Review

# Metabolomics Technologies for the Identification and Quantification of Dietary Phenolic Compound Metabolites: An Overview

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**Table S1.** Secoiridoids metabolites detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| EVOO | Oleuropein and/or oleacein | Hydroxytyrosol | 153 | 123 | [1,2] |
| | | Dihydroxyphenyl acetic acid | 167 | 123 | [1,3] |
| | | Hydroxytyrosol-glucuronide | 329 | 153 | [1] |
| | | Hydroxytyrosol-sulfate | 233 | 153 | [1,4] |
| | | Hydroxytyrosol acetate sulfate | 275 | 195 | [4] |
| | | Homovanillic acid | 181 | 137 | [1,3] |
| | | Homovanillic acid-glucuronide | 357 | 181 | [1] |
| | | Homovanillic alcohol | 167 | 152 | [1,3] |
| | | Homovanillic alcohol-sulfate | 247 | 167 | [1] |
| | | Elenolic acid | 241 | 139 | [1,3] |
| | | Elenolic acid-sulfate | 321 | 241 | |
| | | Elenolic acid-glucuronide | 417 | 241 | [1] |
| | | Methyloleuropein aglycone-sulfate | 471 | 391 | |
| | | Oleuropein aglycone-glucuronide | 553 | 377 | |
| | | Oleacein | 319 | 195 | [5] |
| | | Oleacein-sulfate | 399 | 319 | |
| | | Oleacein-glucuronide | 495 | 319/153 | [5,6] |
| | Oleocanthal | Oleocanthal-hydrate | 319 | 153 | [7] |
| | | Oleocanthal-$H_2O$ | 321 | 201 | |
| | | OLC-hydrate-glucuronide | 481 | 217 | |
| | | OLC-$H_2O$-glucuronide | 497 | 321 | |

EVOO: Extra virgin olive oil.

**Table S2.** Phenolic alcohol metabolites detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| EVOO | Hydroxytyrosol | Hydroxytyrosol-glucuronide | 329 | 153 | [1,2,5,8–12] |
| | | Hydroxytyrosol-sulfate | 233 | 153/123 | [1,2,4–6,8,10–12] |
| | | Hydroxytyrosol acetate-sulfate | 275 | 195 | [4,5,10,12] |
| | | Hydroxytyrosol acetate-glucuronide | 371 | 195 | [5] |
| | | Homovanillic alcohol | 167 | 151/91 | [5,13] |
| | | Homovanillic alcohol-glucuronide | 343 | 167 | [5,9,10,12] |
| | | Homovanillic alcohol-sulfate | 247 | 167 | [5,10,12,13] |
| | | Homovanillic acid | 181 | 137 | [1,2,5,6] |
| | | Homovanillic acid-sulfate | 261 | 181 | [2,4–6,10–12] |
| | | Homovanillic acid-glucuronide | 357 | 181 | [5,12] |
| | | Hydroxytyrosol acetate | 195 | 91/123 | [5,13] |
| | | Dihydroxyphenylacetic acid | 169 | 123/110 | [13] |
| | | Tyrosol | 139* | 121/91 | |
| | Tyrosol | Tyrosol-glucuronide | 313 | 137 | [2,9] |
| | | Tyrosol-sulfate | 217 | 137 | [2,6,11] |

EVOO: Extra virgin olive oil. *In positive mode.

**Table S3.** Flavonoids metabolites detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| | | ***Flavan-3-ols*** | | | |
| Cocoa, cocoa drink, wine, grape extract or epicatechin standard | (Epi)catechin | (Epi)catechin | 289 | 245/205/179/137/151 | [14–19] |
| Black tea, cocoa, cocoa cream and drink, chocolate, dark chocolate, grape (extract and pomace drink), almond, (epi)catechin standard, polyphenol-rich juice, puree of (poly)phenol-rich berry fruits. | | (Epi)catechin-glucuronide | 465 | 289/245/205/179/203/289/245 | [15–29] |
| | | (Epi)catechin-sulfate | 369 | 289/303/217/137/245 | [15–19,22–26,28–30] |
| Cocoa drink, grape (pomace drink and extract, polyphenol-rich juice | | (Epi)catechin-glucuronide-sulfate | 545 | 465/369/289 | [19,27,28,30] |
| (Epic)catechin standard | | Methyl-(Epi)catechin | 305 | 179/147/139/137 | [18,20] |
| Cocoa cream, catechin standard, Cocoa, cocoa drink, dark chocolate, chocolate, almond, grape extract, epicatechin standard, cranberry extract | | Methyl-(Epi)catechin-glucuronide | 479 | 179/139//137/303/289/175/461 | [15–21,24–26,31] |
| Cocoa cream, catechin standard Black tea, cocoa, cocoa cream and drink, chocolate, dark chocolate, grape (extract and pomace drink), almond, (epi)catechin standard, polyphenol-rich juice, puree of (poly)phenol-rich berry fruits. | | Methyl-(Epi)catechin-sulfate | 383 | 289/303/245/217/137 | [15,16,18–20,22,24–27,30] |
| Cocoa drink, chocolate | | Methyl-(Epi)catechin-glucuronide-sulfate | 559 | 289 | [24,30] |
| Chocolate | | Methyl-(Epi)catechin-diglucuronide-sulfate | 639 | 383 | [24] |
| Cranberry syrup | | Catechin-hydrate | 287 | / | [32] |
| | | Catechin-hydrate-glucuronide | 463 | / | |
| Chocolate, epicatechin standard | | (Epi)catechin-glucoside | 451 | 289/313/161 | [18,24] |
| Epicatechin standard | | (Epi)catechin-sulfate-glucoside | 531 | 369/289/451/313 | [18] |
| Grape extract | | (Epi)gallocatechin | 305 | 225 | [19] |
| Polyphenol-rich juice | | (Epi)gallocatechin-glucuronide | 481 | 305 | [28] |
| Black tea | | Dimethyl-(Epi)gallocatechin-sulfate | 413 | / | [30] |
| Grape extract, polyphenol-rich juice | | Methyl-epigallocatechin-glucuronide | 495 | 319 | [19,28] |
| Almond, green tea | | Hydroxyphenyl-γ-valerolactone | 191 | 147 | [26,33] |
| Green tea, chocolate | | Hydroxyphenyl-γ-valerolactone-glucuronide | 367 | 207/197/191 | [24,33] |
| Green tea, epicatechin standard, chocolate, almond | | Hydroxyphenyl-γ-valerolactone-sulfate | 271 | 191 | [18,24,26,33] |
| Green tea, grape extract, epicatechin standard, chocolate, almond, concord grape juice | | Dihydroxyphenyl-γ-valerolactone | 207 | 163/161/147/ 135/122/109 | [18,19,24,26,33,34] |
| Green tea, chocolate, almond, epicatechin standard | | Dihydroxyphenyl-γ-valerolactone-glucuronide | 383 | 207/175/163/135/122/113 | [24,26] |
| Green tea, epicatechin standard | | Dihydroxyphenyl-γ-valerolactone-sulfate | 287 | 207 | [18,33] |
| Green tea | | Dihydroxyphenyl-γ-valerolactone-di-sulfate | 367 | 287 | [33] |
| | | Trihydroxyphenyl-γ-valerolactone | 223 | 179 | |
| Catechin standard | | Methoxy-hydroxyphenyl-γ-valerolactone | 223 | 205/164/163 | [21] |

