<*Natural Product Reports*>

Supporting Information

Advances and challenges in Ginseng research from 2011 to 2020: the phytochemistry, quality control, metabolism, and biosynthesis

Covering: 2011 to the end of 2020

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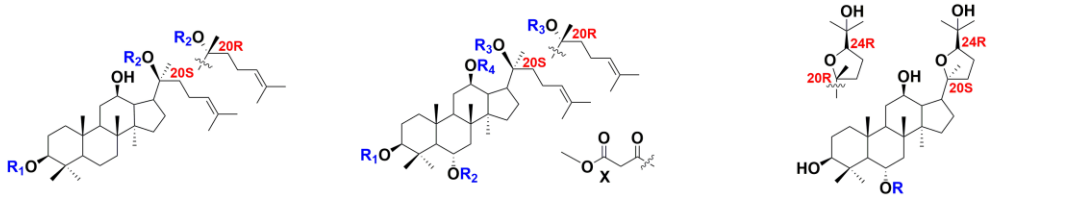

1 R_1=Glc(2,1)Glc, R_2=Glc(6,1)(4-Mal)Glc
2 R_1=Glc(2,1)(3-Mal)Glc, R_2=Glc(6,1)Glc
3 R_1=Glc(2,1)(6-Mal)Glc, R_2=Glc(6,1)Xyl
4 R_1=Glc(2,1)(4-Mal)Glc, R_2=Glc(6,1)Ara(*p*)
5 R_1=Glc(2,1)(3-Mal)Glc, R_2=Glc(6,1)Ara(*p*)
6 R_1=Glc(2,1)(3-Mal)Glc, R_2=Glc(6,1)Ara(*f*)
7 R_1=Glc(2,1)(2-Mal)Glc, R_2=Glc
8 R_1=Glc(2,1)(3-Mal)Glc, R_2=Glc
9 R_1=Glc(2,1)(4-Mal)Glc, R_2=Glc
10 R_1=Glc(2,1)Glc, R_2=(3-Mal)Glc
11 R_1=Glc(2,1)Glc, R_2=(6-Mal)Glc
12 R_1=Glc(2,1)(6-Mal)Glc, R_2=(6-Mal)Glc
13 R_1=Glc(2,1)Glc, R_2=CH_3 (20*S*)
14 R_1=Glc(2,1)Glc, R_2=CH_3 (20*R*)
15 R_1=Glc(2,1)Glc(4,1)Glc, R_2=Glc
16 R_1=Glc(2,1)Glc(4,1)Glc(4,1)Glc, R_2=Glc
17 R_1=Glc(6,1)Xyl, R_2=Glc(6,1)Glc
18 R_1=Glc(2,1)[Glc(6-AcO)], R_2=Glc(6,1)Glc
19 R_1=Glc(2,1)[Glc(6-AcO)], R_2=Glc(6,1)Ara(*f*)
20 R_1=Glc(2,1)Glc(2,1)Xyl, R_2=Glc(6,1)Ara(*p*)
21 R_1=Glc(2,1)Glc, R_2=Glc(6,1)Glc(6,1)Ara(*f*)

22 R_1=H, R_2=Glc(2,1)Rha, R_3=Glc(4,1)Glc, R_4=H
23 R_1=H, R_2=(6-Mal)Glc(2,1)Rha, R_3=Glc, R_4=H
24 R_1=H, R_2=Glc(2,1)Rha, R_3=(2-Mal)Glc, R_4=H
25 R_1=H, R_2=Glc(2,1)Rha, R_3=(4-Mal)Glc, R_4=H
26 R_1=H, R_2=Glc(4,1)Glc, R_3=H, R_4=H
27 R_1=H, R_2=Glc(2,1)Rha, R_3=(6-Mal)Glc, R_4=H
28 R_1=H, R_2=Glc, R_3=Glc(2,1)Rha, R_4=H
29 R_1=H, R_2=Glc(4,1)Glc, R_3=(6-AcO)Glc, R_4=H
30 R_1=H, R_2=Glc(2,1)Glc, R_3=Glc(4,1)Glc, R_4=H
31 R_1=R_2=H, R_3=Glc(6,1)Glc(6,1)Xyl, R_4=H
32 R_1=H, R_2=Glc(6-BuO), R_3=R_4=H
33 R_1=H, R_2=Xyl(2,1)Xyl, R_3=R_4=H
34 R_1=H, R_2=Glc(2,1)Glc, R_3=R_4=H (20*R*)
35 R_1=R_2=H, R_3=Glc(6,1)Ara(*f*)(5,1)Xyl, R_4=H
36 R_1=Glc(2,1)Glc, R_2=H, R_3=Glc(6,1)Ara(*f*), R_4=H
37 R_1=Glc(2,1)Glc, R_2=H, R_3=Glc(6,1)Ara(*p*)(4,1)Xyl, R_4=H
38 R_1=H, R_2=Ac, R_3=R_4=H
39 R_1=H, R_2=(6-BuO)Glc, R_3=R_4=H
40 R_1=H, R_2=(6-AcO)Glc(2,1)Xyl, R_3=R_4=H
41 R_1=H, R_2=Glc, R_3=Ara(*p*), R_4=H
42 R_1=H, R_2=Ara(*p*), R_3=Glc, R_4=H
43 R_1=H, R_2=Glc(2,1)Ara(*f*), R_3=Glc, R_4=H
44 R_1=H, R_2=Glc(2,1)Xyl, R_3=Glc(6,1)Glc, R_4=H
45 R_1=Glc, R_2=R_3=R_4=H (20*R*)
46 R_1=H, R_2=(6-AcO)Glc, R_3=R_4=H
47 R_1=H, R_2=Glc, R_3=Xyl, R_4=H
48 R_1=Glc(2,1)Glc, R_2=R_3=H, R_4=Glc
49 R_1=Glc, R_2=R_3=R_4=H
50 R_1=CHO, R_2=H, R_3=Glc, R_4=H
51 R_1=R_2=R_3=R_4=H
52 R_1=Mal, R_2=H, R_3=Glc(6,1)Ara(*p*), R_4=H
53 R_1=R_2=H, R_3=Glc(6-X), R_4=H
54 R_1=Ac, R_2=H, R_3=Glc, R_4=H
55 R_1=H, R_2=Ara(*p*)(2,1)Rha, R_3=Glc, R_4=H

56 R=Glc(2,1)Rha (20*R*)
57 R=Glc(2,1)Glc

58 R_1=[GlcA(6-O-*n*-butyl)](2,1)Glc, R_2=Glc
59 R_1=GlcA(6-S), R_2=Glc
60 R_1=[GlcA(6-S)](4,1)Ara(*f*), R_2=Glc
61 R_1=[GlcA(6-S)](2,1)Glc, R_2=H
62 R_1=[GlcA(6-ethyl)](2,1)Glc, R_2=H

Fig. S1 Structures for the ginsenosides of the PPD, PPT, OT, and OA types isolated from the *Panax* genus from 2011 to 2020.

