

Supplemental Table 1. Concentration of (poly)phenolic compounds in different red-fleshed apple products expressed as mg/ingested portion \pm SD (portions: red fleshed apple pasteurized purée=500 g, hot air-dried red fleshed apple snack = 66 g, freeze-dried red fleshed apple snack = 60 g).

Compound (mg/ingested portion)	Red-fleshed apple pasteurized purée	Hot air-dried red-fleshed apple	Freeze-dried red- fleshed apple
Cyanidin arabinoside	0.36 \pm 0.05	0.47 \pm 0.03	1.72 \pm 0.06
Cyanidin-3-O-galactoside	1.93 \pm 0.09	3.84 \pm 0.20	14.9 \pm 0.23
TOTAL Anthocyanins	2.29 \pm 0.12	4.31 \pm 0.23	16.6 \pm 0.26
Protocatechuic acid	4.75 \pm 0.09	0.86 \pm 0.03	n.d.
Hydroxytyrosol	0.47 \pm 0.05	0.33 \pm 0.01	0.30 \pm 0.01
Coumaric acid hexoside	1.47 \pm 0.04	1.31 \pm 0.08	0.80 \pm 0.03
Coumaric acid derivate	0.70 \pm 0.01	0.38 \pm 0.09	0.36 \pm 0.05
Vanillic acid hexoside	2.13 \pm 0.38	1.54 \pm 0.05	1.93 \pm 0.07
Homogentisic acid	0.54 \pm 0.01	0.32 \pm 0.06	0.42 \pm 0.04
Ferulic acid	0.16 \pm 0.02	0.14 \pm 0.03	n.d.
Ferulic acid hexoside	1.07 \pm 0.19	0.08 \pm 0.03	1.07 \pm 0.16
5-O-caffeoylequinic acid	92.0 \pm 1.10	87.4 \pm 2.30	92.0 \pm 3.50
TOTAL Phenolic acids	115 \pm 1.90	92.4 \pm 2.90	96.9 \pm 3.80
Epicatechin	2.65 \pm 0.06	1.61 \pm 0.03	3.17 \pm 0.49
Epigallocatechin	0.45 \pm 0.03	0.31 \pm 0.01	0.39 \pm 0.04
Dimer	3.96 \pm 0.23	2.59 \pm 0.16	5.50 \pm 0.51
Trimer	n.d.	1.43 \pm 0.12	2.45 \pm 0.11
TOTAL Flavan-3-ols	7.10 \pm 0.29	5.90 \pm 0.44	11.5 \pm 1.12
Quercetin	0.43 \pm 0.04	0.08 \pm 0.01	n.d.
Dihydroquercetin	0.16 \pm 0.03	0.01 \pm 0.00	0.12 \pm 0.06
Quercetin arabinoside	0.46 \pm 0.01	0.21 \pm 0.04	0.38 \pm 0.06
Quercetin rhamnoside	2.43 \pm 0.14	2.15 \pm 0.14	2.11 \pm 0.08
Quercetin glucoside	0.38 \pm 0.04	0.11 \pm 0.00	0.40 \pm 0.08
Dihydrokaempferol glucoside	n.d.	0.44 \pm 0.02	0.73 \pm 0.16
TOTAL Flavonols	3.86 \pm 0.18	3.00 \pm 0.20	3.74 \pm 0.12
Naringenin glucoside	0.54 \pm 0.09	0.24 \pm 0.03	0.37 \pm 0.05
Eriodictyol hexoside	0.78 \pm 0.06	0.44 \pm 0.06	0.54 \pm 0.01
TOTAL Flavanones	1.32 \pm 0.16	0.68 \pm 0.09	0.91 \pm 0.06
Phloretin glucoside	7.82 \pm 1.92	6.84 \pm 0.46	4.88 \pm 1.09
Phloretin xylosyl glucoside	16.4 \pm 1.47	7.52 \pm 0.59	11.8 \pm 0.89
Hydroxyphloretin xylosyl glucoside	1.71 \pm 0.33	1.58 \pm 0.35	1.01 \pm 0.20
TOTAL Dihydrochalcones	25.9 \pm 2.20	15.9 \pm 0.58	17.7 \pm 1.02
TOTAL Rest (poly)phenolics	153 \pm 2.10	118 \pm 2.30	131 \pm 3.90
TOTAL (POLY)PHENOLICS	155 \pm 2.20	122 \pm 2.50	148 \pm 4.00

n.d.: not detected

Supplemental Table 2. SRM conditions used for the analysis of (poly)phenolic and their generated metabolites.

