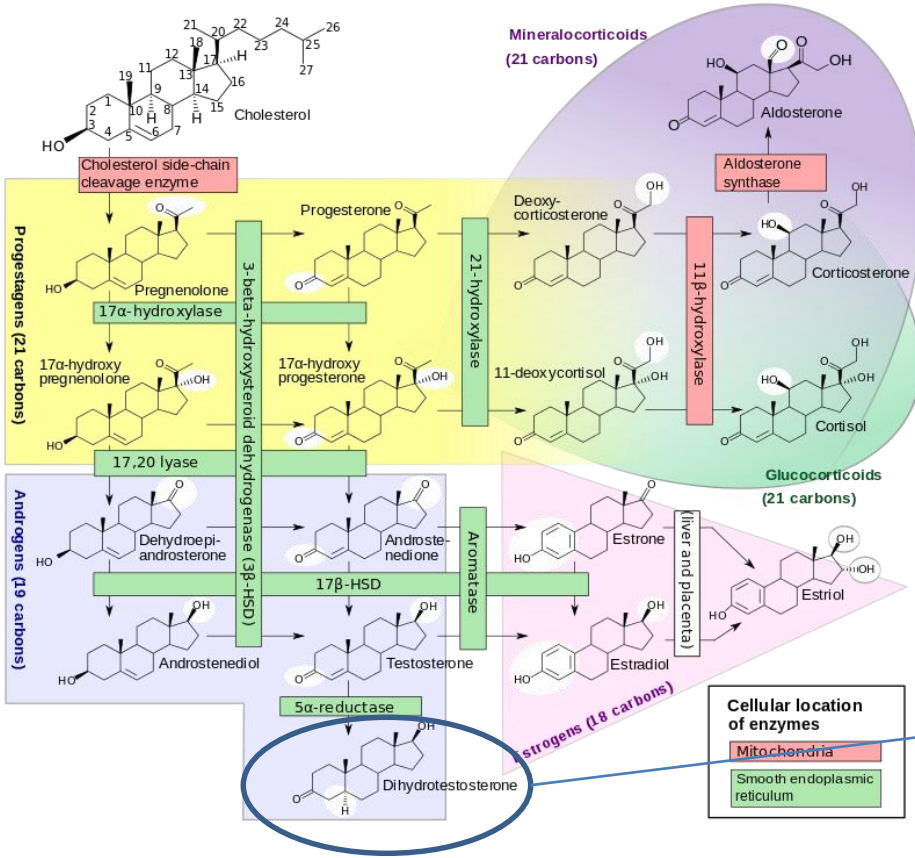
Physical Activity and Health Promotion

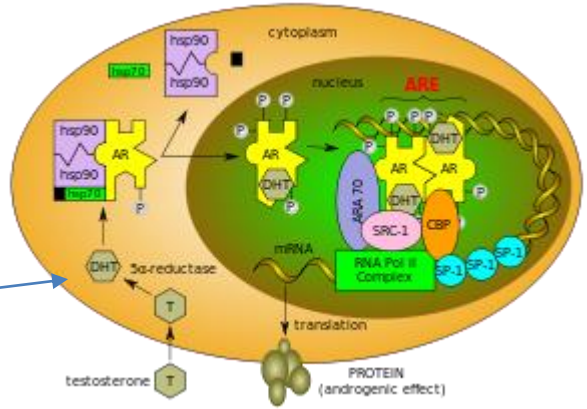
Costanzo Giulio Moretti
Unit of Endocrinology
Università di Roma TorVergata
St John Calibita Hospital Tiber Island Rome
Section of Reproductive Endocrinology

