

**Supplemental Table 1.** Geometric means for urinary concentrations of individual estrogens and estrogen metabolites (EM) and metabolic pathway groups (pmol/mg creatinine) and pathway ratios by overall physical activity, excluding women with anovulatory cycles in the NHSII (N=542).

Estrogen Metabolites (EM)	Overall physical activity (MET-hrs/wk)						p-trend
	<3	3-8.9	9-17.9	18-26.9	27-41.9	42+	
<b>N</b>	56	111	135	87	83	70	
<b>Total EM</b>	195.2	193.1	203.7	195.1	167.0	200.3	0.54
<b>Parent estrogens</b>	42.2	39.3	37.8	41.0	34.2	40.9	0.77
Estrone	29.1	27.0	26.8	28.2	24.1	28.5	0.85
Estradiol	14.8	13.5	13.6	14.1	11.2	13.5	0.20
<b>2-Hydroxylation pathway EM</b>	52.1	54.5	68.3	63.9	54.4	64.8	0.38
<b>4-Hydroxylation pathway EM</b>	5.3	5.7	6.2	6.2	5.3	6.3	0.68
<b>16-Hydroxylation pathway EM</b>	78.3	72.6	71.0	68.4	57.9	71.1	0.16
<b>Catechols</b>	48.7	51.8	64.9	60.8	52.2	62.7	0.28
2-Hydroxyestrone	36.7	39.5	51.2	46.8	39.8	48.6	0.28
2-Hydroxyestradiol	4.4	4.6	5.6	5.6	5.0	5.6	0.18
4-Hydroxyestrone	4.9	5.5	5.7	6.1	4.8	6.1	0.56
<b>Methylated catechols</b>	9.8	9.5	10.3	9.7	8.0	9.2	0.19
2-Methoxyestrone	7.5	7.1	7.9	7.3	6.0	6.9	0.20
2-Methoxyestradiol	0.65	0.66	0.71	0.72	0.57	0.64	0.37
2-Hydroxyestrone-3-methyl ether	1.15	1.21	1.14	1.21	0.92	0.98	0.02
4-Methoxyestrone	0.10	0.14	0.10	0.12	0.11	0.12	0.92
4-Methoxyestradiol	0.04	0.04	0.05	0.05	0.05	0.06	0.09
<b>16-Hydroxylation pathway EM</b>							
16 $\alpha$ -Hydroxyestrone	13.1	13.6	12.5	13.2	10.6	11.4	0.07
Estriol	37.4	30.9	30.9	28.4	24.8	32.9	0.39
17-Epiestriol	1.9	2.0	1.7	1.8	1.5	1.7	0.21
16-Ketoestradiol	15.1	14.9	14.7	13.6	12.7	14.1	0.17
16-Epiestriol	6.8	6.9	6.7	6.3	5.6	6.6	0.23
<b>EM metabolic pathway ratios</b>							
2-Pathway EM:Parent estrogens	1.2	1.4	1.7	1.5	1.6	1.6	0.09
2-Pathway catechols:Parent estrogens	1.0	1.1	1.5	1.2	1.3	1.3	0.05
Methylated 2-pathway catechols:Parent estrogens	0.22	0.23	0.25	0.23	0.23	0.22	0.28
2-pathway catechols:Methylated 2-pathway catechols	4.3	5.0	5.7	5.3	5.9	6.2	< 0.01
2-Pathway EM:4-Pathway EM	9.7	9.5	10.6	9.8	10.4	10.4	0.53
2-Pathway EM:16-Pathway EM	0.67	0.75	0.96	0.89	0.94	0.92	0.09
2-Hydroxyestrone/16 $\alpha$ -Hydroxyestrone	2.8	2.9	4.0	3.5	3.8	4.3	0.02
4-Pathway EM:Parent estrogens	0.13	0.15	0.16	0.15	0.15	0.15	0.50
4-Pathway EM:16-Pathway EM	0.07	0.08	0.09	0.09	0.09	0.09	0.28
4-Pathway catechols:Methylated 4-pathway catechols	29.3	24.6	32.9	31.8	26.3	27.1	0.80
16-Pathway EM:Parent EM	1.8	1.8	1.8	1.7	1.7	1.7	0.35

Adjusted for: age at urine collection, luteal day at collection, first morning urine, BMI (continuous), alcohol consumption, and usual menstrual cycle length  
<sup>†</sup> p<sub>trend</sub> evaluated using the median MET-hrs/wk value for each activity category as a continuous variable

**Supplemental Table 2.** Geometric means for urinary concentrations of individual estrogens and estrogen metabolites (EM) and metabolic pathway groups (pmol/mg creatinine) and pathway ratios by overall physical activity and body mass index (BMI) category in the NHSII (N=603).

