Polycystic Ovary Syndrome Center

PENN Fertility Care

Penn Medicine

DIAGNOSIS OF PCOS

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Delayed Diagnosis and a Lack of Information Associated With Dissatisfaction in Women With Polycystic Ovary Syndrome

Melanie Gibson-Helm,[1] Helena Teede,[1,2] Andrea Dunaif,[3] and Anuja Dokras[4]

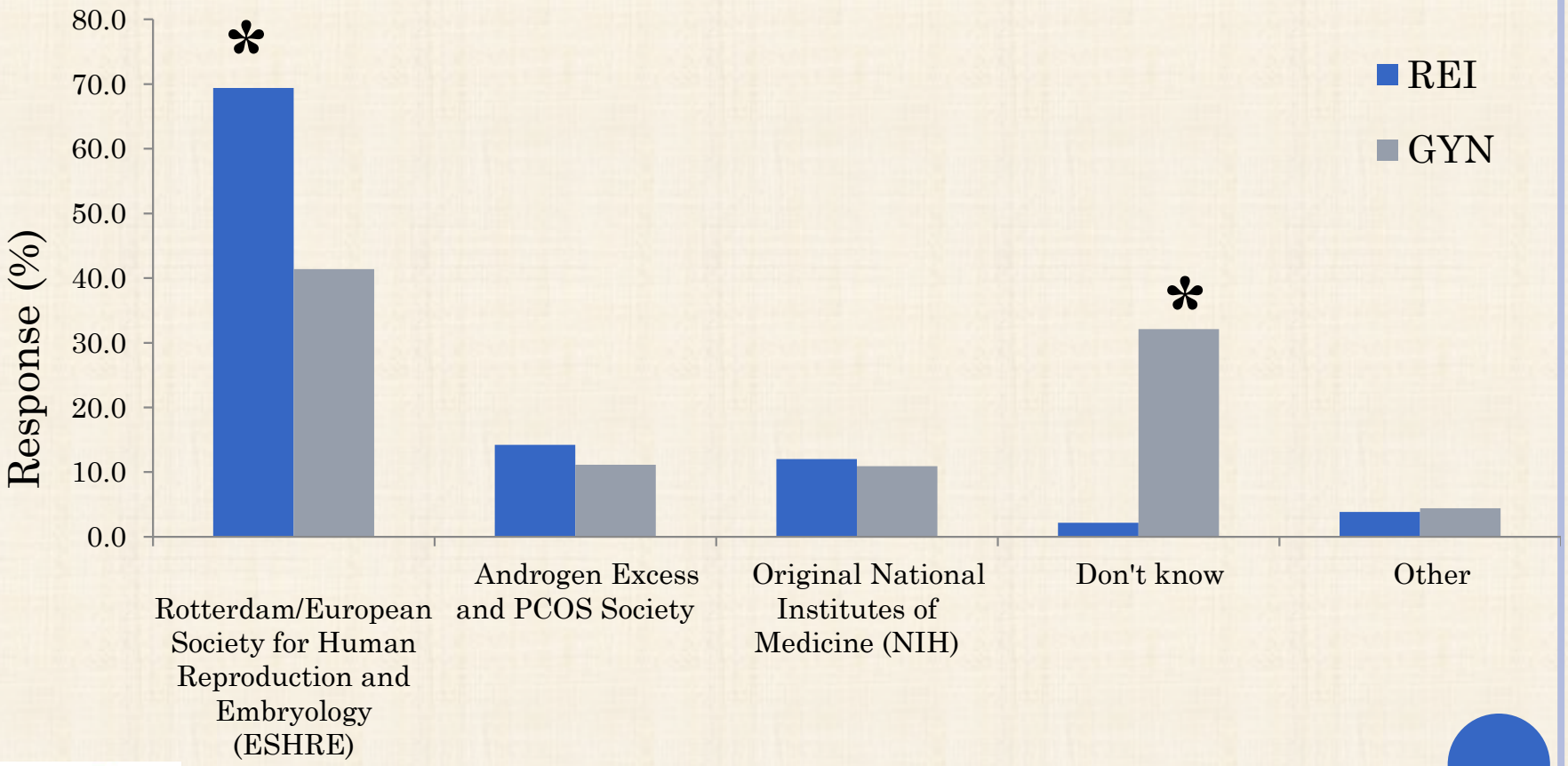
n=1381	Number of women (%)
Age (years)	
18-25	190 (13.8)
26-35	705 (51.1)
36-45	390 (28.2)
>45	96 (6.9)
World region of birth	
North America	689 (49.9)
Europe	568 (41.1)
Oceania	39 (2.8)
Asia	37 (2.7)
Central, Latin, South America, Caribbean	32 (2.3)
Africa	17 (1.2)
World region of residence	
North America	732 (53.0)
Europe	583 (42.2)

JCEM, 2017

PATIENT PERCEPTIONS - PCOS DIAGNOSIS

PCOS diagnosis experience:	**North America**	**Europe**
Time since diagnosis	n (%)	n (%)
≤ 1.0 year	103 (14.2)	47 (8.1)
1.1-5.0 years	183 (25.2)	133 (23.0)
5.1-10.0 years	181 (25.0)	152 (26.3)
> 10.0 years	258 (35.6)	246 (42.6)
Time until diagnosis		
Within 6 months	294 (40.5)	266 (45.9)
Within 6- 12 months	86 (11.9)	88 (15.2)
Within 1-2 years	74 (10.2)	55 (9.4)
More than 2 years	**271 (37.4)**	**171 (29.5)**
Number of health professionals seen before diagnosis		
1 – 2	364 (50.0)	327 (56.8)
3 – 4	**272 (37.4)**	**178 (30.9)**
5 or more	92 (12.6)	71 (12.3)

PHYSICIAN SURVEY-DIAGNOSTIC CRITERIA



*p<0.001

Dokras et al, Fert Steril, 2017

Polycystic ovarian syndrome: marked differences between endocrinologists and gynaecologists in diagnosis and management

Andrea J. Cussons*†‡, Bronwyn G. A. Stuckey*†, John P. Walsh*†, Valerie Burke‡ and Robert J. Norman§

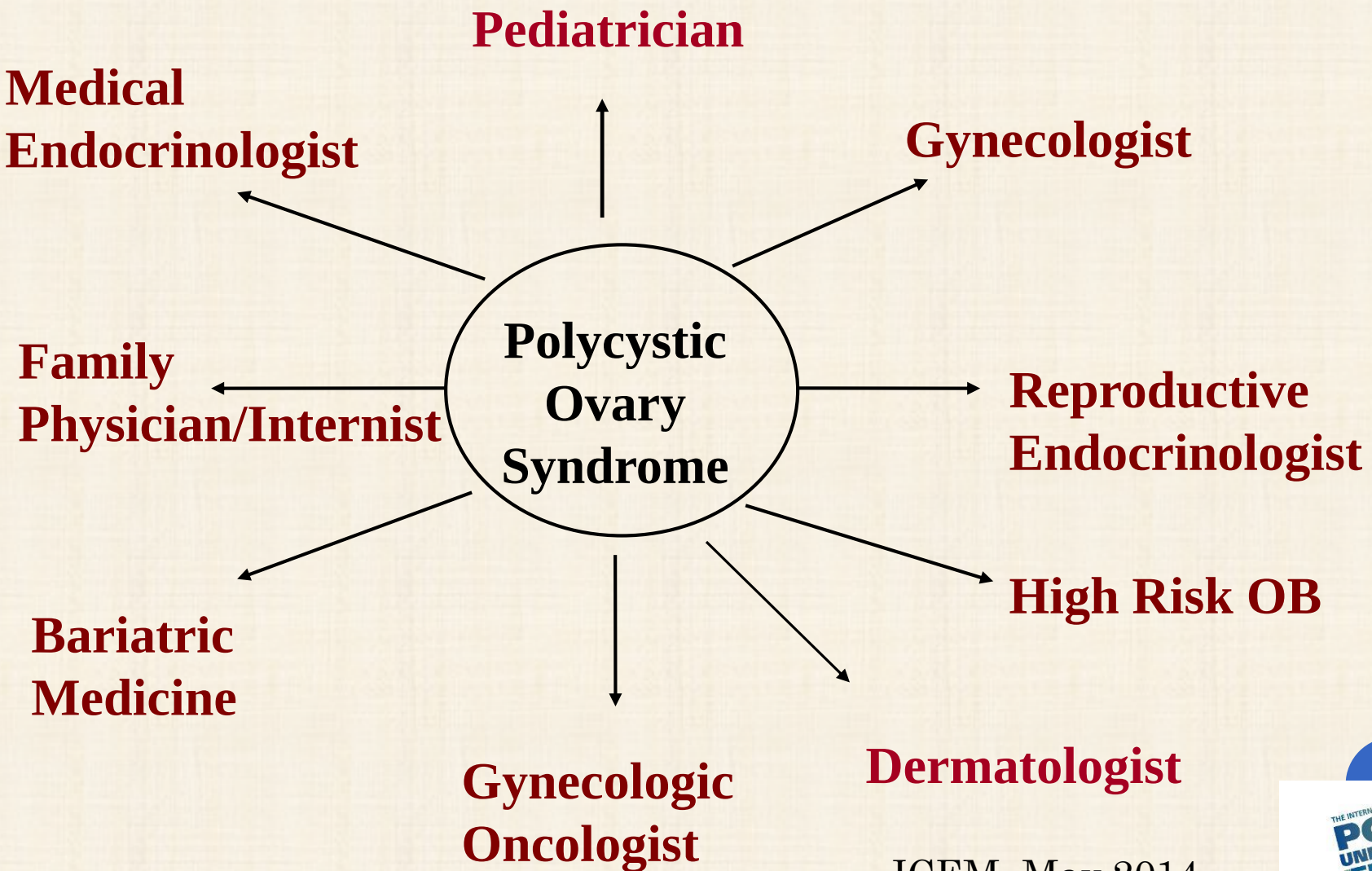
Table 2. Features considered essential for the diagnosis of polycystic ovarian syndrome

	Endo (%) $n = 138$	Gyn (%) $n = 172$	P-value
Menstrual irregularity	70	47	< 0·001
Any androgenization	81	59	< 0·001
Clinical (C) androgenization	5	4	0·672
Biochemical (B) androgenization	8	9	0·816
Either C or B androgenization	55	35	< 0·001
Both C and B androgenization	10	10	0·878
Obesity	11	8	0·320
Polycystic ovaries on ultrasound	14	61	< 0·001
Elevated LH/FSH ratio	24	47	< 0·001
Insulin resistance	6	11	0·162

Clinical Endocrinology, 2005

Are Young Adult Women with Polycystic Ovary Syndrome Slipping through the Healthcare Cracks?