Phenolic metabolites	SRM Quantification	CV (V) / CE (eV)	Standard in which has been quantified
<i>Catechols</i>			
Catechol sulphate	189 > 109	20 / 15	Catechol-4- <i>O</i> -sulphate
Methyl catechol sulphate	203 > 123	20 / 15	4-methyl catechol sulphate
Catechol glucuronide	285 > 109	20 / 15	Catechol-4- <i>O</i> -sulphate
Methyl catechol glucuronide	299 > 123	20 / 15	4-methyl catechol sulphate
<i>Benzoic acids</i>			
Vanillic acid	167 > 123	30 / 10	Vanillic acid
Vanillic acid sulphate	247 > 167	30 / 25	Vanillic acid-4- <i>O</i> -sulphate
Vanillic acid glucuronide	343 > 167	30 / 25	Vanillic acid
Homovanillic acid	181 > 137	40 / 15	Vanillic acid
Homovanillic acid sulphate	261 > 181	40 / 15	Vanillic acid
Protocatechuic acid	153 > 109	45 / 15	Protocatechuic acid
Protocatechuic acid sulphate	233 > 153	35 / 15	Protocatechuic acid
Protocatechuic acid glucuronide	329 > 153	35 / 15	Protocatechuic acid
Hydroxytyrosol sulphate	233 > 123	35 / 15	Hydroxytyrosol
Hydroxytyrosol glucuronide	329 > 123	35 / 20	Hydroxytyrosol
Hydroxybenzoic acid	137 > 93	30 / 15	<i>p</i> -Hydroxybenzoic acid
Hydroxybenzoic acid sulphate	217 > 137	35 / 15	<i>p</i> -Hydroxybenzoic acid
Hydroxybenzoic acid glucuronide	313 > 137	35 / 15	<i>p</i> -Hydroxybenzoic acid
Hydroxyhippuric acid	194 > 100	40 / 10	<i>p</i> -Hydroxybenzoic acid
<i>Phenylpropionic acids</i>			
Hydroxyphenylpropionic acid	165 > 121	20 / 10	3-(3'-hydroxyphenyl)propionic acid
Hydroxyphenylpropionic acid sulphate	245 > 165	35 / 15	3-(3'-hydroxyphenyl)propionic acid
Hydroxyphenylpropionic acid glucuronide	341 > 165	40 / 25	3-(3'-hydroxyphenyl)propionic acid
Dihydroxyphenylpropionic acid	181 > 137	35 / 15	3-(3',4'-dihydroxyphenyl) propionic acid
Dihydroxyphenylpropionic acid sulphate	261 > 181	40 / 15	3-(3',4'-dihydroxyphenyl) propionic acid
Dihydrocaffeic acid glucuronide	357 > 181	40 / 10	3-(3',4'-dihydroxyphenyl) propionic acid
<i>Hydroxycinnamic acid derivatives</i>			
Coumaric acid	163 > 119	35 / 10	<i>p</i> -coumaric acid
Coumaric acid sulphate	243 > 163	35 / 15	<i>p</i> -coumaric acid
Caffeic acid sulphate	259 > 179	35 / 15	Caffeic acid
Caffeic acid glucuronide	355 > 179	35 / 15	Caffeic acid
Ferulic acid	193 > 134	30 / 15	Ferulic acid
Ferulic acid sulphate	273 > 193	35 / 15	Ferulic acid
Ferulic acid glucuronide	369 > 193	35 / 15	Ferulic acid
Dihydroferulic acid	195 > 136	35 / 10	Ferulic acid
Dihydroferulic acid sulphate	275 > 195	35 / 15	Ferulic acid
Dihydroferulic acid glucuronide	371 > 195	35 / 20	Ferulic acid
<i>Phenyl-γ-valerolactone derivatives</i>			
Hydroxyphenyl-γ-valerolactone sulphate	271 > 191	40 / 20	Epicatechin
Dihydroxyphenyl-γ-valerolactone sulphate	287 > 207	40 / 15	Epicatechin
Dihydroxyphenyl-γ-valerolactone glucuronide	383 > 207	40 / 20	Epicatechin
Dihydroxyphenyl-γ-valerolactone sulphate glucuronide	383 > 207	40 / 20	Epicatechin
Dihydroxyphenylvaleric acid	209 > 135	40 / 15	Epicatechin
<i>Flavan-3-ol</i>			
Catechin sulphate	369 > 289	40 / 15	Catechin
Epicatechin sulphate	369 > 289	40 / 15	Epicatechin
Methyl catechin sulphate	383 > 303	40 / 15	Catechin
Methyl epicatechin sulphate	383 > 303	40 / 15	Epicatechin
Catechin glucuronide	465 > 289	40 / 20	Catechin
Epicatechin glucuronide	465 > 289	40 / 20	Epicatechin
Methyl catechin glucuronide	383 > 303	40 / 15	Catechin
Methyl epicatechin glucuronide	383 > 303	40 / 15	Epicatechin

