Vascular function and insulin resistance in Polycystic Ovary Syndrome

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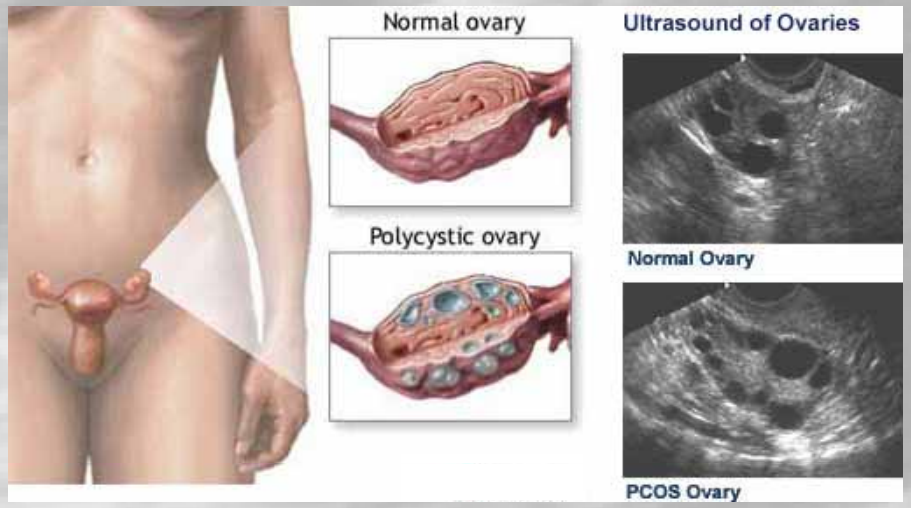
Polycystic Ovary Syndrome

- 3-4% of the fertile women
- Most common endocrine disorder
- Is defined by (two of three criteria)*

- Chronic anovulation
- Polycystic ovaries
- Hyperandrogenism
- (Elevated LH)



*ESHRE R'dam 2003

Heterogeneous disorder

	Severe PCOS	Hyperandrogenism and chronic anovulation	Ovulatory PCOS	Mild PCOS
Periods	Irregular	Irregular	Normal	Irregular
Ovaries on ultrasonography	Polycystic	Normal	Polycystic	Polycystic
Androgen concentrations	High	High	High	Mildly raised
Insulin concentrations	Increased	Increased	Increased	Normal
Risks	Potential long-term	Potential long-term	Unknown	Unknown
Prevalence in affected women[10]	61%	7%	16%	16%

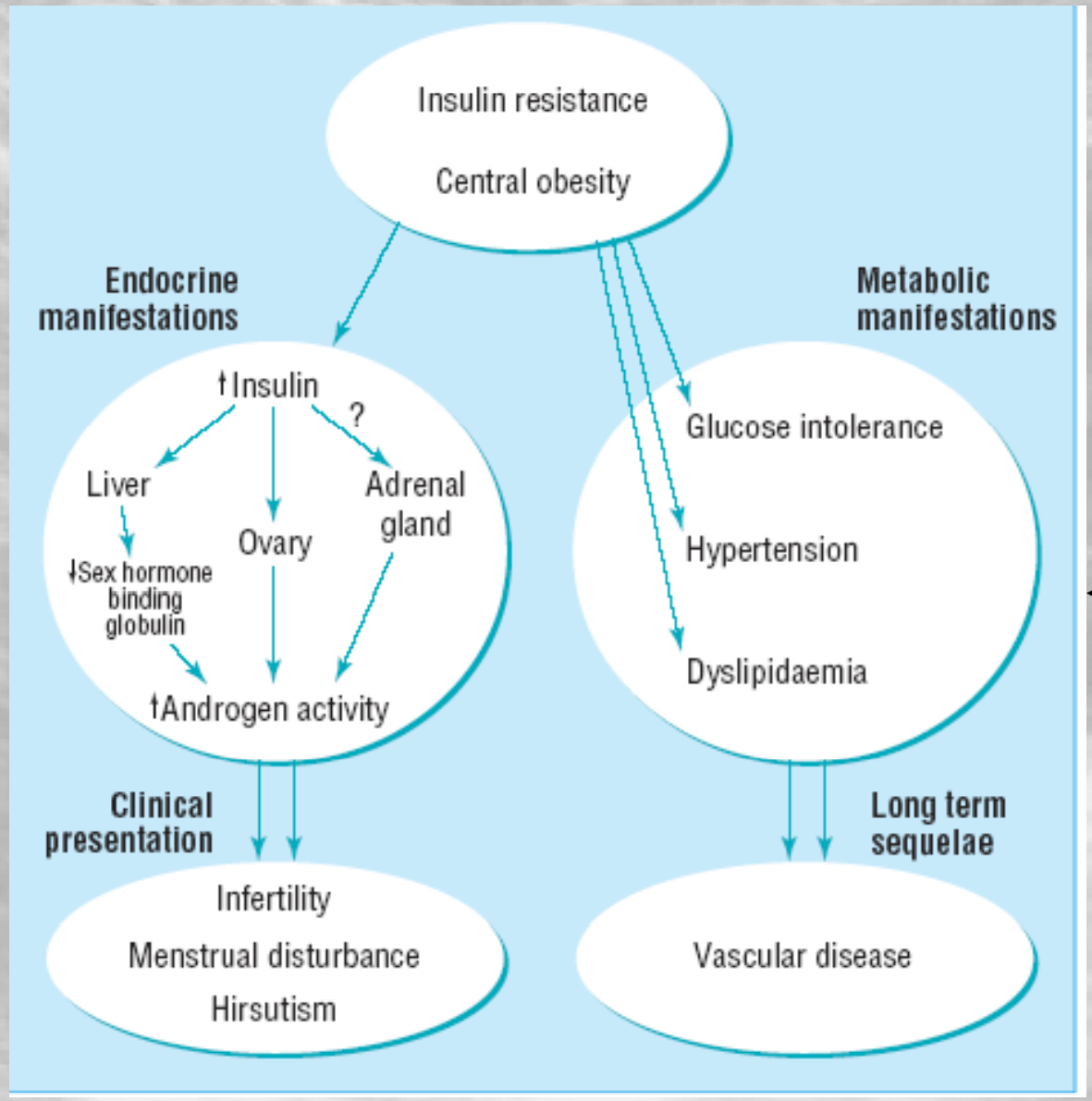
PCOS=polycystic ovary syndrome.