Anuja Dokras[1],MD, PhD, Selma Feldman Witchel[2],MD



JCEM, May 2014

How do we establish an accurate the diagnosis of Polycystic Ovary Syndrome?

THE ROTTERDAM CRITERIA

1. Oligo-ovulation or anovulation
2. Clinical or biochemical signs of hyperandrogenism
3. Polycystic ovaries on ultrasound

- any two of above three
  (exclusion of TSH, Prolactin, 17 OH progesterone, DHEAS)

Most common endocrine disorder in reproductive age
10-15%

Human Reproduction Vol.19, No.1 pp. 41-47, 2004
Fertil Steril 81 (2004), pp. 19–25.

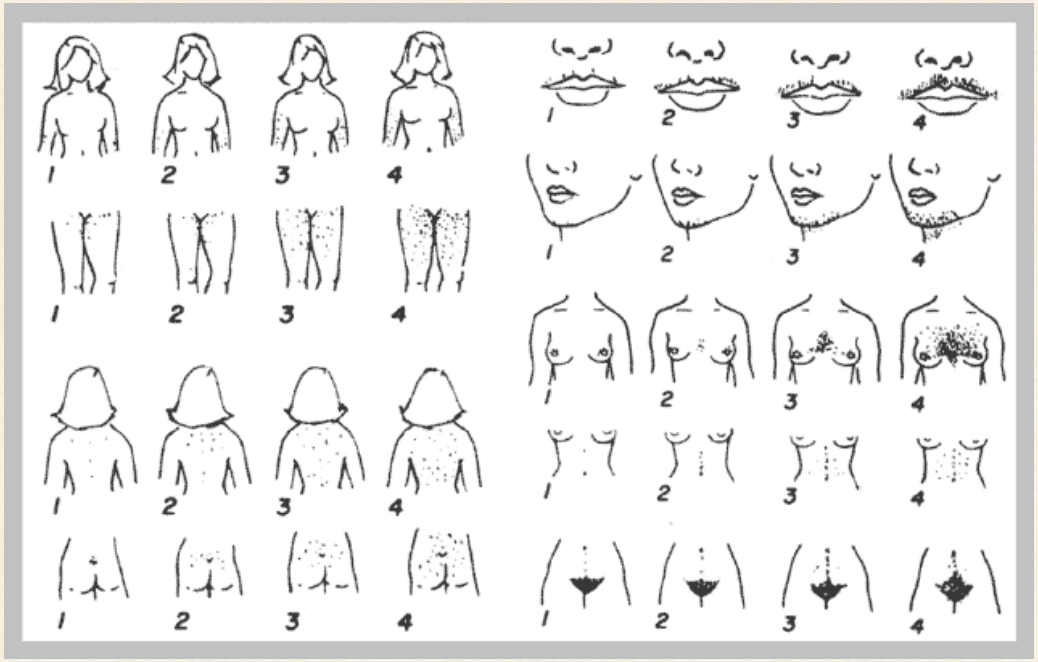
IRREGULAR MENSES

- Less than 6-9 menses per year

- Blood tests
  - Thyroid problem
  - Prolactin problem
  - Low progesterone levels

PCOS is the most common cause for anovulation

CLINICAL HYPERANDROGENISM



Ferriman Galwey score

- Subjective in nature
- Poor correlation with serum testosterone levels
- Failure to account for hair growth in some areas (i.e., sideburns)
- Scores differ with ethnicity

Epidemiology, diagnosis and management of hirsutism: a consensus statement by the Androgen Excess and Polycystic Ovary Syndrome Society

Author	Country	Race	Ethnicity	Cut Off
Api, 2009	Turkey	White	Middle Eastern	≥ 11
Noorbala, 2010	Iran	White	Middle Eastern	≥ 10
Moran, 2010	Mexico	White	Hispanic	≥ 10
Gambineri, 2011	Italy	White	Mediterranean	≥ 9
Asuncion, 2000	Spain	White	Mediterranean	≥ 8
DeUgarte, 2006	USA	White Black	Caucasian/Hispanic African-American	≥ 8
Tellez, 1995	Chile	White	Hispanic	≥ 6
Kim, 2011	Korea	Asian	Chinese	≥ 6
Cheewadhanaraks, 2004	Thailand	Asian	Thai & Chinese	≥ 3
Zhao, 2007	China	Asian	Chinese Han	≥ 2

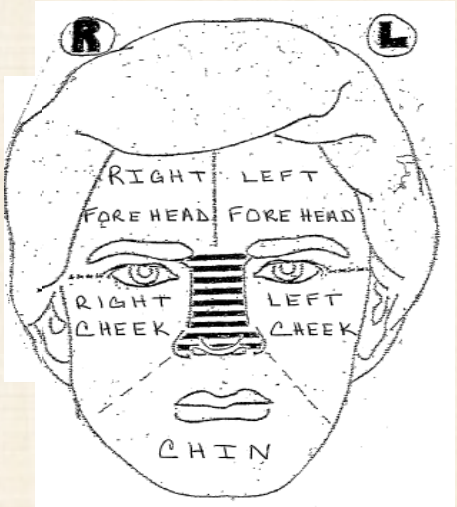
Escobar-Morreale et al, 2011

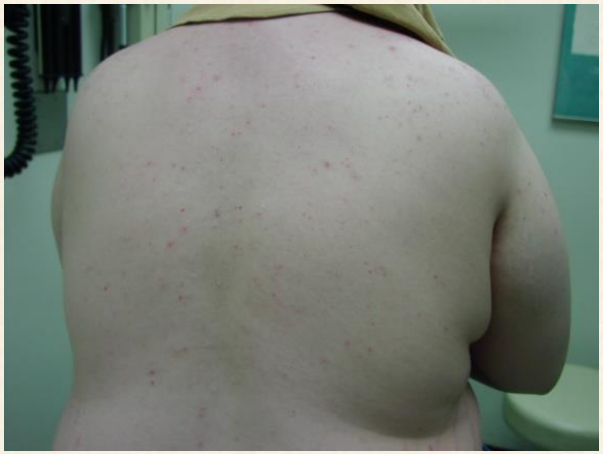
RACIAL & ETHNIC DIFFERENCES

	U.S. White (ref)	U.S. Black	India	Brazil	Finland	Norway
n	217	113	325	350	107	337
Median age, (IQR)	29 (25-32)	29 (26-33)	25 (23-28)[a]	26 (24-39)[b]	33 (28-39)[a]	28 (25-32)
Presence of oligo/amenorrhea	197 (90.8%)	97 (85.5%)	291 (89.5%)	307 (87.7%)	101 (94.4%)	304 (90.2%)
Presence of HA	191 (88.0%)	102 (90.3%)	294 (90.5%)	312 (89.1%)	73 (68.2%)[a]	231 (68.5%)[a]
Presence of PCO on US	146 (67.3%)	86 (76.1%)	259 (79.7%)[b]	229 (65.4%)[a]	107 (100%)[a]	300 (89.0%)[a]
Mean testosterone (SD), ng/dL	53.8 (26.8)	62.5 (32.0)[b]	-	86.4 (41.4)[a]	60.1 (34.0)	65.3 (35.3)[b]
Mean Ferriman-Gallwey (SD)	11.1 (7.7)	11.0 (7.0)[b]	15.6 (6.5)[a]	11.6 (6.2)	7.8 (5.1)[b]	4.3 (4.9)[a]
% meeting NIH criteria	171 (78.8%)	86 (76.1%)	260 (80%)	270 (77.1%)	67 (62.6%)	199 (59.1%)
% meeting all 3 Rotterdam criteria	100 (46.1%)	59 (52.2%)	194 (59.7%)	189 (54.0%)	67 (62.6%)	167 (49.6%)

Chan et al, 2017, AJOG a $p<0.01$

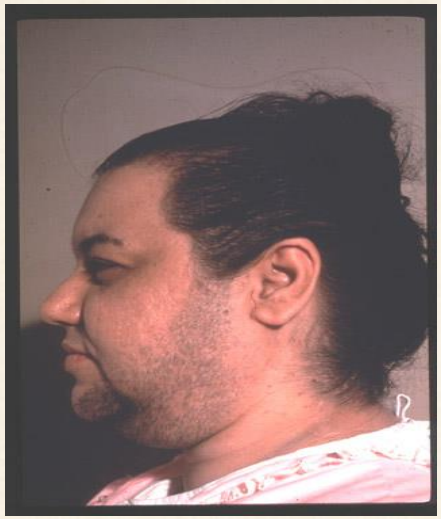
ACNE

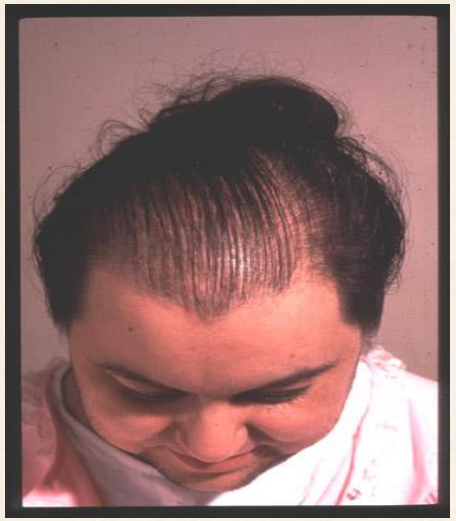




Reference	Minimal	Mild	Moderate	Severe
Gollnick 2003 [47]	Comedonal	Papulopustular, moderate mapulopustular	Nodular	Nodular/conglobate
European Dermatology Forum 2011 [48]	Comedonal acne	Moderate papulopustular acne		Severe papulopustular acne, moderate nodular acne; severe nodular acne, conglobate acne