| | | | | | |
|---|---|---|---|---|---|
| | | Methoxy-hydroxyphenyl-γ-valerolactone-glucuronide | 399 | 381/223/205 | |
| | | Methoxy-hydroxyphenyl-γ-valerolactone-sullfate | 303 | 285/223/163 | |
| Epicatechin standard | | Dihydroxyphenyl-γ-valeric acid-sulfate | 289 | 209/147/101 | [18] |
| | | Trihydroxyphenyl-γ-valeric acid-sulfate | 305 | 225/207/123 | |
| | | Methyl-epicatechin-glucoside-sulfate | 545 | 383/303/245/327/501/217 | |
| Green tea, chocolate, almond, epicatechin standard | | Methoxyl-hydroxyphenyl-γ-valerolactone-glucuronide | 397 | 175/221/206/177/162/123 | [18,24,26,33] |
| Almond, epicatechin standard | | Methoxyl-hydroxyphenyl-γ-valerolactone-sulfate | 301 | 221 | [18,26] |
| Almond | | Hydroxyphenylpropionic acid | 165 | 121 | [26] |
| Epicatechin standard | | Hydroxyphenylpropionic acid-glucuronide | 341 | 175/165/121/113 | [18] |
| | | Hydroxyphenylpropionic acid-sulfate | 245 | 165/121 | |
| Almond | | Dihydroxyphenylpropionic acid | 181 | 137 | [26] |
| Epicatechin standard | | Methyl-dihydroxyphenylpropionic acid-sulfate | 275 | 195 | [18] |
| | | Dihydroxyphenylacetic acid-sulfate | 261 | 181/137/217 | |
| | | Hydroxyphenylacetic acid-sulfate | 231 | 151/217 | |
| | | Benzonic acid-sulfate | 217 | 137 | |
| | | Tetrahydroxyphenylpropanol-glucuronide | 451 | 275/217 | |
| | | Tetrahydroxyphenylpropanol-sulfate | 355 | 275 | |
| | | Pentahydroxyphenylpropanol-sulfate | 371 | 291/247/353/245 | |
| | | Methyl-pentahydroxyphenylpropanol-sulfate | 385 | 305 | |
| | | Methyl-pentahydroxyphenylpropanol-glucuronide | 481 | 305 | |
| | | Methyl-dihydroxyphenylacrylic acid-sulfate | 273 | 193/229 | |
| Almond | Isorhamnetin | Isorhamnetin-glucuronide | 491 | 315 | [26] |
| | | Isorhamnetin-sulfate | 395 | 315 | |
| Green and black tea | Epigallocatechin/ epicatechingallate/ epigallocatechingallat e | Methyl-epicatechin-sulfate | 383 | / | [30,35] |
| Green tea, grape extract | | Epigallocatechin-glucuronide | 481 | 305 | [14,15,19] |
| Black tea | | Methyl-epigallocatechin-sulfate | 399 | / | [30] |
| | | Epicatechingallate-sulfate | 521 | / | |
| | | Epicatechingallate-glucuronide-sulfate | 697 | / | |
| | | Methyl-epicatechingallate-sulfate | 535 | / | |
| | | Methyl-epicatechingallate-glucuronide-sulfate | 711 | / | |
| | | Epigallocatechingallate-sulfate | 537 | / | |
| | | Methyl-epigallocatechingallate-sulfate | 551 | / | [36] |
| Black tea, yerba mate, orange juice, cranberry juice, strawberry, beans | Kaempferol | Kaempferol-glucuronide | 461 | 363/285/257/229/175/113/85 | [30,35,37–41] |
| Wine | Phenylvalerolactones | Phenyl-γ-valerolactone-glucuronide | 367 | 191 | [42] |
| | | Phenyl-γ-valerolactone-sulfate | 271 | 191 | |
| Cocoa | Proanthocyanidin | Dihydroxyphenyl-γ-valerolactone | 207 | 163 | [15] |
| | | Methoxy-hydroxyphenyl-γ-valerolactone | 221 | 163 | |
| | Hydroxyphenyl-valerolactones | Dihydroxyphenyl-γ-valerolactone-glucuronide | 383 | 207 | |
| | | Dihydroxyphenyl-γ-valerolactone-sulfate | 287 | 207 | |
| | | Methoxy-hydroxyphenyl-γ-valerolactone-glucuronide | 397 | 221 | |
| Cocoa, chocolate | | Methoxy-hydroxyphenyl-γ-valerolactone-sulfate | 301 | 221/206/162/161/147 | [15,24] |
| Chocolate | | Methoxy-hydroxyphenyl-γ-valerolactone-sulfate | 317 | 222/179/163/137/125/113 | [24] |

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|---|---|---|---|---|---|
| | | Dihydroxyphenyl-γ-valerolactone-sulfate | 303 | 165/136/124/123/121 | |
| Cocoa, wine | | Procyanidin B1 | 577 | 425,289 | [14,42] |
| Wine | | Procyanidin B2 | 577 | 425, 289 | |
| Cranberry syrup | Myricetin | Myricetin | 317 | / | [32] |
| | | Methyl-myricetin | 331 | 317 | |
| | | Methyl-myricetin-glucuronide | 507 | 317 | |
| Tomato sauce, cranberry syrup, grape extract, beans | Quercetin | Quercetin | 301 | 151 | [19,32,41,43] |
| Tomato sauce, applesauce enriched with apple peel and onion, quercetin standard | | Quercetin-sulfate | 381 | 301/151 | [43–45] |
| Tomato sauce, cranberry (juice and syrup), applesauce enriched with apple peel and onion, quercetin standard | | Quercetin-glucuronide | 477 | 301/151 | [32,38,43–45] |
| Applesauce enriched with apple peel and onion, quercetin standard | | Quercetin-diglucuronide | 653 | 477/301 | [44,45] |
| | | Quercetin-glucuronide-sulfate | 557 | 477/380/301 | |
| Quercetin standard, cranberry syrup | | Methyl-quercetin | 315 | 300/151 | [32,44] |
| Yerba mate, applesauce enriched with apple peel and onion, quercetin standard, cranberry syrup | | Methyl-quercetin-glucuronide | 491 | 315/300 | [32,44–46] |
| Applesauce enriched with apple peel and onion or quercetin standard | | Methyl-quercetin-diglucuronide | 667 | 491/315/300 | [44,45] |
| Quercetin standard | | Methyl-quercetin-sulfate | 395 | 380/301 | [44] |
| | | Methyl-quercetin-glucuronide-sulfate | 571 | 491/315/301 | |
| | | Dimethyl-quercetin | 329 | 315/301 | |
| | | Dimethyl-quercetin-glucuronide | 505 | 491/315/301 | |
| Cranberry syrup | | Methoxy-quercetin-galactoside | 477 | / | [32] |
| Grape extract | | Dihydroquercetin | 303 | 223 | [19] |
| Applesauce enriched with apple peel and onion | | Quercetin-glutathione | 651 | / | [45] |
| | | ***Flavones*** | | | |
| EVOO | Apigenin | Apigenin-glucuronide | 445 | 269 | [6,11] |
| Luteolin standard | Luteolin | Luteolin-glucuronide | 461 | 285 | [47] |
| | | ***Isoflavones*** | | | |
| Daidzein standard | Daidzein | Equol | 241 | 212/135/121 | [48] |
| Daidzein standard, chocolate | | Equol-glucuronide | 417 | 175/241/113 | [48,49] |
| Chocolate | Equol | Equol-sulfate | 321 | 241 | [49] |
| Black soybean or daidzein standard | Daidzein | Genistein | 269 | 225/181/201 | [48,50] |
| Chocolate, black soybean | Genistein | Genistein-glucuronide | 445 | 269/175 | [49,50] |
| | | Genistein-sulfate | 349 | 269/303/225 | |
| Black soybean | | Hydroxygenistein-glucuronide | 461 | 286/175 | [50] |
| | Daidzein | Daidzein | 253 | 225/209/197 | |
| Chocolate, black soybean, daidzein standard | | Daidzein-glucuronide | 429 | 253/175 | [48–50] |
| | | Daidzein-sulfate | 333 | 253 | |
| Black soybean | | Daidzein-disulfate | 413 | 333/253 | [50] |
| | | Daidzein-glucuronide-sulfate | 509 | 333/253 | |
| Daidzein standard | | Daidzein-hydrate | 255 | 135/254/149 | [48] |

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|---|---|---|---|---|---|
| | | Daidzein-dihydrate | 257 | 137/161/147 | |
| Black soybean | | Hydroge-daidzein-glucuronide | 431 | 255/175 | [50] |
| | | Hydroge-daidzein-sulfate | 335 | 255/253/207 | |
| Daidzein standard | | Methyl-daidzein | 267 | 252 | [48] |
| | | Daidzein-glucoside | 415 | 253/252/295 | |
| | | Daidzin-glucoside | 579 | 2755/481 | |
| Black soybean, daidzein standard | | Daidzin | 415 | 253/191/155 | [48,50] |
| Black soybean | | Daidzin-sulfate | 495 | 415/253 | [50] |
| Daidzein standard | | Puerarin | 415 | 295 | [48] |
| | | Methyl-genistein | 283 | 268 | |
| | | Dimethyl-genistein | 285 | 270/149 | |
| | | Glucosygenistin | 593 | 269/431/433/271/178 | |
| | | Hydroxygenistein | 285 | 257/229/217 | |
| | | Hydroxygenistein-glucosides | 447 | 285/327/255 | |
| | | Glycitein | 283 | 268/240 | [50] |
| | | Glycitein-glucuronide | 459 | 283/268/240 | |
| | | Glycitein-sulfate | 363 | 283/268/240 | |
| | | Dihydroxyphenyl-chromane-diol | 275 | 151 | [48] |
| | | Hydroxyphenyl-chromene-triol. | 271 | 165/151 | |
| | | Hydroxyphenyl-chromen-ol | 239 | 147/195/197 | |
| ***Flavanones*** | | | | | |
| Tomato sauce, orange juice | Naringenin | Naringenin | 271 | 253/235//151/119/107/93/83 | [37,43] |
| Tomato sauce, almond | | Naringenin-glucuronide | 447 | 271 | [26,43,51] |
| Orange juice | | Naringenin-diglucuronide | 623 | 447/313/271/1757151/113 | [37,52] |
| | | Naringenin-glucoside-glucuronide | 609 | 489/447/429/313/271/175/151/113 | [37] |
| | | Naringenin-glucoside-sulfate | 513 | 433/351/313/271/187/177/151/119 | |
| | | Naringenin-sulfate | 351 | 271/177/164/119/107/93 | |
| | | Methylnaringenin-glucuronide | 461 | 285/270/243/175/164/151/113/85 | |
| Orange juice or hesperetin standard | Hesperetin | Hesperetin | 301 | 286/255/242/215/201/164/151/136 | [37,53] |
| Orange juice, polyphenol-rich juice, hesperetin standard | | Hesperetin-glucuronide | 477 | 301/175/151/459 | [28,37,52,53] |
| Orange juice, hesperetin standard | | Hesperetin-diglucuronide | 653 | 477/301/286/242/175/113/85 | [37,52,53] |
| | | Hesperetin-sulfate | 381 | 301/286/257/242/229/164/151/149 | [37,53] |
| Orange juice | | Hesperetin-disulfate | 461 | 381/365/301/286/231/113 | [37] |
| Orange juice, polyphenol-rich juice | | Hesperetin-glucuronide-sulfate | 557 | 477/381/301/286/254/242/229/113 | [28,37,52] |
| Hesperetin standard | | Hesperetin-glucoside | 463 | 175/445/151 | [53] |
| Orange juice | | Hesperetin-sulfate-glucoside | 543 | 463/423/381/373/301/286/257/242 | [37] |
| | | Isosakuranetin-glucuronide | 461 | 285 | [52] |
| | | Dihesperetin-glucuronide | 955 | 477/301/175/113/85 | [37] |
| Hesperidin standard | Hesperidin | Hesperidin | 609 | 301/286/257 | |
| | | Hesperidin-glucuronide | 477 | 301/459 | |
| | | Hesperidin-sulfate | 381 | 229/149/134/151 | |
| | | Hesperidin-diglucuronide | 653 | 477/301 | |