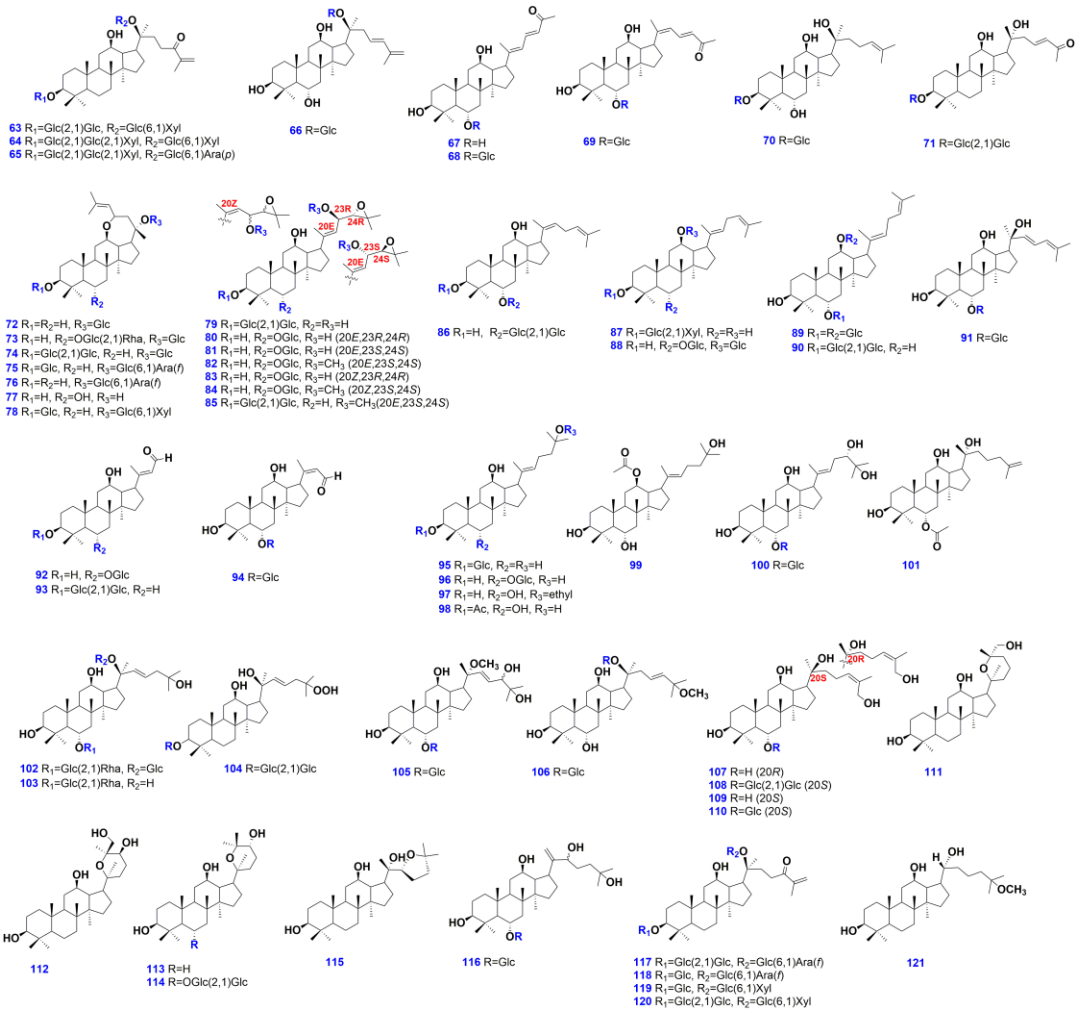

Fig. S2 Structures for the ginsenosides of the C-17 side chain varied type isolated from the *Panax* genus from 2011 to 2020.

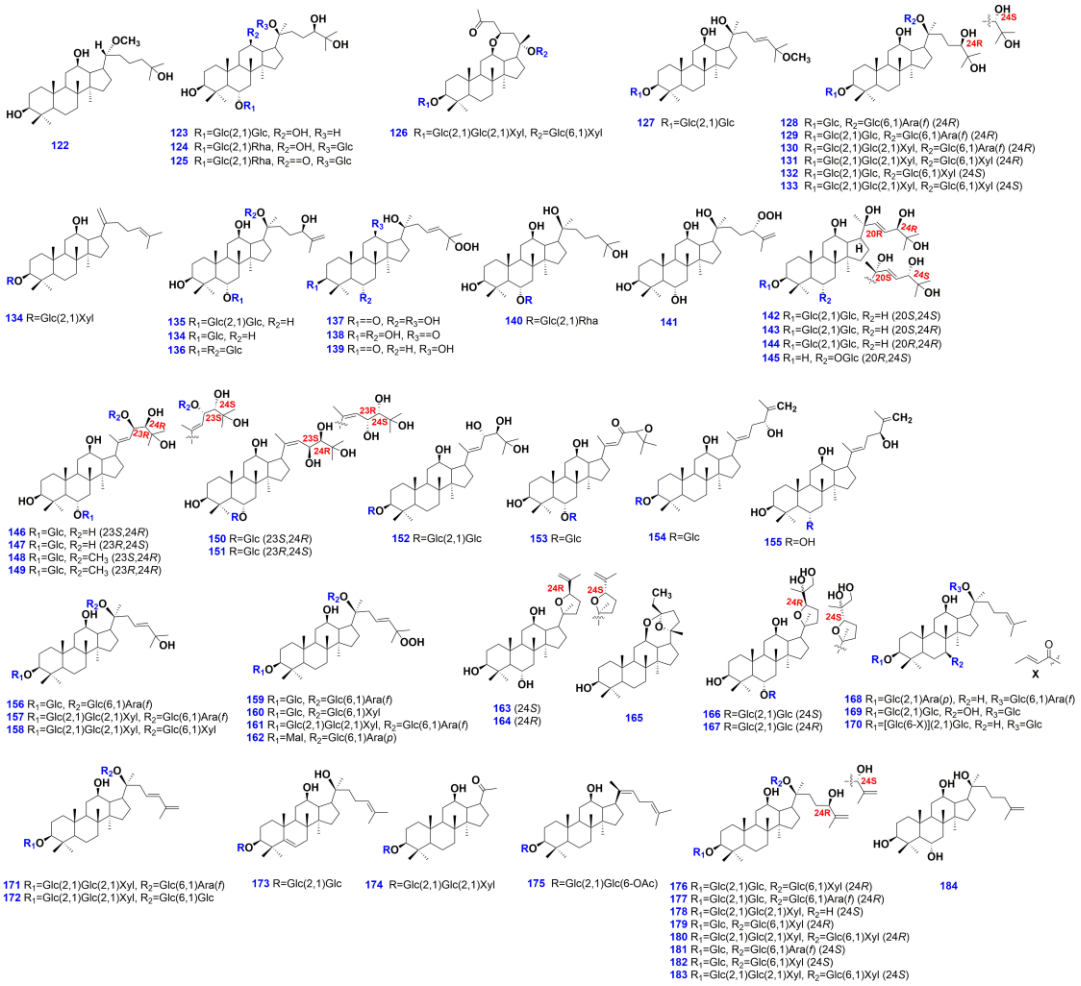

Fig. S2 Structures for the ginsenosides of the C-17 side chain varied type isolated from the *Panax* genus from 2011 to 2020. (continued)