HAIR LOSS





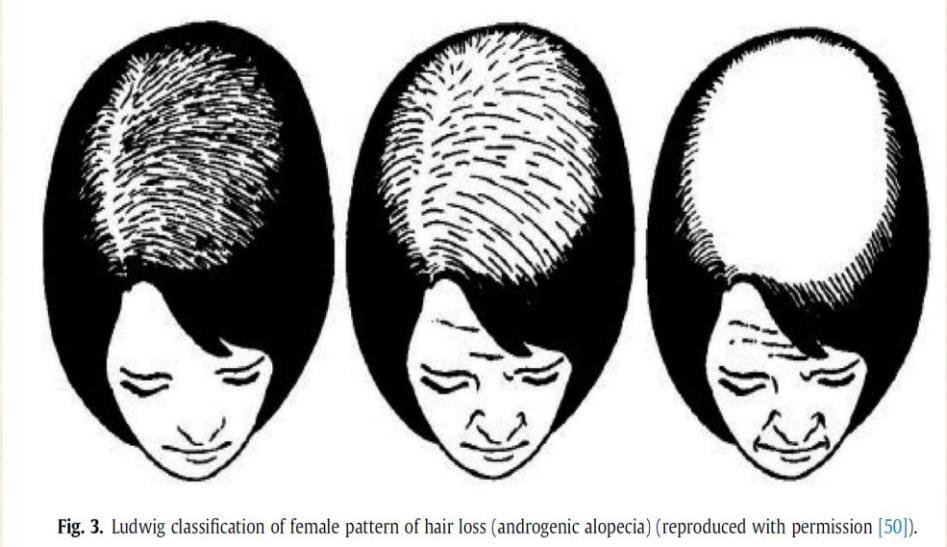
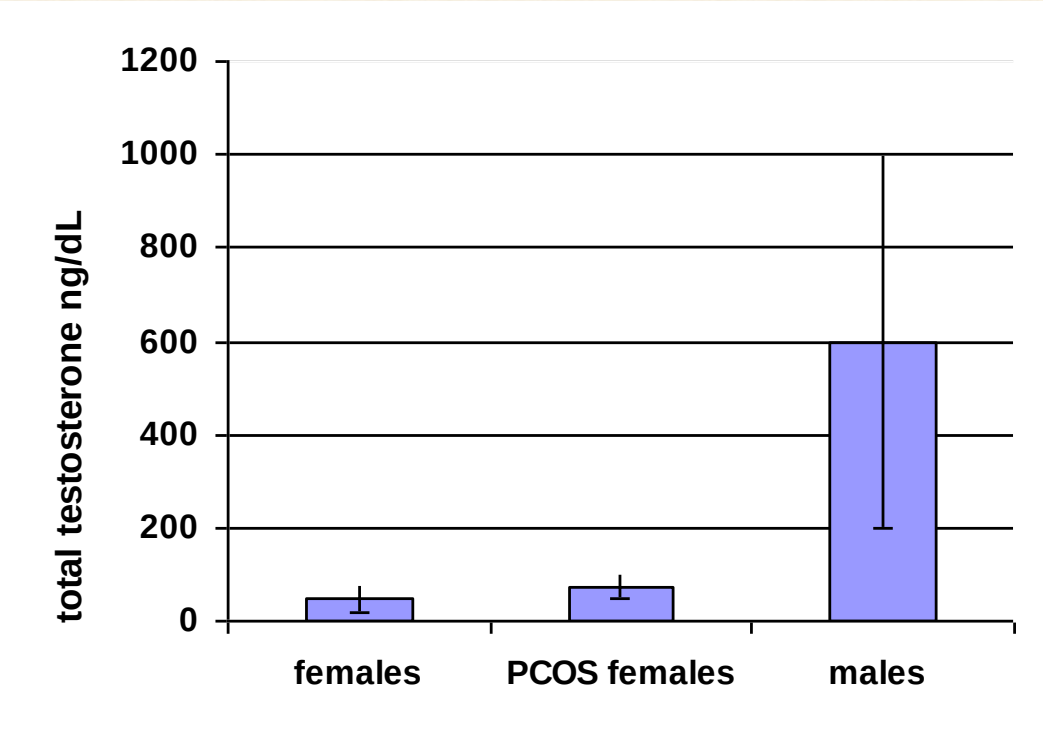


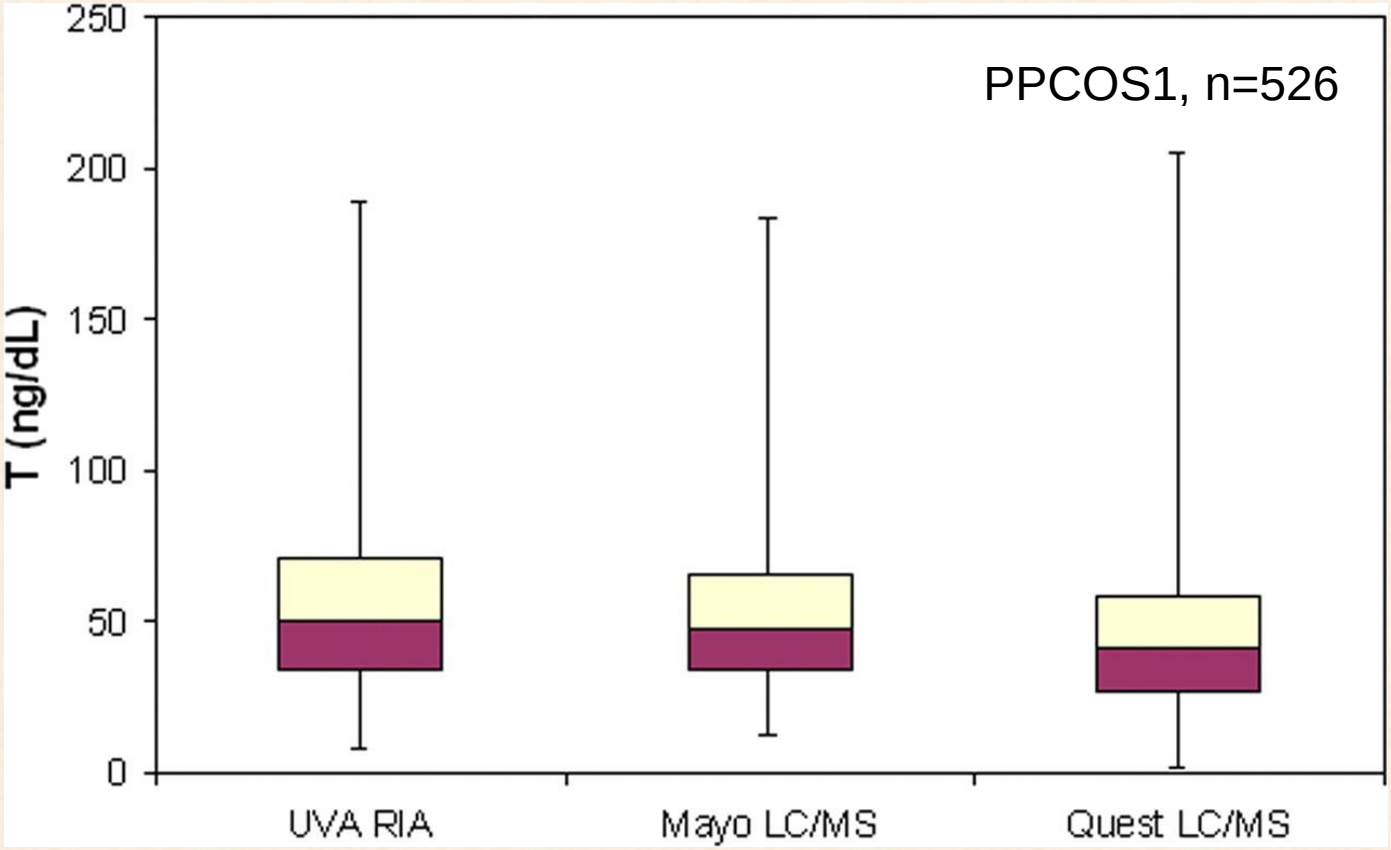
Fig. 3. Ludwig classification of female pattern of hair loss (androgenic alopecia) (reproduced with permission [50]).

BIOCHEMICAL HYPERANDROGENISM

- Total testosterone
- Free testosterone
- Free Androgen Index (most commonly elevated)
- DHEAS
- 17 hydroxyprogesterone r/o late onset adrenal hyperplasia



SERUM TESTOSTERONE ASSAYS



Total Testosterone not sensitive at the lower end of range.

Legro, R. S. et al. J Clin Endocrinol Metab 2010;95:5305-5313

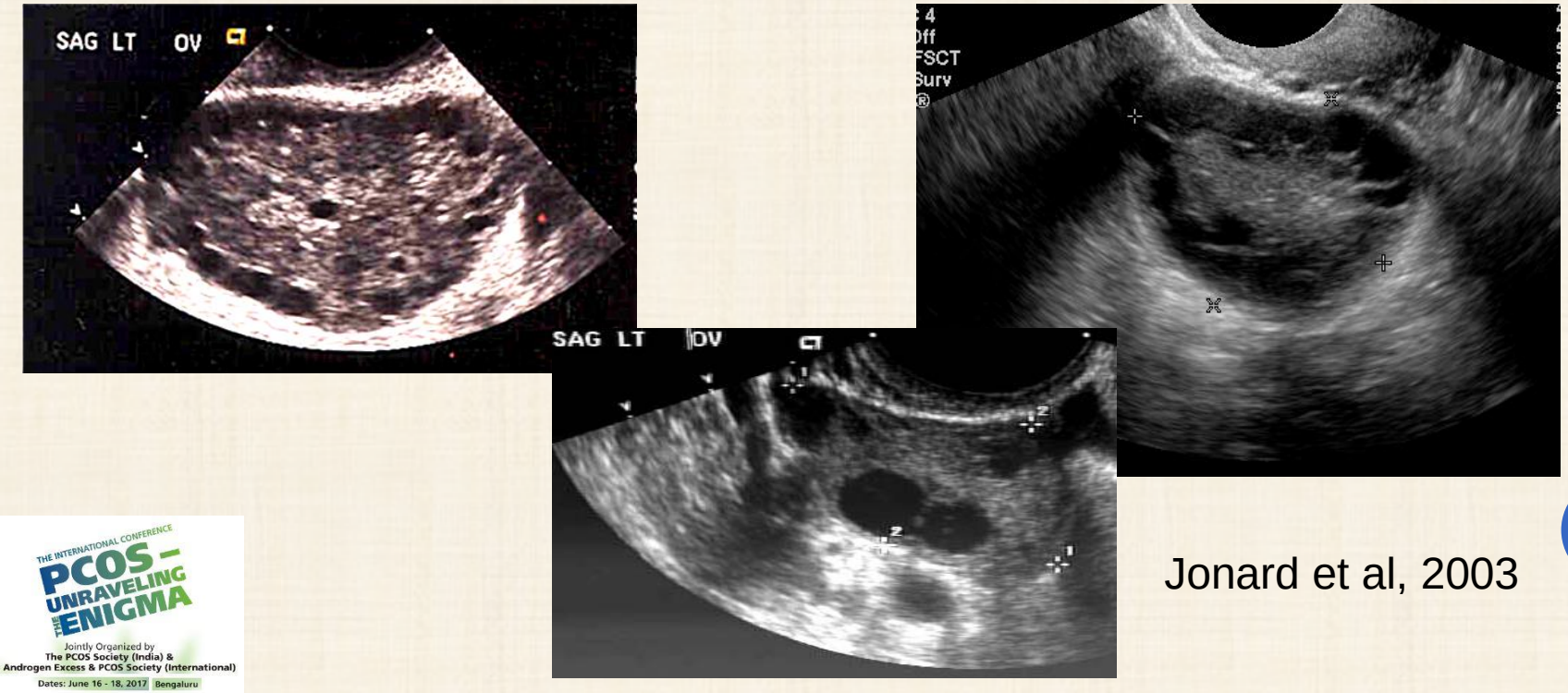
RACIAL & ETHNIC DIFFERENCES

	Control	US PCOS	US PCOS	US PCOS	US PCOS
Ethnicity	White	White	Black	Hispanic	Asian
n	32	172	44	25	21
Testosterone (ng/dl)	35.6 ± 17.0	66.2 ± 35.6	**73.9 ± 41.8**	**77.4 ± 53.1**	57.7 ± 29.7
Free testosterone (ng/dl)	0.6 ± 0.3	1.3 ± 0.8	**1.7 ± 1.1**	**1.8 ± 1.4**	1.3 ± 0.9
BMI (kg/m2)	30.2 ± 7.5	30.7 ± 9.2	**36.3 ± 7.9**	32.3 ± 10.3	26.3 ± 5.9
PCO morphology	31%	99.3%	97.4%	95%	100%

