

1 **Supplementary Table 1.** Comparison of the basic clinical data in each group of participants categorized by their BMI.

	Lean (BMI <23kg/m ²)			Overweight (23kg/m ² ≤ BMI <25kg/m ²)			Obese (BMI ≥ 25kg/m ²)		
	Control	PCOS	<i>P</i> -value	Control	PCOS	<i>P</i> -value	Control	PCOS	<i>P</i> -value
N	48	46		26	24		58	62	
Age (year)	31.00 (28.00-33.00)	30.00 (27.00-32.00)	0.293	31.00 (29.00-32.25)	32.00 (29.00-34.00)	0.800	32.00 (29.00-35.00)	31.00 (29.00-34.00)	0.482
BMI (kg/m ²)	21.75 (20.53-22.20)	21.11 (20.26-22.00)	0.146	24.05 (23.40-24.73)	23.70 (23.30-24.20)	0.164	27.65 (26.23-29.70)	27.10 (25.80-29.20)	0.132
D-lactate (μM)	2.51 ± 0.65	3.25 ± 0.79	< 0.001	2.79 ± 0.83	3.49 ± 0.75	0.002	2.88 ± 0.66	3.89 ± 0.64	< 0.001
TT (ng/mL)	0.46 (0.31-0.59)	0.66 (0.48-0.88)	0.001	0.46 (0.33-0.62)	0.56 (0.46-0.71)	0.063	0.53 (0.37-0.66)	0.64 (0.49-0.79)	0.007
FT (nM)	0.02 (0.02-0.03)	0.04 (0.02-0.05)	0.002	0.03 (0.02-0.03)	0.04 (0.03-0.05)	0.007	0.03 (0.02-0.04)	0.03 (0.02-0.05)	0.194
SHBG (nM)	49.00 (29.13-62.68)	35.35 (23.73-62.53)	0.079	34.50 (22.20-50.70)	24.40 (15.95-27.45)	0.004	24.20 (17.30-32.10)	20.30 (13.88-30.33)	0.083
DHEAS (μM)	3.03 (2.02-3.63)	4.56 (3.08-7.26)	0.001	3.33 (2.50-4.83)	5.34 (3.09-7.78)	0.017	3.18 (2.36-4.45)	4.54 (2.75-6.73)	0.004
AMH (pmol/L)	30.84 (14.64-43.27)	62.69 (44.13-88.04)	< 0.001	27.49 (13.21-35.70)	64.40 (36.77-111.53)	< 0.001	25.63 (12.78-39.91)	57.48 (31.70-82.61)	< 0.001
FSH (mIU/mL)	7.48 ± 2.55	6.91 ± 2.06	0.240	7.11 ± 2.23	6.59 ± 1.28	0.317	7.09 ± 2.01	6.27 ± 2.07	0.031