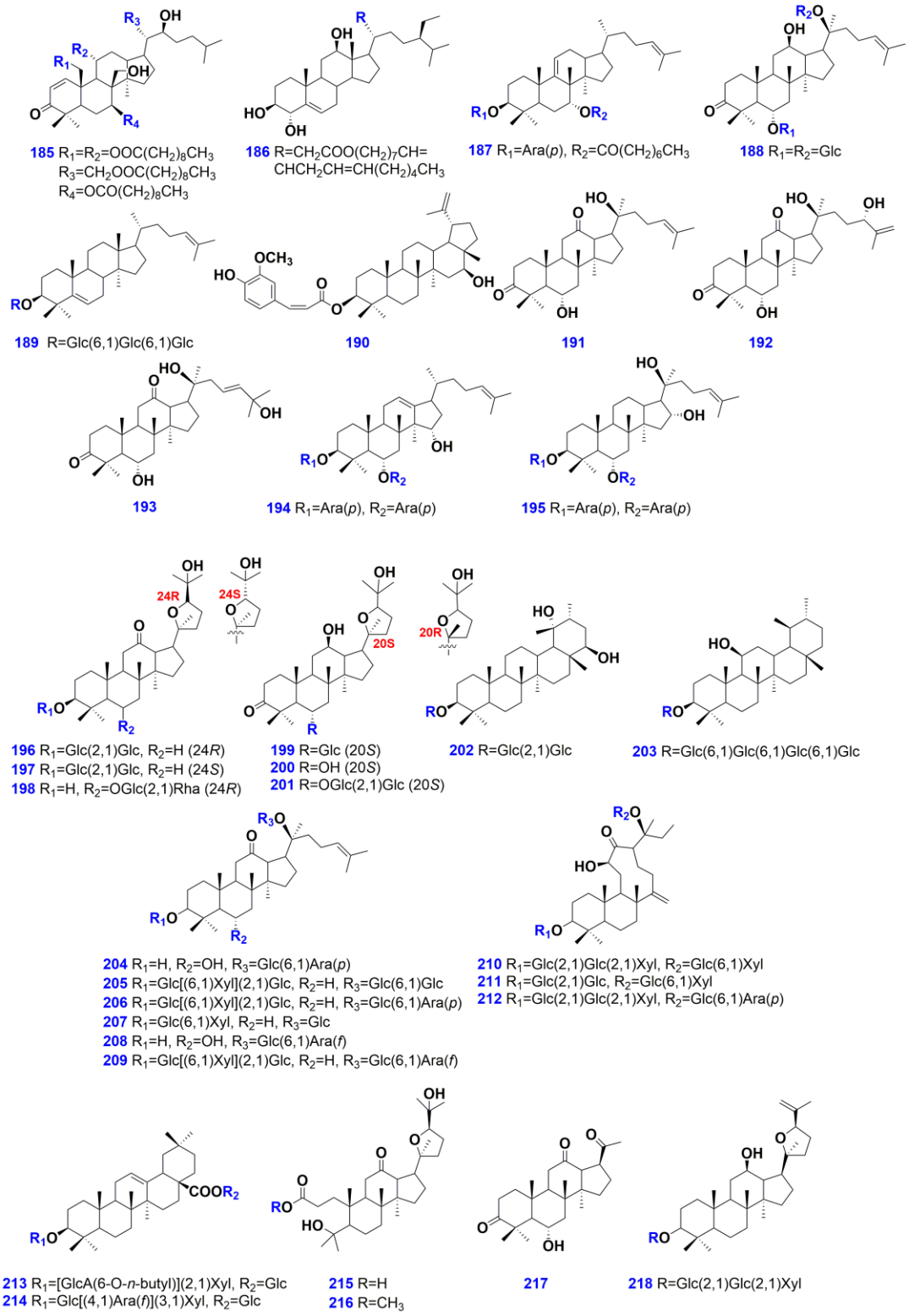

Fig. S3 Structures for the miscellaneous ginsenosides isolated from the *Panax* genus from 2011 to 2020.

Table S1 The abbreviations used in this review.

Medicine	Reagent	Extraction Method	Analysis Technology	Analysis Method	Others
PG: *P. ginseng*; **PGL:** leaf of *P. ginseng;* **PJ:** *P. japonicus* C. A. Meyer; **PJm:** *P. japonicus* var. *major* (Burk.) C.Y. Wu & K.M. Feng; **PN:** *P. notoginseng*; **PQ:** *P. quinquefolius;* **RG:** Red ginseng; **PS:** *P.*	**SEVAGE：** a mixture of trichloromethane and *n*-butanol with the volume ratio of 4 :1; **PMP：** 1-phenyl-3-methyl -5-pyrazolinone; **Glc:** glucose; **Gal:** galactose; **Rha:** rhamnose; **Man:** mannose; **Ara:** arabinose; **Xyl:** xylose; **GlcA:** glucuronic acid; **GalA:** galacturonic acid; **MTBE:** methyl tert-butyl ether; **FA:** formic acid; **AA:** ammonium acetate	**CSE:** cold-soaked extraction; **WDE:** water decoction extraction; **HRE:** heat reflux extraction; **SE:** Soxhlet extraction; **UAE:** ultrasound-assisted extraction; **MAE:** microwave-assisted extraction; **HBE:** heating-block extraction; **HES:** heating solvent extraction; **PLE:** pressurized liquid extraction; **DLLME:** dispersive liquid-liquid microextraction; **LLE:** liquid-liquid	**GC:** gas chromatography; **1D-/2D-NMR:** one-dimensional and two-dimensional nuclear magnetic resonance; **SXRD:** *X*-ray diffraction; **ECD:** and electronic circular dichroism; **LC-MS:** liquid chromatography mass spectrometry; **HPGPC:** High-performance gel permeation chromatography; **HPSEC:** high-performance size exclusion chromatography; **HPGFC:** high-performance gel filtration chromatography; **RID:** refractive index detector; **ELSD:** evaporative light scattering detector; **MALLS:** multi-angle laser light scattering detector; **DP-ALLS:** and differential pressure viscometer-angle laser light scattering detector; **IR:** Infrared spectrophotometry; **GC-MS:** gas chromatography mass	**MDC:** multi-dimensional chromatography; **IEC:** ion exchange chromatography; **2D-LC:** two-dimensional liquid chromatography; **MHC-2D LC:** multiple heart-cutting 2D-LC; **HILIC:** hydrophilic interaction chromatography; **RPC:** reversed-phase chromatography; **DDA:** Data-dependent acquisition; **DIA:** Data-independent acquisition; **IM-QTOF:** ion mobility/quadrupole time-of-flight; **DE:** dynamic exclusion; **PIL:** precursor ion list; **MDF:** mass defect filtering; **IDA-EPI:** information-dependent	**TCMs:** Traditional Chinese Medicines; **PPD:** protopanaxadiol; **PPT:** protopanaxatriol; **OT:** octillol; **OA:** oleanolic acid; **CPMs:** Chinese patent medicines; **CCS:** collision cross section; **ESI:** electron spray ionization; ***m/z*:** mass-to-charge ratio; **MS^n:** multi-stage tandem mass spectrometry; **DNA:** deoxyribonucleic acid; **AD:** Alzheimer's disease; **DDI:** drug-drug interaction; ***AUC_t*:** the area under