Welt et al, 2006 JCEM

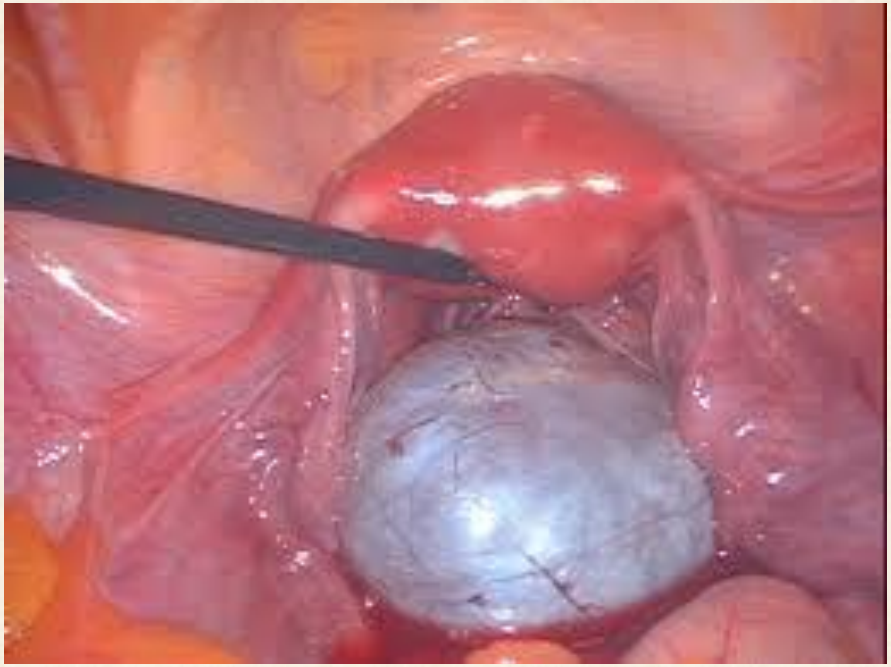
ULTRASOUND EVALUATION OF OVARIES

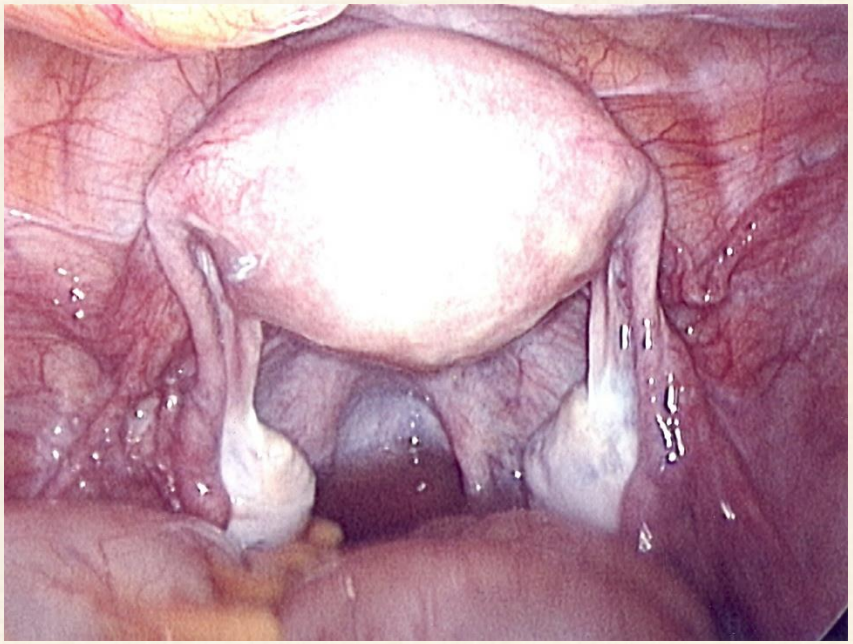
- 12 or more follicles in each ovary measuring 2-9mm in diameter and/or increased volume > $10cm^3$
- Only one ovary fitting this definition is sufficient
- Not included - location of follicles / stroma



Jonard et al, 2003

THERE IS NO OVARIAN CYST





Definition and significance of polycystic ovarian morphology: a task force report from the Androgen Excess and Polycystic Ovary Syndrome Society

Didier Dewailly[1,*], Marla E. Lujan[2], Enrico Carmina[3], Marcelle I. Cedars[4], Joop Laven[5], Robert J. Norman[6], and Héctor F. Escobar-Morreale[7]

(1) The threshold for FNPO defining PCOM should be ≥25 follicles per whole ovary.
   (a) This threshold applies to use of newer imaging technology (essentially transducer frequency ≥8 MHz),
   (b) FNPO is recommended over OV since FNPO has been shown to have greater predictive power for PCOS and less variability among populations aged 18–35 years
   (c) Real-time methods should follow recently proposed standardization. Offline methods, with either 2D or 3D ultrasound, must be applied after completion of a learning curve and standardization.
(2) The threshold for OV should remain at ≥10 ml.
   OV may have a role in instances when image quality does not allow for reliable estimates of FNPO.
(3) The use of the AMH assay as a surrogate to ultrasound is for research purpose only at the present time. Only in-house AMH thresholds for PCOM can be used until there is standardization of the assay techniques.

FNPO, follicle number pre ovary; OV, ovarian volume.

Human Reprod Update, 2014

DIAGNOSIS OF PCOS

WHAT ABOUT INSULIN RESISTANCE?

WHAT ABOUT LH/FSH RATIO?

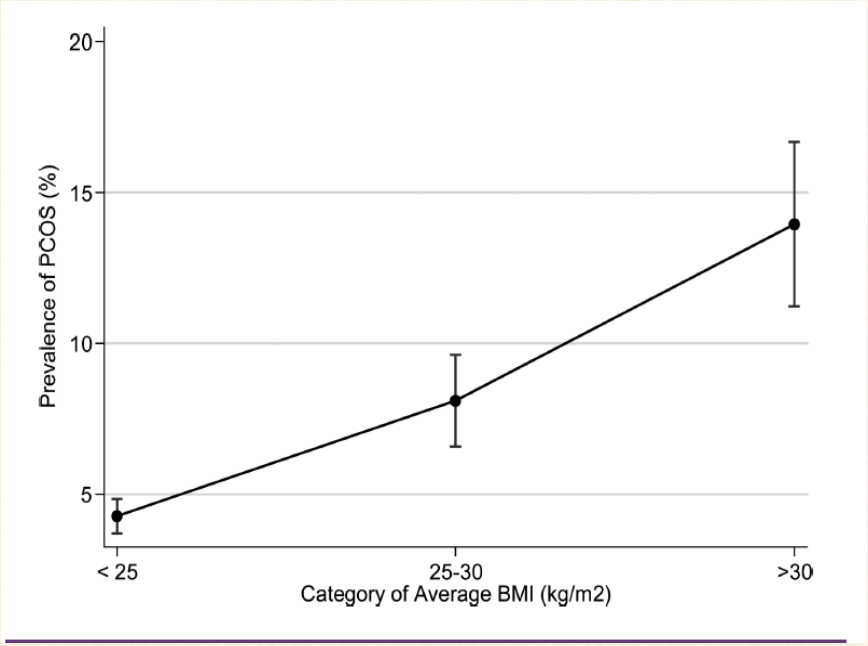
WHAT ABOUT AMH?

WHAT ABOUT OBESITY?

TABLE 2. Prevalence of PCOS according to BMI among 675 unselected reproductive-aged women

Obesity class	n (%)	Estimated no. (%) of PCOS in obesity class
Underweight (≥18.9 kg/m^2)	36 (5.3)	2.95 (8.2)
Normal (19.0–24.9 kg/m^2)	282 (41.8)	27.64 (9.8)
Overweight (25.0–29.9 kg/m^2)	160 (23.7)	15.84 (9.9)
Class I (mild) obesity (30.0–34.9 kg/m^2)	87 (12.9)	4.52 (5.2)
Class II (moderate) obesity (35.0–39.9 kg/m^2)	57 (8.5)	7.07 (12.4)
Class III (severe) obesity (≥40.0 kg/m^2)	53 (7.8)	6.10 (11.5)