Table 1: Phenotypes for polycystic ovary syndrome based on 2003 Rotterdam criteria

Norman Lancet 2007

Aetiology of PCOS

- Unknown
- Genetic
- **Insulin resistance**
- Gestational environment and or lifestyle factors



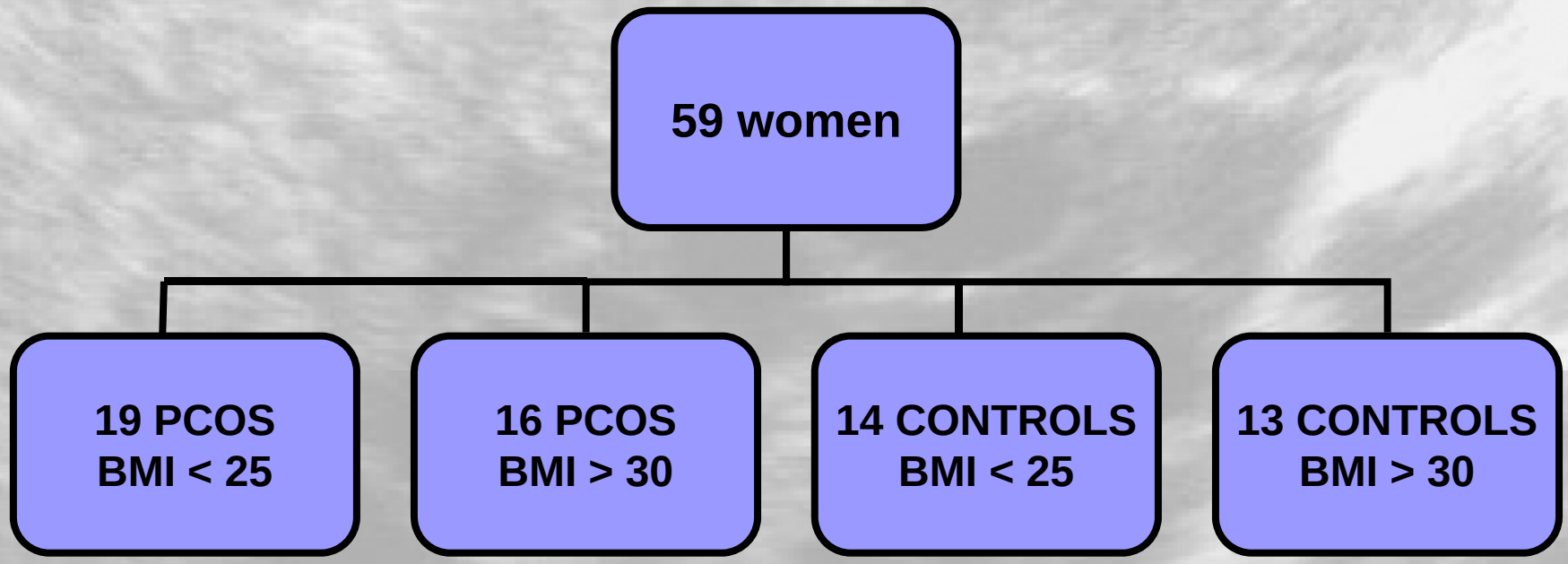
Vascular function

Study project

Vascular function and Insulin Resistance in Women with Polycystic Ovary Syndrome

Aim of the study

To assess the association between PCOS and the vascular function and insulin resistance, independent of obesity