Medicine	Reagent	Extraction Method	Analysis Technology	Analysis Method	Others
sokpayensis; **PB:** *P. bipinnatifidus*		extraction; **SPE:** solid phase extraction; **SFE:** supercritical fluid extraction; **HHP-EH:** high hydrostatic pressure and enzymatic hydrolysis; **PEF-CPEF:** pulsed electric field combined with commercial enzyme	spectrometry; **HDMS^{E}:** high-definition MS^{E}; **MSI:** Mass spectrometry imaging; **MALDI:** matrix assisted laser desorption ionization; **SI-MSI:** secondary ion mass spectrometry imaging; **DESI:** desorption electrospray ionization; **HPLC:** high performance liquid chromatography; **UPLC:** ultra-performance liquid chromatography; **UHPLC:** ultra-high performance liquid chromatography; **CE-MS:** capillary electrophoresis mass spectrometry; **UHPSFC:** ultra-high performance supercritical fluid chromatography; **LC-CAD:** liquid chromatography charged aerosol detection; **FT-NIR:** Fourier transform near-infrared spectroscopy	acquisition/enhanced product ion scans; **AIF:** all ions fragmentation; **SWATH:** sequential windowed acquisition of all theoretical fragment ions; **MRM:** multiple reaction monitoring; **SRM:** selective reaction monitoring; **SIM:** selective ion monitoring; **PCA:** principal components analysis; **PCR:** polymerase chain reaction; **PLS-DA:** partial least squares-discriminant analysis; **OPLS-DA:** orthogonal partial least squares-discriminant analysis	the plasma concentration versus time curve from 0 h to the last measurable concentration; **C_{max}:** maximum plasma concentration; **t_{max}:** time required to reach maximum plasma concentration

Table S2 Information for the ginsenosides isolated from the *Panax* genus from 2011 to 2020.

No.	Trivial Name	M.F.	Source	Ref.
PPD-Type (1–21)				
1	malonylfloralginsenoside Rb1	$C_{57}H_{94}O_{26}$	PG (flower bud)	43
2	malonylfloralginsenoside Rb2	$C_{57}H_{94}O_{26}$	PG (flower bud)	43
3	malonylfloralginsenoside Rc1	$C_{56}H_{92}O_{25}$	PG (flower bud)	43
4	malonylfloralginsenoside Rc2	$C_{56}H_{92}O_{25}$	PG (flower bud)	43
5	malonylfloralginsenoside Rc3	$C_{56}H_{92}O_{25}$	PG (flower bud)	43
6	malonylfloralginsenoside Rc4	$C_{56}H_{92}O_{25}$	PG (flower bud)	43
7	malonylfloralginsenoside Rd1	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
8	malonylfloralginsenoside Rd2	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
9	malonylfloralginsenoside Rd3	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
10	malonylfloralginsenoside Rd4	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
11	malonylfloralginsenoside Rd5	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
12	malonylfloralginsenoside Rd6	$C_{54}H_{86}O_{24}$	PG (flower bud)	43
13	20(*S*)-methoxyl-ginsenoside Rg3	$C_{43}H_{74}O_{13}$	PG (flower bud)	58
14	20(*R*)-methoxyl-ginsenoside Rg3	$C_{43}H_{74}O_{13}$	PG (flower bud)	58
15	ginsenoside Rb4	$C_{54}H_{92}O_{23}$	PG	59
16	ginsenoside Rb5	$C_{60}H_{102}O_{28}$	PG	59
17	chikusetsusaponin VII	$C_{53}H_{90}O_{22}$	PJ (rhizome and root)	60
18	6″-*O*-acetylginsenoside Rb1	$C_{56}H_{94}O_{24}$	PQ (root)	61
19	ginsenoside Rs11	$C_{55}H_{92}O_{23}$	PG (root)	62
20	notoginsenoside FZ	$C_{58}H_{98}O_{26}$	PN (leaf)	55
21	quinquenoside Jb	$C_{59}H_{100}O_{27}$	PQ (root)	63