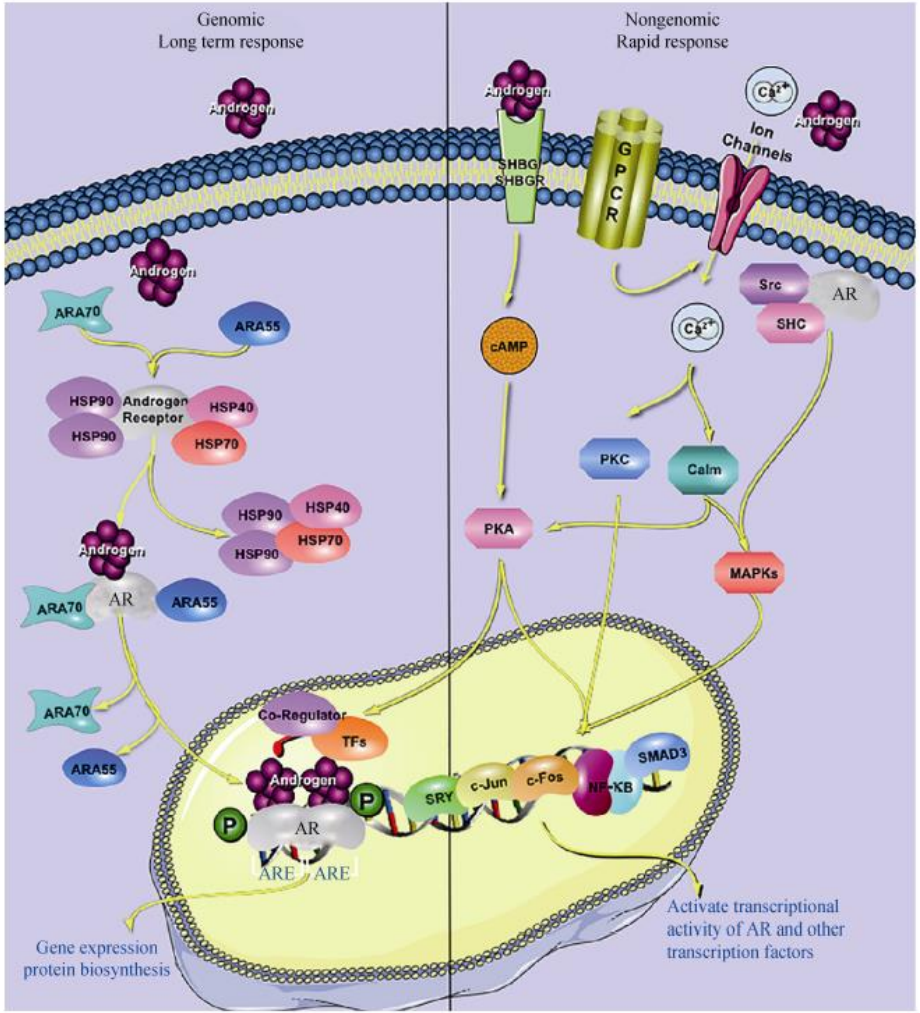
Lesson 6

Hypothesis on the action of androgens in promoting hypertension

Sex steroids are involved in the regulation of blood pressure







The androgen signal pathways

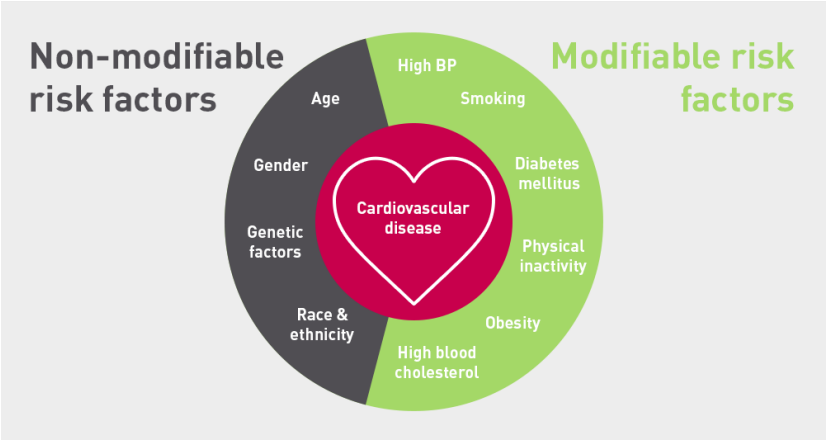
1.

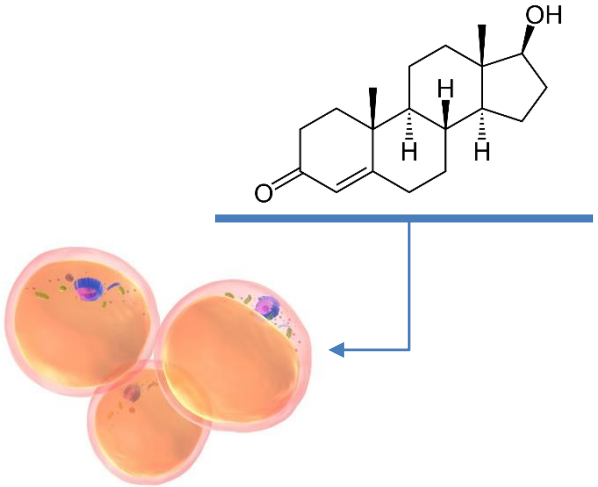
Genomic pathway by binding to the AR and translocation into the nucleus

2.

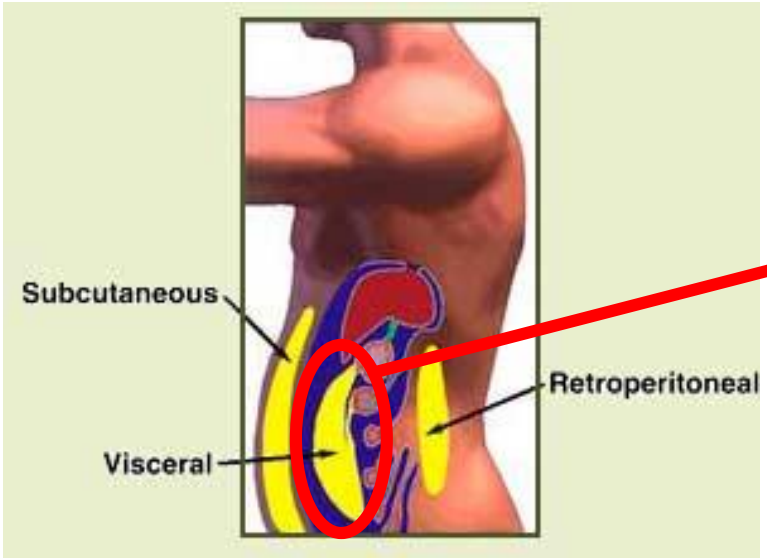
Nongenomic stimulation of second messenger cascades