PCOS

- All 3 criteria of PCOS*
- Non smoking
- No medication
- Caucasian

*ESHRE Rotterdam 2003

Controls

- Healthy/ regular cycle
- No PCOS features
- Non smoking
- No medication
- Caucasian

Vascular function

- Microcirculation
  - Iontophoresis
  - Capillary recruitment
- Macrocirculation
  - arterial stiffness
  - (PWV)

Iontophoresis

ACh = acetylcholine, endothelium-dependent vasodilator

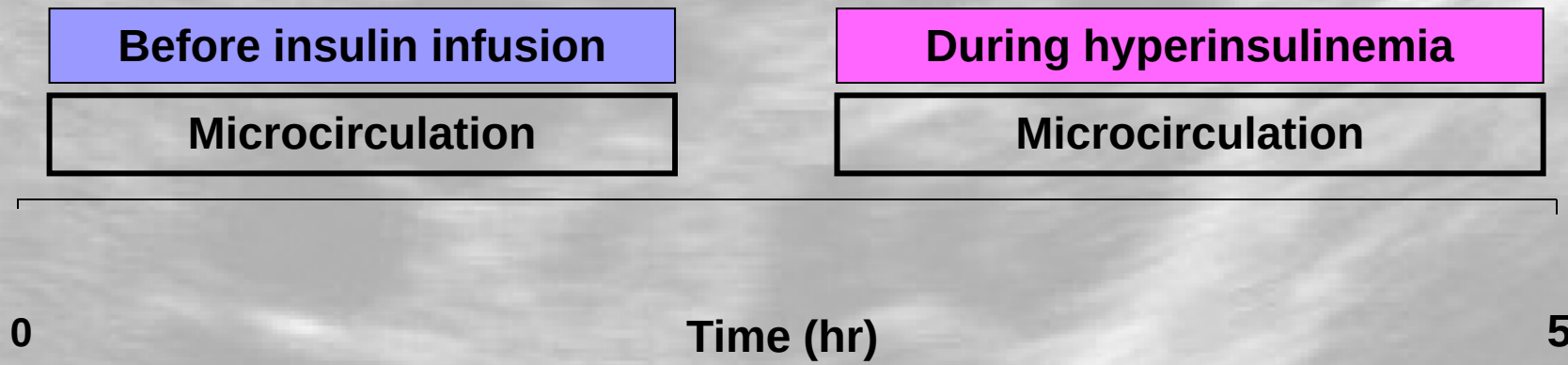
SNP = sodium nitroprusside, endothelium- independent

