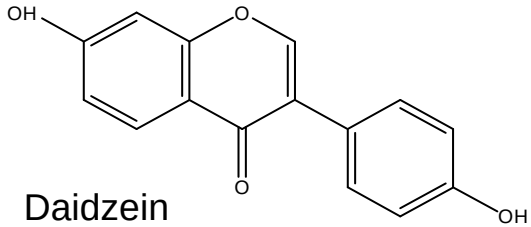
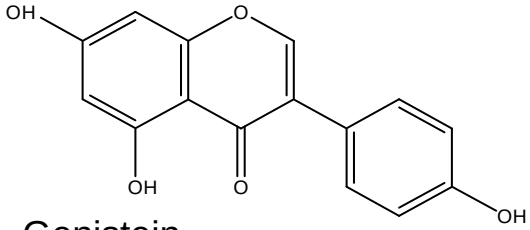
Supplemental Figure 1 Urine phytoestrogens, NHANES 1999-2010

Plant Isoflavones

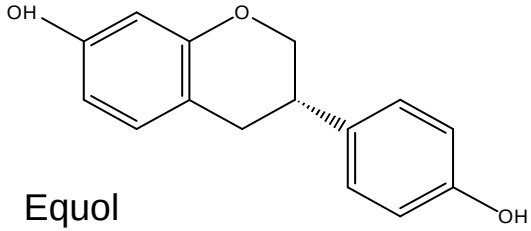


Daidzein

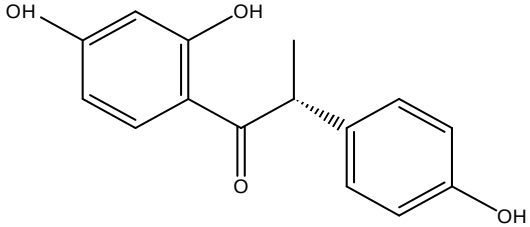


Genistein

Daidzein metabolites

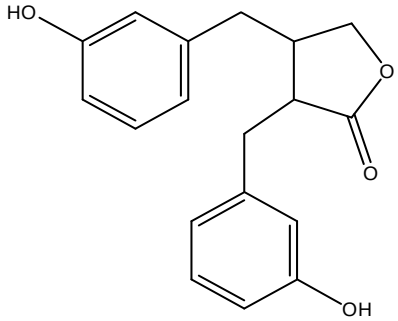


Equol

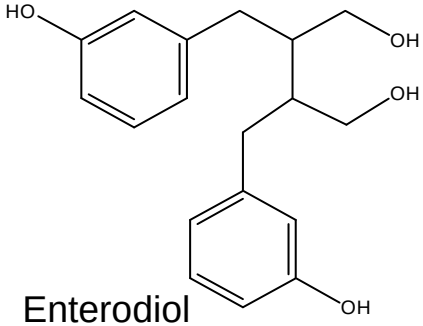


O-desmethylangolensin

Enterolignans



Enterolactone



Enterodiol

On-line supporting material

Supplemental Table 1 Sample sizes for urine phytoestrogens by sociodemographic and lifestyle influential variables for adults ≥20 y, NHANES 2003–2006[1]

Variable	Genistein	Daidzein	Equol	DMA	Enterodiol	Enterolactone
Sociodemographic						
Age, *y*						
20–39	1083	1083	1083	1075	1083	1083
40–59	861	861	857	859	861	861
≥60	929	929	928	926	929	929
Gender						
Males	1381	1381	1377	1377	1381	1381
Females	1492	1492	1491	1483	1492	1492
Race-ethnicity						
Mexican American	595	595	595	594	595	595
Non-Hispanic black	610	610	607	609	610	610
Non-Hispanic white	1454	1454	1452	1446	1454	1454
Education						
<High school	805	805	803	802	805	805
High school	702	702	700	697	702	702
>High school	1363	1363	1362	1358	1363	1363
PIR[2]						
Low	1081	1081	1078	1076	1081	1081
Medium	722	722	720	721	722	722
High	895	895	895	889	895	895
Lifestyle						
Smoking[3]						
No	1975	1975	1973	1967	1975	1975
Yes	753	753	750	748	753	753
Alcohol consumption[4]						
No drinks	923	923	923	919	923	923
>0–<1 drinks/d	1417	1417	1413	1410	1417	1417
≥1–<2 drinks/d	187	187	187	185	187	187

≥2 drinks/d	130	130	129	130	130	130
BMI[5]						
Underweight	49	49	49	49	49	49
Normal weight	819	819	818	813	819	819
Overweight	988	988	984	985	988	988
Obese	980	980	980	976	980	980
Physical activity[6]						
None	1029	1029	1027	1024	1029	1029
>0–<500	625	625	624	623	625	625
≥500–<1000	362	362	361	360	362	362
≥1000	740	740	739	736	740	740
Supplement use[7]						
No	1445	1445	1442	1439	1445	1445
Yes	1424	1424	1422	1417	1424	1424

[1] Excludes individuals who reported antibiotic use in the past 30 d.