No.	Trivial Name	M.F.	Source	Ref.
PPT-Type (22–55)				
22	quinquenoside Ja	$C_{54}H_{92}O_{23}$	PQ (root)	63
23	malonylfloralginsenoside Re1	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
24	malonylfloralginsenoside Re2	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
25	malonylfloralginsenoside Re3	$C_{51}H_{84}O_{21}$	PG (flower bud)	43
26	20(*S*)-ginsenoside-Rf-1a	$C_{42}H_{72}O_{14}$	RG	65
27	malonyl-ginsenoside Re	$C_{51}H_{84}O_{21}$	PG (flower bud)	66
28	ginsenoside Rg18	$C_{42}H_{72}O_{14}$	PG (root)	62
29	6-acetyl ginsenoside Rg3	$C_{50}H_{84}O_{20}$	PG (root)	62
30	6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-20-*O*-[*β*-D-glucopyranosyl-(1→4)-*β*-D-glucopyranosyl]-20(*S*)-protopanaxatriol	$C_{54}H_{92}O_{24}$	PJ (rhizome and root)	67
31	(20*S*)-20-*O*-[*β*-D-xylopyranosyl-(1→6)-*β*-D-glucopyranosyl-(1→6)-*β*-D-glucopyranosyl]dammar-24-ene-3*β*,6*α*,12*β*,20-tetrol	$C_{47}H_{80}O_{18}$	PN (root)	68
32	(20*S*)-6-*O*-[(*E*)-but-2-enoyl-(1→6)-*β*-D-glucopyranosyl] dammar-24-ene-3*β*,6*α*,12*β*,20-tetrol	$C_{40}H_{66}O_{10}$	PN (root)	68
33	(20*S*)-6-*O*-[*β*-D-xylopyranosyl-(1→2)-*β*-D-xylopyranosyl] dammar-24-ene-3*β*,6*α*,12*β*,20-tetrol	$C_{40}H_{68}O_{12}$	PN (root)	68
34	20(*R*)-ginsenoside Rf	$C_{42}H_{71}O_{14}$	RG	69
35	chikusetsusaponin LM_3	$C_{46}H_{78}O_{17}$	PJ (leaf)	70
36	chikusetsusaponin LM_5	$C_{53}H_{90}O_{23}$	PJ (leaf)	70
37	chikusetsusaponin LM_6	$C_{58}H_{98}O_{27}$	PJ (leaf)	70
38	6*α*-acetoxy-3*β*,12*β*,20*R*-trihydroxydammar-24-ene	$C_{32}H_{54}O_5$	PG (stem and leaf)	71
39	20(*S*)-sanchirhinoside A_1	$C_{40}H_{66}O_{10}$	PN (root)	72
40	20(*S*)-sanchirhinoside A_2	$C_{43}H_{72}O_{14}$	PN (root)	72
41	20(*S*)-sanchirhinoside A_3	$C_{41}H_{70}O_{13}$	PN (root)	72
42	20(*S*)-sanchirhinoside A_4	$C_{41}H_{70}O_{13}$	PN (root)	72

No.	Trivial Name	M.F.	Source	Ref.
43	20(*S*)-sanchirhinoside A_5	$C_{47}H_{80}O_{18}$	PN (root)	72
44	20(*S*)-sanchirhinoside A_6	$C_{53}H_{90}O_{23}$	PN (root)	72
45	20(*R*)-ginsenoside Rh19	$C_{36}H_{62}O_9$	PG (stem and leaf)	73
46	20(*S*)-ginsenoside-Rh1-6′-acetate	$C_{38}H_{64}O_{10}$	PG (stem and leaf)	74
47	6-*O*-(*β*-D-glucopyranosyl)-20-*O*-(*β*-D-xylopyranosyl)-3*β*,6*α*,12*β*,20(*S*)-tetrahydroxydammar-ene	$C_{41}H_{70}O_{13}$	PN (root)	75
48	chikusetsusaponin LM_4	$C_{48}H_{82}O_{19}$	PJ (leaf)	70
49	ginsenosides Rh19	$C_{36}H_{62}O_9$	PG (stem and leaf)	76
50	3-formyloxy-20-*O*-*β*-D-glucopyranosyl-20(*S*)-protopanaxtriol	$C_{37}H_{62}O_{10}$	PG (leaf)	77
51	dammar-24-ene-3*α*,6*α*,12*β*,20*S*-tetraol (ginsengenin-S1)	$C_{30}H_{52}O_4$	PG	79
52	notoginsenosides NL-D	$C_{44}H_{72}O_{16}$	PN (leaf)	80
53	6’ -malonyl formyl ginsenoside F1	$C_{40}H_{66}O_{12}$	PG (flower bud)	81
54	3*β*-eacetoxyl ginsenoside F1	$C_{38}H_{64}O_{10}$	PG (flower bud)	81
55	ginsenoside Rh24	$C_{47}H_{80}O_{17}$	PG (flower bud)	81
OT-Type (56–57)				
56	20(*R*)-pseudoginsenoside F11	$C_{42}H_{72}O_{14}$	Red PQ (root)	82
57	24(*R*)-majoroside R1	$C_{42}H_{72}O_{15}$	PJ (rhizome and root)	67
OA-Type (58–62)				
58	ginsenoside Ro-6′-*O*-butyl ester	$C_{52}H_{84}O_{19}$	RG	65
59	baisanqisaponin A	$C_{59}H_{90}O_{16}$	PJ (root)	83
60	baisanqisaponin B	$C_{64}H_{98}O_{20}$	PJ (root)	83

No.	Trivial Name	M.F.	Source	Ref.
61	baisanqisaponin C	$C_{59}H_{90}O_{16}$	PJ (root)	83
62	chikusetsusaponin V ethyl ester	$C_{50}H_{80}O_{19}$	PJ (root)	83
C17-side chain varied (63–184)				
63	notoginsenoside LK1	$C_{53}H_{88}O_{23}$	PN (stem and leaf)	64
64	notoginsenoside LK4	$C_{58}H_{96}O_{27}$	PN (stem and leaf)	64
65	notoginsenoside LK5	$C_{58}H_{96}O_{27}$	PN (stem and leaf)	64
66	ginsenoside LS1	$C_{36}H_{60}O_{9}$	PG (leaf)	78
67	27-demethyl-(*E*, *E*)-20(22),23-dien-3*β*,6*α*,12*β*-trihydr-oxydammar-25-one	$C_{29}H_{46}O_{4}$	PG (leaf)	84
68	notoginsenoside ST6	$C_{35}H_{57}O_{9}$	PN (steamed root)	56
69	notoginsenoside ST7	$C_{35}H_{57}O_{9}$	PN (steamed root)	56
70	3-O-*β*-D-glucopyranosyl-20(*S*)-protopanaxtriol	$C_{36}H_{62}O_{9}$	PG (leaf)	77
71	notoginsenoside SY3	$C_{41}H_{68}O_{14}$	PN	85
72	3*β*,20(*S*)-dihydroxydammar-24-en-12*β*,23*β*-epoxy-20-*O*-*β*-D-glucopyranoside	$C_{36}H_{60}O_{8}$	PG (leaf)	84
73	quinquefoloside Ld	$C_{48}H_{80}O_{18}$	PQ (leaf)	57
74	quinquefoloside Le	$C_{48}H_{80}O_{18}$	PQ (leaf)	57
75	notoginsenoside-LX	$C_{47}H_{78}O_{17}$	PN (leaf)	55
76	notoginsenoside-LY	$C_{41}H_{68}O_{12}$	PN (leaf)	55
77	12*β*,23(*R*)-epoxydammara-24-ene-3*β*,6*α*,20(*S*)-triol	$C_{30}H_{50}O_{4}$	PG (stem and leaf)	76
78	notoginsenoside Ng1	$C_{47}H_{78}O_{17}$	PN (leaf)	86
79	ginsenoside Rg11	$C_{42}H_{70}O_{14}$	PG (root)	87