LH (mIU/mL)	3.93 (3.40-5.67)	12.63 (6.27-18.31)	< 0.001	3.96 (2.99-7.11)	9.39 (4.62-15.98)	0.001	3.65 (2.65-5.12)	9.80 (5.54-12.48)	< 0.001
Estradiol (pg/mL)	43.50 (32.75-61.25)	52.50 (37.75-85.50)	0.050	47.00 (34.00-74.50)	42.00 (30.75-52.50)	0.226	40.00 (31.00-50.00)	47.00 (33.50-61.00)	0.118
Prolactin (μg/L)	12.18 (9.00-16.58)	10.62 (8.04-14.73)	0.106	12.66 (8.90-16.73)	9.74 (7.92-13.60)	0.078	11.40 (8.32-16.74)	9.38 (7.13-13.99)	0.088
P (ng/mL)	0.60 (0.40-0.96)	0.64 (0.42-1.05)	0.907	0.58 (0.48-0.74)	0.73 (0.48-1.14)	0.211	0.51 (0.37-0.77)	0.54 (0.36-1.05)	0.440
TSH (μIU/mL)	2.16 (1.56-2.69)	1.89 (1.25-2.78)	0.354	1.97 (1.20-2.88)	1.84 (1.23-2.73)	0.627	1.48 (1.13-2.44)	1.90 (1.33-2.50)	0.219
FPG (mM)	5.12 (4.87-5.53)	5.15 (4.86-5.42)	0.991	5.13 (4.78-5.63)	5.04 (4.72-5.56)	0.522	5.45 (5.16-5.74)	5.26 (5.01-5.70)	0.197
FSI (mIU/L)	8.55 (6.70-10.95)	8.75 (6.08-11.53)	0.771	10.45 (9.25-15.20)	11.75 (9.08-18.73)	0.432	13.50 (10.20-18.05)	17.60 (12.95-20.88)	0.007
HOMA-IR	1.97 (1.47-2.59)	1.93 (1.34-2.65)	0.797	2.42 (2.00-3.51)	2.64 (1.97-4.24)	0.461	3.34 (2.34-4.68)	4.18 (2.96-5.13)	0.022
TC (mM)	4.32 (3.90-4.91)	4.37 (3.93-4.85)	0.916	4.77 (4.32-5.44)	4.65 (4.26-5.48)	0.771	4.98 (4.38-5.28)	4.86 (4.47-5.43)	0.678
LDL-C (mM)	2.58 ± 0.89	2.59 ± 0.81	0.944	3.12 ± 0.76	2.92 ± 0.65	0.420	3.12 ± 0.77	3.10 ± 0.68	0.936
HDL-C (mM)	1.38 (1.24-1.59)	1.29 (1.13-1.43)	0.092	1.11 (0.99-1.34)	1.21 (0.97-1.35)	0.600	1.11 (0.99-1.27)	1.11 (0.98-1.25)	0.710
TG (mM)	0.70 (0.61-1.04)	0.97 (0.55-1.32)	0.246	0.97 (0.75-1.79)	1.38 (1.01-2.73)	0.055	1.30 (0.83-1.82)	1.64 (1.07-2.56)	0.032