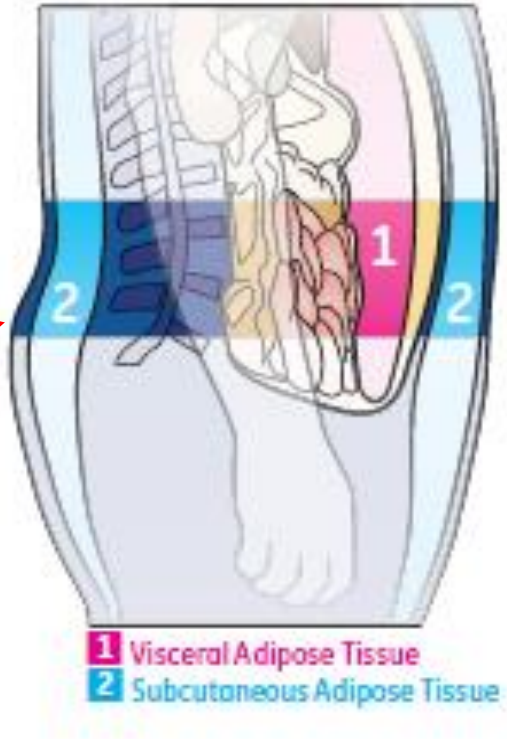
There is a gender-specific regulation exerted by androgens on metabolism, adipose cell function and cardiovascular risk





Involvement of androgens in the development of metabolic syndrome and hypertension: gender-specific regulation of the visceral adipose cell