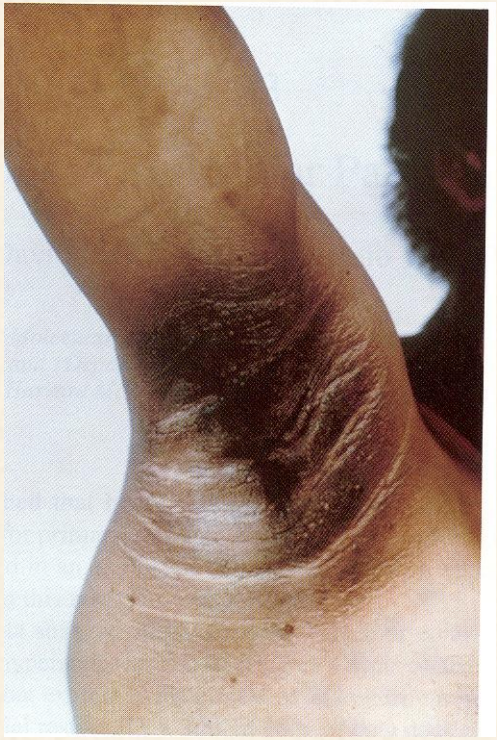
Yildiz et al, JCEM, 2008

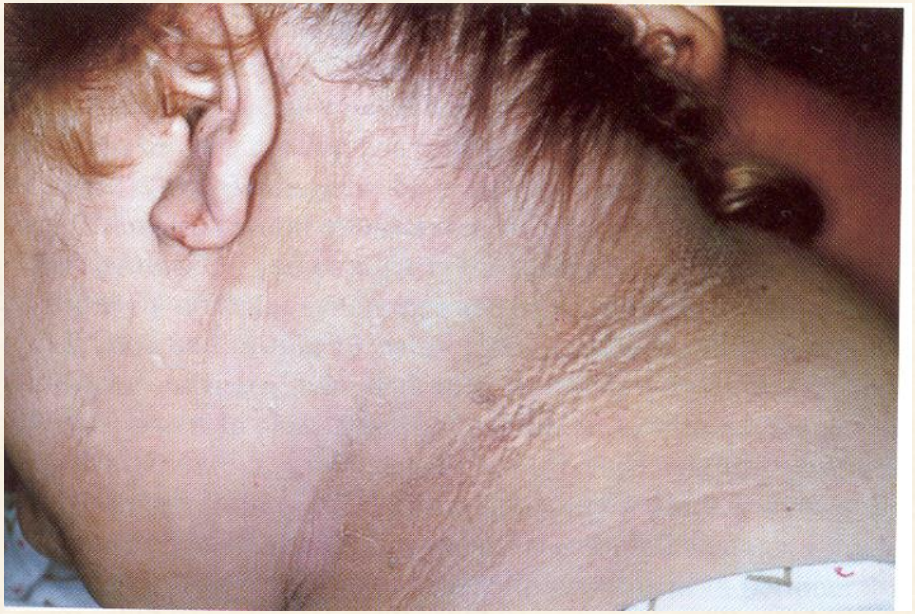


Teede et al, Obesity, 2013

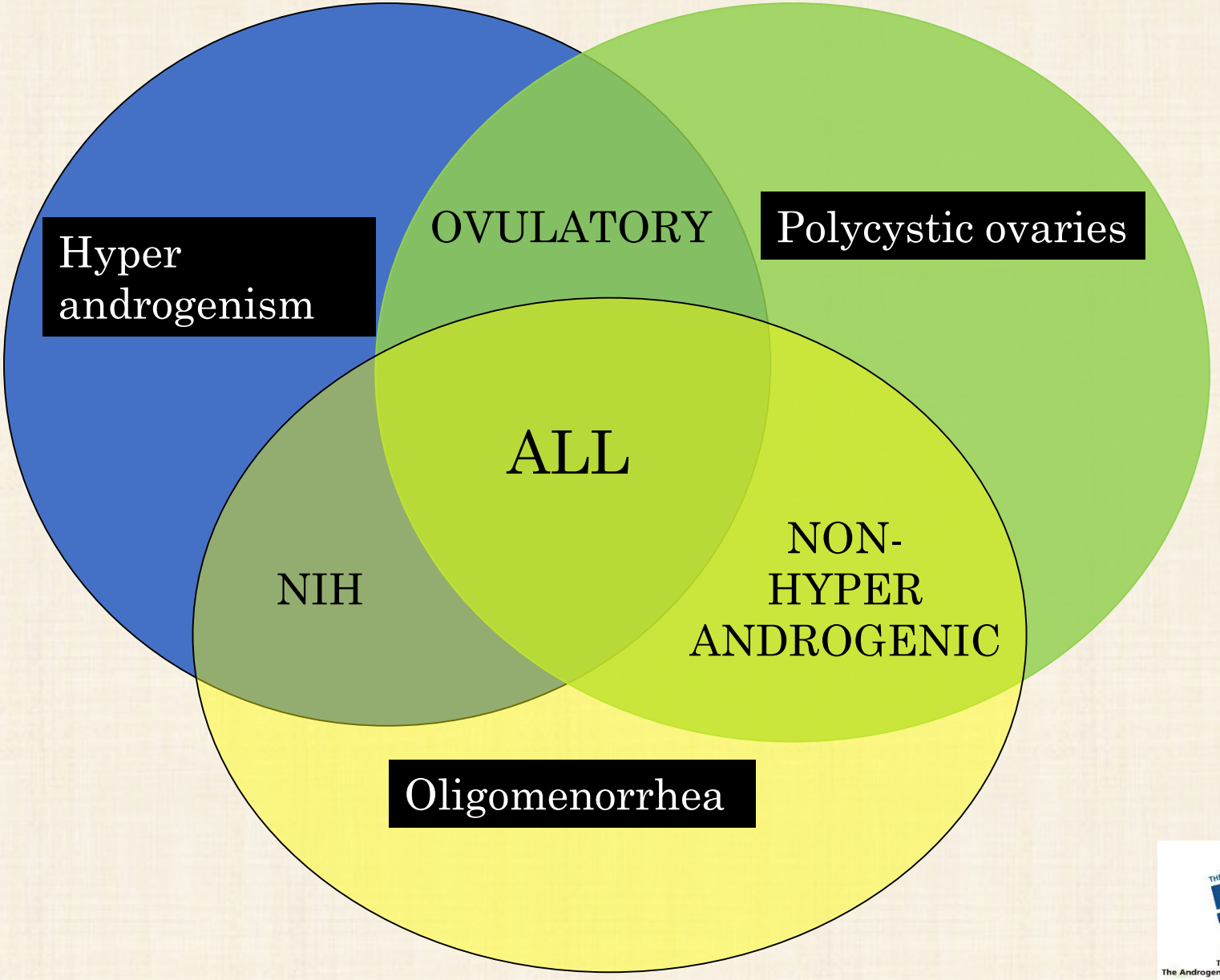
ACANTHOSIS NIGRICANS

- Raised, velvety, hyperpigmentation of skin
- Axilla, neck, intertrigenous areas
- Marker of insulin resistance
- Associated with PCOS





PCOS PHENOTYPES



CHALLENGES IN ADOLESCENTS

- Defining hirsutism/androgen concentrations
- Irregular menses
- Multi-follicular ovary

- Over diagnosis – labeling
- Missed diagnosis – opportunity to intervene

METABOLIC RISK IN ADOLESCENTS WITH PCOS

Table IV. Prevalence of metabolic syndrome and its individual components in adolescents with and without PCOS

	PCOS (2 criteria)	No PCOS (≤1 criteria)	OR (95% CI)
BMI ≥90th percentile	50.3%	22.8%	3.6 (1.8-7.1)
BP ≥90th percentile	27.7%	14%	2.3 (1.03-5.2)
TG ≥150 mg/dL	16.2%	7%	2.6 (0.9-7.1)
TG ≥110 mg/dL (Ford criteria)	28.3%	17.5%	1.8 (0.9-3.8)
Glucose ≥100 mg/dL	2.7%	1.7%	1.5 (0.6-7.79)
HDL ≤40 mg/dL	17.4%	5.5%	3.14 (1-10.2)
Metabolic syndrome (Cook criteria)	10.8%	1.7%	6.7 (0.9-52.7)
	14.8%	7.02%	2.3 (0.8-6.7)

Roe et al, J Pediatr 2013

Clinical Practice Committee Publication

HORMONE RESEARCH IN PÆDIATRICS

Horm Res Paediatr 2015;83:376–389
DOI: 10.1159/000375530

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The Diagnosis of Polycystic Ovary Syndrome during Adolescence

Selma F. Witchel[a] Sharon Oberfield[b] Robert L. Rosenfield[c] Ethel Codner[d]
Andrea Bonny[e] Lourdes Ibáñez[f] Alexia Pena[g] Reiko Horikawa[h]
Veronica Gomez-Lobo[i] Dipesalema Joel[j] Hala Tfayli[k] Silva Arslanian[l]
Preeti Dabadghao[m] Cecilia Garcia Rudaz[n] Peter A. Lee[o]

- Overlap with normal puberty
- Recommend caution in diagnosing PCOS if menarche occurred less than 2 years ago
- To prevent misdiagnosis recommend calling an adolescent "AT RISK"
- Offer treatments to alleviate symptoms
- Obesity and insulin resistance are not diagnostic criteria

DIAGNOSTIC DILEMMAS

- Expanding definition
- Heterogeneous - phenotypes
- Race/Ethnicity
- Age of diagnosis - changing symptoms

Stein IF, Leventhal ML. Amenorrhea associated with bilateral polycystic ovaries. Am J Obstet Gynecol, 1935; 29: 181-91.



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PENN Fertility Care

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THE INTERNATIONAL CONFERENCE
PCOS – UNRAVELING THE ENIGMA
Jointly Organized by
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The Androgen Excess & PCOS Society (International)
Dates: June 16 - 18, 2017 Bengaluru

Polycystic Ovary Syndrome Center

PENN Fertility Care

Penn Medicine

- Reproductive Endocrinologist
- Nurse Practitioner
- Clinical Nutritionist
- Dermatologist
- Psychiatrist/ Clinical Psychologist
- Weight management
- Research Coordinator

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PREVALENCE OF PCOS

Country	Prevalence NIH	Prevalence Rotterdam
Australia	8.6-15.3%	9-21.3%
Brazil	NA	8.5%
China	2.2-7.1%	5.6-11.2%
Denmark	NA	16.6%
Greece	6.8%	NA
Iran	4.8-7.1%	14.1-15.2%
Italy and Spain	5.4%	NA
Mexico	6%	NA
Sri Lanka	NA	6.3%
Turkey	6.1%	19.9%
UK	8%	NA
USA	4-13%	NA

