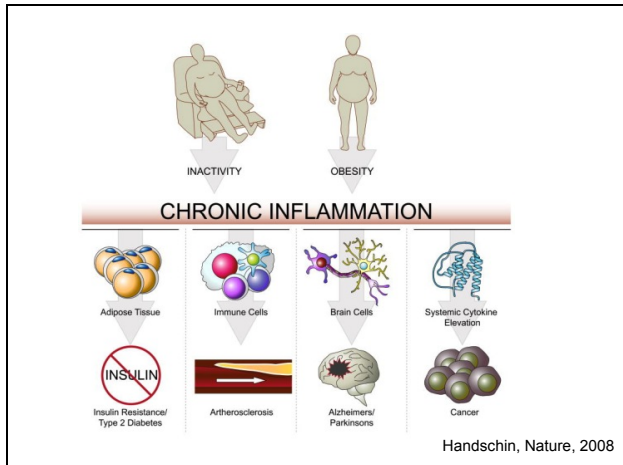


# INTERACTION BETWEEN NUTRITION AND SPORT TO PREVENT CHRONICAL-DEGENERATIVE DISEASES

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## Criteria for Clinical Diagnosis of the Metabolic Syndrome

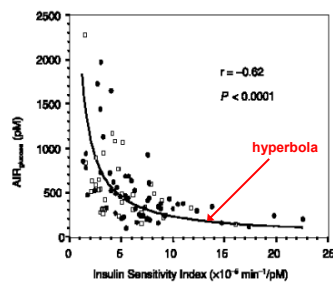
Measure	Categorical cut points
-Elevated waist circumference	Population- and country-specific definitions
-Elevated triglycerides (drug treatment for elevated triglycerides is an alternate indicator)	$\geq 150$ mg/dL
-Reduced HDL cholesterol (drug treatment for reduced HDL cholesterol is an alternate indicator)	$< 40$ mg/dL for males and $< 50$ mg/dL for females
-Elevated blood pressure (drug treatment for elevated blood pressure is an alternate indicator)	Systolic $\geq 130$ mm Hg and/or diastolic $\geq 85$ mm Hg
-Elevated fasting glucose (drug treatment for elevated glucose is an alternate indicator)	$\geq 100$ mg/dL

Alberti KG et al. *Circulation* 2009; 120:1640-1645.

## The Relationship between Insulin Sensitivity and Beta-cell Secretion is Hyperbolic

The product **insulin sensitivity** x **beta-cell function** tends to remain **CONSTANT** in normal subjects (\*).

The relationship between insulin sensitivity and beta-cell function is thus **hyperbolic**.



(\*) Kahn et al. - *Diabetes*, 1993

## Strong association between muscle fiber composition and insulin sensitivity

There are correlations between insulin-stimulated glucose uptake and:

- type I muscle fibers (positive),
- type IIb muscle fibers (negative),
- and the capillary density (positive).

A study demonstrated an increased number of type IIb fibers in skeletal muscle of healthy normoglycemic first-degree relatives of NIDDM patients, compared with a control group matched for age, sex, and BMI

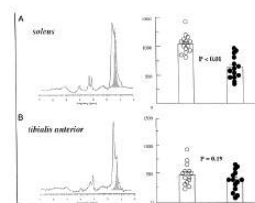
Nyholm B et al., *Diabetes* 46:1822-1828, 1997

## Hypetryglyceridemia

- Orthotopic fat deposition
  - Adipose tissue
- Ectopic fat deposition
  - Muscle
  - Heart
  - Liver
- Effect of physical exercise

## Intramyocellular Triglyceride Content Is a Determinant of in Vivo Insulin Resistance in Humans

A 1H-13C Nuclear Magnetic Resonance Spectroscopy Assessment in Offspring of Type 2 Diabetic Parents



*Diabetes*, vol. 48, August 1999

## Conclusions

- Metabolic syndrome is complex and in evolution;
- Several genetic determinants were described;
- Recently epigenetic modifications have been considered;
- Physical activity is capable to act at most of the molecular determinants of metabolic syndrome;
- Specific drugs have been developed

## Thrifty Genotype Hypothesis... 50 years later

Diabetes Mellitus: A "Thrifty" Genotype  
Rendered Detrimental by "Progress"?

JAMES V. NEEL

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Ann Arbor, Mich.

Am J Hum Genet. 1962 December; 14(4): 353–362.