Dihydrochalcones

Phloretin glucuronide	449 > 273	40 / 20	Phloretin-2'-O-gucoside
Phloretin sulphate	353 > 273	40 / 20	Phloretin-2'-O-gucoside
Phloretin sulphate glucuronide	529 > 353	40 / 20	Phloretin-2'-O-gucoside

Anthocyanins

Cyanidin arabinoside	419 > 287	40 / 20	Cyanidin-3-O-galactoside
Cyanidin-3-O-galactoside	449 > 287	40 / 20	Cyanidin-3-O-galactoside
Cyanidin glucuronide	463 > 287	40 / 20	Cyanidin-3-O-galactoside
Peonidin galactoside	463 > 301	40 / 20	Cyanidin-3-O-galactoside
Peonidin glucuronide	477 > 301	40 / 20	Cyanidin-3-O-galactoside
Methyl peonidin glucuronide	491 > 315	40 / 20	Cyanidin-3-O-galactoside
Cyanidin sulphate glucuronide	543 > 367	40 / 20	Cyanidin-3-O-galactoside
Cyanidin galactoside glucuronide	625 > 463	40 / 20	Cyanidin-3-O-galactoside
Peonidin galactoside glucuronide	639 > 463	40 / 20	Cyanidin-3-O-galactoside

CV: Cone voltage

CE: Collision energy

Supplemental Table 3. Amount of the main (poly)phenolic groups (mean \pm SD) excreted in urine (0-24h) after the intake of freeze-dried red-fleshed apple, hot air-dried red-fleshed apple and red-fleshed apple pasteurized purée.