[2] PIR: family poverty income ratio. Low: ≤1.85; Medium: >1.85–≤3.5; High: >3.5.

[3] Based on serum cotinine concentration. Smoker: >10 μg/L. Non-smoker: ≤10 μg/L.

[4] Categories by increasing alcohol consumption calculated as average daily number of “standard drinks”, i.e. (quantity×frequency)/365.25; 1 drink ≈ 15 g ethanol.

[5] BMI: body mass index (kg/m^2). Underweight: <18.5. Normal weight: ≥18.5–<25.0. Overweight: ≥25.0–<30.0. Obese: ≥30.0.

[6] Categories by increasing degree of leisure time physical activity based on metabolic equivalent task (MET)-min/wk.

[7] Based on reported use of any dietary supplement in the past 30 d.

Supplemental Table 2 Descriptive information of respondent characteristics by sociodemographic or lifestyle influential variables for adults ≥20 y, NHANES 2003–2006[1]

Variable	2003–2006
Sociodemographic	
Age, *y*	
20–39	38.3
40–59	38.7
≥60	23.0
Gender	
Males	49.0
Females	51.0
Race/ethnicity	
Mexican American	8.1
Non-Hispanic black	11.4
Non-Hispanic white	71.6
Other Hispanic	3.53
Other (including multiracial)	5.39
Education	
≤High school	42.9
>High school	57.1
PIR[2]	
Low	29.2
Medium	27.3
High	43.5
Lifestyle	
Smoking[3]	
No	68.7
Yes	31.3
Alcohol consumption[4]	
No drinks	28.4

>0–<1 drinks/d	57.5
≥1–<2 drinks/d	8.69
≥2 drinks/d	5.45
BMI[5]	
Underweight	2.11
Normal weight	30.9
Overweight	33.2
Obese	33.8
Physical activity[6]	
No activity	30.2
>0–<500 MET min/wk	24.5
≥500–<1000 MET min/wk	14.7
≥1000 MET min/wk	30.6
Supplement use[7]	
No	52.4
Yes	47.6

[1] Values represent weighted percentage using 4-y urine environmental subsample weights from NHANES 2003–2006. Excludes individuals who reported antibiotic use in the past 30 d.

[2] PIR: family poverty income ratio. Low: ≤1.85; Medium: >1.85–≤ 3.5; High: >3.5.

[3] Based on serum cotinine concentration. Smoker: >0 μg/L. Non-smoker: ≤10 μg/L.

[4] Categories by increasing alcohol consumption calculated as average daily number of “standard” drinks, i.e. (quantity×frequency)/365.25; 1 drink ≈ 15 g ethanol.

[5] BMI: body mass index (kg/m^2). Underweight: <18.5. Normal weight: ≥18.5 <25.0. Overweight: ≥25.0–<30.0. Obese: ≥30.0.

[6] Categories by increasing degree of leisure time physical activity based on metabolic equivalent task (MET)-min/wk.

[7] Based on reported use of any dietary supplement in the past 30 d.

Supplemental Table 3 *Beta* coefficients from staged modeling approach for urine phytoestrogens by sociodemograhic and lifestyle influential factors for adults ≥20 y, NHANES 2003–2006[1,2]