Lizneva et al, Fertil Steril. 2016

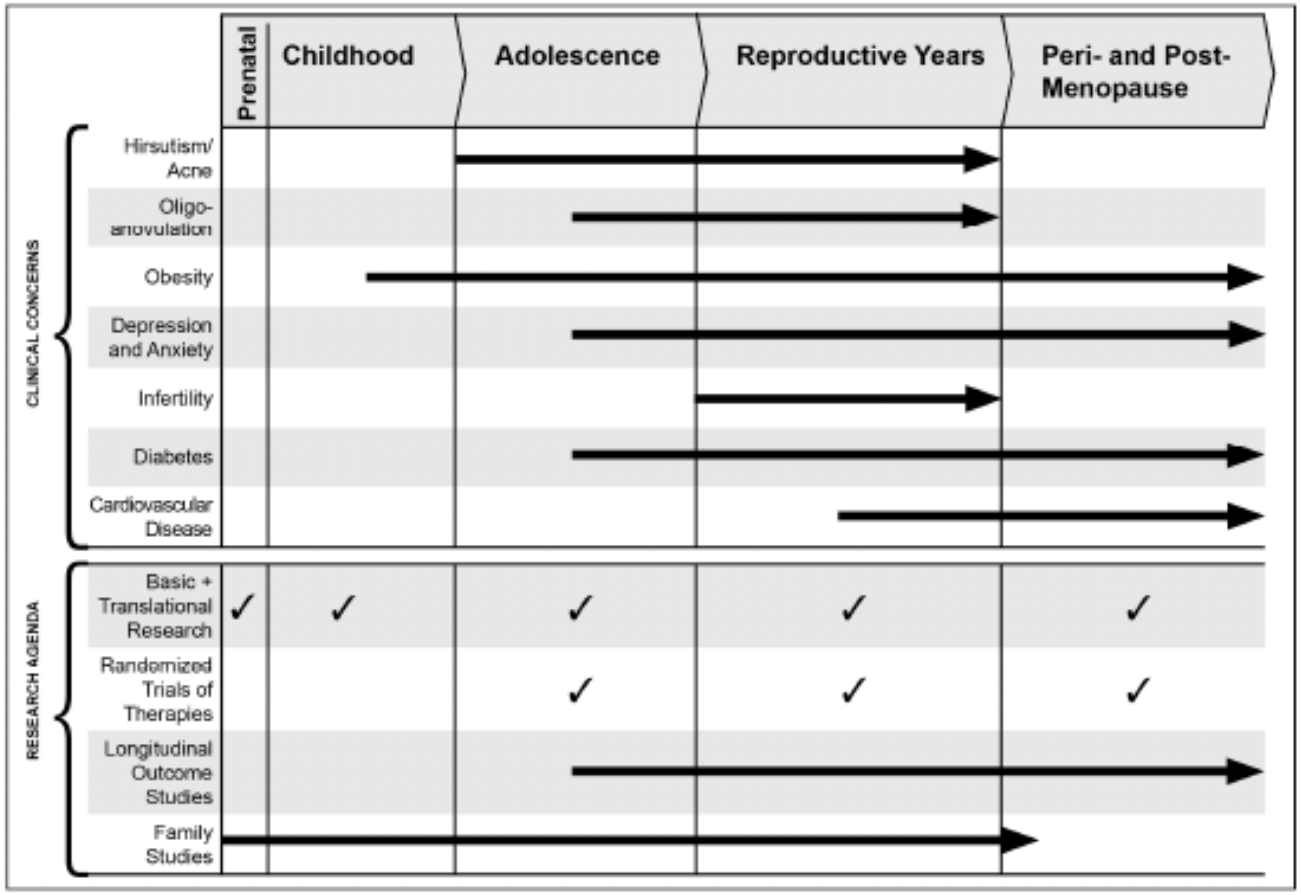
NIH WORKSHOP ON PCOS - 2012

Table 2. Potential Phenotypes of PCOS by NIH 1990, Rotterdam 2003, and AE-PCOS 2006

		Potential PCOS Phenotypes									
		A	B	C	D	E	F	G	H	I	J
Panel Terminology	**Diagnostic Criteria**	**NIH**						**AE-PCOS/ Rotterdam 1**			**Rotterdam 2**
Androgen Excess	Hyperandrogenemia	+	–	+	+	–	+	+	–	+	–
	Hyperandrogenism*	+	+	–	+	+	–	+	+	–	–
Ovulatory Dysfunction	Oligo-anovulation	+	+	+	+	+	+	–	–	–	+
Polycystic Ovarian Morphology	Polycystic Ovaries	+	+	+	–	–	–	+	+	+	+
	NIH 1990 Criteria	x	x	x	x	x	x				
	Rotterdam 2003 Criteria	x	x	x	x	x	x	x	x	x	x
	AE-PCOS 2006 Criteria	x	x	x	x	x	x	x	x	x	

NIH Workshop on PCOS -2012

Table 4. Common Clinical Manifestations Associated With the Syndrome Across the Life Course and Types of Research Recommended



ARE THE ROTTERDAM CRITERIA STILL VALID?

- Improve uniformity of diagnosis
- Improve patient satisfaction regarding diagnosis
- Identification of phenotypes is critical - provide information regarding long term risks

INFORMATION REGARDING PCOS

	North America	Europe
Satisfaction with information about PCOS		
Dissatisfied or indifferent	**606 (83.0)**	**505 (86.9)**
Satisfied	124 (17.0)	76 (13.1)
Information about lifestyle management		
Dissatisfied or indifferent	316 (43.2)	250 (43.1)
Satisfied	95 (13.0)	55 (9.5)
This information was not mentioned	320 (43.8)	275 (47.4)
Information about medical therapy		
Dissatisfied or indifferent	406 (55.7)	302 (52.2)
Satisfied	141 (19.3)	74 (12.8)
This information was not mentioned	182 (25.0)	203 (35.0)
Information on long term complications		
Dissatisfied or indifferent	299 (41.0)	225 (38.9)
Satisfied	68 (9.3)	30 (5.2)
This information was not mentioned	363 (49.7)	323 (55.9)
Emotional support and counselling after diagnosis		
Dissatisfied or indifferent	275 (37.6)	184 (31.8)
Satisfied	30 (4.1)	10 (1.7)
This information was not mentioned	426 (58.3)	384 (66.4)

Mimics of PCOS

- Cushings Syndrome
- Acromegaly
- HAIR-IN syndrome

ENDOCRINE SOCIETY GUIDELINES

- Adolescents - NICHD criteria for diagnosis of PCOS
- Adults- Rotterdam criteria for diagnosis of PCOS
- Perimenopause – Presumptive diagnosis based on NICHD criteria

JCEM, Dec 2013

DIAGNOSIS - PERIMENOPAUSE

Table 2. Clinical and Endocrine Data of 193 Women With Polycystic Ovary Syndrome During 20 Years of Follow-up (Evaluated at 5-Year Intervals)

	Age (y)	BMI (kg/m²)	Waist Circumference (cm)	LH:FSH Ratio	Total T	DHEAS	Insulin	QUICKI	Ovarian Volume
Basal	21.9±2.1	26.6±6.7	88.9±14.5	1.5±0.6	75±26	2.7±1.2	14.9±6.5	0.327±0.02	10.9±3.9
After 5 y	27.2±2.2	27.3±7	89.4±12	1.6±0.8	71±25	2.5±1.1	13.8±7	0.329±0.2	11±4.1
After 10 y	32.3±1	27.5±5.7	90.8±11.5	1.4±0.5	68±22*	2.2±1.3†	15.2±8	0.328±0.02	10.7±4
After 15 y	37.5±1.4	26.8±4.5	91.7±11.8*	1.4±0.6	65±25†	2.1±0.85†	14.5±6.8	0.332±0.02	10.3±3.1
After 20 y	42.8±1.5	26.9±5.1	94.7±12.5†	1.2±0.4	59±28†	2.00±0.9†	13.5±4.5	0.329±0.02	9.1±3.1†

% women with ovulatory cycles increased from 52 to 85%
menses and androgens improve

Carmina et al, 2012, Obstetrics and Gynecology

IMPACT OF RACE ON METABOLIC RISK

Age 20-34yrs	N	**Metabolic Syndrome**	BMI ≥30 kg/m^2	TG ≥ 150 mg/dL	HDL ≤ 50 mg/dL	BP ≥ 130/85 mmHg	Glucose ≥ 100 mg/dL
PCOS White	244	22.6 %	51.7%	**24.6 %**	35.6 %	31.9%	4.9%
PCOS Black	67	**40 %****	**72.7% ****	10.9% *	**76.6% ****	**45.5% ***	**18.8%****
NHANES White	250	14.9%	66.1%	15.5%	39.9%	3.3%	9.0%
NHANES Black	157	16.6%	75.4%*	9.9%	42.9%	10.6%*	8.3%

Hillman et al, Fert Steril 2014

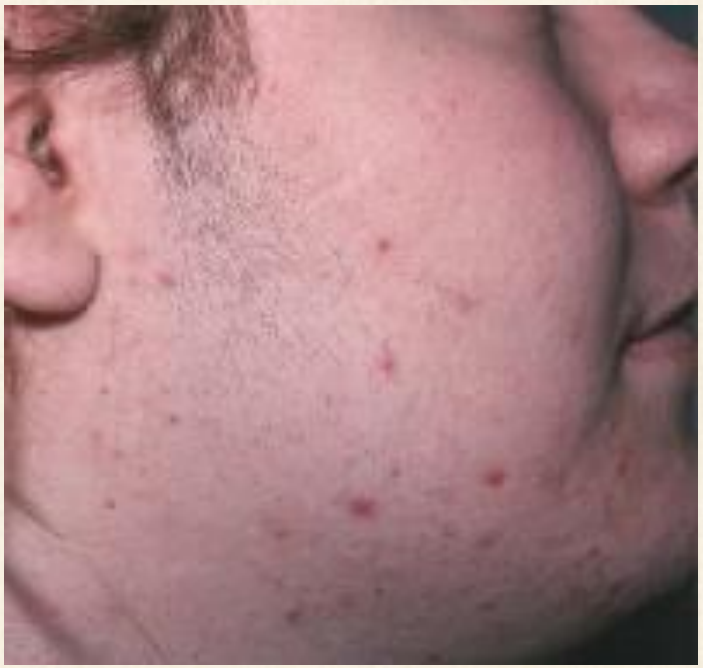
Obesity in PCOS Adolescents

Table I Features of PCOS in adolescence according to three international adult diagnostic criteria (Hickey, 2009).