Capillary recruitment

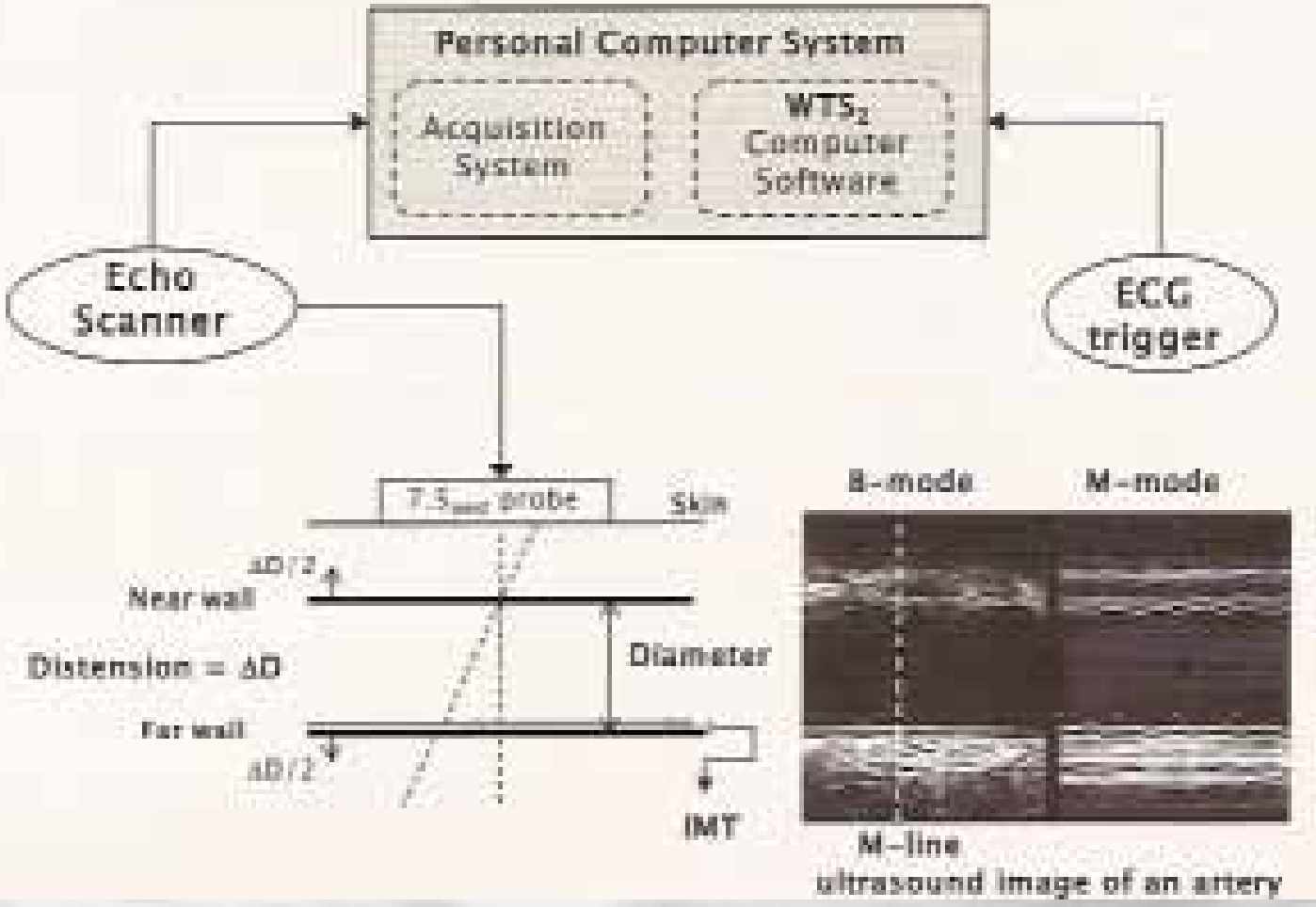
Capillary microscopy equipment

Baseline density capillaries

Peak density capillaries


Before insulin infusion
During hyperinsulinemia
Microcirculation
Microcirculation
0
Time (hr)
5

