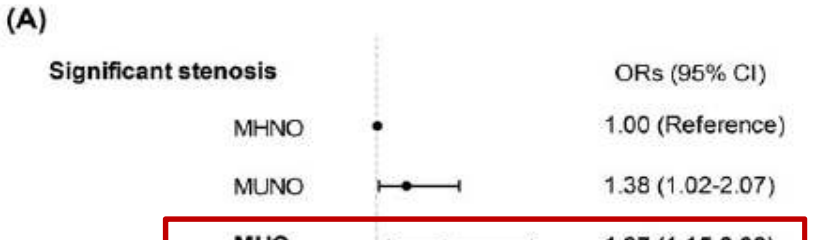
MHO & Subclinical Coronary Atherosclerosis

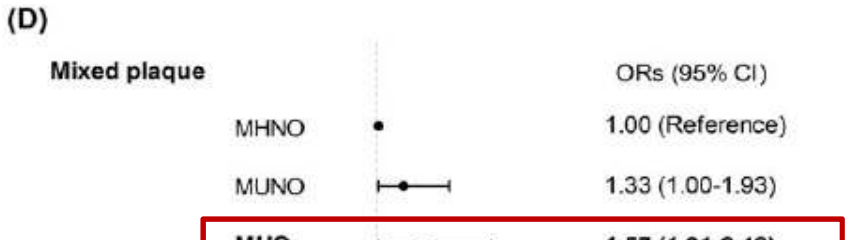
MHO & Subclinical Coronary Atherosclerosis

Table 3 Prevalence Ratios* for CAC by BMI Categories in 14,828 Metabolically-Healthy