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|---|---|---|---|---|---|
| | | Hesperidin-glucoside | 611 | 413/197/443 | |
| | | Hesperidin-demethoxylate | 433 | 271/256/257//415 | |
| | | Hesperidin-demethylate | 595 | 577/559/529/487 | |
| Orange juice | Eriodictyol | Eriodictyol-glucuronide-sulfate | 543 | 463/367/287/254/187/175/151/135 | |
| | | Eriodictyol-glucuronide | 463 | 427/287/151/135/113/85 | |
| | | Eriodictyol-sulfate | 367 | 287/151/135/107 | |
| | | Homoeriodictyol | 301 | 286/242/201/174/151/136/108/107 | |
| ***Anthocyanidins*** | | | | | |
| Chokeberry extract, strawberry drink | Cyanidin | Cyanidin-glucoside | 449 | 287 | [36,39,54,55] |
| | | Cyanidin-glucuronide | 463 | 287 | [54] |
| Strawberry drink | Pelargonidin | Pelargonidin-glucuronide | 447 | / | [36,39,40] |
| | | Pelargonidin-glucoside | 433 | 271/121 | |
| | | Pelargonidin-rutinoside | 579 | 433/271 | |
| Bilberry | Peonidin-arabinoside | Delphinidin-glucuronide | 479 | 303 | [56] |
| | Malvidin | Malvidin-arabinoside-glucuronide | 639 | 331 | |
| | Cyanidin | Peonidin-glucoside-glucuronide | 639 | 301 | |
| | Petunidin | Malvidin-glucoside-glucuronide | 669 | 339 | |
| | Peonidin | Petunidin-glucoside-glucuronide | 655 | 317 | |
| Red raspberry | Anthocyanins | Hydroxybenzoic acid | 137 | 93 | |
| | | Hydroxybenzoic acid-sulfate | 233 | 153 | |
| Red raspberry, yerba mate | | Dihydroxybenzoic acid | 153 | 109 | [46,55] |
| Red raspberry | | Ferulic acid-glucuronide | 369 | 351/325/193/175/149/134/113/178 | [55] |
| | | Hippuric acid | 178 | 134 | |
| | | Hydroxyhippuric acid | 194 | 100/150 | |
| Almond | | Phenylacetic acid | 135 | 91 | [26] |
| | | Hydroxyphenylacetic acid | 151 | 107 | |
| Red raspberry, almond | | Dihydroxyphenylacetic acid | 167 | 123/137 | [26,55] |
| | | Methoxy-hydroxyphenylacetic acid | 181 | 137/109/121 | |
| Red raspberry | | Dihydrocaffeic acid-sulfate | 261 | 181/109/121 | [55] |
| | | Ferulic acid | 193 | 134/178/149 | |
| | | Ferulic acid-glucuronide | 369 | 351/325/193/175/149/134/113/178 | |
| | | Isoferulic acid-glucuronide | 369 | 193/178/113/134//175 | |
| | | Isoferulic acid-sulfate | 273 | 193/178/134/149 | |
| Cranberry extract | | Peonidin-glucoside | 461 | 264 | [31] |
| ***Dihydrochalcones*** | | | | | |
| Polyphenol-rich juice, apple | Phloretin | Phloretin-glucuronide | 449 | 273 | [28,57] |
| Polyphenol-rich juice | | Phloretin-glucuronide-sulfate | 529 | 353/449/273 | [28] |

**Table S5.** Metabolites of phenolic acids detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| ***Hydroxybenzoic acids*** | | | | | |
| Cocoa, EVOO, cranberry juice | | Vanillic acid | 167 | 152/123 | [6,14,15,38] |
| Orange juice, grape pomace drink, puree of (poly)phenol-rich berry fruits | | Vanillic acid-glucuronide | 343 | 167 | [27,29,52] |
| EVOO, orange juice, cranberry juice, grape pomace drink, puree of (poly)phenol-rich berry fruits, grape extract | | Vanillic acid-sulfate | 247 | 203, 167, 123 | [6,11,19,27,29,38,41,52] |
| Cranberry juice | | Isovanillic acid | 167 | / | [38] |
| Cocoa, grape extract, cranberry juice, almond, beans | | Protocatechuic acid | 153 | 109 | [14,15,19,26,38,41] |
| Grape extract | | Protocatechuic-glucoside | 315 | 153 | [19] |
| Grape pomace drink | Protocatechuic acid | Protocatechuic acid-glucuronide | 329 | 153 | [27] |
| Grape pomace, puree of (poly)phenol-rich berry fruits | | Protocatechuic acid-sulfate | 233 | 153 | [27,29] |
| Concord grape juice | | Mandelic acid | 151 | 73 | [34] |
| | Benzoic acid | Benzoic acid | 105 | 77 | |
| Grape pomace drink | | Benzoic acid-sulfate | 217 | 137 | [27] |
| Cocoa, coffee, beans, orange juice, red raspberry, strawberry, wine, cranberry (juice, syrup, and extract), almond, grape and concord grape juice | | Hydroxybenzoic acid | 137 | 93 | [14,15,19,26,27,31,32,32,34, 36,38,41,42,52,58] |
| Coffee, cranberry juice, cranberry syrup | | Dihydroxybenzoic acid | 153 | 109 | [32,38,58] |
| Coffee, concord grape juice | | Methoxy-hydroxybenzoic acid | 167 | 123 | [34,58] |
| Tomato sauce, black tea, orange juice, wine, cranberry (juice and syrup), grape (extract, pomace drink, and juice) and beans | Benzoic acid | Hippuric acid | 178 | 134 | [19,27,30,32,34,38,41–43,52,59] |
| Almond, black tea, beans. cocoa, coffee, orange juice, tomato sauce, wine, yerba mate, cranberry (juice and syrup), and grape (extract, pomace drink, and juice). | Hydroxybenzoic acid | Hydroxyhippuric acid | 194 | 100 | [14,19,26,27,30,32,34,38,41 –43,46,52,58,59] |
| Wine, cranberry juice, grape pomace drink. | | Gallic acid | 169 | 125 | [19,27,38] |
| Puree of (poly)phenol-rich berry fruits. | | Gallic acid-glucuronide | 345 | 169 | [29] |
| Grape extract, puree of (poly)phenol-rich berry fruits | | Methyl-gallic acid | 183 | 139/95 | [19,29] |
| Black tea, cranberry juice, grape extract, polyphenol-rich juice, puree of (poly)phenol-rich berry fruits | Gallic acid | Methyl-gallic acid-sulfate | 263 | 183 | [19,28–30,38] |
| Grape extract | | Dimethyl-gallic acid | 197 | 182/153/137 | [19] |
| Cranberry juice, grape extract | | Syringic acid | 197 | 137 | [19,38] |
| *Hydroxycinnamic acids* | | | | | |
| Cocoa, wine, cranberry juice, almond, coffee, beans, grape extract | | Coumaric acid | 163 | 119/91 | [14,15,19,26,38,41,60] |
| Wine, coffee | Coumaric acid | Coumaric acid-glucuronide | 339 | 163/113/119 | [42,58,60] |
| EVOO, coffee | | Coumaric acid-sulfate | 243 | 199/163/119 | [6,11,58,60,61] |
| Coffee, yerba mate | | Dihydrocoumaric acid | 165 | 121/106/59 | [46,58,60,62] |
| | | Dihydrocoumaric acid-glucuronide | 341 | 113/121/59/165 | [46,58,60] |