No.	Trivial Name	M.F.	Source	Ref.
80	notoginsenoside SP12	$C_{36}H_{60}O_{10}$	PN (steamed root)	88
81	notoginsenoside SP13	$C_{36}H_{60}O_{10}$	PN (steamed root)	88
82	notoginsenoside SP14	$C_{37}H_{62}O_{10}$	PN (steamed root)	88
83	notoginsenoside SP15	$C_{36}H_{60}O_{10}$	PN (steamed root)	88
84	notoginsenoside SP16	$C_{37}H_{62}O_{10}$	PN (steamed root)	88
85	notoginsenoside SP17	$C_{43}H_{72}O_{14}$	PN (steamed root)	88
86	20(*Z*)-ginsenoside Rg9	$C_{42}H_{70}O_{13}$	RG	89
87	notoginsenoside ST11	$C_{41}H_{68}O_{11}$	PN (steamed root)	56
88	sanchirhinoside B	$C_{42}H_{70}O_{13}$	PN (root)	72
89	12-*O*-glucoginsenoside Rh4	$C_{42}H_{70}O_{13}$	PG (root)	87
90	20(*E*) ginsenoside Rg9	$C_{42}H_{70}O_{13}$	RG	89
91	notoginsenoside ST14	$C_{36}H_{60}O_{9}$	PN (steamed root)	56
92	notoginsenoside ST8	$C_{32}H_{52}O_{9}$	PN (steamed root)	56
93	notoginsenoside ST10	$C_{38}H_{62}O_{13}$	PN (steamed root)	56
94	notoginsenoside ST9	$C_{32}H_{52}O_{9}$	PN (steamed root)	56
95	ginsenosides Rh10	$C_{36}H_{62}O_{8}$	PG (root)	87
96	notoginsenoside ST13	$C_{36}H_{62}O_{9}$	PN (steamed root)	56
97	ginsenotransmetin B	$C_{32}H_{56}O_{4}$	PG (stem and leaf)	90
98	3*β*-acetoxy-6*α*,12*β*,25-trihydroxy-24,25-dihydrodammar-(*E*)-20(22)-ene	$C_{32}H_{54}O_{5}$	PG (stem and leaf)	71
99	12*β*-acetoxy-3*β*,6*α*,25-trihydroxy-24,25-dihydro-dammar-(*E*)-20(22)-ene	$C_{32}H_{54}O_{5}$	PG (stem and leaf)	71
100	notoginsenoside ST-7	$C_{36}H_{62}O_{10}$	PN (root,	91

No.	Trivial Name	M.F.	Source	Ref.
			fermented)	
101	6*α*-acetoxy-3*β*,12*β*,20*R*-trihydroxydammar-25-ene	$C_{32}H_{54}O_5$	PG (stem and leaf)	71
102	ginsenoside Re7	$C_{48}H_{82}O_{19}$	PG (root)	62
103	ginsenosides Rh20	$C_{42}H_{72}O_{14}$	PG (stem and leaf)	76
104	ginsenoside Rg12	$C_{42}H_{72}O_{15}$	PG (root)	92
105	notoginsenoside SP20	$C_{37}H_{64}O_{11}$	PN (steamed root)	93
106	ginsenoside Rh23	$C_{37}H_{64}O_{10}$	PG (leaf)	94
107	ginsenotransmetin C	$C_{30}H_{52}O_5$	PG (stem and leaf)	90
108	panajaponol A	$C_{42}H_{72}O_{15}$	PJm (root)	95
109	26-hydroxyl-24(*E*)-20(*S*)-protopanaxtriol	$C_{30}H_{52}O_5$	PG (leaf)	77
110	yesanchinoside R3	$C_{36}H_{62}O_{10}$	PJ (rhizome)	96
111	dammar-20*S*,25*S*-epoxy-3*β*,12*β*,26-triol	$C_{30}H_{52}O_4$	PQ (stem and leaf)	97
112	24,26-dihydroxy-panaxdiol	$C_{30}H_{52}O_5$	RG	98
113	24-hydroxy-panaxdiol	$C_{30}H_{52}O_4$	RG	98
114	(20*S*)-6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-dammar-20,25-epoxy-3*β*,6*α*,12*β*,24*α*-tetriol	$C_{42}H_{72}O_{15}$	*Panacis majoris* (rhizome)	99
115	(20*S*,22*S*)-dammar-22,25-epoxy-3*β*,12*β*,20-triol	$C_{30}H_{52}O_4$	PG (root)	100
116	notoginsenoside SP21	$C_{36}H_{62}O_{10}$	PN (root)	93
117	notoginsenoside Ng2	$C_{53}H_{88}O_{23}$	PN (leaf)	86
118	notoginsenoside NL-C1	$C_{47}H_{78}O_{18}$	PN (leaf)	80

No.	Trivial Name	M.F.	Source	Ref.
119	notoginsenoside NL-C2	$C_{47}H_{78}O_{18}$	PN (leaf)	80
120	notoginsenoside NL-C3	$C_{53}H_{88}O_{23}$	PN (leaf)	80
121	20(*R*)-25-methoxyl-dammarane-3*β*,12*β*,20-triol	$C_{31}H_{56}O_4$	PG (berry)	101
122	20(*R*)-20-methoxyl-dammarane-3*β*,12*β*,25-triol	$C_{31}H_{56}O_4$	PG (berry)	101
123	6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-dammar-3*β*,6*α*,12*β*,20*S*,24*R*,25-hexaol	$C_{42}H_{74}O_{16}$	*Panacis majoris* (rhizome)	99
124	6-*O*-[*α*-*L*-rhamnopyranosyl-(1→2)-*β*-D-glucopyranosyl]-20-*O*-*β*-D-glucopyranosyl-dammarane-3*β*,6*α*,12*β*,20*S*,24*S*,25-hexaol (ginsenoside S3)	$C_{48}H_{84}O_{20}$	PG	79
125	6-O-[*α*-*L*-rhamnopyranosyl-(1→2)-*β*-D-glucopyranosyl]-20-*O*-*β*-D-glucopyranosyl-dammarane-12-one-3*β*,6*α*,20*S*,24*R*,25-pentaol (ginsenoside S4)	$C_{48}H_{82}O_{20}$	PG	79
126	notoginsenoside NL-J	$C_{57}H_{94}O_{27}$	PN (leaf)	102
127	notoginsenoside SY4	$C_{43}H_{74}O_{14}$	PN	85
128	notoginsenoside NL-E1	$C_{47}H_{82}O_{19}$	PN (leaf)	103
129	notoginsenoside NL-E2	$C_{53}H_{92}O_{24}$	PN (leaf)	103
130	notoginsenoside NL-E3	$C_{58}H_{100}O_{28}$	PN (leaf)	103
131	notoginsenoside NL-E4	$C_{58}H_{100}O_{28}$	PN (leaf)	103
132	notoginsenoside NL-F1	$C_{53}H_{92}O_{24}$	PN (leaf)	103
133	notoginsenoside NL-F2	$C_{58}H_{100}O_{28}$	PN (leaf)	103
134	notoginsenoside ST12	$C_{41}H_{68}O_{11}$	PN (steamed root)	56
135	6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-dammar-25(26)-ene-3*β*,6*α*,12*β*,20*S*,24*R*-pentaol	$C_{42}H_{72}O_{15}$	*Panacis majoris* (rhizome)	99
136	ginsenoside Rh21	$C_{42}H_{72}O_{15}$	PG (stem and leaf)	104
137	20(*S*)-dammar-3-oxo-23-ene-25-hydroperoxyl-6*α*,12*β*,20-triol	$C_{30}H_{50}O_6$	PN (root)	105