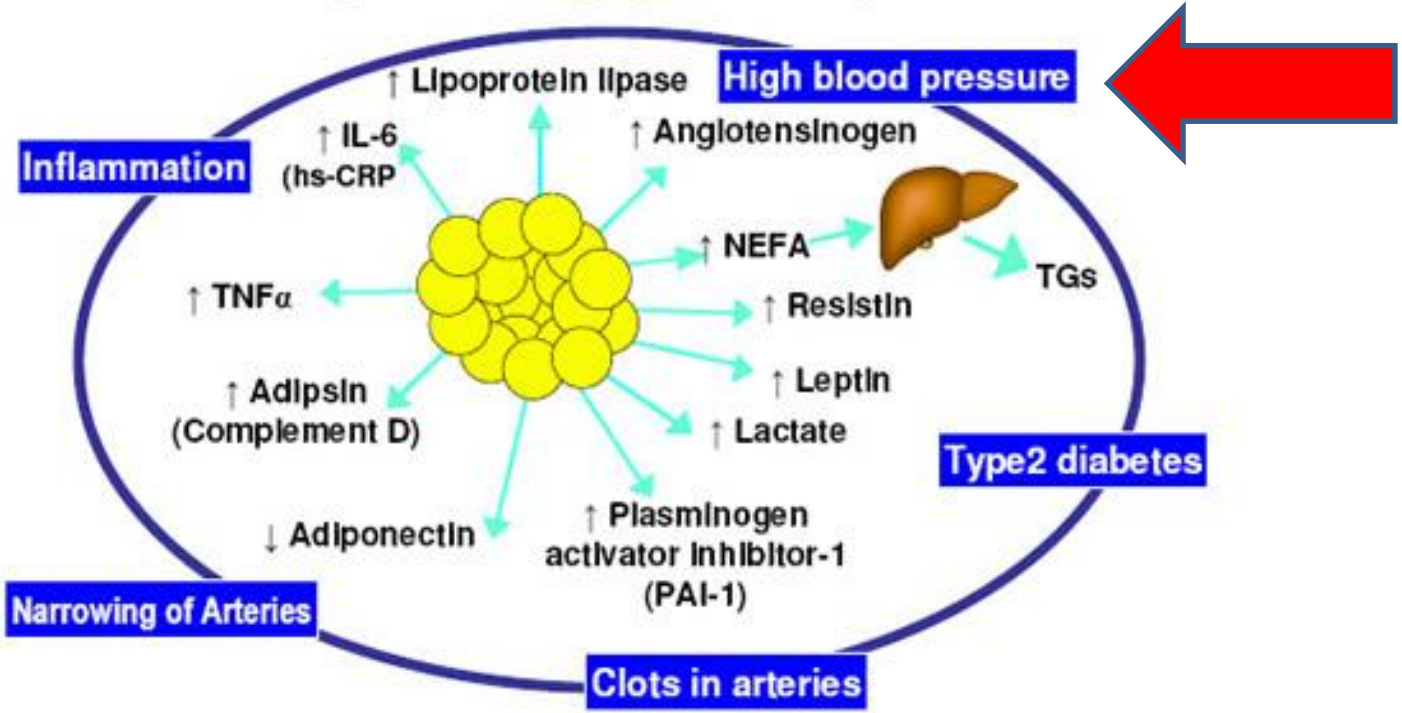




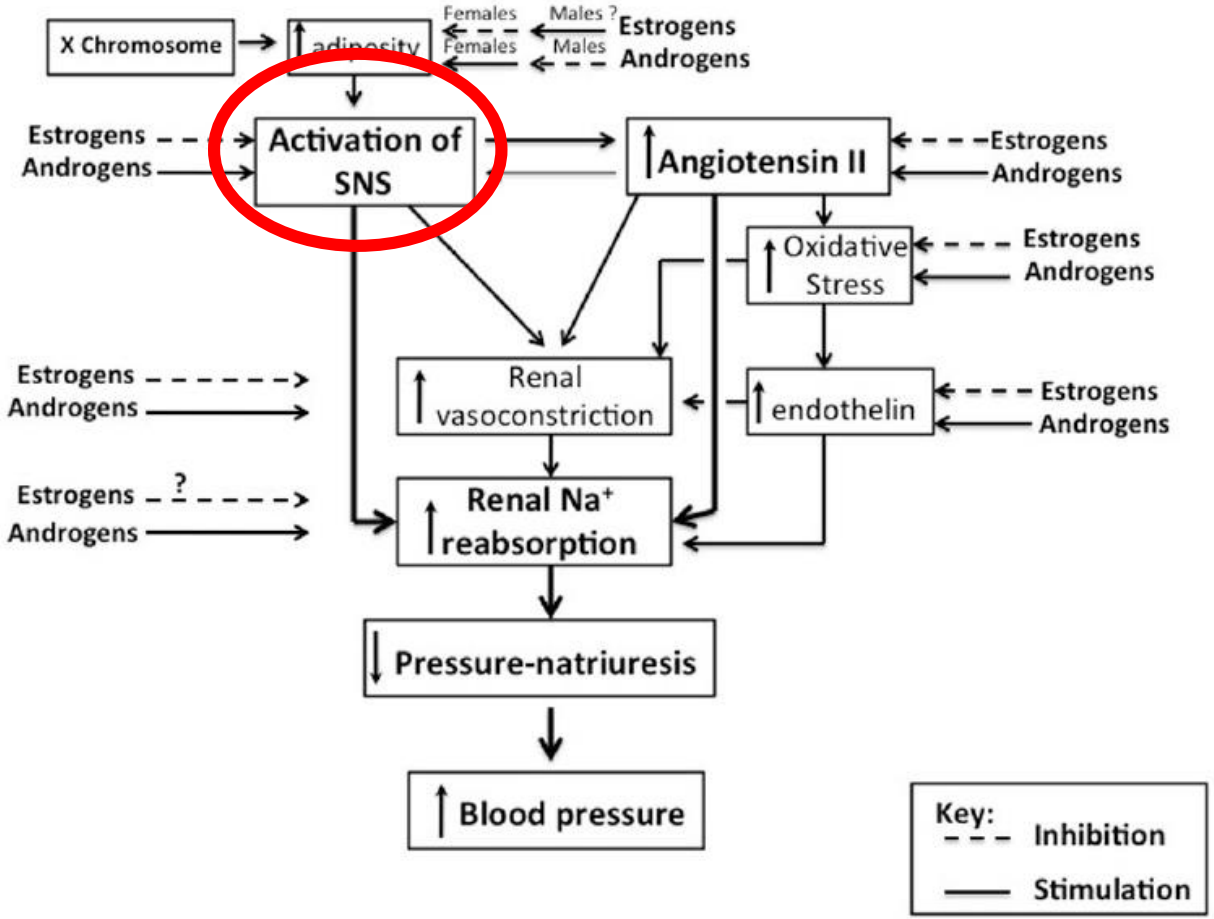
The amount of central adipose fat and the related adipokine dysregulation is related to higher insulin resistance and increased risk of hypertension

Internal fat as a "hormone factory"

Internal high-risk fat is highly metabolically active



Androgens and hypertensive risk in males


X Chromosome
adiposity
Females
Males ?
Females
Males
Estrogens
Androgens
Estrogens
Androgens
Activation of SNS
Angiotensin II
Estrogens
Androgens
Oxidative Stress
Estrogens
Androgens
Estrogens
Androgens
Renal vasoconstriction
endothelin
Estrogens
Androgens
Estrogens
Androgens
?
Renal Na+ reabsorption
Pressure-natriuresis
Blood pressure
Key:
Inhibition
Stimulation

Men with free testosterone levels in the lowest quartile have a 24% greater risk for all-cause mortality due to ischemic hearth disease