| | | | | | |
|---|---|---|---|---|---|
| | | Dihydrocoumaric acid-sulfate | 245 | 165/121/59 | [46,58,60,62] |
| | | Dihydrocoumaroylquinic acid | 339 | 165 | [46,58] |
| Wine, cranberry syrup | | Coumaroyl-glucose | 325 | / | [32,63] |
| Coffee, yerba mate | | Coumaroylquinic acid | 337 | 163 | [46,58] |
| Cocoa, coffee, EVOO, tomato sauce, wine, grape extract, cranberry juice, almond, beans, standard solution | | Caffeic acid | 179 | 135 | [6,14,15,19,26,38,41–43,51,58,60,63,64] |
| Tomato sauce, coffee, yerba mate, grape extract, EVOO, polyphenol-rich juice, puree of (poly)phenol-rich berry fruits | Caffeic acid | Caffeic acid-sulfate | 259 | 215/179/135 | [6,19,28–30,43,58,60–62] |
| Tomato sauce, wine, cranberry juice, beans, standard solutions | | Caffeic acid-glucuronide | 355 | 311/179/135 | [38,41–43,51,60,61,64] |
| Cranberry syrup | | Caffeic acid-glucoside | 341 | 179 | [32] |
| | | Caffeic acid-glucoside hydrate | 339 | / | |
| Standard solution | | Hydroxyglucuronyl crylic acid | 355 | 337/311/293/179/175/135/113 | [64] |
| | | Glucuronylhydroxy crylic acid | 355 | 337/311/267/179/175/135/113 | |
| Tomato sauce, coffee, yerba mate, grape extract, cranberry juice | Caffeic acid | Dihydrocaffeic acid | 181 | 137/109 | [38,43,46,58,60,62] |
| Tomato sauce, coffee, yerba mate, cranberry juice, grape pomace drink, beans, polyphenol-rich juice | Dihydrocaffeic acid | Dihydrocaffeic acid-sulfate | 261 | 181/113 | [27,28,38,41,43,46,58,60,62] |
| Tomato sauce, coffee, yerba mate, grape extract, cranberry juice | | Dihydrocaffeic acid-glucuronide | 357 | 339/313/295/181/175/166/137/113 | [19,38,43,46,58,60,61] |
| Coffee, yerba mate | Caffeic acid | Caffeoylquinic acid | 353 | 191/179 | [46,58,60,62] |
| Coffee | | Caffeoylquinic-sulfate | 433 | 191/353/179 | [60] |
| | | Caffeoylquinic-lactone | 335 | 161/133 | |
| Coffee, yerba mate | | Dihydrocaffeoylquinic acid | 355 | 181 | [46,58] |
| Yerba mate | | Caffeoylquinic lactone-sulfate | 415 | 335 | [46] |
| Cocoa, tomato sauce, coffee, wine, cranberry juice, almond, standard solution | Undefined or ferulic acid<br>Ferulic acid | Ferulic acid | 193 | 134/178/149 | [14,15,26,38,42,43,51,58,60,64] |
| Tomato sauce, coffee, yerba mate, orange juice, EVOO, cranberry juice, beans, polyphenol-rich juice, puree of (poly)phenol-rich berry fruits, grape extract | | Ferulic acid-sulfate | 273 | 193/149/134/178 | [6,19,28,29,38,41–43,46,52,58,60–62] |
| Tomato sauce, coffee, yerba mate, orange juice, EVOO, cranberry juice, grape pomace drink, puree of (poly)phenol-rich berry fruits | | Ferulic acid-glucuronide | 369 | 351/325/193/175/149/134 | [6,27,29,38,41–43,46,51,52,58,60–62] |
| Coffee | | Methyl-ferulic acid | 207 | 103/163 | [60,62] |
| | | Methyl-dihydroferulic acid | 209 | 150/165 | [60] |
| Yerba mate, cranberry juice, coffee, polyphenol-rich juice | | Dihydroferulic acid | 197 | 136 | [28,38,43,46,58,60,62] |
| Yerba mate, grape extract, cranberry (juice and syrup), coffee, beans | | Dihydroferulic acid-glucuronide | 373 | 195/175/136 | [19,32,38,41,43,46,60,62] |

| | | | | | |
|---|---|---|---|---|---|
| Yerba mate, grape extract, coffee, orange juice, beans, (poly)phenol-rich berry fruits | | Dihydroferulic acid-sulfate | 277 | 195 | [19,28,38,41,43,46,52,60,62] |
| Tomato sauce, coffee, yerba mate, cranberry juice, standard solution | | Isoferulic acid | 193 | 178/134 | [38,43,46,58,60,62,64] |
| Coffee, yerba mate, orange juice, wine, cranberry juice, puree of (poly)phenol-rich berry fruits | | Isoferulic acid-glucuronide | 369 | 193/134 | [29,38,42,46,52,58,60,62] |
| Coffee, yerba mate, polyphenol-rich juice | | Dihydroisoferulic acid | 195 | 136 | [28,46,58] |
| Coffee, yerba mate, orange juice, cranberry juice, beans | | Dihydroisoferulic acid-glucuronide | 371 | 195/136 | [38,41,46,52,58] |
| Coffee, yerba mate, EVOO, cranberry juice | | Dihydroisoferulic acid-sulfate | 273 | 195/136 | [11,38,46,58] |
| Coffee, yerba mate | | Feruloylquinic acid | 367 | 191 | [46,58,60,62] |
| Coffee | | Feruloylquinic-sulfate | 447 | 191/193 | [60] |
| | | Feruloylquinic-glucuronide | 543 | 191/193 | |
| | | Feruloylquinic-lactone | 349 | 175/160 | |
| Coffee, yerba mate | | Dihydroferuloylquinic acid | 369 | 195 | [46,58] |
| Coffee | | Feruloylquinic lactone-glucuronide | 525 | 349 | [58] |
| Coffee, yerba mate, orange juice, grape pomace drink, polyphenol-rich juice | | Feruloylglycine | 250 | 191/134 | [27,28,46,52,58] |
| Coffee, yerba mate | | Isoferuloylglycine | 250 | 191/134 | [46,58] |
| Cranberry juice, beans | | Sinapic acid | 223 | / | [38,41] |
| Grape pomace drink | | Sinapic acid-sulfate | 303 | 223 | [27] |
| Coffee | | Cinnamic acid | 147 | 103 | [60] |
| | | Methoxy-cinnamic acid | 177 | 133/117 | |
| | Dimethoxy-cinnamic acid | Dimethoxy-cinnamic acid | 207 | 103 | [58] |
| | | Dimethoxy-dihydrocinnamic acid | 209 | / | |
| Almond | | Methoxy-hydroxycinnamic acid | 193 | 134 | [26] |
| Tomato sauce, cranberry juice. | Chlorogenic acid | Chlorogenic acid | 353 | 191 | [38,43] |
| Cranberry syrup | | Hydroxychlorogenic acid | 369 | / | [32] |
| | | Chlorogenic acid + $H_2O$ | 371 | 353 | |
| Coffee | | Caffeoylquinic acid lactone-sulfate | 415 | 335/161/135 | [65] |
| | | Feruloylquinic acid | 367 | 193 | |
| | | Ferulic acid-sulfate | 273 | 193/178/149/134 | |
| | | Feruloylglycine | 250 | 206/191/177/149 | |
| | | Dihydroferulic acid-sulfate | 277 | 195/171/151 | |
| | | Dihydroferulic acid-glucuronide | 371 | 195/173/113 | |
| | | Isoferulic acid-sulfate | 273 | 193/178 | |
| | | Isoferulic acid-glucuronide | 369 | 193/175/113 | |
| | | Dihydro(iso)ferulic acid-glucuronide | 371 | 195/175/113 | |
| | | Caffeic acid-sulfate | 259 | 179/135 | |
| | | Dihydrocaffeic acid | 181 | 137/119 | |
| | | Dihydrocaffeic acid-glucuronide | 357 | 181/175/137/113 | |
| | | Dihydrocaffeic acid-sulfate | 261 | 181/137/119 | |
| ***Hydroxyphenilacetic acids*** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cocoa, coffee, wine, grape extract, cranberry juice, concord grape juice, wine | Hydroxyphenylacetic acid | Hydroxyphenylacetic acid | 151 | 107 | [14,15,19,34,38,38,42,58] |
| Tomato sauce | | Hydroxyphenylacetic acid-sulfate | 231 | 213/187/151/143 | [51] |
| Cocoa, yerba mate, coffee, grape extract, cranberry juice, concord grape juice | | Dihydroxyphenylacetic acid | 167 | 123/137 | [14,15,19,34,38,46,58] |
| Orange juice | | Dihydroxyphenylacetic acid-sulfate | 247 | 167 | [52] |
| Cocoa, yerba mate, wine, coffee, concord grape juice, wine | Dihydroxyphenylacetic acid | Methoxy-hydroxyphenylacetic acid | 181 | 137 | [14,15,34,34,42,46,58] |
| Black soybean | | Hydroxymethoxyl-phenylacetic acid-sulfate | 261 | 181/125 | [50] |
| Concord grape juice | | Phenoxyacetic acid | 151 | 165/147/135/73 | [34] |
| Cocoa, cranberry juice | | Phenylacetic acid | 135 | 91 | [14,15,38] |
| Grape extract, cranberry juice | | Homovanillic acid | 181 | 137 | [19,38] |
| Grape extract, beans, cranberry juice | | Homovanillic acid-sulfate | 261 | 181 | |
| Hydroxyphenylpropanoic acids | | | | | |
| Coffee | | Phenylpropionic acid | 149 | 105 | [60] |
| Wine | | Hydroxyphenylpropionic acid- sulfate | 245 | 165 | [42] |
| | | Hydroxyphenylpropionic acid-glucuronide | 341 | 165 | |
| Coffee | Phenylpropionic acid | Methoxy-phenylpropionic acid | 179 | 135 | [60] |
| Wine | | Methoxy-hydroxyphenylpropionic acid-sulfate | 275 | 195 | [42] |
| | | Methoxy-hydroxyphenylpropionic acid-glucuronide | 371 | 195 | |
| Wine, orange juice | | Methoxy-hydroxyphenylpropionic acid | 195 | 136 | [42,59] |
| Tomato sauce, cocoa; yerba mate, wine, coffee, concord grape juice, cranberry juice, standard solution | | Hydroxyphenylpropionic acid | 165 | 121 | [15,34,42,43,46,51,58] |
| Tomato sauce, wine, grape pomace drink | Hydroxyphenyl propionic acid | Hydroxyphenylpropionic acid-sulfate | 245 | 227/201/165/121 | [27,42] |
| Wine, orange juice | Dihydroxyphenylpropi onic acid | Dihydroxyphenylpropionic aci- glucuronide | 357 | 181 | [42,66] |
| Black tea | Homovanillic acid | Hydroxymethoxyphenylcarboxylic acid-sulfate | 261 | / | [30] |
| Cocoa, concord grape juice, cranberry juice, orange juice | | Dihydroxyphenylpropionic acid | 181 | 137 | [14,15,34,38,59] |
| Apple, orange juice | | Dihydroxyphenylpropionic acid-sulfate | 261 | 181 | [57,66] |
| Standard solution | | Dihydroxyphenylmethyoxypropionic acid | 211 | 184/167/123 | [64] |
| | | Dihydroxyphenyllactic acid | 197 | 179/153/135/73 | |
| | | Trihydroxyphenyllactic acid | 213 | 195/169/151 | |
| | | Hydroxymethylphenyl lactic acid | 211 | 193/165/123 | |
| | | Hydroxymethyloxyphenyl lactic acid | 211 | 193/148/134 | |
| | | Dihydroxyphenyllactic acid methyl ester | 211 | 193/182/165/156 | |
| ***Hydroxyphenylpentanoic acids*** | | | | | |
| Cranberry juice, grape pomace drink, apple | | Phenyl-γ-valerolactone-sulfate | 271 | 191 | [27,67,68] |
| | | Phenyl-γ-valerolactone-glucuronide | 367 | 191 | |
| Grape pomace drink, apple | | Phenyl γ-valerolactone-glucuronide-sulfate | 463 | 287/207 | [27,68] |
| Cocoa | | Hydroxyphenyl-γ-valerolactone | 191 | 147 | [22] |
| Black tea, cocoa, cranberry extract | | Hydroxyphenyl-γ-valerolactone-sulfate | 271 | 191 | [22,30,31] |