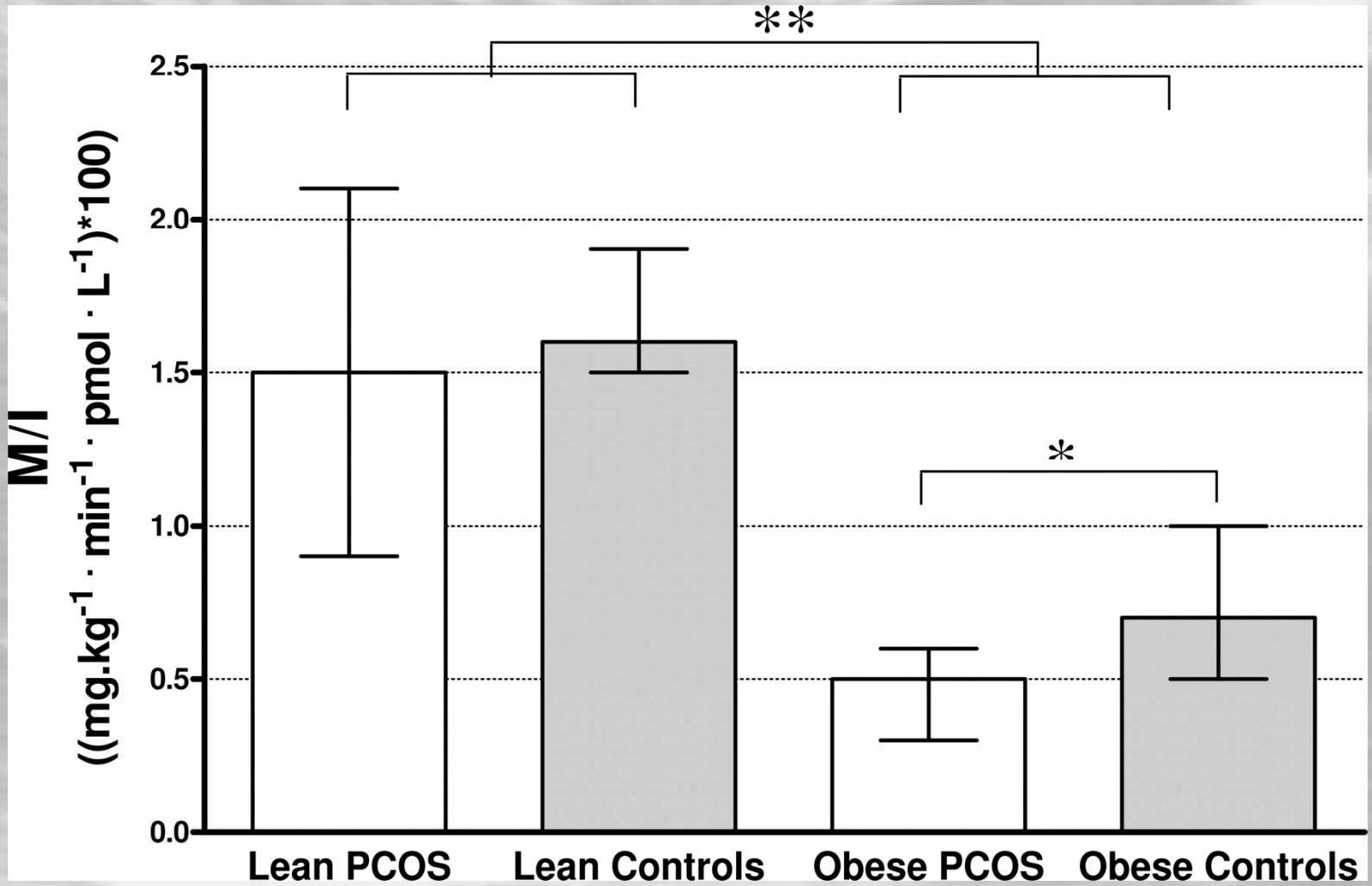
Arterial stiffness



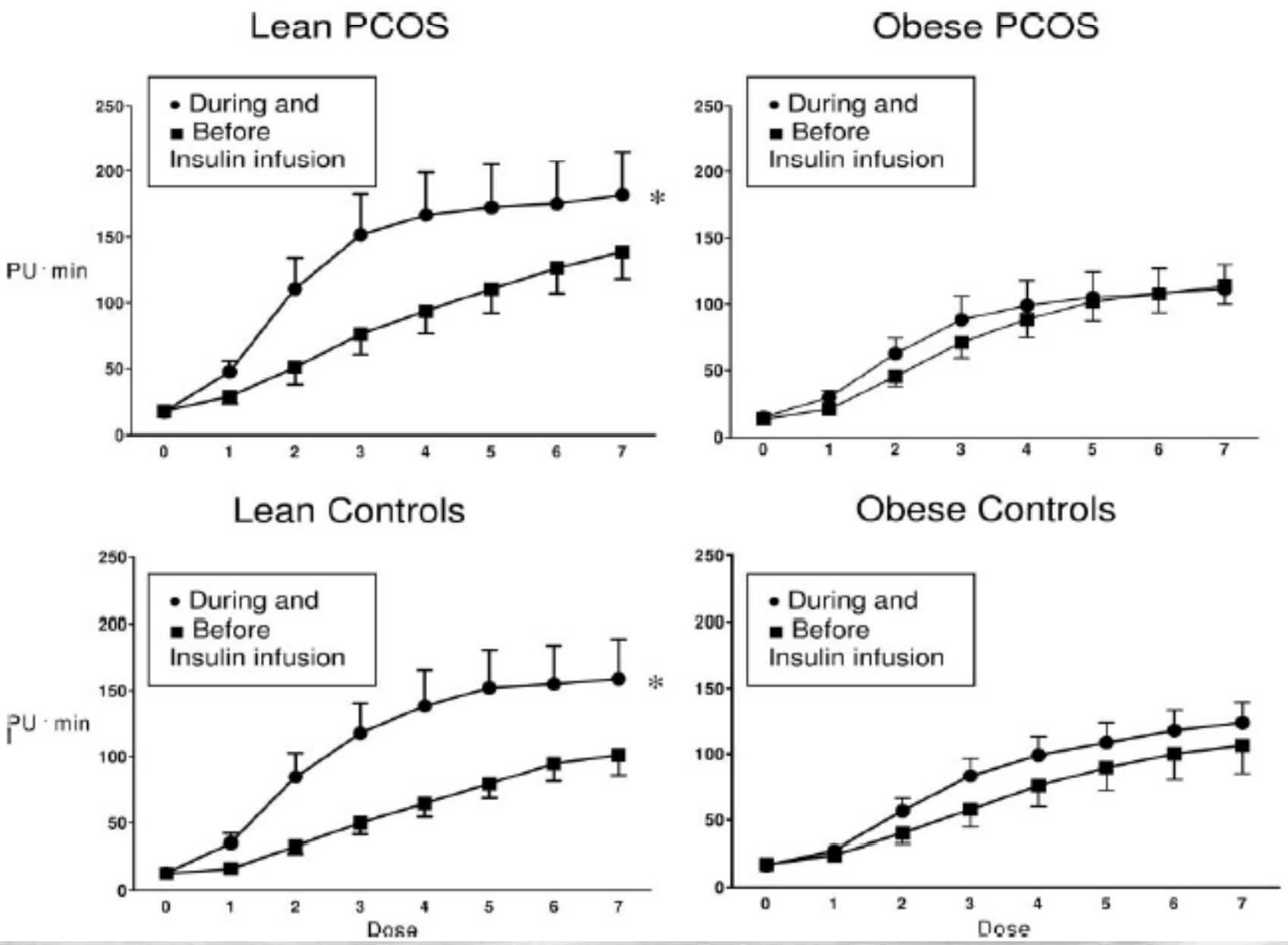
Results

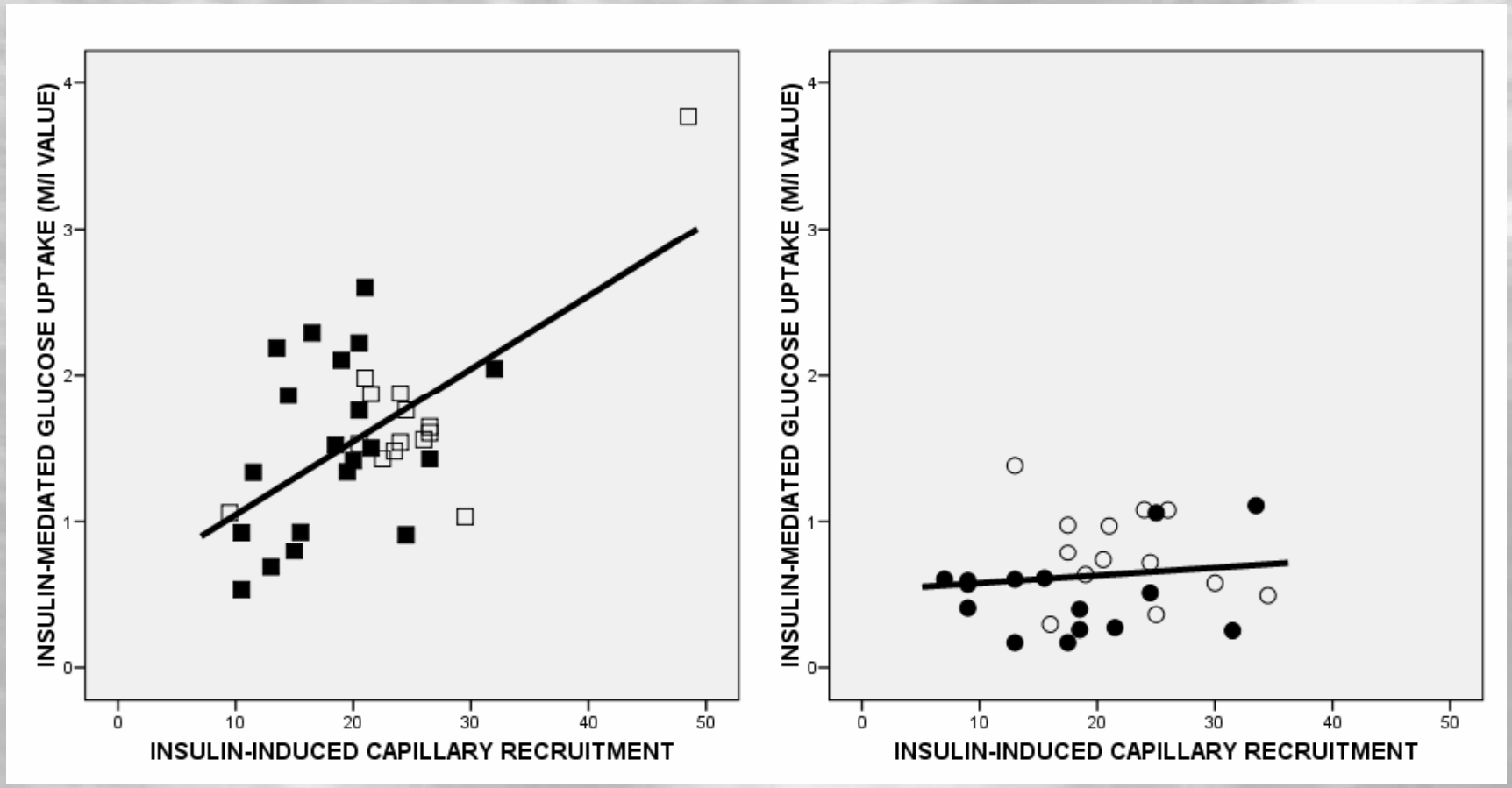
	PCOS		Controls			
	Lean (19)	obese (16)	Lean (14)	obese (10)	PCOS vs Controls	Lean vs Obese
Age	28.2	30.4	27.1	27.4		
BMI	21.7	35.9	22.1	39.3		p<0.01
Systolic blood pressure	111.5	120.8	109.8	128.3		p<0.01
Diastolic blood pressure	70.0	69.9	67.4	69.3		
Testosterone	1.4	1.7	1.2	1.4		
A'dion	6.8	7.2	4.8	4.5	p< 0.05	
LH	7.9	7.0	4.8	3.7	p< 0.05	
FSH	4.6	4.8	6.1	5.5		
E2	185.1	134.4	152.7	107.1		