Hormone	Events (*n*)	Mean hormone level	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)
Testosterone (nmol/l)				
Q1 (<9.7)	104	8.0	1.0 (ref)	1.0 (ref)
Q2 (9.7–12.7)	108	11.3	0.99 (0.76–1.30)	1.06 (0.81–1.40)
Q3 (12.7–16.0)	85	14.3	0.84 (0.63–1.12)	0.85 (0.64–1.15)
Q4 (>16.0)	98	19.2	1.01 (0.77–1.33)	1.09 (0.81–1.46)
Free testosterone (pmol/l)				
Q1 (<158)	143	130	1.0 (ref)	1.0 (ref)
Q2 (158–197)	102	178	0.78 (0.61–1.01)	0.80 (0.62–1.04)
Q3 (197–242)	78	219	0.72 (0.55–0.96)	0.73 (0.55–0.97)
Q4 (>242)	72	285	0.97 (0.72–1.30)	0.92 (0.68–1.24)
Estradiol (nmol/l)				
Q1 (<0.04)	86	0.03	1.0 (ref)	1.0 (ref)
Q2 (0.04–0.06)	47	0.05	0.82 (0.57–1.17)	0.81 (0.56–1.16)
Q3 (0.06–0.08)	131	0.06	1.48 (1.12–1.94)	1.32 (0.99–1.75)
Q4 (>0.080)	116	0.09	0.98 (0.74–1.30)	0.98 (0.73–1.30)

[a]Adjusted for age.
[b]Adjusted for age, systolic blood pressure, HDL/cholesterol ratio, self-reported diabetes, current smoking, and waist/hip ratio.

Testosterone: a metabolic hormone in health and disease

Daniel M Kelly[1] and **T Hugh Jones**[1,2]

[1]Department of Human Metabolism, Medical School, The University of Sheffield, Sheffield S10 2RX, UK [2]Robert Hague Centre for Diabetes and Endocrinology, Barnsley Hospital NHS Foundation Trust, Gawber Road, Barnsley S75 2EP, UK

Correspondence should be addressed to T H Jones
Email
hugh.jones@nhs.net

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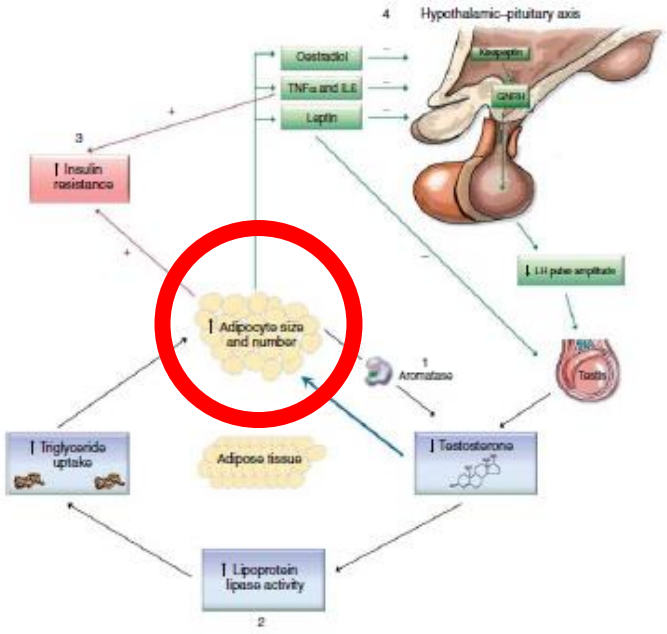
Review