	All	PCOS-R[a]			PCOS-N[a]			PCOS-AES[a]		
	n = 232	No (*n* = 179)	Yes (*n* = 48)	*P*	No (*n* = 216)	Yes (*n* = 10)	*P*	No (*n* = 216)	Yes (*n* = 11)	*P*
Current age (years)	15.2 (0.48)	15.2 (0.43)	15.4 (0.62)	0.099	15.2 (0.45)	15.7 (0.72)	0.001	15.2 (0.43)	15.9 (0.89)	*<0.001*
Age at menarche (years)	12.5 (1.2)	12.6 (1.2)	12.4 (1.1)	0.361	12.5 (1.2)	11.9 (1.4)	0.165	12.6 (1.2)	11.8 (1.3)	*0.112*
Months since menarche	32.2 (15.0)	31.3 (15.0)	35.4 (15.0)	0.092	31.8 (15.0)	46.1 (17.0)	0.026	31.5 (14.4)	48.4 (17.8)	*0.010*
BMI (kg/m^2)	22.7 (3.8)	22.3 (3.0)	24.5 (5.7)	<0.001	22.4 (3.4)	29.4 (6.8)	<0.001	22.5 (3.4)	28.8 (6.7)	*<0.001*
BMI (z-score)	0.54 (0.8)	0.48 (0.8)	0.77 (0.9)	0.026	0.50 (0.8)	1.45 (0.9)	0.008	0.50 (0.8)	1.37 (0.9)	*0.009*
BMI, *n* (%)										
Normal	163 (70.3)	134 (74.9)	26 (54.2)	<0.001	157 (72.7)	2 (20.0)	<0.001	153 (70.8)	3 (27.3)	*<0.001*
Overweight	48 (20.7)	37 (20.7)	10 (20.8)		44 (20.4)	3 (30.0)		44 (20.4)	3 (27.3)	
Obese	19 (8.2)	7 (3.9)	11 (22.9)		13 (6.0)	5 (50.0)		13 (6.0)	5 (45.5)	

Hickey et al, 2011, Hum Repro

INCREASED HAIR GROWTH



WHY MONITOR IN THE MENOPAUSE?

Table 3. Odds Ratio (95% Confidence Interval) of Cumulative Incident Diabetes and Dyslipidemia According to Baseline Body Mass Index (Year 2) and Polycystic Ovary Syndrome Classification at Ages 20–32

	Diabetes			Dyslipidemia		
	n	Model 1*	Model 2†	n	Model 1	Model 2
No PCOS, normal weight‡	610	1.0	1.0	531	1.0	1.0
No PCOS, overweight§	428	2.0 (1.3–2.9)	1.4 (0.8–2.2)	320	1.7 (1.2–2.3)	0.9 (0.6–1.3)
PCOS, normal weight	31	3.1 (1.2–8.0)	3.2 (1.2–8.3)	28	1.9 (0.8–4.3)	2.0 (0.8–4.5)
PCOS, overweight	21	4.0 (1.5–11.0)	3.0 (1.0–8.6)	15	3.5 (1.2–9.8)	1.8 (0.6–5.4)

CWS, Coronary Artery Risk Development in Young Adults Women's Study; PCOS, polycystic ovary syndrome.
* Logistic regression model adjusted for age, race, education, parity, and family history of diabetes at baseline.
† Logistic regression model adjusted for the covariates in Model 1 plus body mass index (BMI) at year 20.
‡ Normal weight defined as BMI (calculated as weight (kg)/[height (m)]^2) lower than 25.
§ Overweight defined as BMI 25 or higher.

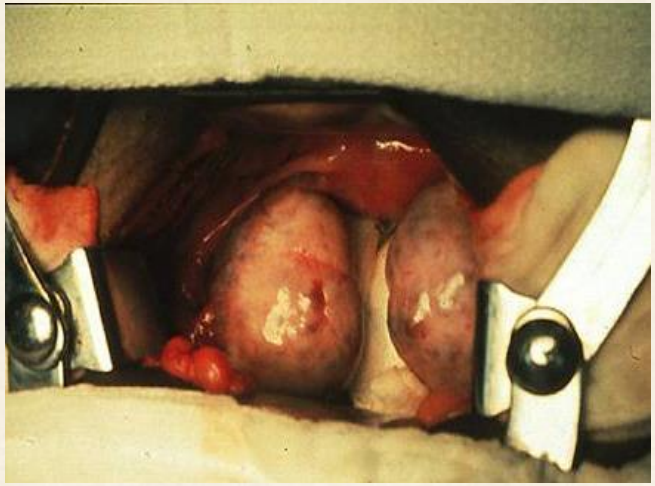
Wang et al, 2010 Obstet Gynecol

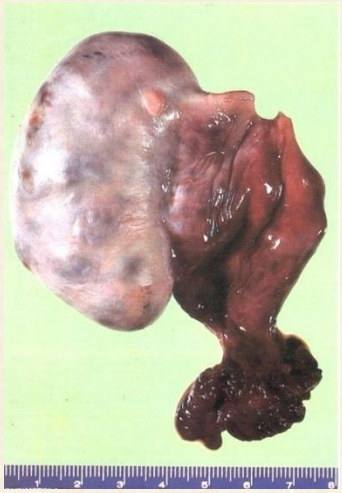
IMPACT OF RACE ON METABOLIC RISK

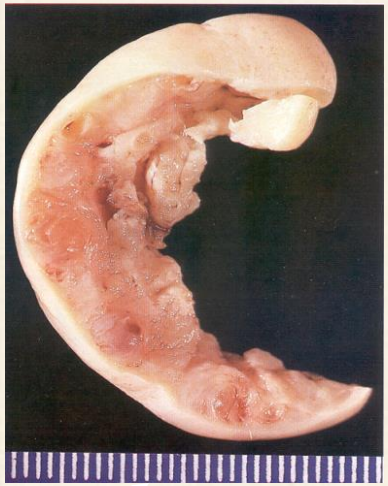
PCOS	US White	US Black	India	Brazil	Finland	Norway
n	186	101	220	238	94	287
Metabolic Syndrome	52 (28%)	**52 (51.5%)**	65 (29.6%)	70 (29.4%)	26 (27.7%)	106 (26.5%)
BMI criterion	89 (47.9%)	**74 (73.3%)**	82 (37.3%)	100 (42%)	45 (47.9%)	135 (47%)
TG criterion	38 (20.4%)	10 (9.9%)	**59 (26.8%)**	**64 (26.9%)**	11 (11.7%)	58 (20.2%)
BP criterion	68 (36.6%)	**59 (58.4%)**	37 (16.8%)	83 (34.9%)	34 (36.2%)	131 (45.6%)
Glucose criterion	22 (11.8%)	22 (21.8%)	**63 (28.6%)**	42 (17.7%)	16 (17%)	75 (26.1%)
HDL criterion	77 (41.4%)	72 (71.3%)	**214 (97.3%)**	142 (59.7%)	41 (43.6%)	161 (56.1%

STEIN-LEVENTHAL SYNDROME

- Case series of 7 women
- Obese, hirsute, irregular menses, difficulty getting pregnant



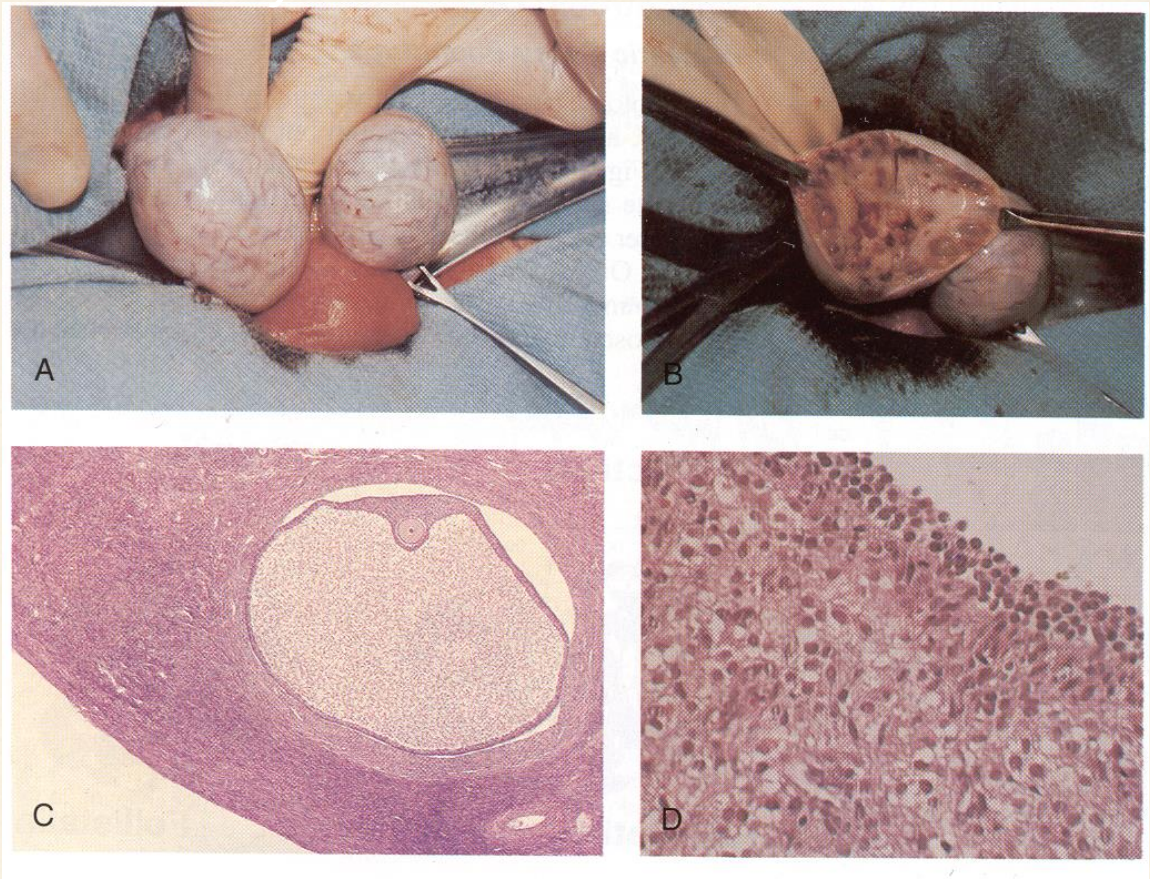




Ovary

STEIN-LEVENTHAL SYNDROME

Ovary



Ovary

NICHD DEFINITION

Definition:

NICHD/NIH Consensus Conference, April 1990

- Clinical or biochemical hyperandrogenemia
- Chronic oligomenorrhea or anovulation
- Exclusion of related disorders (pituitary, adrenals, ovary)

Most common endocrine disorder in reproductive age women
6-10%

Zawadski and Dunaif, 1992

The Androgen Excess and PCOS Society criteria for the polycystic ovary syndrome: the complete task force report