Factor	Genistein	Daidzein	Equol	DMA[3]	Enterodiol	Enterolactone
Sociodemographic						
Age, continuous, every 10 y increase						
Model 1	0.02	0.01	-0.05*	0.03	-0.001	0.04
Model 2	0.03	0.03	-0.06*	0.02	0.02	0.06*
Model 3	0.03	0.03	-0.06*	0.01	0.03	0.08*
Model 4	0.09*	0.09*	0.00	0.06	0.09*	0.12*
Gender: female vs. male						
Model 1	0.19*	0.18*	0.09	-0.07	0.08	0.06
Model 2	0.23*	0.23*	0.19	-0.04	0.08	0.04
Model 3	0.21*	0.22*	0.16	0.04	0.02	0.12
Model 4	-0.14	-0.13	-0.17*	-0.26*	-0.32*	-0.13
Race/ethnicity[4], MA vs. NHW						
Model 1	-0.01	-0.15*	-0.45*	-0.87*	-0.01	0.12
Model 2	-0.05	-0.14	-0.44*	-0.71*	0.15	0.32*
Model 3	-0.03	-0.16	-0.44*	-0.81*	0.14	0.26
Model 4	-0.03	-0.17*	-0.45*	-0.81*	0.14	0.26
Race/ethnicity[4], NHB vs. NHW						
Model 1	0.03	0.14	-0.27*	0.00	-0.03	-0.02
Model 2	0.03	0.16	-0.28*	0.10	0.04	0.08
Model 3	-0.02	0.07	-0.28*	0.05	0.01	0.05
Model 4	-0.28*	-0.18*	-0.52*	-0.17	-0.23*	-0.13
PIR[5], continuous						
Model 1	-0.006	0.02	0.06*	0.12*	0.09*	0.08*
Model 2	-0.02	0.01	0.03	0.07	0.07*	0.07*
Model 3	0.00	0.02	0.03	0.08	0.08*	0.07*
Model 4	0.02	0.03	0.04	0.09*	0.10*	0.08*
Education[6], ≤HS vs. >HS						
Model 1	-0.008	-0.06	-0.14	-0.31*	-0.28*	-0.17

Model 2	-0.02	-0.04	-0.04	-0.17	-0.23*	-0.15
Model 3	-0.04	-0.06	0.00	-0.07	-0.16	-0.07
Model 4	-0.07	-0.09	-0.02	-0.10	-0.18	-0.09
Lifestyle						
Smoking[7], yes vs. no						
Model 1	0.08	0.14	0.10	0.42*	0.12	0.42*
Model 3	0.05	0.11	0.08	0.33*	0.08	0.38*
Model 4	0.08	0.13	0.11	0.36*	0.11	0.40*
Alcohol[8], continuous						
Model 1	-0.12	-0.20*	-0.28*	-0.51*	0.14	-0.15
Model 3	-0.09	-0.16	-0.34*	-0.40*	0.15	-0.10
Model 4	-0.03	-0.10	-0.28*	-0.34*	0.20*	-0.06
BMI[9], continuous						
Model 1	0.001	0.29	0.16	0.23	-0.05	-0.61*
Model 3	-0.03	0.21	0.13	0.12	-0.11	-0.80*
Model 4	-0.39	-0.13	-0.21	-0.18	-0.44*	-1.06*
Physical activity[10], continuous						
Model 1	0.001	-0.001	0.03*	0.03*	0.03*	0.04*
Model 3	0.00	-0.01	0.02	-0.00	0.02	0.03*
Model 4	0.01	0.00	0.02	0.00	0.02	0.03*
Supplements use[11], yes vs. no						
Model 1	-0.02	-0.05	0.09	0.21	0.08	0.15
Model 3	-0.00	-0.06	0.09	0.09	-0.01	-0.03
Model 4	0.08	0.02	0.16	0.15	0.07	0.03
Model sample size, *n*						
Model 2	*2698*	*2698*	*2693*	*2686*	*2698*	*2698*
Model 3	*2288*	*2288*	*2283*	*2276*	*2288*	*2288*
Model 4	*2288*	*2288*	*2283*	*2276*	*2288*	*2288*
Model R^2,%						
Model 2	*1*	*1***	*2***	*2***	*1***	*1***

Model 3	*1*	*1*	*3***	*3***	*2*	*4***
Model 4	*13*	*13*	*17***	*8***	*13***	*10***

[1] Excludes individuals who reported antibiotic use in the past 30 d. Sample sizes for urine phytoestrogens by variable are given in Supplemental Table 1.

[2] Log-transformed concentration (μg/L) was dependent variables in all cases.

[3] DMA: O-desmethylangolensin.

[4] MA: Mexican Americans. NHB: non-Hispanic blacks. NHW: non-Hispanic whites.

[5] PIR: family poverty income ratio.

[6] HS: high school

[7] Based on serum cotinine concentration. Yes (smoker): >10 μg/L. No (non-smoker): ≤10 μg/L

[8] Calculated as average daily number of "standard" drinks, i.e. (quantity×frequency)/365.25; 1 drink ≈ 15 g ethanol.

[9] BMI: body mass index (kg/m^2).

[10] Calculated as total metabolic equivalent task (MET)-min/wk based on self-reported leisure time physical activity.

[11] Based on reported use of any dietary supplement in the past 30 d.

* Wald F *P*-value <0.05; *beta* coefficient is significantly different from 0.

** Satterthwaite adjusted F *P*-value for chunk test <0.05; testing whether at least 1 *beta* coefficient for the set of variables in the chunk is significantly different from 0.