No.	Trivial Name	M.F.	Source	Ref.
138	20(*S*)-dammar-12-oxo-23-ene-25-hydroperoxyl-3*β*,6*α*,20-triol	$C_{30}H_{50}O_6$	PN (root)	105
139	20(*S*)-dammar-3-oxo-23-ene-25-hydroperoxyl-12*β*,20-diol	$C_{30}H_{50}O_5$	PN (root)	105
140	20(*S*)-ginsenoside Rf2	$C_{42}H_{74}O_{14}$	PG (stem and leaf)	106
141	20(*S*)-dammar-25-ene-24(*S*)-hydroperoxyl-3*β*,6*α*,12*β*,20-tetrol	$C_{30}H_{52}O_6$	PN (root)	105
142	notoginsenoside SP1	$C_{42}H_{72}O_{15}$	PN (steamed root)	88
143	notoginsenoside SP2	$C_{42}H_{72}O_{15}$	PN (steamed root)	88
144	notoginsenoside SP3	$C_{42}H_{72}O_{15}$	PN (steamed root)	88
145	notoginsenoside SP4	$C_{36}H_{62}O_{11}$	PN (steamed root)	88
146	notoginsenoside SP5	$C_{36}H_{62}O_{11}$	PN (steamed root)	88
147	notoginsenoside SP6	$C_{36}H_{62}O_{11}$	PN (steamed root)	88
148	notoginsenoside SP9	$C_{37}H_{64}O_{11}$	PN (steamed root)	88
149	notoginsenoside SP10	$C_{37}H_{64}O_{11}$	PN (steamed root)	88
150	notoginsenoside SP7	$C_{36}H_{62}O_{11}$	PN (steamed root)	88
151	notoginsenoside SP8	$C_{36}H_{62}O_{11}$	PN (steamed root)	88
152	notoginsenoside SP11	$C_{42}H_{72}O_{15}$	PN (steamed root)	88
153	notoginsenoside SP18	$C_{36}H_{58}O_{10}$	PN (steamed root)	88
154	ginsenoslaloside I	$C_{36}H_{60}O_8$	PG (stem and leaf)	74
155	dammara-(20*E*)22,25-diene-3*β*,6*α*,12*β*,24*S*-tetrol	$C_{30}H_{50}O_4$	PG (stem and leaf)	76
156	notoginsenoside NL-B1	$C_{47}H_{80}O_{18}$	PN (leaf)	80
157	notoginsenoside NL-B2	$C_{58}H_{98}O_{27}$	PN (leaf)	80
158	notoginsenoside NL-B3	$C_{58}H_{98}O_{27}$	PN (leaf)	80

No.	Trivial Name	M.F.	Source	Ref.
159	notoginsenoside NL-A1	$C_{47}H_{80}O_{19}$	PN (leaf)	80
160	notoginsenoside NL-A2	$C_{47}H_{80}O_{19}$	PN (leaf)	80
161	notoginsenoside NL-A3	$C_{58}H_{98}O_{28}$	PN (leaf)	80
162	notoginsenoside NL-A4	$C_{44}H_{72}O_{17}$	PN (leaf)	80
163	3*β*,6*α*,12*β*-trihydroxy-20*S*,24*S*-epoxydammar-25-ene	$C_{30}H_{50}O_4$	PG (stem and leaf)	71
164	3*β*,6*α*,12*β*-trihydroxy-20*S*,24*R*-epoxydammar-25-ene	$C_{30}H_{50}O_4$	PG (stem and leaf)	71
165	(12*R*,20*S*,24*S*)-20,24-;12,24-diepoxy-dammarane-3*β*-ol	$C_{30}H_{50}O_3$	PG (berry)	01
166	(20*S*,24*S*,25*R*)-6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-dammar-20,24-epoxy-3*β*,6*α*,12*β*,25,26-pentaol	$C_{42}H_{72}O_{16}$	*Panacis majoris* (rhizome)	99
167	(20*S*,24*R*,25*R*)-6-*O*-[*β*-D-glucopyranosyl-(1→2)-*β*-D-glucopyranosyl]-dammar-20,24-epoxy-3*β*,6*α*,12*β*,25,26-pentaol	$C_{42}H_{72}O_{16}$	*Panacis majoris* (rhizome)	99
168	ginsenoside Rh25	$C_{52}H_{88}O_{21}$	PG (flower bud)	81
169	7-*β*-hydroxyl ginsenoside Rd	$C_{48}H_{82}O_{19}$	PG (flower bud)	81
170	ginsenoside Rh26	$C_{52}H_{86}O_{19}$	PG (flower bud)	81
171	notoginsenoside LK2	$C_{58}H_{96}O_{26}$	PN (stem and leaf)	64
172	notoginsenoside LK3	$C_{59}H_{98}O_{27}$	PN (stem and leaf)	64
173	5,6-didehydroginsenoside Rg3	$C_{42}H_{70}O_{13}$	PG (leaf)	78
174	notoginsenoside SY1	$C_{41}H_{68}O_{17}$	PN (stem and leaf)	107
175	20*Z*-ginsenoside Rs4	$C_{44}H_{72}O_{13}$	RG	65