MHO & Subclinical Coronary Atherosclerosis

MHO & Subclinical Coronary Atherosclerosis



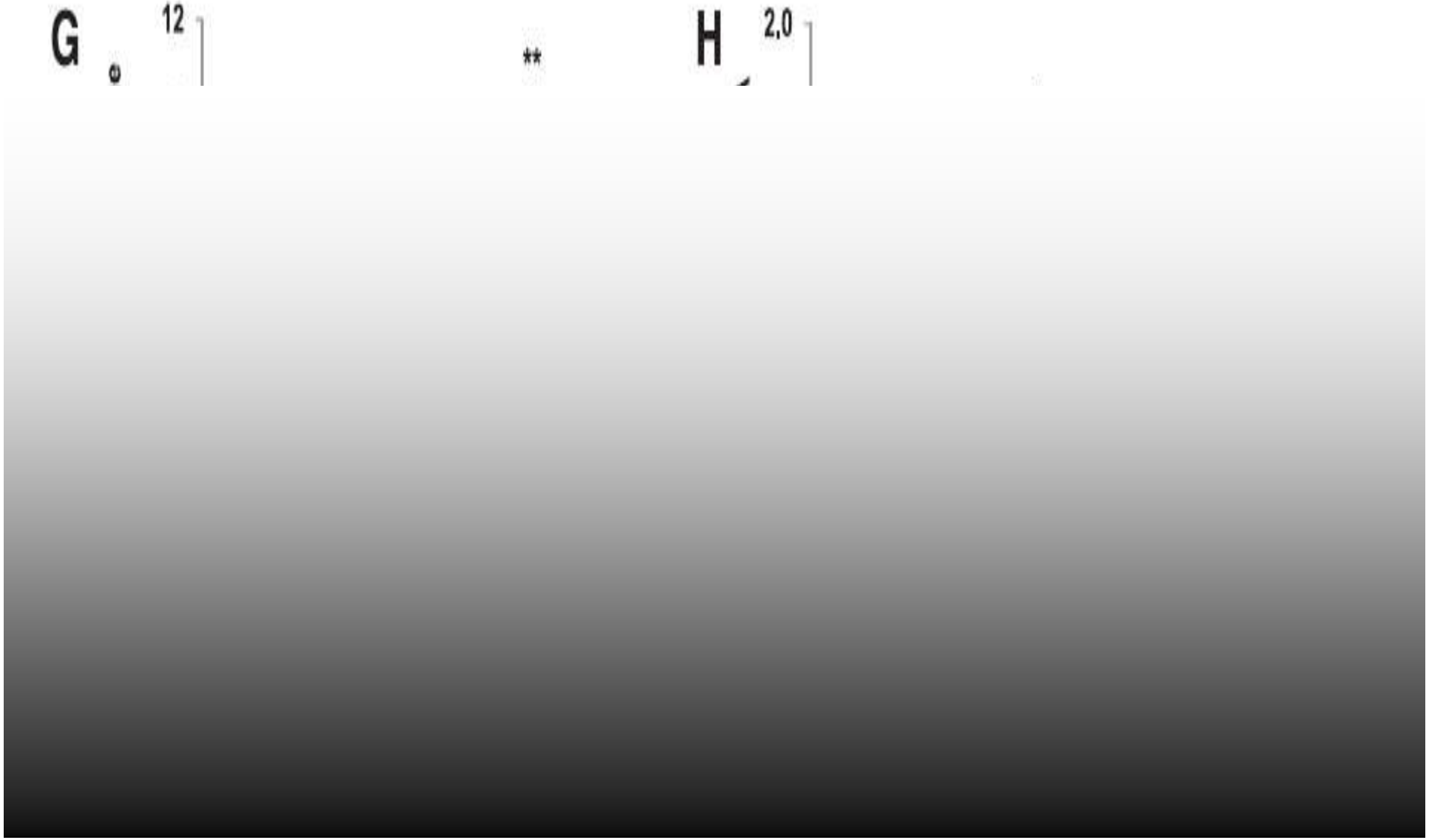


MHO & Incident Type 2 Diabetes

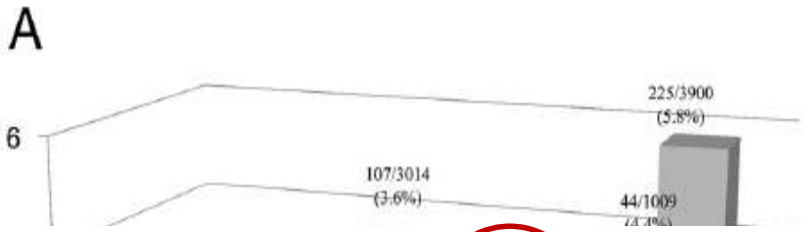
MHO & Incident Type 2 Diabetes

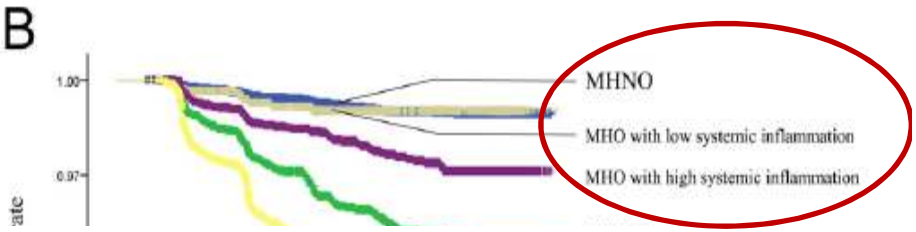
- MH Criteria: ≤ 1 of ATP III criteria (except WC)
- Incident Diabetes: FPG ≥ 126 mg/dl and/or HbA1c ≥6.5%
  , antidiabetic medication (+)

MHO & Systemic Inflammation

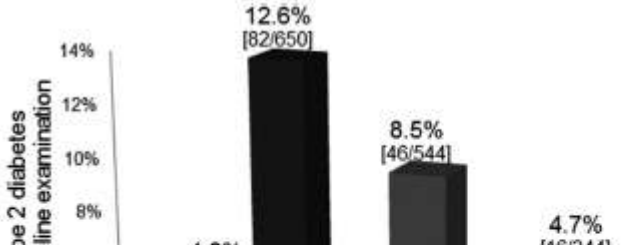


MHO & Incident Type 2 Diabetes





MHO & Incident Type 2 Diabetes: Ectopic FAT



MHO & Incident CKD (P.109)