| | | | | | |
|---|---|---|---|---|---|
| Black tea, cocoa | Hydroxyphenyl-γ-valerolactone | Hydroxyphenyl-γ-valerolactone-glucuronide | 367 | 191 | [22,30] |
| Cocoa, cranberry juice, grape pomace drink | | Dihydroxyphenyl-γ-valerolactone | 207 | 163 | [22,27,67] |
| Cranberry juice, apple, grape pomace drink, black tea, cocoa | | Dihydroxyphenyl-γ-valerolactone-sulfate | 287 | 207 | [22,30,38,67,68] |
| Cranberry juice, grape pomace drink, apple, black tea | | Dihydroxyphenyl-γ-valerolactone-glucuronide | 383 | 207 | [27,30,67,68] |
| Black tea, cranberry juice, cocoa | | Dihydroxyphenyl γ-valerolactone-glucuronide-sulfate | 463 | 287 | [30,67] |
| Black tea | | Trihydroxy-γ-valerolactone-sulfate | 303 | / | [30] |
| | | Trihydroxy-γ-valerolactone-glucuronide | 399 | / | |
| | | Trihydroxy-γ-valerolactone-glucuronide-sulfate | 479 | / | |
| Cocoa, black tea, cranberry juice | | Methyl-dihydroxyphenyl-γ-valerolactone-sulfate | 301 | 221 | [22] |
| Cocoa, black tea | | Methyl-dihydroxyphenyl-γ-valerolactone-glucuronide | 397 | 221 | [22,30] |
| Black tea | | Methyl-trihydroxyphenyl-γ-valerolactone-sulfate | 317 | / | [30] |
| | | Methyl-trihydroxyphenyl-γ-valerolactone-glucuronide | 413 | / | |
| Cranberry juice, grape pomace drink, apple | | Phenyl-γ-valerolactone-methoxy-sulfate | 301 | 221/206 | [27,67,68] |
| Cranberry juice, apple | | Phenyl-γ-valerolactone-methoxy-glucuronide | 397 | 221 | [67,68] |
| Chocolate, cranberry extract | | Dihydroxyphenylvaleric acid | 209 | 193/179/150/137 | [24,31] |
| Cocoa, chocolate | | Trihydroxyvaleric acid | 225 | 170/163/147/135 | [22,24] |
| Cranberry extract | | Dihydroxyvaleric acid-sulfate | 289 | / | [31] |
| Black tea, cocoa, chocolate, apple | Trihydroxyvaleric acid/ Tetrahydroxyvaleric acid | Trihydroxyvaleric acid-sulfate | 305 | 225/208/163/148 | [22,24,30,68] |
| | | Trihydroxyvaleric acid-glucuronide | 401 | 225/207/163/123 | |
| Black tea | | Methyl-dihydroxyphenylvaleric acid-sulfate | 303 | / | [30] |
| Black tea, chocolate | | Methyl-trihydroxyphenylvaleric acid-sulfate | 319 | 239/163/123/95/79 | [24,30] |
| Black tea | | Methyl-tetrahydroxyphenylvaleric acid-glucuronide | 431 | / | [30] |
| Apple | | Methoxy-hydroxyphenylvaleric acid-sulfate | 319 | 239 | [68] |

**Table S5.** Metabolites of enterolignans, stilbenes and ellagitannins detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| ***Enterolignans*** | | | | | |
| Cocoa | | Enterodiol | 301 | 253 | [14] |
| | | Enterolactone | 577 | 289 | |
| ***Stilbenes*** | | | | | |
| Wine, resveratrol pill and standard | Resveratrol | *trans-/cis*-resveratrol | 227 | 185 | [69–71] |
| Wine, grape extract, resveratrol pill and standard | | *trans-/cis*-resveratrol-glucuronide | 403 | 227 | [19,69–71] |
| | | *trans-/cis*-resveratrol-sulfate | 307 | 227 | |
| Resveratrol pill | | *trans*-resveratrol-glucuronide-sulfate | 483 | 307 | [71] |
| | | *trans*-resveratrol-diglucuronide | 579 | 403 | |
| Wine | | *trans-/cis*-piceid | 389 | 227 | [69] |
| | | *trans-/cis*-piceid-glucuronide | 565 | 389, 227 | |
| | | *trans-/cis*-piceid-sulfate | 469 | 389, 227 | |
| Wine, resveratrol pill | | Dihydroresveratrol | 229 | 123 | [69,71] |
| | | Dihydroresveratrol-glucuronide | 405 | 229 | |
| Wine, grape extract | | Dihydroresveratrol-sulfate | 309 | 229 | [19,69] |
| Grape extract, resveratrol pill | | Dihydroresveratrol-glucuronide sulfate | 485 | 309/ 233/ 175 | [19,71] |
| ***Ellagitannins*** | | | | | |
| Red raspberry | Ellagitannins | Urolithin A | 227 | 182/171 | [55] |
| | | Urolithin A-glucuronide | 403 | 175/171 | |
| | | Urolithin A-sulfate | 307 | 175/113 | |
| | | Isourolithin A-glucuronide | 403 | 171/175 | |
| | | (iso)Urolithin A-glucuronide-sulfate | 483 | 403/277/307/175 | |
| | | Urolithin B | 211 | 117/167 | |
| | | Urolithin B-glucuronide | 387 | 175/113 | |
| | | Dimethylellagic acid-glucuronide | 505 | 113/175 | |

**Table S6.** Metabolites of other phenolic compounds detected in plasma and/or urine from humans and rats.

| Food or supplement | Compounds | Metabolites | Parent mass | Fragments | Ref |
|---|---|---|---|---|---|
| Wine, concord grape juice | | Tartaric acid | 149 | / | [34,63] |
| Wine | | Ethyl hydrogen-sulfate | 125 | / | [63] |
| | | Monoglyceride citrate | 265 | / | |
| | | Galactosylglycerol | 253 | / | |
| | | Methylisocitric acid | 187 | / | |
| | | Isopropyl-oxosuccinate | 219 | / | |
| | | Dihydroxy-methoxyacetophenone-glucoside | 343 | / | |
| | | Ethyl maltol | 139 | / | |
| | | Phloroglucinol | 125 | / | [42,63] |
| | | α-terpinyl cinnamate | 283 | / | [63] |
| | | Licarin C/kanzonol R | 369 | / | |
| | | Kanzonol I | 435 | / | |
| Grape extract, concord grape juice | | Pyrogallol | 125 | 97 | [19,34] |
| Black tea, cranberry juice, beans, puree of (poly)phenol-rich berry fruits | Pyrogallol | Pyrogallol-sulfate | 204 | 125 | [29,30,38,41] |
| Cranberry juice, grape pomace drink, beans, puree of (poly)phenol-rich berry fruits | | Methylpyrogallol-sulfate | 218 | 139, 124 | [29] |
| Black tea, puree of (poly)phenol-rich berry fruits | Pyrogallol | Pyrogallol-glucuronide | 301 | 125 | [29,30] |
| Black tea | | Dihydroxyphenyl-sulfate | 209 | 129 | [72] |
| Grape extract | | Methylpyrogallol | 139 | 124 | [29] |
| Cranberry (juice and extract), grape pomace drink, beans, puree of (poly)phenol-rich berry fruits, apple | | Catechol-sulfate | 189 | 109 | [27,29,31,38,41,57] |
| Puree of (poly)phenol-rich berry fruits | | Catechol-glucuronide | 285 | | [29] |
| Cranberry juice, grape pomace drink, beans, puree of (poly)phenol-rich berry fruits, apple | | Methylcatechol-sulfate | 203 | 123 | [27,29,38,41,57] |
| Puree of (poly)phenol-rich berry fruits | | Methylcatechol-glucuronide | 299 | | [29] |
| Black tea | Resorcinol | Diphenol-glucuronide | 285 | / | [30] |
| | | Diphenol-sulfate | 188 | / | |
| Cranberry juice, beans | | Hydroxybenzaldehyde | 121 | / | [38,41] |
| Cranberry juice | | Dihydroxybenzaldehyde | 137 | / | [38] |
| EVOO, almond | | Vanillin | 151 | 136 | [6,26] |
| EVOO | | Vanillin-sulfate | 231 | 151/136 | [6] |
| | | Vanillin-glucuronide | 327 | | |
| Cranberry syrup | | Scopoletin | 193 | / | [32] |
| | | Methyl-scopoletin | 207 | / | |
| | | Dihydroxycoumarin-glucuronide | 355 | / | |
| | | Methyl-hydroxycoumarin-glucuronide | 353 | / | |

## References


[1] M.-C. López de las Hazas, C. Piñol, A. Macià, M.-P. Romero, A. Pedret, R. Solà, L. Rubió, M.-J. Motilva, Differential absorption and metabolism of hydroxytyrosol and its precursors oleuropein and secoiridoids, Journal of Functional Foods. 22 (2016) 52–63. https://doi.org/10.1016/j.jff.2016.01.030.