Metabolic Insulin resistance

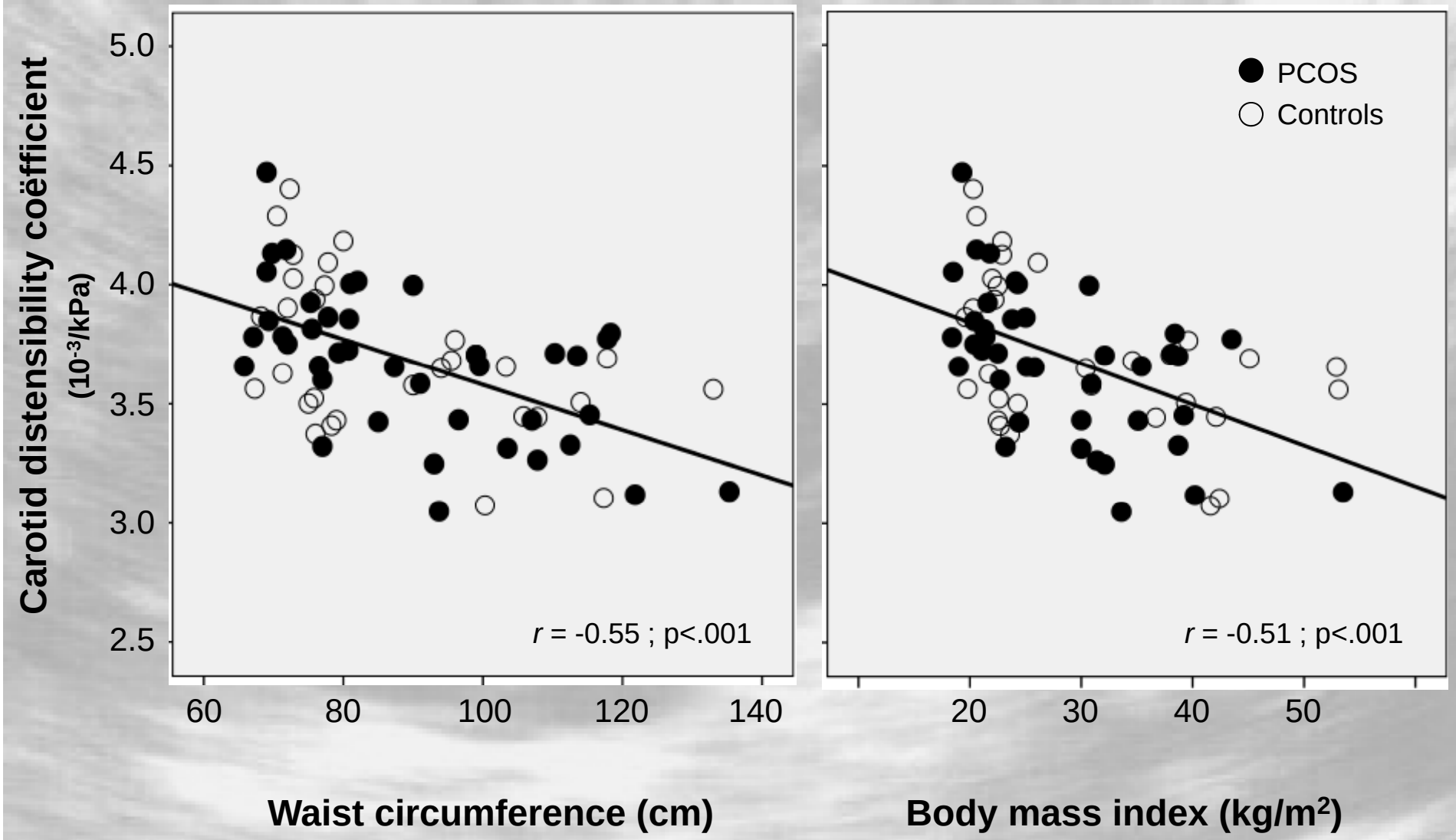


Ketel et al JCEM 2008


Lean PCOS
Obese PCOS
Lean Controls
Obese Controls
• During and
■ Before
Insulin infusion
PU · min
Dose
*
0
50
100
150
200
250
0 1 2 3 4 5 6 7