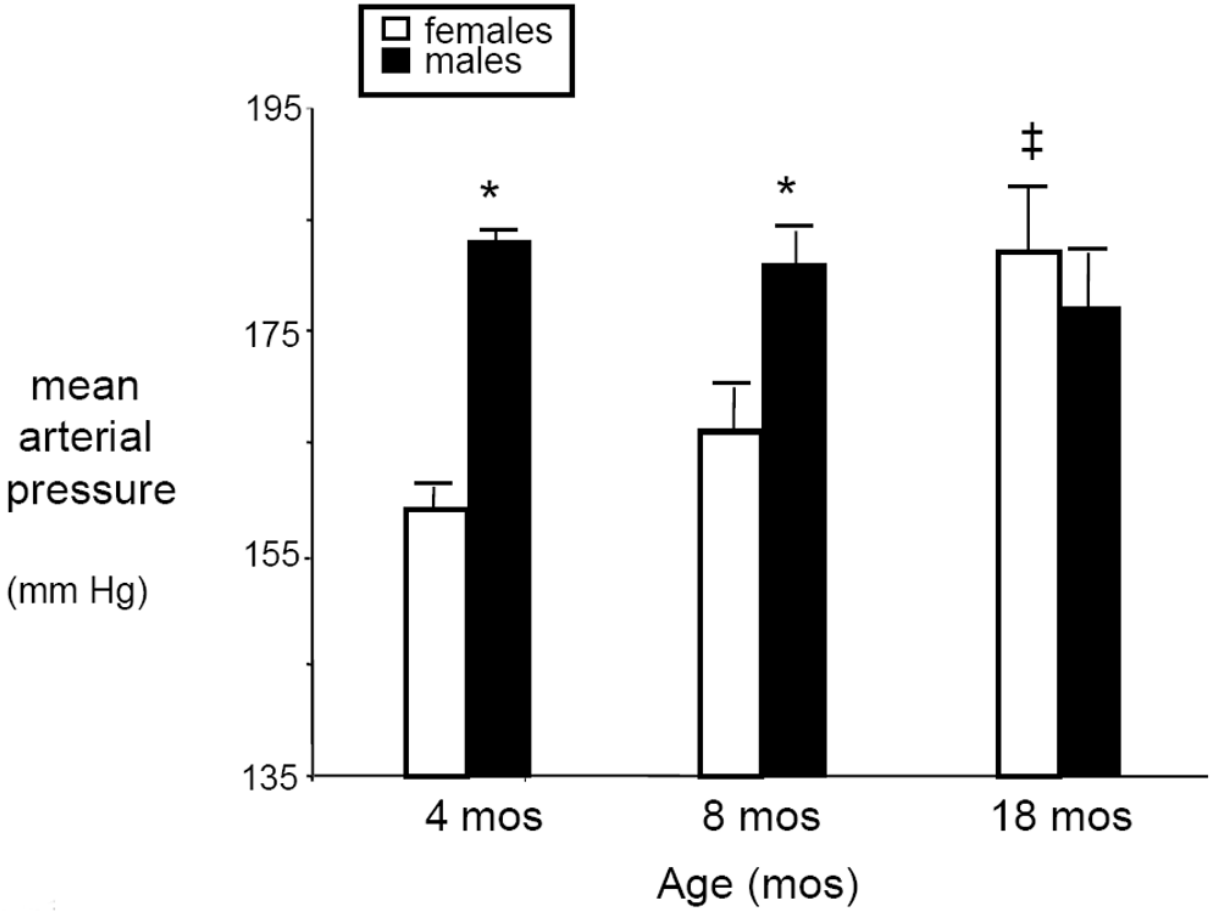
Hypogonadism as a possible link between metabolic diseases and erectile dysfunction in aging men

Giovanni Corona,[1] Silvia Bianchini,[1] Alessandra Sforza,[1] Linda Vignozzi,[2] Mario Maggi[2]

[1]Endocrinology Unit, Maggiore-Bellaria Hospital, Medical Department, Azienda-Usl Bologna, Bologna; [2]Sexual Medicine and Andrology Unit, Department of Experimental, Clinical and Biomedical Sciences, University of Florence, Florence; Italy

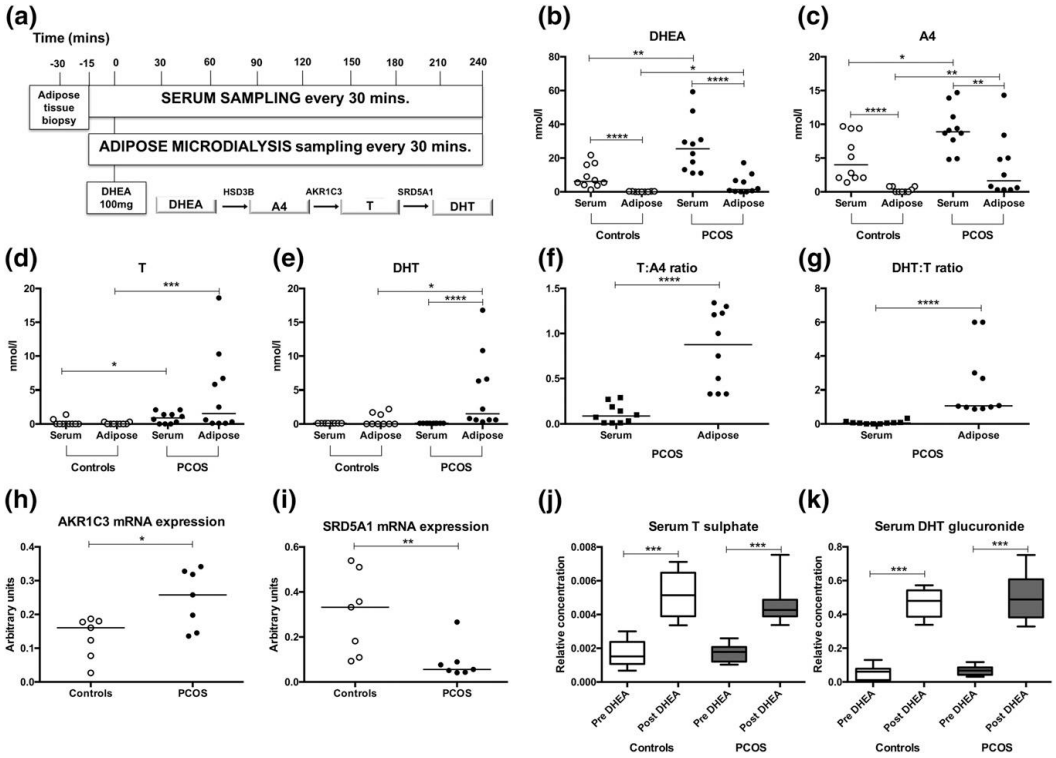


Androgens and hypertensive risk in young women with PCOS



Yanes LL Am J Hypertens. 2011 July ; 24(7)