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3 **Abbreviations:** PCOS, polycystic ovary syndrome; BMI, body mass index; TT, total testosterone; FT, free testosterone; SHBG, sex
4 hormone-binding globulin; DHEAS, dehydroepiandrosterone sulfate; AMH, anti-Müllerian hormone; FSH, follicle-stimulating hormone; LH,
5 luteinizing hormone; P, progesterone; TSH, thyroid-stimulating hormone; FPG, fasting plasma glucose; FSI, fasting serum insulin; HOMA-IR,
6 homeostasis model assessment of insulin resistance; TC, total cholesterol; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density
7 lipoprotein cholesterol; TG, triglycerides. Mean ± standard deviation or median (interquartile range) are shown. The *Z*-test was used for data
8 with normal distribution and the Mann–Whitney *U*-test was used for data with non-normal distribution.

9 **Supplementary Table 2.** Description of the study participants categorized by HOMA-IR.

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	IR (HOMA-IR \geq 2.5)			Non-IR (HOMA-IR <2.5)		
	Control	PCOS	<i>P</i> -value	Control	PCOS	<i>P</i> -value
N	66	80		66	50	
Age (year)	31.00 (28.00-34.00)	31.00 (28.00-34.00)	0.625	31.00 (29.00-33.25)	31.00 (29.00-33.00)	0.331
BMI (kg/m ²)	26.95 (23.98-29.32)	26.05 (23.88-28.56)	0.366	22.80 (21.10-25.03)	22.25 (20.70-24.60)	0.058
D-lactate (μM)	2.82 \pm 0.74	3.81 \pm 0.68	< 0.001	2.65 \pm 0.66	3.24 \pm 0.78	< 0.001
TT (ng/mL)	0.48 (0.35-0.66)	0.57 (0.41-0.73)	< 0.001	0.48 (0.33-0.62)	0.52 (0.40-0.68)	0.002
FT (nM)	0.03 (0.02-0.04)	0.03 (0.02-0.04)	0.007	0.03 (0.02-0.04)	0.03 (0.02-0.04)	0.005
SHBG (nM)	27.75 (18.45-36.00)	23.65 (16.53-32.45)	0.014	40.50 (26.85-62.68)	39.70 (24.90-63.30)	0.266
DHEAS (μ M)	3.27 (2.51-4.82)	4.05 (2.77-5.95)	< 0.001	3.06 (1.99-3.87)	3.42 (2.33-5.43)	0.001
AMH (pmol/L)	23.06 (13.49-38.70)	37.41 (21.71-67.90)	< 0.001	31.56 (15.35-43.48)	41.48 (28.13-70.83)	< 0.001
FSH (mIU/mL)	7.05 \pm 2.10	6.38 \pm 2.03	0.054	7.42 \pm 2.40	6.85 \pm 1.81	0.164
LH (mIU/mL)	3.48 (2.80-4.58)	5.41 (3.31-11.03)	< 0.001	4.49 (3.04-6.45)	5.86 (3.74-11.47)	< 0.001
Estradiol (pg/mL)	42.00 (30.25-56.75)	43.00 (30.00-59.00)	0.467	44.00 (34.25-55.25)	46.00 (36.75-71.00)	0.029
Prolactin (μ g/L)	12.16 (8.35-16.34)	10.73 (8.03-15.31)	0.049	11.49 (9.00-17.45)	10.54 (8.30-15.65)	0.035
P (ng/mL)	0.51 (0.37-0.83)	0.55 (0.38-0.97)	0.204	0.58 (0.47-0.80)	0.59 (0.44-0.88)	0.664
TSH (μ IU/mL)	1.74 (1.20-2.67)	1.76 (1.27-2.61)	0.777	1.91 (1.33-2.72)	1.89 (1.32-2.69)	0.612
FPG (mM)	5.58 (5.30-5.88)	5.45 (5.16-5.79)	0.008	4.98 (4.75-5.34)	5.00 (4.75-5.30)	0.918
FSI (mIU/L)	14.50 (11.90-20.05)	16.25 (12.68-20.23)	0.132	8.45 (6.70-9.53)	8.30 (6.43-9.50)	0.214
HOMA-IR	3.54 (2.97-4.98)	3.78 (3.00-4.98)	0.434	1.94 (1.49-2.22)	1.88 (1.46-2.19)	0.224
TC (mM)	4.76 (4.32-5.18)	4.83 (4.37-5.39)	0.276	4.60 (3.97-5.28)	4.43 (3.94-5.11)	0.143
LDL-C (mM)	3.06 \pm 0.83	3.05 \pm 0.71	0.850	2.79 \pm 0.85	2.62 \pm 0.75	0.254
HDL-C (mM)	1.12 (0.98-1.31)	1.12 (0.99-1.30)	0.886	1.31 (1.10-1.55)	1.27 (1.10-1.51)	0.356
TG (mM)	1.25 (0.79-1.73)	1.42 (0.93-2.08)	0.002	0.80 (0.64-1.31)	0.88 (0.63-1.29)	0.482

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12 **Abbreviations:** HOMA-IR, homeostasis model assessment of insulin resistance; IR, insulin resistance; PCOS, polycystic ovary syndrome; BMI, body mass
13 index; TT, total testosterone; FT, free testosterone; SHBG, sex hormone-binding globulin; DHEAS, dehydroepiandrosterone sulfate; AMH, anti-Müllerian
14 hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone; P, progesterone; TSH, thyroid-stimulating hormone; FPG, fasting plasma glucose; FSI,
15 fasting serum insulin; TC, total cholesterol; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides.
16 Mean \pm standard deviation or median (interquartile range) are shown. The Z-test was used for normal distribution data and the Mann–Whitney *U*-test was
17 used for non-normal distribution data.

18 **Supplementary Table 3.** Description of the study participants in dyslipidemia and normolipidemia groups.