EM Measures	BMI ≤ 25 kg/m <sup>2</sup>							BMI > 25 kg/m <sup>2</sup>						
	Overall activity (MET-hrs/wk)							Overall activity (MET-hrs/wk)						
	<3	3-8.9	9-17.9	18-26.9	27-41.9	42+	p-trend <sup>1</sup>	<3	3-8.9	9-17.9	18-26.9	27-41.9	42+	p-trend <sup>1</sup>
<b>N</b>	28	74	90	59	62	64		32	53	58	37	30	16	
<b>Total EM</b>	197.7	222.2	218.2	219.4	182.7	213.7	0.47	190.2	189.6	187.8	180.3	172.8	179.6	0.44
<b>Parent estrogens</b>	40.8	45.0	38.9	46.1	36.2	41.8	0.58	46.3	40.8	39.2	42.7	37.1	33.6	0.13
Estrone	27.1	30.6	27.6	30.8	25.2	28.0	0.44	30.4	26.2	24.7	28.4	24.7	23.0	0.30
Estradiol	13.9	14.8	13.4	15.0	11.5	13.5	0.26	16.5	13.3	13.9	14.7	11.9	10.8	0.04
<b>2-Hydroxylation pathway EM</b>	56.2	70.9	79.1	71.7	67.4	75.3	0.62	49.8	49.4	60.3	57.0	54.2	49.4	0.89
<b>4-Hydroxylation pathway EM</b>	4.3	6.7	6.3	6.6	5.7	6.8	0.47	5.6	5.5	5.9	5.3	4.5	4.1	0.11
<b>16-Hydroxylation pathway EM</b>	82.9	75.9	72.8	77.1	59.5	69.4	0.10	70.7	74.4	63.4	63.3	59.6	57.5	0.10
<b>Catechols</b>	51.1	66.7	73.5	66.3	63.8	72.5	0.43	46.1	46.4	58.7	53.7	49.5	47.8	0.86
2-Hydroxyestrone	40.8	51.3	59.7	51.7	50.1	56.3	0.53	34.0	35.0	43.9	42.1	38.5	37.8	0.63
2-Hydroxyestradiol	4.4	5.7	6.1	6.2	6.1	6.3	0.25	4.3	3.9	4.9	4.6	4.8	3.8	0.90
4-Hydroxyestrone	3.8	6.4	5.9	6.6	5.1	6.8	0.33	5.1	5.6	5.4	4.9	3.9	3.7	0.05
<b>Methylated catechols</b>	9.8	12.4	11.7	12.1	9.7	10.7	0.25	10.0	8.9	8.9	8.4	8.3	6.8	0.10
2-Methoxyestrone	7.5	9.5	9.1	9.0	7.4	8.1	0.22	7.5	6.5	6.8	6.1	6.3	5.2	0.16
2-Methoxyestradiol	0.59	0.82	0.76	0.87	0.68	0.75	0.82	0.76	0.63	0.68	0.64	0.54	0.41	0.01
2-Hydroxyestrone-3-methyl ether	1.12	1.49	1.23	1.34	1.05	1.16	0.09	1.24	1.16	1.07	1.15	0.99	0.68	0.02
4-Methoxyestrone	0.14	0.19	0.11	0.19	0.15	0.16	0.56	0.08	0.13	0.12	0.09	0.14	0.12	0.61
4-Methoxyestradiol	0.04	0.05	0.05	0.06	0.06	0.06	0.22	0.04	0.03	0.05	0.04	0.04	0.06	0.14
<b>16-hydroxylation pathway EM</b>														
16α-Hydroxyestrone	13.4	14.5	12.2	15.0	10.9	11.1	0.06	11.4	12.2	11.2	11.0	10.3	7.0	0.02
Estriol	39.0	30.8	32.3	30.4	25.3	30.7	0.26	35.5	33.4	29.4	30.2	26.5	36.6	0.62
17-Epiestriol	1.82	1.73	1.61	2.02	1.39	1.59	0.42	1.76	1.96	1.39	1.43	1.27	1.17	0.04
16-Ketoestradiol	17.5	16.3	14.7	15.4	13.3	13.6	0.03	12.3	13.2	13.4	12.3	12.3	11.2	0.37
16-Epiestriol	6.7	6.7	6.5	6.7	5.5	5.9	0.05	6.6	7.2	6.2	6.0	5.9	6.6	0.38
<b>Metabolic pathway ratios</b>														
2-Pathway EM:Parent estrogens	1.3	1.5	1.8	1.5	1.8	1.7	0.13	1.0	1.1	1.5	1.2	1.5	1.5	0.02
2-Pathway catechols:Parent estrogens	1.1	1.2	1.5	1.2	1.5	1.4	0.09	0.8	0.9	1.2	1.0	1.3	1.2	0.01
Methylated 2-pathway catechols:Parent estrogens	0.23	0.25	0.27	0.25	0.25	0.25	0.75	0.20	0.19	0.22	0.18	0.22	0.19	0.96
2-pathway catechols:Methylated 2-pathway catechols	4.8	4.9	5.7	5.1	6.1	6.1	0.01	3.9	4.7	5.4	5.1	5.5	6.5	0.01
2-Pathway EM:4-Pathway EM	12.9	10.3	12.2	10.6	11.6	10.8	0.71	8.5	8.2	9.5	9.6	12.2	11.7	0.02
2-Pathway EM:16-Pathway EM	0.68	0.93	1.07	0.93	1.13	1.08	0.11	0.69	0.64	0.90	0.81	0.92	0.85	0.17
2-Hydroxyestrone:16α-Hydroxyestrone	3.0	3.5	4.8	3.4	4.6	5.0	0.04	3.0	3.0	3.7	3.9	3.8	5.5	0.03
4-Pathway EM:Parent estrogens	0.11	0.15	0.15	0.14	0.16	0.16	0.21	0.12	0.13	0.15	0.12	0.12	0.12	0.67
4-Pathway EM:16-Pathway EM	0.05	0.09	0.09	0.09	0.10	0.10	0.10	0.08	0.08	0.09	0.08	0.08	0.07	0.67
4-Pathway catechols:Methylated 4-pathway catechols	19.5	22.1	29.6	22.3	21.3	24.9	0.92	34.5	28.2	25.1	31.4	20.5	15.1	0.04
16-Pathway EM:Parent EM	2.0	1.7	1.8	1.7	1.6	1.7	0.39	1.4	1.7	1.6	1.5	1.5	1.6	0.96

Adjusted for: age at urine collection, luteal day at collection, first morning urine, alcohol consumption, and usual menstrual cycle length

<sup>1</sup> p<sub>trend</sub> evaluated using the median MET-hrs/wk value for each activity category as a continuous variable