Compounds	Freeze-dried red-fleshed apple			Hot air-dried red-fleshed apple			Red-fleshed apple pasteurized purée		
	V1	V2	V3	V1	V2	V3	V1	V2	V3
Benzoic acids	62.6 \pm 2.51 ^b * + #	8.47 \pm 0.40 ^a + #	6.90 \pm 0.36 ^a #	105 \pm 5.43 ^C ** + ##	1.19 \pm 0.06 ^A + ##	18.5 \pm 1.01 ^B ##	236 \pm 13.4 ³ *** ++ ###	107 \pm 5.91 ² ++ #	57.1 \pm 2.82 ¹ ###
Phenylpropionic acids derivatives	129 \pm 5.73 ^c * + #	16.5 \pm 0.89 ^a + #	86.8 \pm 5.01 ^b #	300 \pm 16.2 ^C ** + ##	4.67 \pm 0.22 ^A + ##	192 \pm 10.5 ^B ##	276 \pm 16.3 ² ** ++ ###	119 \pm 8.12 ¹ ++ #	282 \pm 18.4 ² ###
Phenylvalerolactones derivatives	14.5 \pm 0.74 ^b * + #	2.31 \pm 0.12 ^a + #	27.6 \pm 1.15 ^c #	23.9 \pm 1.00 ^B * + #	3.21 \pm 0.17 ^A + #	24.4 \pm 0.95 ^B #	97.7 \pm 5.29 ³ ** ++ ##	11.4 \pm 0.57 ¹ ++ #	36.9 \pm 1.89 ² ##
Catechols derivatives	38.2 \pm 1.94 ^c ** ++ #	5.87 \pm 0.23 ^a ++ #	20.0 \pm 0.90 ^b #	17.8 \pm 0.77 ^B * + #	0.83 \pm 0.05 ^A + #	20.4 \pm 0.92 ^B #	45.7 \pm 1.99 ³ *** +++ ##	19.6 \pm 0.55 ¹ +++ ##	37.4 \pm 1.59 ² ##
Major metabolites									
Anthocyanins derivatives	0.02 \pm 0.00 ^a ** +++ ##	0.01 \pm 0.00 ^a +++ ##	0.01 \pm 0.00 ^a ##	0.00 \pm 0.00 ^A * ++ ##	0.01 \pm 0.00 ^B + ##	0.01 \pm 0.00 ^C ##	0.00 \pm 0.00 ¹ * + #	0.00 \pm 0.00 ¹ + #	0.00 \pm 0.00 ¹ #
Flavan-3-ols derivatives	1.70 \pm 0.07 ^c ** ++ ##	0.70 \pm 0.04 ^a ++ ##	1.09 \pm 0.07 ^b ##	2.14 \pm 0.11 ^C *** + ##	0.24 \pm 0.01 ^A + ##	0.95 \pm 0.06 ^B ##	0.92 \pm 0.05 ² * ++ #	0.77 \pm 0.05 ^{1,2} ++ #	0.65 \pm 0.04 ¹ #
Dihydrochalcones derivatives	0.55 \pm 0.02 ^b ** ++ #	0.36 \pm 0.02 ^a ++ #	0.30 \pm 0.01 ^a #	0.42 \pm 0.02 ^B * + ##	0.16 \pm 0.01 ^A + ##	0.48 \pm 0.02 ^B ##	0.68 \pm 0.03 ² *** +++ ##	1.03 \pm 0.07 ³ +++ ##	0.41 \pm 0.02 ¹ ##
Hydroxycinnamic acids derivatives	4.45 \pm 0.21 ^c * + #	1.53 \pm 0.10 ^a + #	2.44 \pm 0.14 ^b #	11.2 \pm 0.59 ^C ** + ##	0.48 \pm 0.02 ^A + ##	4.39 \pm 0.28 ^B ##	37.1 \pm 1.93 ² *** ++ ##	8.84 \pm 0.54 ¹ ++ ##	7.93 \pm 0.40 ¹ ##
Minor metabolites									
TOTAL METABOLITES (μmol)	250 \pm 11.5^c * + #	35.6 \pm 2.04^a + #	145 \pm 6.11^b #	460 \pm 24.1^C ** + ##	10.8 \pm 0.54^A + ##	261 \pm 13.7^B ##	694 \pm 39.0³ *** ++ ##	268 \pm 15.8¹ ++ ##	422 \pm 25.2² ##

The values were compared inter-individual and intra-individual (One-way ANOVA, Tukey's test between all means, $p < 0.05$).

Different lowercase letters: indicates differences between volunteers in excretion of (poly)phenols after the intake of freeze-dried red-fleshed apple.

Different capital letters: indicates differences between volunteers in excretion of (poly)phenols after the intake of hot air-dried red-fleshed apple.

Different numbers: indicates differences between volunteers in excretion of (poly)phenols after the intake of red-fleshed apple pasteurized purée.

The symbols *, +, and # indicate differences between the 3 intakes for the same volunteer.

Supplemental Table 4. Amount of the (poly)phenolic compounds (mean \pm SD) excreted in urine (0-24h) after the intake of freeze-dried red-fleshed apple, hot air-dried red-fleshed apple and red-fleshed apple pasteurized purée for each of the 3 volunteers.