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	Dyslipidemia			Normolipidemia		
	Control	PCOS	<i>P</i> -value	Control	PCOS	<i>P</i> -value
N	42	47		90	83	
Age (year)	31.50 (29.00-33.00)	31.00 (28.00-34.00)	0.931	31.00 (29.00-34.00)	30.00 (28.00-32.00)	0.264
BMI (kg/m ²)	25.20 (23.15-27.55)	25.40 (22.60-27.90)	0.793	23.67 (21.80-27.43)	23.70 (21.40-26.10)	0.580
D-lactate (μM)	2.78 ± 0.74	3.67 ± 0.73	< 0.001	2.71 ± 0.69	3.54 ± 0.79	< 0.001
TT (ng/mL)	0.49 (0.30-0.65)	0.63 (0.48-0.76)	0.005	0.48 (0.37-0.63)	0.63 (0.48-0.79)	< 0.001
FT (nM)	0.03 (0.02-0.04)	0.04 (0.03-0.05)	0.118	0.03 (0.02-0.03)	0.04 (0.02-0.05)	< 0.001
SHBG (nM)	26.00 (17.30-38.25)	21.30 (14.10-30.40)	0.178	36.80 (26.10-55.20)	26.25 (20.05-42.48)	0.008
DHEAS (μM)	3.07 (1.94-4.52)	4.65 (2.95-7.16)	0.001	3.20 (2.37-4.27)	4.65 (2.84-6.94)	< 0.001
AMH (pmol/L)	30.42 (16.71-52.19)	51.27 (32.06-87.47)	0.001	26.99 (12.99-37.56)	69.04 (43.84-89.61)	< 0.001
FSH (mIU/mL)	6.60 ± 2.05	6.74 ± 1.96	0.733	7.55 ± 2.9	6.46 ± 1.96	0.001
LH (mIU/mL)	4.13 (2.58-7.67)	11.01 (5.41-15.49)	< 0.001	3.77 (3.12-5.31)	9.51 (5.97-15.67)	< 0.001
Estradiol (pg/mL)	42.00 (29.50-68.25)	42.00 (29.00-62.00)	0.812	43.00 (34.75-53.75)	48.00 (39.50-75.50)	0.022
Prolactin (μg/L)	11.90 (9.27-14.82)	10.05 (7.32-15.08)	0.051	11.74 (8.45-16.99)	9.84 (7.60-13.84)	0.030
P (ng/mL)	0.55 (0.40-0.87)	0.61 (0.42-1.15)	0.278	0.55 (0.41-0.81)	0.58 (0.38-1.01)	0.532
TSH (μIU/mL)	1.81 (1.28-2.73)	2.08 (1.37-2.82)	0.455	1.84 (1.29-2.67)	1.86 (1.18-2.40)	0.422
FPG (mM)	5.38 (4.93-5.79)	5.16 (4.88-5.48)	0.118	5.20 (4.91-5.61)	5.19 (4.92-5.59)	0.784
FSI (mIU/L)	13.15 (9.68-18.60)	15.70 (10.20-19.00)	0.428	10.05 (7.80-13.40)	11.00 (8.10-17.70)	0.187
HOMA-IR	3.26 (2.11-4.68)	3.43 (2.37-4.58)	0.590	2.39 (1.77-3.17)	2.62 (1.76-3.98)	0.212
TC (mM)	5.18 (4.61-6.15)	5.10 (4.39-5.98)	0.302	4.46 (3.97-5.00)	4.49 (4.09-5.10)	0.437
LDL-C (mM)	3.48 ± 0.93	3.09 ± 0.90	0.051	2.66 ± 0.66	2.77 ± 0.63	0.215
HDL-C (mM)	0.97 (0.85-1.10)	0.96 (0.82-1.26)	0.892	1.28 (1.12-1.52)	1.23 (1.11-1.38)	0.093
TG (mM)	1.76 (1.21-2.63)	2.61 (1.48-3.91)	0.014	0.80 (0.65-1.17)	1.01 (0.68-1.42)	0.017

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21 **Abbreviations:** PCOS, polycystic ovary syndrome; BMI, body mass index; TT, total testosterone; FT, free testosterone; SHBG, sex hormone-binding
 22 globulin; DHEAS, dehydroepiandrosterone sulfate; AMH, anti-Müllerian hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone; P,
 23 progesterone; TSH, thyroid-stimulating hormone; FPG, fasting plasma glucose; FSI, fasting serum insulin; TC, total cholesterol; LDL-C, low-density
 24 lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides. Mean ± standard deviation or median (interquartile range) are shown.
 25 The Z-test was used for normal distribution data and the Mann–Whitney *U*-test was used for non-normal distribution data.

26 **Supplementary Table 4.** Pairwise comparison of ROC curves predicting PCOS.

	D-lactate vs. AMH	D-lactate vs. LH	D-lactate+AMH vs. AMH	D-lactate+LH vs. LH	D-lactate+AMH+LH vs. AMH	D-lactate+AMH+LH vs. LH
Difference between areas	0.0234	0.0106	0.0672	0.0787	0.0922	0.105
Standard error	0.0367	0.039	0.0212	0.0253	0.0228	0.0264
95% confidence interval	-0.0485 to 0.0953	-0.0658 to 0.0870	0.0255 to 0.109	0.0290 to 0.128	0.0474 to 0.137	0.0531 to 0.157
Z-statistic	0.637	0.272	3.163	3.106	4.039	3.969
Significance level	$P = 0.5238$	$P = 0.7856$	$P = 0.0016$	$P = 0.0019$	$P = 0.0001$	$P = 0.0001$

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28 **Abbreviations:** ROC, receiver operating characteristic; PCOS, polycystic ovary syndrome; AMH, anti-Müllerian hormone; LH, luteinizing
 29 hormone.

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