[2] M.I. Orozco-Solano, C. Ferreiro-Vera, F. Priego-Capote, M.D. Luque de Castro, Automated method for determination of olive oil phenols and metabolites in human plasma and application in intervention studies, Journal of Chromatography A. 1258 (2012) 108–116. https://doi.org/10.1016/j.chroma.2012.08.057.

[3] F.N. Bazoti, E. Gikas, A. Tsarbopoulos, Simultaneous quantification of oleuropein and its metabolites in rat plasma by liquid chromatography electrospray ionization tandem mass spectrometry, Biomed. Chromatogr. 24 (2010) 506–515. https://doi.org/10.1002/bmc.1319.

[4] L. Rubió, R.-M. Valls, A. Macià, A. Pedret, M. Giralt, M.-P. Romero, R. de la Torre, M.-I. Covas, R. Solà, M.-J. Motilva, Impact of olive oil phenolic concentration on human plasmatic phenolic metabolites, Food Chemistry. 135 (2012) 2922–2929. https://doi.org/10.1016/j.foodchem.2012.07.085.

[5] L. Rubió, A. Macià, R.M. Valls, A. Pedret, M.-P. Romero, R. Solà, M.-J. Motilva, A new hydroxytyrosol metabolite identified in human plasma: Hydroxytyrosol acetate sulphate, Food Chemistry. 134 (2012) 1132–1136. https://doi.org/10.1016/j.foodchem.2012.02.192.

[6] M. Suárez, R.M. Valls, M.-P. Romero, A. Macià, S. Fernández, M. Giralt, R. Solà, M.-J. Motilva, Bioavailability of phenols from a phenol-enriched olive oil, Br J Nutr. 106 (2011) 1691–1701. https://doi.org/10.1017/S0007114511002200.

[7] López-Yerena, Vallverdú-Queralt, Mols, Augustijns, Lamuela-Raventós, Escribano-Ferrer, Absorption and Intestinal Metabolic Profile of Oleocanthal in Rats, Pharmaceutics. 12 (2020) 134. https://doi.org/10.3390/pharmaceutics12020134.

[8] O. Khymenets, M.C. Crespo, O. Dangles, N. Rakotomanomana, C. Andres-Lacueva, F. Visioli, Human hydroxytyrosol's absorption and excretion from a nutraceutical, Journal of Functional Foods. 23 (2016) 278–282. https://doi.org/10.1016/j.jff.2016.02.046.

[9] O. Khymenets, M. Farré, M. Pujadas, E. Ortiz, J. Joglar, M.I. Covas, R. de la Torre, Direct analysis of glucuronidated metabolites of main olive oil phenols in human urine after dietary consumption of virgin olive oil, Food Chemistry. 126 (2011) 306–314. https://doi.org/10.1016/j.foodchem.2010.10.044.

[10] A. Serra, L. Rubió, A. Macià, R.-M. Valls, Ú. Catalán, Application of dried spot cards as a rapid sample treatment method for determining hydroxytyrosol metabolites in human urine samples. Comparison with microelution solid-phase extraction, (n.d.) 14.

[11] M. Suárez, M.-P. Romero, A. Macià, R.M. Valls, S. Fernández, R. Solà, M.-J. Motilva, Improved method for identifying and quantifying olive oil phenolic compounds and their metabolites in human plasma by microelution solid-phase extraction plate and liquid chromatography–tandem mass spectrometry, Journal of Chromatography B. 877 (2009) 4097–4106. https://doi.org/10.1016/j.jchromb.2009.10.025.

[12] M.-C. López de las Hazas, L. Rubió, A. Kotronoulas, R. de la Torre, R. Solà, M.-J. Motilva, Dose effect on the uptake and accumulation of hydroxytyrosol and its metabolites in target tissues in rats, Mol. Nutr. Food Res. 59 (2015) 1395–1399. https://doi.org/10.1002/mnfr.201500048.

[13] R. Domínguez-Perles, D. Auñón, F. Ferreres, A. Gil-Izquierdo, Gender differences in plasma and urine metabolites from Sprague–Dawley rats after oral administration of normal and high doses of hydroxytyrosol, hydroxytyrosol acetate, and DOPAC, Eur J Nutr. 56 (2017) 215–224. https://doi.org/10.1007/s00394-015-1071-2.

[14] M. Urpi-Sarda, M. Monagas, N. Khan, R.M. Lamuela-Raventos, C. Santos-Buelga, E. Sacanella, M. Castell, J. Permanyer, C. Andres-Lacueva, Epicatechin, procyanidins, and

phenolic microbial metabolites after cocoa intake in humans and rats, Anal Bioanal Chem. 394 (2009) 1545–1556. https://doi.org/10.1007/s00216-009-2676-1.
[15] M. Urpi-Sarda, M. Monagas, N. Khan, R. Llorach, R.M. Lamuela-Raventós, O. Jáuregui, R. Estruch, M. Izquierdo-Pulido, C. Andrés-Lacueva, Targeted metabolic profiling of phenolics in urine and plasma after regular consumption of cocoa by liquid chromatography–tandem mass spectrometry, Journal of Chromatography A. 1216 (2009) 7258–7267. https://doi.org/10.1016/j.chroma.2009.07.058.
[16] E. Roura, C. Andrés-Lacueva, O. Jáuregui, E. Badia, R. Estruch, M. Izquierdo-Pulido, R.M. Lamuela-Raventós, Rapid Liquid Chromatography Tandem Mass Spectrometry Assay To Quantify Plasma (−)-Epicatechin Metabolites after Ingestion of a Standard Portion of Cocoa Beverage in Humans, J. Agric. Food Chem. 53 (2005) 6190–6194. https://doi.org/10.1021/jf050377u.
[17] J.I. Ottaviani, T.Y. Momma, G.K. Kuhnle, C.L. Keen, H. Schroeter, Structurally related (−)-epicatechin metabolites in humans: Assessment using de novo chemically synthesized authentic standards, 52 (2012) 1403–1412. https://doi.org/10.1016/j.freeradbiomed.2011.12.010.
[18] Z. Shang, F. Wang, S. Dai, J. Lu, X. Wu, J. Zhang, Profiling and identification of (−)-epicatechin metabolites in rats using ultra-high performance liquid chromatography coupled with linear trap-Orbitrap mass spectrometer: Study of EC in vivo metabolites, Drug Test. Analysis. 9 (2017) 1224–1235. https://doi.org/10.1002/dta.2155.
[19] G. Sasot, M. Martínez-Huélamo, A. Vallverdú-Queralt, M. Mercader-Martí, R. Estruch, R.M. Lamuela-Raventós, Identification of phenolic metabolites in human urine after the intake of a functional food made from grape extract by a high resolution LTQ-Orbitrap-MS approach, Food Research International. 100 (2017) 435–444. https://doi.org/10.1016/j.foodres.2017.01.020.
[20] A. Serra, A. Macià, L. Rubió, N. Anglès, N. Ortega, J.R. Morelló, M.-P. Romero, M.-J. Motilva, Distribution of procyanidins and their metabolites in rat plasma and tissues in relation to ingestion of procyanidin-enriched or procyanidin-rich cocoa creams, Eur J Nutr. 52 (2013) 1029–1038. https://doi.org/10.1007/s00394-012-0409-2.
[21] A. Fardet, R. Llorach, J.-F. Martin, C. Besson, B. Lyan, E. Pujos-Guillot, A. Scalbert, A Liquid Chromatography−Quadrupole Time-of-Flight (LC−QTOF)-based Metabolomic Approach Reveals New Metabolic Effects of Catechin in Rats Fed High-Fat Diets, J. Proteome Res. 7 (2008) 2388–2398. https://doi.org/10.1021/pr800034h.
[22] M. Gómez-Juaristi, B. Sarria, S. Martínez-López, L. Bravo Clemente, R. Mateos, Flavanol Bioavailability in Two Cocoa Products with Different Phenolic Content. A Comparative Study in Humans, Nutrients. 11 (2019) 1441. https://doi.org/10.3390/nu11071441.
[23] E. Roura, C. Andrés-Lacueva, R. Estruch, M. Lourdes Mata Bilbao, M. Izquierdo-Pulido, R.M. Lamuela-Raventós, The effects of milk as a food matrix for polyphenols on the excretion profile of cocoa ( − )-epicatechin metabolites in healthy human subjects, Br J Nutr. 100 (2008) 846–851. https://doi.org/10.1017/S0007114508922534.
[24] I. Hakeem Said, J.D. Truex, C. Heidorn, M.B. Retta, D.D. Petrov, S. Haka, N. Kuhnert, LC-MS/MS based molecular networking approach for the identification of cocoa phenolic metabolites in human urine, Food Research International. 132 (2020) 109119. https://doi.org/10.1016/j.foodres.2020.109119.
[25] L. Actis-Goretta, A. Lévèques, F. Giuffrida, F. Romanov-Michailidis, F. Viton, D. Barron, M. Duenas-Paton, S. Gonzalez-Manzano, C. Santos-Buelga, G. Williamson, F. Dionisi, Elucidation of (−)-epicatechin metabolites after ingestion of chocolate by healthy humans, Free Radical Biology and Medicine. 53 (2012) 787–795. https://doi.org/10.1016/j.freeradbiomed.2012.05.023.
[26] M. Urpi-Sarda, I. Garrido, M. Monagas, C. Gómez-Cordovés, A. Medina-Remón, C. Andres-Lacueva, B. Bartolomé, Profile of Plasma and Urine Metabolites after the Intake of Almond