1. Hyperandrogenism: hirsutism and/or hyperandrogenemia (free T)
and

2. Ovarian Dysfunction: Oligo-anovulation and/or polycystic ovaries

and

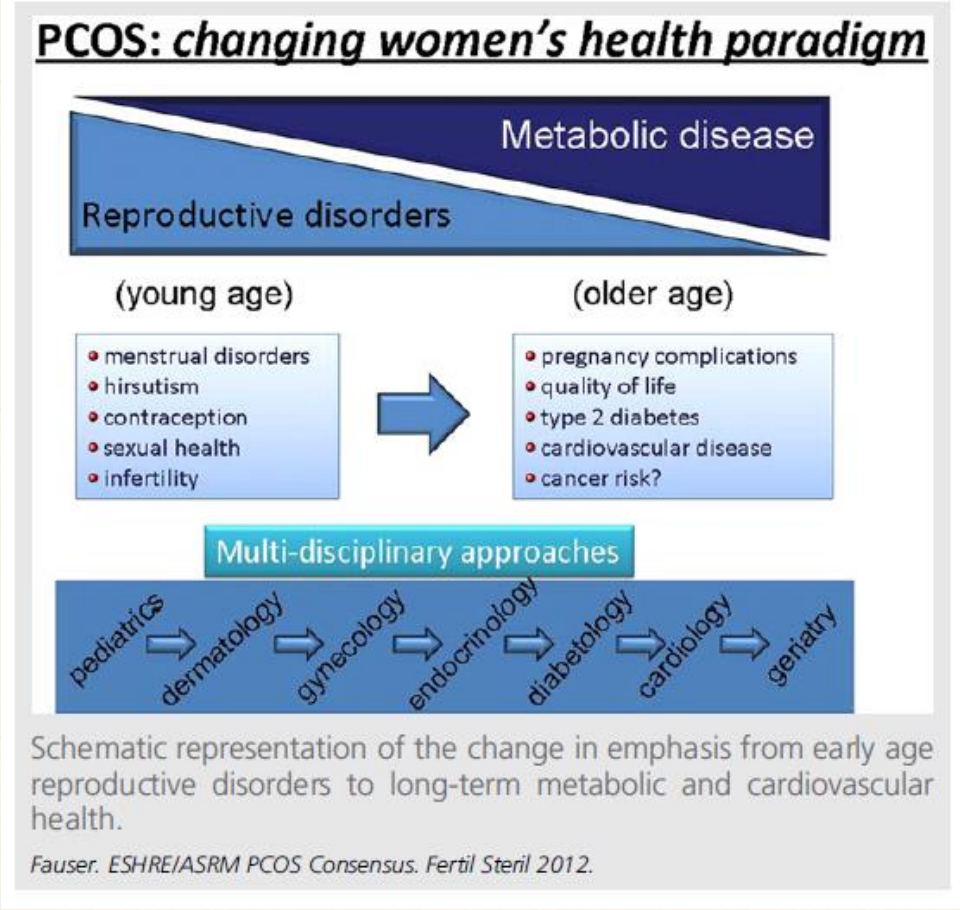
3. Exclusion of other androgen excess or related disorders

Azziz, R. et al. J Clin Endocrinol Metab 2006;91:4237-4245

PCOS is an androgen excess disorder

Azziz et al, 2006, JCEM

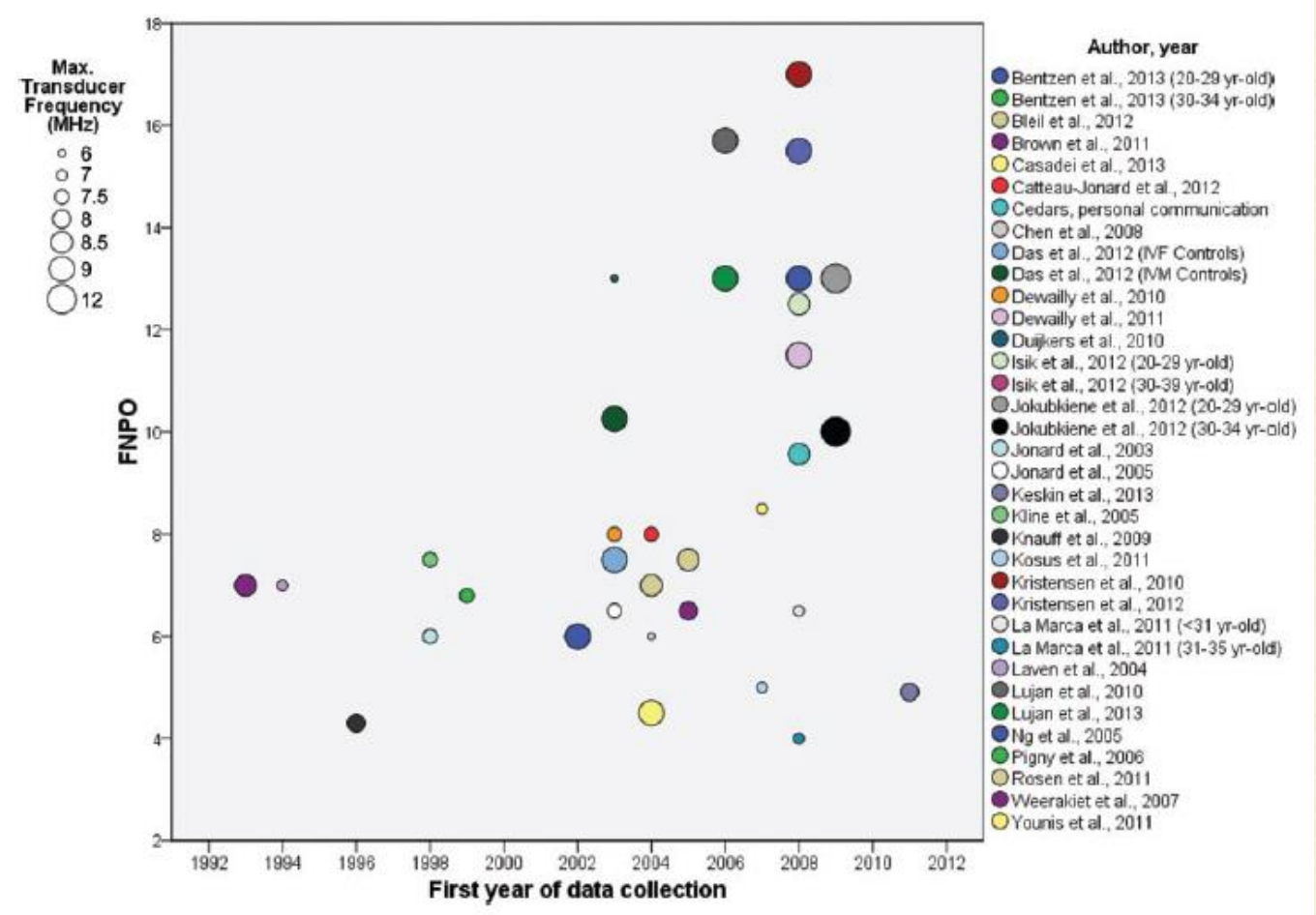
DOES THE DEFINITION MATTER?



Schematic representation of the change in emphasis from early age reproductive disorders to long-term metabolic and cardiovascular health.

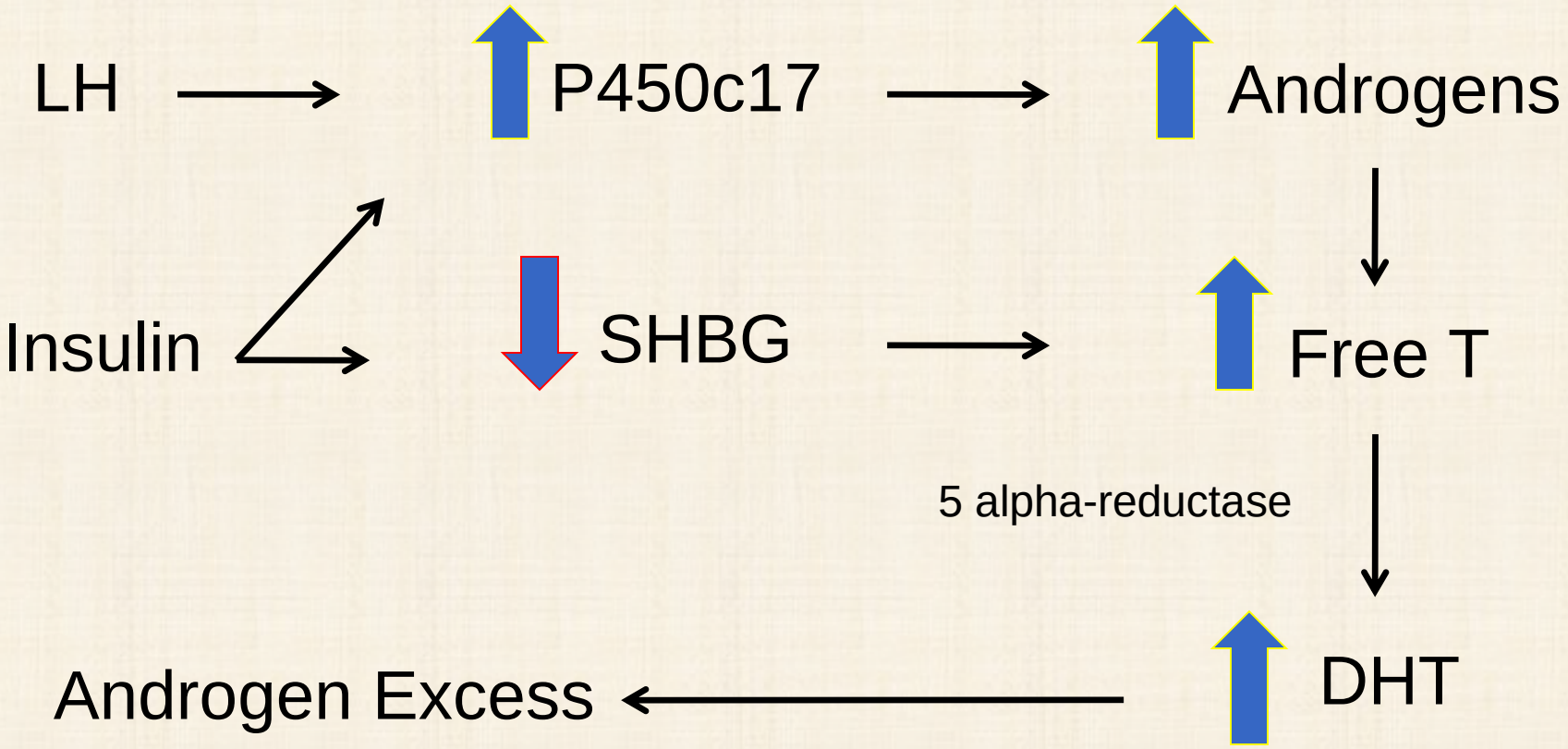
Fauser. ESHRE/ASRM PCOS Consensus. Fertil Steril 2012.

ULTRASOUND EVALUATION OF OVARIES



Human Reprod Update, 2014

ENVIRONMENTAL INFLUENCES: NUTRITION



McCartney 2007, Franks 2008, Homburg 2009