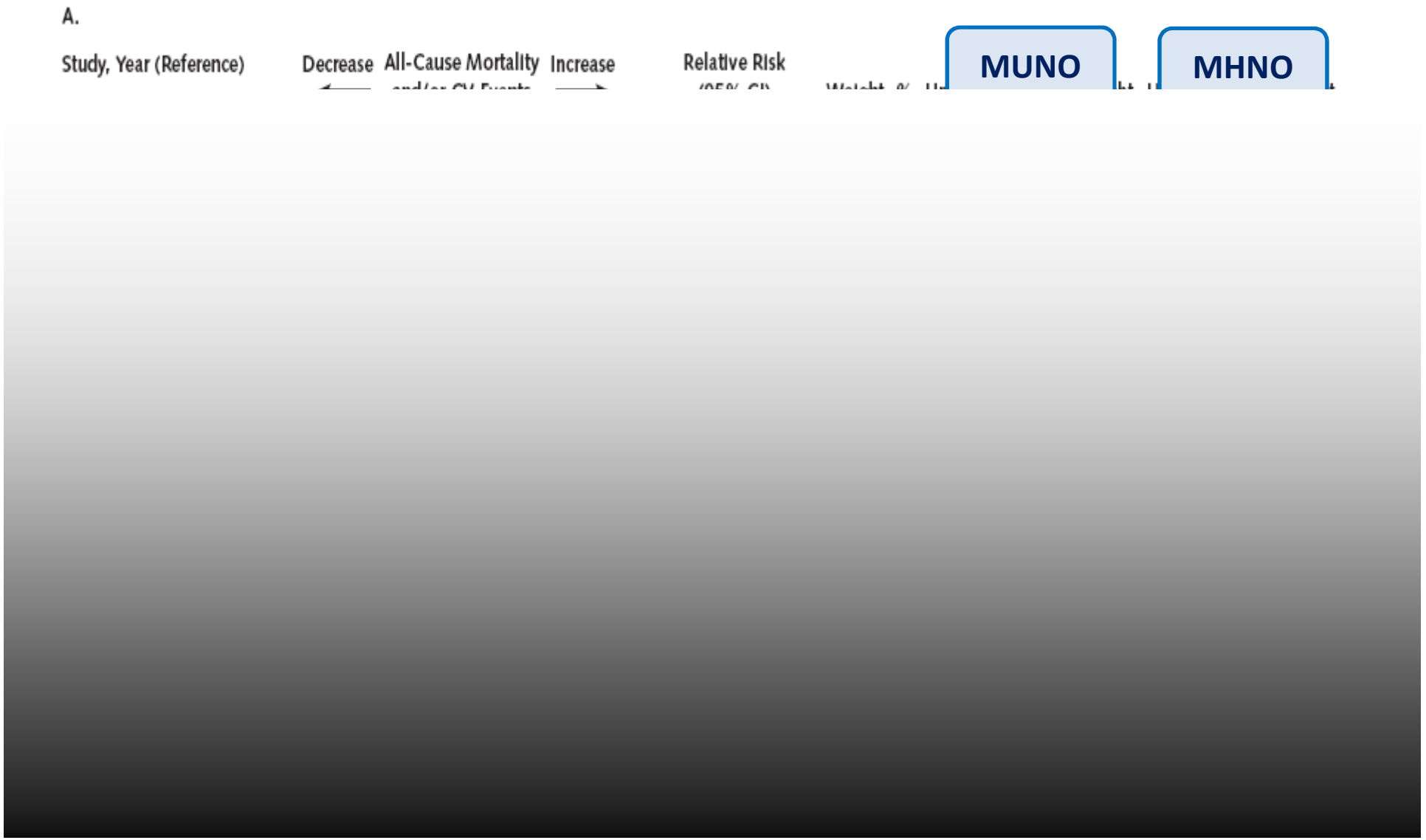
- MH Criteria: ≤ 1 of ATP III criteria (except WC)
- CKD definition: eGFR (CKD-EPI) < 60 ml/min/1.73m^2