INSULIN-MEDIATED GLUCOSE UPTAKE (M/I VALUE)
0
1
2
3
4
0
10
20
30
40
50
INSULIN-INDUCED CAPILLARY RECRUITMENT
INSULIN-MEDIATED GLUCOSE UPTAKE (M/I VALUE)
0
1
2
3
4
0
10
20
30
40
50
INSULIN-INDUCED CAPILLARY RECRUITMENT

The association between carotid distensibility, waist circumference and BMI

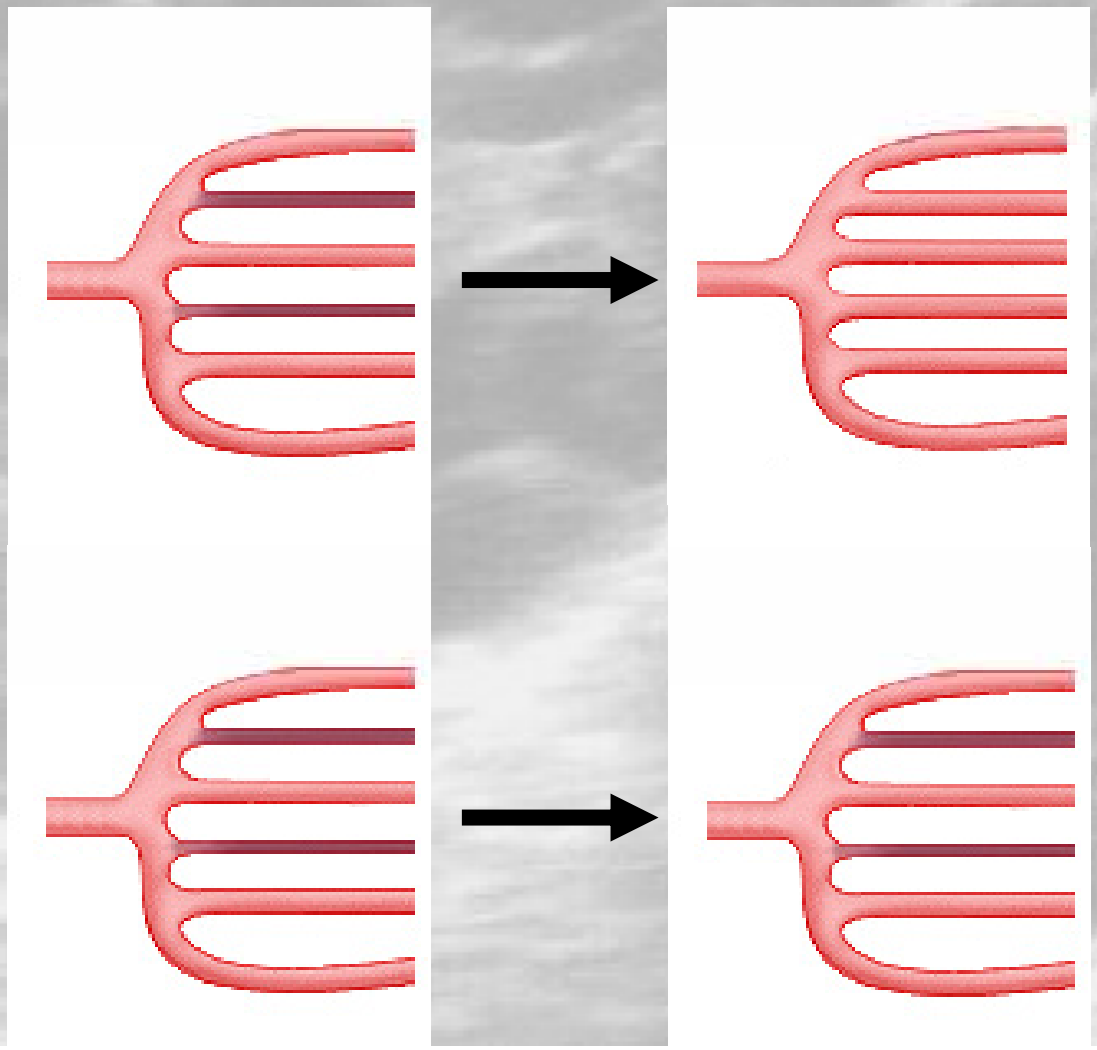


Vascular function

Lean

Obesity

Low insulin → High insulin



PCOS in absence of obesity and insulin resistance may not contribute to an increased risk of CVD