Phloretin sulphate	0.15 ± 0.01	0.10 ± 0.01	0.08 ± 0.00	0.07 ± 0.00	0.02 ± 0.00	0.08 ± 0.00	0.18 ± 0.01	0.11 ± 0.01	0.09 ± 0.00
Phloretin glucuronide	0.24 ± 0.01	0.16 ± 0.01	0.12 ± 0.01	0.26 ± 0.01	0.12 ± 0.01	0.31 ± 0.02	0.38 ± 0.02	0.80 ± 0.06	0.27 ± 0.01
Phloretin sulphate glucuronide	0.16 ± 0.01	0.09 ± 0.00	0.10 ± 0.00	0.09 ± 0.01	0.01 ± 0.00	0.09 ± 0.01	0.12 ± 0.01	0.13 ± 0.01	0.06 ± 0.00
<i>Phenylpropionic acids derivatives (μmols)</i>									
Hydroxyphenylpropionic acid	14.6 ± 0.52	n.d.	0.19 ± 0.01	2.89 ± 0.11	n.d.	8.27 ± 0.48	42.6 ± 1.55	1.40 ± 0.05	18.0 ± 0.65
Hydroxyphenylpropionic acid sulphate	75.0 ± 2.38	3.14 ± 0.11	35.0 ± 1.80	27.0 ± 1.39	1.40 ± 0.05	110 ± 7.34	108 ± 5.52	28.8 ± 1.48	77.7 ± 3.99
Hydroxyphenylpropionic acid glucuronide	3.62 ± 0.21	n.d.	0.25 ± 0.01	1.05 ± 0.06	n.d.	1.11 ± 0.08	1.49 ± 0.09	0.82 ± 0.05	2.09 ± 0.12
Dihydroxyphenylpropionic acid	0.38 ± 0.03	0.10 ± 0.00	n.d.	2.27 ± 0.16	n.d.	0.11 ± 0.00	4.68 ± 0.31	2.39 ± 0.16	0.95 ± 0.06
Dihydroxyphenylpropionic acid sulphate	35.0 ± 2.59	13.0 ± 0.76	50.9 ± 3.16	266 ± 14.5	3.27 ± 0.17	72.5 ± 2.58	119 ± 8.87	85.3 ± 6.35	183 ± 13.6
Dihidrocaffeic acid glucuronide	n.d.	0.21 ± 0.01	0.44 ± 0.03	0.24 ± 0.01	n.d.	n.d.	0.22 ± 0.01	0.76 ± 0.03	0.41 ± 0.02
<i>Benzoic acids (μmols)</i>									
Vanillic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3.13 ± 0.11	1.73 ± 0.06	n.d.
Vanillic acid sulphate	n.d.	2.34 ± 0.08	1.76 ± 0.06	28.6 ± 1.06	n.d.	5.36 ± 0.20	61.9 ± 3.17	57.2 ± 2.93	19.4 ± 0.70
Vanillic acid glucuronide	n.d.	0.22 ± 0.01	0.39 ± 0.02	0.08 ± 0.00	0.12 ± 0.01	0.20 ± 0.01	6.67 ± 0.39	4.32 ± 0.25	3.08 ± 0.16
Homovanillic acid	n.d.								
Homovanillic ac sulphate	20.5 ± 0.75	n.d.	n.d.	32.4 ± 1.94	n.d.	1.01 ± 0.06	21.8 ± 1.45	7.22 ± 0.48	n.d.
Protocatechuic acid	n.d.								
Protocatechuic acid sulphate	2.43 ± 0.13	0.45 ± 0.02	4.52 ± 0.27	4.67 ± 0.30	0.31 ± 0.01	1.76 ± 0.12	19.1 ± 1.42	13.8 ± 1.03	14.0 ± 0.82
Protocatechuic acid glucuronide	n.d.	0.01 ± 0.00	n.d.	0.09 ± 0.01	n.d.	0.01 ± 0.00	0.70 ± 0.03	0.04 ± 0.00	0.21 ± 0.01