MHO & Incident CKD

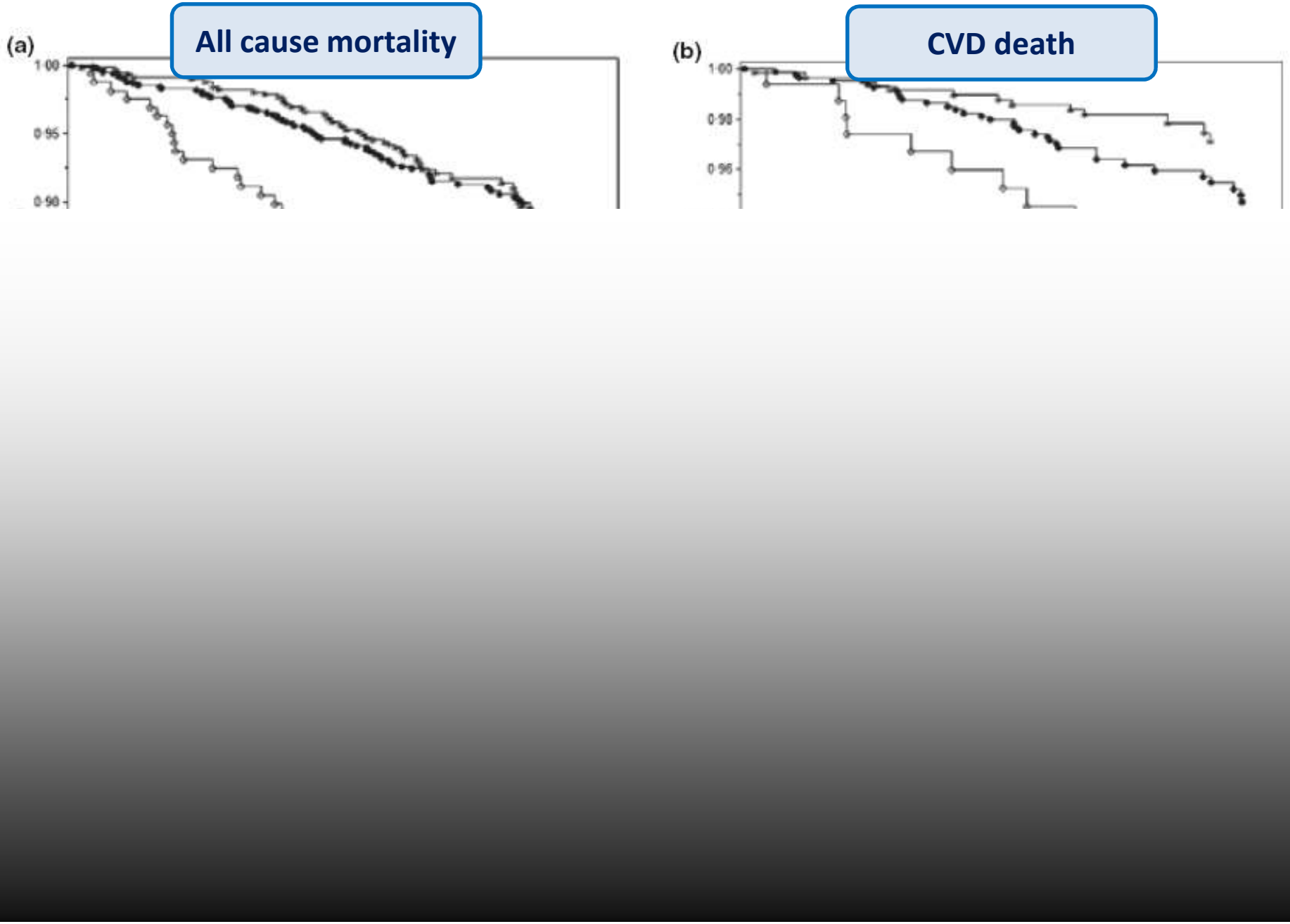
MHO & Incident CKD: Strict MH Criteria

- MH Criteria: None of ATP III criteria (except WC)
- CKD definition: eGFR (CKD-EPI) < 60 ml/min/1.73m^2

MUNO: Very harmful condition (Meta-analysis)



MUNO: More harmful condition than MHO



Summary 3

- The association of MHO and various health outcomes seems to

Conclusion

- Overall, MHO might not be a benign disease. In addition,