[Prunus dulcis (Mill.) D.A. Webb] Polyphenols in Humans, J. Agric. Food Chem. 57 (2009) 10134–10142. https://doi.org/10.1021/jf901450z.
[27] F. Castello, G. Costabile, L. Bresciani, M. Tassotti, D. Naviglio, D. Luongo, P. Ciciola, M. Vitale, C. Vetrani, G. Galaverna, F. Brighenti, R. Giacco, D. Del Rio, P. Mena, Bioavailability and pharmacokinetic profile of grape pomace phenolic compounds in humans, Archives of Biochemistry and Biophysics. 646 (2018) 1–9. https://doi.org/10.1016/j.abb.2018.03.021.
[28] W. Mullen, G. Borges, M.E.J. Lean, S.A. Roberts, A. Crozier, Identification of Metabolites in Human Plasma and Urine after Consumption of a Polyphenol-Rich Juice Drink, J. Agric. Food Chem. 58 (2010) 2586–2595. https://doi.org/10.1021/jf904096v.
[29] R.C. Pimpão, T. Dew, M.E. Figueira, G.J. McDougall, D. Stewart, R.B. Ferreira, C.N. Santos, G. Williamson, Urinary metabolite profiling identifies novel colonic metabolites and conjugates of phenolics in healthy volunteers, Mol. Nutr. Food Res. 58 (2014) 1414–1425. https://doi.org/10.1002/mnfr.201300822.
[30] J. van Duynhoven, J.J.J. van der Hooft, F.A. van Dorsten, S. Peters, M. Foltz, V. Gomez-Roldan, J. Vervoort, R.C.H. de Vos, D.M. Jacobs, Rapid and Sustained Systemic Circulation of Conjugated Gut Microbial Catabolites after Single-Dose Black Tea Extract Consumption, J. Proteome Res. 13 (2014) 2668–2678. https://doi.org/10.1021/pr5001253.
[31] H. Liu, T.J. Garrett, F. Tayyari, L. Gu, Profiling the metabolome changes caused by cranberry procyanidins in plasma of female rats using $^{1}$H NMR and UHPLC-Q-Orbitrap-HRMS global metabolomics approaches, Mol. Nutr. Food Res. 59 (2015) 2107–2118. https://doi.org/10.1002/mnfr.201500236.
[32] I. Iswaldi, D. Arráez-Román, A.M. Gómez-Caravaca, M. del M. Contreras, J. Uberos, A. Segura-Carretero, A. Fernández-Gutiérrez, Identification of polyphenols and their metabolites in human urine after cranberry-syrup consumption, Food and Chemical Toxicology. 55 (2013) 484–492. https://doi.org/10.1016/j.fct.2013.01.039.
[33] N. Brindani, P. Mena, L. Calani, I. Benzie, S.-W. Choi, F. Brighenti, F. Zanardi, C. Curti, D. Del Rio, Synthetic and analytical strategies for the quantification of phenyl-γ-valerolactone conjugated metabolites in human urine, Mol. Nutr. Food Res. 61 (2017) 1700077. https://doi.org/10.1002/mnfr.201700077.
[34] A. Stalmach, C.A. Edwards, J.D. Wightman, A. Crozier, Colonic catabolism of dietary phenolic and polyphenolic compounds from Concord grape juice, Food Function. 4 (2013) 52–62. https://doi.org/10.1039/C2FO30151B.
[35] C. Li, X. Meng, B. Winnik, M.-J. Lee, H. Lu, S. Sheng, B. Buckley, C.S. Yang, Analysis of Urinary Metabolites of Tea Catechins by Liquid Chromatography/Electrospray Ionization Mass Spectrometry, Chem. Res. Toxicol. 14 (2001) 702–707. https://doi.org/10.1021/tx0002536.
[36] K. Banaszewski, E. Park, I. Edirisinghe, J.C. Cappozzo, B.M. Burton-Freeman, A pilot study to investigate bioavailability of strawberry anthocyanins and characterize postprandial plasma polyphenols absorption patterns by Q-TOF LC/MS in humans, Journal of Berry Research. 3 (2013) 113–126. https://doi.org/10.3233/JBR-130048.
[37] X. Zeng, W. Su, Y. Bai, T. Chen, Z. Yan, J. Wang, M. Su, Y. Zheng, W. Peng, H. Yao, Urinary metabolite profiling of flavonoids in Chinese volunteers after consumption of orange juice by UFLC-Q-TOF-MS/MS, Journal of Chromatography B. 1061–1062 (2017) 79–88. https://doi.org/10.1016/j.jchromb.2017.07.015.
[38] R.P. Feliciano, E. Mecha, M.R. Bronze, A. Rodriguez-Mateos, Development and validation of a high-throughput micro solid-phase extraction method coupled with ultra-high-performance liquid chromatography-quadrupole time-of-flight mass spectrometry for rapid identification and quantification of phenolic metabolites in human plasma and urine, Journal of Chromatography A. 1464 (2016) 21–31. https://doi.org/10.1016/j.chroma.2016.08.027.

[39] A.K. Sandhu, Y. Huang, D. Xiao, E. Park, I. Edirisinghe, B. Burton-Freeman, Pharmacokinetic Characterization and Bioavailability of Strawberry Anthocyanins Relative to Meal Intake, J. Agric. Food Chem. 64 (2016) 4891–4899. https://doi.org/10.1021/acs.jafc.6b00805.
[40] A.K. Sandhu, M.G. Miller, N. Thangthaeng, T.M. Scott, B. Shukitt-Hale, I. Edirisinghe, B. Burton-Freeman, Metabolic fate of strawberry polyphenols after chronic intake in healthy older adults, Food Funct. 9 (2018) 96–106. https://doi.org/10.1039/C7FO01843F.
[41] E. Mecha, R.P. Feliciano, A. Rodriguez-Mateos, S.D. Silva, M.E. Figueira, M.C. Vaz Patto, M.R. Bronze, Human bioavailability of phenolic compounds found in common beans: the use of high-resolution MS to evaluate inter-individual variability, Br J Nutr. 123 (2020) 273–292. https://doi.org/10.1017/S0007114519002836.
[42] G. Pereira-Caro, J.L. Ordóñez, I. Ludwig, S. Gaillet, P. Mena, D. Del Rio, J.-M. Rouanet, K.A. Bindon, J.M. Moreno-Rojas, A. Crozier, Development and validation of an UHPLC-HRMS protocol for the analysis of flavan-3-ol metabolites and catabolites in urine, plasma and feces of rats fed a red wine proanthocyanidin extract, Food Chemistry. 252 (2018) 49–60. https://doi.org/10.1016/j.foodchem.2018.01.083.
[43] M. Martínez-Huélamo, S. Tulipani, X. Torrado, R. Estruch, R.M. Lamuela-Raventós, Validation of a New LC-MS/MS Method for the Detection and Quantification of Phenolic Metabolites from Tomato Sauce in Biological Samples, J. Agric. Food Chem. 60 (2012) 4542–4549. https://doi.org/10.1021/jf205266h.
[44] M. Wu, X. Wu, D. Zhang, F. Qiu, L. Ding, H. Ma, X. Chen, Metabolic profiling of quercetin in rats using ultra-performance liquid chromatography/quadrupole-time-of-flight mass spectrometry, Biomedical Chromatography. 31 (2017) e4016. https://doi.org/10.1002/bmc.4016.
[45] J. Lee, S.E. Ebeler, J.A. Zweigenbaum, A.E. Mitchell, UHPLC-(ESI)QTOF MS/MS Profiling of Quercetin Metabolites in Human Plasma Postconsumption of Applesauce Enriched with Apple Peel and Onion, J. Agric. Food Chem. 60 (2012) 8510–8520. https://doi.org/10.1021/jf302637t.
[46] M. Gómez-Juaristi, S. Martínez-López, B. Sarria, L. Bravo, R. Mateos, Absorption and metabolism of yerba mate phenolic compounds in humans, Food Chemistry. 240 (2018) 1028–1038. https://doi.org/10.1016/j.foodchem.2017.08.003.
[47] N. Hayasaka, N. Shimizu, T. Komoda, S. Mohri, T. Tsushida, T. Eitsuka, T. Miyazawa, K. Nakagawa, Absorption and Metabolism of Luteolin in Rats and Humans in Relation to in Vitro Anti-inflammatory Effects, J. Agric. Food Chem. 66 (2018) 11320-11329. https://doi.org/10.1021/acs.jafc.8b03273.
[48] W. Zhao, Z. Shang, Q. Li, M. Huang, W. He, Z. Wang, J. Zhang, Rapid Screening and Identification of Daidzein Metabolites in Rats Based on UHPLC-LTQ-Orbitrap Mass Spectrometry Coupled with Data-Mining Technologies, Molecules. 23 (2018) 151. https://doi.org/10.3390/molecules23010151.
[49] S. Saha, P.A. Kroon, A Simple and Rapid LC-MS/MS Method for Quantification of Total Daidzein, Genistein, and Equol in Human Urine, Journal of Analytical Methods in Chemistry. 2020 (2020) 1–9. https://doi.org/10.1155/2020/2359397.
[50] J. Zhang, Q. Guo, M. Wei, J. Bai, J. Huang, Y. Liu, Z. Su, X. Qiu, Metabolite Identification and Pharmacokinetic Profiling of Isoflavones from Black Soybean in Rats Using Ultrahigh-Performance Liquid Chromatography with Linear-Ion-Trap–Orbitrap and Triple-Quadrupole Tandem Mass Spectrometry, J. Agric. Food Chem. 66 (2018) 12941–12952. https://doi.org/10.1021/acs.jafc.8b04852.
[51] S. Tulipani, M. Martinez Huelamo, M. Rotches Ribalta, R. Estruch, E.E. Ferrer, C. Andres-Lacueva, M. Illan, R.M. Lamuela-Raventós, Oil matrix effects on plasma exposure and urinary excretion of phenolic compounds from tomato sauces: Evidence from a human pilot study, Food Chemistry. 130 (2012) 581–590. https://doi.org/10.1016/j.foodchem.2011.07.078.