PCOS women have increased expression of the androgen-activating enzyme aldo-ketoreductase type 1 C3 (AKR1C3) in adipose tissue



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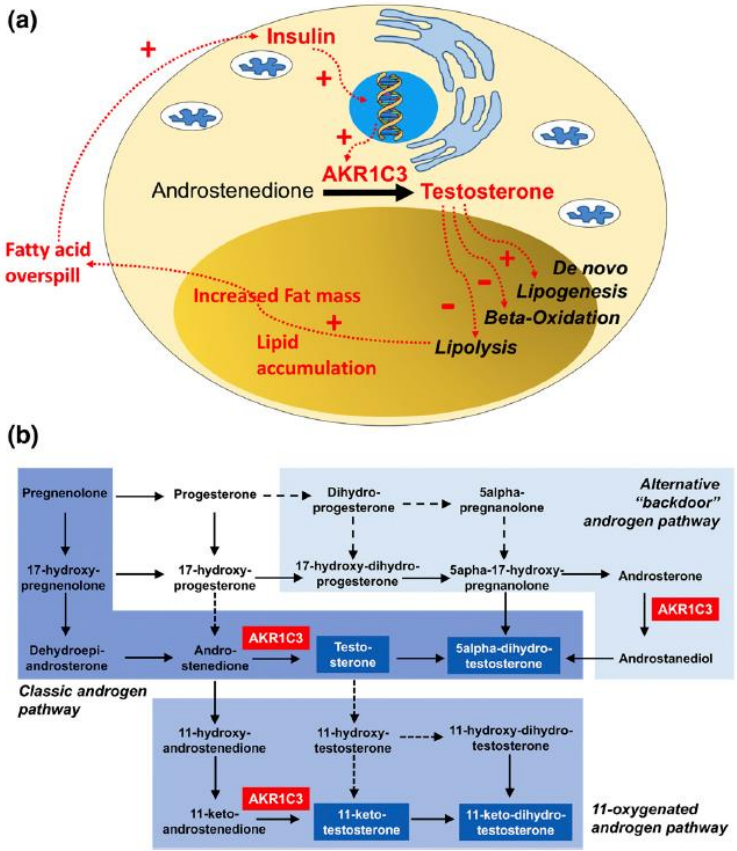
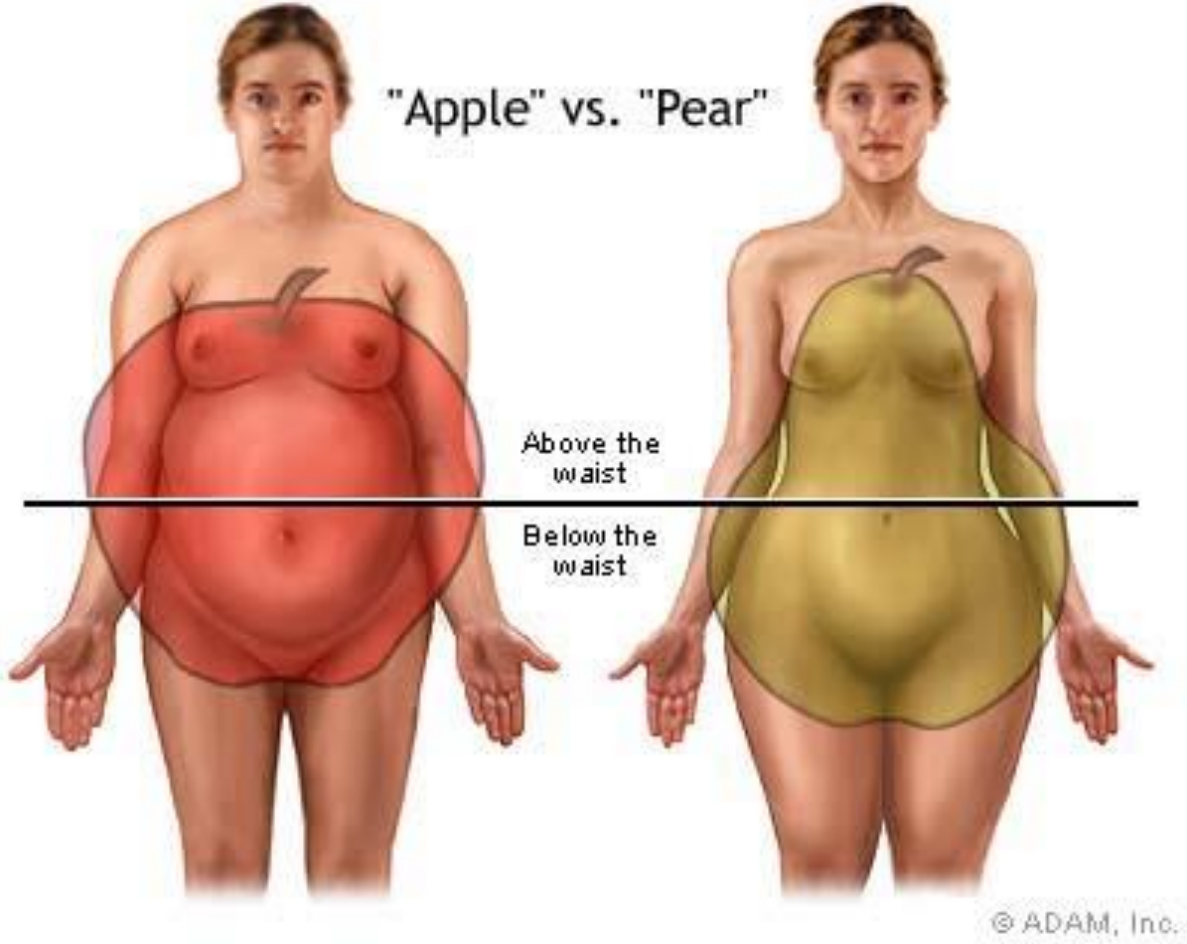
In PCOS women increased risk of hypertension is linked to the metabolic dysfunction