Hydroxytyrosol sulphate	5.76 ± 0.30	n.d.	n.d.	7.90 ± 0.35	n.d.	n.d.	20.2 ± 0.73	0.66 ± 0.02	n.d.
Hydroxytyrosol glucuronide	0.07 ± 0.00	0.10 ± 0.01	0.09 ± 0.01	n.d.	0.03 ± 0.00	0.03 ± 0.00	0.11 ± 0.01	0.20 ± 0.01	0.09 ± 0.01
p-hydroxybenzoic acid	0.03 ± 0.00	0.28 ± 0.01	n.d.	0.27 ± 0.01	n.d.	0.46 ± 0.02	4.19 ± 0.25	2.30 ± 0.14	1.01 ± 0.04
Hydroxybenzoic acid sulphate	29.3 ± 1.11	3.47 ± 0.13	0.09 ± 0.01	18.2 ± 0.93	n.d.	1.81 ± 0.09	64.1 ± 4.27	5.08 ± 0.34	2.72 ± 0.10
Hydroxybenzoic acid glucuronide	0.64 ± 0.02	0.00 ± 0.00	0.05 ± 0.00	0.78 ± 0.05	n.d.	0.02 ± 0.00	0.86 ± 0.06	0.05 ± 0.00	0.18 ± 0.01
Hydroxyhippuric acid	3.85 ± 0.20	1.58 ± 0.14	n.d.	11.9 ± 0.79	0.72 ± 0.04	7.81 ± 0.52	33.6 ± 1.48	14.6 ± 0.64	16.4 ± 0.96
<i>Hydroxycinnamic acids derivatives (μmols)</i>									
Coumaric acid	0.43 ± 0.02	0.15 ± 0.01	0.18 ± 0.01	0.20 ± 0.01	0.11 ± 0.00	0.12 ± 0.00	1.42 ± 0.05	0.52 ± 0.02	0.24 ± 0.01
Coumaric acid sulphate	2.65 ± 0.13	n.d.	n.d.	0.89 ± 0.05	0.02 ± 0.00	0.62 ± 0.03	25.1 ± 1.29	1.02 ± 0.05	1.16 ± 0.06
Caffeic acid sulphate	0.27 ± 0.01	0.34 ± 0.02	0.59 ± 0.03	1.10 ± 0.06	0.22 ± 0.01	0.84 ± 0.05	1.44 ± 0.08	0.94 ± 0.05	0.73 ± 0.04
Caffeic acid glucuronide	0.04 ± 0.00	n.d.	n.d.	0.02 ± 0.00	n.d.	n.d.	n.d.	n.d.	n.d.
Ferulic acid	0.00 ± 0.00	0.01 ± 0.00	n.d.	0.11 ± 0.01	0.05 ± 0.00	0.02 ± 0.00	0.25 ± 0.02	0.14 ± 0.01	0.18 ± 0.01
Ferulic acid sulphate	0.80 ± 0.03	0.93 ± 0.07	1.54 ± 0.10	3.51 ± 0.15	0.07 ± 0.00	2.38 ± 0.18	2.78 ± 0.21	3.79 ± 0.28	1.21 ± 0.09
Ferulic acid glucuronide	0.15 ± 0.01	0.05 ± 0.00	0.13 ± 0.01	0.36 ± 0.01	0.03 ± 0.00	0.13 ± 0.00	0.29 ± 0.01	0.14 ± 0.01	0.16 ± 0.01
Dihydroferulic acid	0.02 ± 0.00	n.d.	n.d.	0.52 ± 0.03	n.d.	n.d.	2.22 ± 0.08	0.44 ± 0.02	2.69 ± 0.10
Dihydroferulic acid sulphate	n.d.	0.05 ± 0.00	n.d.	3.61 ± 0.21	n.d.	0.18 ± 0.00	2.79 ± 0.14	1.55 ± 0.08	1.15 ± 0.06
Dihydroferulic acid glucuronide	0.08 ± 0.00	0.01 ± 0.00	n.d.	0.93 ± 0.07	n.d.	0.11 ± 0.01	0.83 ± 0.05	0.29 ± 0.02	0.41 ± 0.02