[52] F. Castello, M.-S. Fernández-Pachón, I. Cerrillo, B. Escudero-López, Á. Ortega, A. Rosi, L. Bresciani, D. Del Rio, P. Mena, Absorption, metabolism, and excretion of orange juice (poly)phenols in humans: The effect of a controlled alcoholic fermentation, Archives of Biochemistry and Biophysics. 695 (2020) 108627. https://doi.org/10.1016/j.abb.2020.108627.
[53] Q. Jiao, L. Xu, L. Jiang, Y. Jiang, J. Zhang, B. Liu, Metabolism study of hesperetin and hesperidin in rats by UHPLC-LTQ-Orbitrap MS $^{n}$ , Xenobiotica. 50 (2020) 1311–1322. https://doi.org/10.1080/00498254.2019.1567956.
[54] C.D. Kay, G. Mazza, B.J. Holub, J. Wang, Anthocyanin metabolites in human urine and serum, Br J Nutr. 91 (2004) 933–942. https://doi.org/10.1079/BJN20041126.
[55] I.A. Ludwig, P. Mena, L. Calani, G. Borges, G. Pereira-Caro, L. Bresciani, D. Del Rio, M.E.J. Lean, A. Crozier, New insights into the bioavailability of red raspberry anthocyanins and ellagitannins, Free Radical Biology and Medicine. 89 (2015) 758–769. https://doi.org/10.1016/j.freeradbiomed.2015.10.400.
[56] D.N. Cooke, S. Thomasset, D.J. Boocock, M. Schwarz, P. Winterhalter, W.P. Steward, A.J. Gescher, T.H. Marczylo, Development of Analyses by High-Performance Liquid Chromatography and Liquid Chromatography/Tandem Mass Spectrometry of Bilberry ( *Vaccinium myrtilus* ) Anthocyanins in Human Plasma and Urine, J. Agric. Food Chem. 54 (2006) 7009–7013. https://doi.org/10.1021/jf061562q.
[57] S. Yuste, A. Macià, I.A. Ludwig, M.-P. Romero, S. Fernández-Castillejo, Ú. Catalán, M.-J. Motilva, L. Rubió, Validation of Dried Blood Spot Cards to Determine Apple Phenolic Metabolites in Human Blood and Plasma After an Acute Intake of Red-Fleshed Apple Snack, Mol. Nutr. Food Res. 62 (2018) 1800623. https://doi.org/10.1002/mnfr.201800623.
[58] M. Gómez-Juaristi, S. Martínez-López, B. Sarria, L. Bravo, R. Mateos, Bioavailability of hydroxycinnamates in an instant green/roasted coffee blend in humans. Identification of novel colonic metabolites, Food Funct. 9 (2018) 331–343. https://doi.org/10.1039/C7FO01553D.
[59] J.K. Aschoff, K.M. Riedl, J.L. Cooperstone, J. Högel, A. Bosy-Westphal, S.J. Schwartz, R. Carle, R.M. Schweiggert, Urinary excretion of Citrus flavanones and their major catabolites after consumption of fresh oranges and pasteurized orange juice: A randomized cross-over study, Mol. Nutr. Food Res. 60 (2016) 2602–2610. https://doi.org/10.1002/mnfr.201600315.
[60] C. Marmet, L. Actis-Goretta, M. Renouf, F. Giuffrida, Quantification of phenolic acids and their methylates, glucuronides, sulfates and lactones metabolites in human plasma by LC–MS/MS after oral ingestion of soluble coffee, Journal of Pharmaceutical and Biomedical Analysis. 88 (2014) 617–625. https://doi.org/10.1016/j.jpba.2013.10.009.
[61] M. Martínez-Huélamo, A. Vallverdú-Queralt, G. Di Lecce, P. Valderas-Martínez, S. Tulipani, O. Jáuregui, E. Escribano-Ferrer, R. Estruch, M. Illan, R.M. Lamuela-Raventós, Bioavailability of tomato polyphenols is enhanced by processing and fat addition: Evidence from a randomized feeding trial, Mol. Nutr. Food Res. 60 (2016) 1578–1589. https://doi.org/10.1002/mnfr.201500820.
[62] D. Scherbl, M. Renouf, C. Marmet, L. Poquet, I. Cristiani, S. Dahbane, S. Emady-Azar, J. Sauser, J. Galan, F. Dionisi, E. Richling, Breakfast consumption induces retarded release of chlorogenic acid metabolites in humans, Eur Food Res Technol. 243 (2017) 791–806. https://doi.org/10.1007/s00217-016-2793-y.
[63] A. Esteban-Fernández, C. Ibañez, C. Simó, B. Bartolomé, M.V. Moreno-Arribas, An Ultrahigh-Performance Liquid Chromatography–Time-of-Flight Mass Spectrometry Metabolomic Approach to Studying the Impact of Moderate Red-Wine Consumption on Urinary Metabolome, Journal of Proteome Research. 17 (2018) 1624–1635.
[64] Z. Zhang, M. Xu, S. Sun, X. Qiao, B. Wang, J. Han, D. Guo, Metabolic analysis of four phenolic acids in rat by liquid chromatography–tandem mass spectrometry, J. Chromatogr. B. 87 (2008) 7–14. https://doi.org/10.1016/j.jchromb.2008.06.019.

[65] A. Stalmach, W. Mullen, D. Barron, K. Uchida, T. Yokota, C. Cavin, H. Steiling, G. Williamson, A. Crozier, Metabolite Profiling of Hydroxycinnamate Derivatives in Plasma and Urine after the Ingestion of Coffee by Humans: Identification of Biomarkers of Coffee Consumption, Drug Metab Dispos. 37 (2009) 1749–1758. https://doi.org/10.1124/dmd.109.028019.
[66] G. Pereira-Caro, M.N. Clifford, T. Polyviou, I.A. Ludwig, H. Alfheeaid, J.M. Moreno-Rojas, A.L. Garcia, D. Malkova, A. Crozier, Plasma pharmacokinetics of (poly)phenol metabolites and catabolites after ingestion of orange juice by endurance trained men, Free Radical Biology and Medicine. 160 (2020) 784–795. https://doi.org/10.1016/j.freeradbiomed.2020.09.007.
[67] C. Favari, P. Mena, C. Curti, G. Istas, C. Heiss, D. Del Rio, A. Rodriguez-Mateos, Kinetic profile and urinary excretion of phenyl-γ-valerolactones upon consumption of cranberry: a dose–response relationship, Food Funct. 11 (2020) 3975–3985. https://doi.org/10.1039/D0FO00806K.
[68] A. Anesi, P. Mena, A. Bub, M. Ulaszewska, D. Del Rio, S.E. Kulling, F. Mattivi, Quantification of Urinary Phenyl-γ-Valerolactones and Related Valeric Acids in Human Urine on Consumption of Apples, Metabolites. 9 (2019) 254. https://doi.org/10.3390/metabo9110254.
[69] M. Rotches-Ribalta, C. Andres-Lacueva, R. Estruch, E. Escribano, M. Urpi-Sarda, Pharmacokinetics of resveratrol metabolic profile in healthy humans after moderate consumption of red wine and grape extract tablets, Pharmacological Research. 66 (2012) 375–382. https://doi.org/10.1016/j.phrs.2012.08.001.
[70] Z. Qiu, J. Yu, Y. Dai, X. Chen, F. Huang, N. Li, A simple LC–MS/MS method for the simultaneous quantification of resveratrol and its major phase II metabolites: Assessment of their urinary and biliary excretions in rats, Journal of Chromatography B. 1048 (2017) 85–93. https://doi.org/10.1016/j.jchromb.2017.02.011.
[71] L. Svilar, J.-C. Martin, C. Defoort, C. Paut, F. Tourniaire, A. Brochot, Quantification of trans-resveratrol and its metabolites in human plasma using ultra-high performance liquid chromatography tandem quadrupole-orbitrap mass spectrometry, Journal of Chromatography B. 1104 (2019) 119–129. https://doi.org/10.1016/j.jchromb.2018.11.016.
[72] C.A. Daykin, J.P.M.V. Duynhoven, A. Groenewegen, M. Dachtler, J.M.M.V. Amelsvoort, T.P.J. Mulder, Nuclear Magnetic Resonance Spectroscopic Based Studies of the Metabolism of Black Tea Polyphenols in Humans, J. Agric. Food Chem. 53 (2005) 1428–1434. https://doi.org/10.1021/jf048439o.