Androgens and hypertension in post-menopausal women


"Apple" vs. "Pear"
Above the waist
Below the waist
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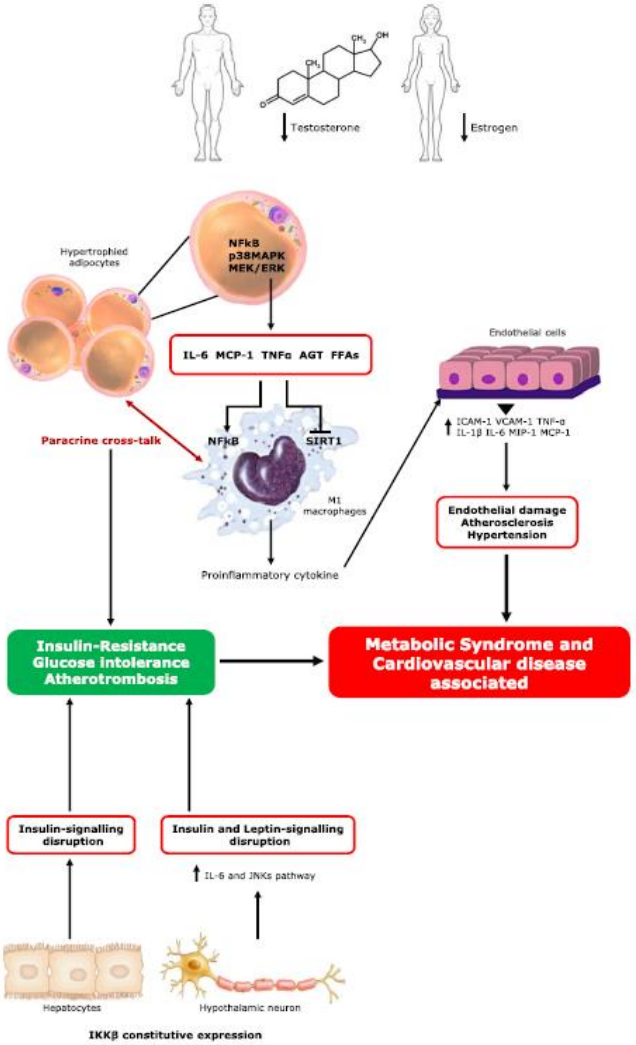

HYPERTENSION AND METABOLIC SYNDROME (J SPERATI, SECTION EDITOR)

Androgens and Hypertension in Men and Women: a Unifying View

Costanzo Moretti[1] · Giulia Lanzolla[2] · Marta Moretti[3] · Lucio Gnessi[2] · Enrico Carmina[4]

- **Androgen deficiency may promote inflammatory and immune responses inside the adipose tissue**
- **NF-kB may play an important role in the inflammatory activation and progression of adypocyte dysfunction and dysregulation in CNS and liver**
- **IKKβ one of the most important activator of NF-kB rises in its central expression in high fat diet, reducing leptin sensitivity and promoting IL-6 secretion**
- **NF-kB proinflammatory pathway takes part to endothelial dysfunction and vascular diseases associated with metabolic syndrome**

Summary

Androgen deficiency, mainly increasing visceral obesity and determining adipocyte and endothelian dysfunction, seems to be the main responsible of increased prevalence of hypertension in man but also in women particularly in the post manopause when the protective action of estrogens is over