No.	Trivial Name	M.F.	Source	Ref.
176	notoginsenoside LK6	$C_{53}H_{90}O_{23}$	PN (stem and leaf)	64
177	notoginsenoside LK7	$C_{53}H_{90}O_{23}$	PN (stem and leaf)	64
178	notoginsenoside LK8	$C_{47}H_{80}O_{18}$	PN (stem and leaf)	64
179	notoginsenoside NL-G1	$C_{47}H_{80}O_{18}$	PN (leaf)	103
180	notoginsenoside NL-G2	$C_{58}H_{98}O_{27}$	PN (leaf)	103
181	notoginsenoside NL-H1	$C_{47}H_{80}O_{18}$	PN (leaf)	103
182	notoginsenoside NL-H2	$C_{47}H_{80}O_{18}$	PN (leaf)	103
183	notoginsenoside NL-H3	$C_{58}H_{98}O_{27}$	PN (leaf)	103
184	dammar-25-ene-3*α*,6*α*,12*β*,20*S*-tetraol (ginsengenin S2)	$C_{30}H_{52}O_4$	PG	79
Miscellaneous (185–218)				
185	(*cis*)-7*β*,11*α*,19,21-tetra-*O*-decanoy-18,22*β*-dihydroxy-dammar-1-en-3-one	$C_{70}H_{122}O_{11}$	RG	108
186	3*β*,4*α*,12*β*-trihydroxystigmast-5-en-21-yloctadecan-9′,12′-dienoate	$C_{47}H_{80}O_5$	RG	108
187	dammar-9(11),24-dien-3*β*-ol-3*α*-L-arabinosyl-7*α*-octanoate	$C_{43}H_{75}O_7$	PG (steamed root)	109
188	6-*O*-*β*-D-glucopyranosyl-20-*O*-*β*-D-glucopyranosyl-20(*S*)-protopanaxadiol-3-one	$C_{42}H_{70}O_{14}$	PN (root)	110
189	lanost-5,24-dien-3*β*-ol-3-*O*-*β*-D-glucopyranosyl-(6′→1″)-*β*-D-glucopyranosyl-(6″→1‴)-*β*-D-glucopyranoside	$C_{48}H_{81}O_{16}$	RG	111
190	3*β*-*cis*-feruloyloxy-16*β*-hydroxylup-20(29)-ene	$C_{40}H_{58}O_5$	PG (seed)	112
191	6*α*,20(*S*)-dihydroxydammar-3,12-dione-24-ene	$C_{30}H_{48}O_4$	PG (leaf)	9
192	6*α*,20(*S*),24(*S*)-trihydroxydammar-3,12-dione-25-ene	$C_{30}H_{48}O_5$	PG (leaf)	9
193	6*α*,20(*S*),25-trihydroxydammar-3,12-dione-23-ene	$C_{30}H_{48}O_5$	PG (leaf)	9
194	dammar-12,24-dien-3*α*,6*β*,15*α*-triol-3*α*-D-arabinopyra-nosyl-6*β*-L-arabinopyranoside	$C_{40}H_{66}O_{11}$	RG	108
195	dammar-24-en-3*α*,6*β*,16*α*,20*β*-tetraol-3*α*-D-arabinopy-ranosyl-6*β*-D-arabinopyranoside	$C_{40}H_{66}O_{12}$	RG	108

No.	Trivial Name	M.F.	Source	Ref.
196	pseudoginsenoside G1	$C_{42}H_{70}O_{14}$	RG	113
197	pseudoginsenoside G2	$C_{42}H_{70}O_{14}$	RG	113
198	12-one-pseudoginsenoside F11	$C_{42}H_{70}O_{14}$	PQ (stem and leaf)	114
199	pseudoginsenoside RT6	$C_{36}H_{60}O_{10}$	PQ (stem and leaf)	115
200	pseudoginsengenin R1	$C_{30}H_{50}O_{5}$	PQ (stem and leaf)	115
201	pseudoginsenoside RT8	$C_{42}H_{70}O_{15}$	PG (seed)	116
202	ursan-3*β*,19*α*,22*β*-triol-3-*O*-*β*-D-glucopyranosyl-(2′→1″)-*β*-D-glucopyranoside	$C_{42}H_{73}O_{13}$	RG	111
203	ursan-3*α*,11*β*-diol-3-*O*-*α*-D-glucopyranosyl-(6′→1″)-*α*-D-glucopyranosyl-(6″→1‴)-*α*-D-glucopyranosyl-(6‴→1⁗)-*α*-D-glucopyranoside	$C_{54}H_{93}O_{22}$	RG	111
204	chikusetsusaponin FT1	$C_{41}H_{68}O_{13}$	PJ (fruit)	117
205	chikusetsusaponin FT2	$C_{59}H_{98}O_{27}$	PJ (fruit)	117
206	chikusetsusaponin FT3	$C_{58}H_{96}O_{26}$	PJ (fruit)	117
207	chikusetsusaponin FT4	$C_{47}H_{78}O_{17}$	PJ (fruit)	117
208	chikusetsusaponin FH1	$C_{41}H_{68}O_{13}$	PJ (fruit)	117
209	chikusetsusaponin FH2	$C_{58}H_{96}O_{26}$	PJ (fruit)	117
210	nototronesides A	$C_{54}H_{90}O_{27}$	PN (leaf)	54
211	nototronesides B	$C_{49}H_{82}O_{23}$	PN (leaf)	54
212	nototronesides C	$C_{54}H_{90}O_{27}$	PN (leaf)	54
213	pseudoginsenoside RT1 butyl ester	$C_{51}H_{82}O_{18}$	PJm (root)	95
214	3-*O*-{*β*-D-xylopyranosyl(1→3)-[*α*-l-arabinofuranosyl(1→4)]-*β*-D-glucopyranosyl}oleanolic acid 28-*O*-*β*-D-glucopyranosyl ester	$C_{52}H_{84}O_{21}$	*Panax bipinnatifidus*	118

No.	Trivial Name	M.F.	Source	Ref.
215	20(*S*),24(*R*)-epoxy-3,4-seco-dammar-25-hydroxy-12-one-3-oic acid	$C_{30}H_{50}O_6$	PN (root)	105
216	20(*S*),24(*R*)-epoxy-3,4-seco-dammar-25-hydroxy-12-one-3-oic acid methyl ester	$C_{31}H_{52}O_6$	PN (root)	105
217	6*α*-hydroxy-22,23,24,25,26,27-hexanordammar-3,12,20-trione	$C_{24}H_{36}O_4$	PN (root)	105
218	notoginsenoside SY2	$C_{47}H_{78}O_{17}$	PN (stem and leaf)	107

Abbreviations: **PG:** *P. ginseng*; **PGL**: leaf of *P. ginseng*; **PJ**: *P. japonicus* C. A. Meyer; **PJm:** *P. japonicus* var. *major* (Burk.) C.Y. Wu & K.M. Feng; **PN:** *P. notoginseng*; **PQ:** *P. quinquefolius*; **RG**: Red ginseng.

Table S3 Detailed information of the researches regarding the multicomponent characterization of various ginseng drugs.

Analyte	Extraction Method	Analytical Technology	Instrument	Column	Mobile Phase	Identified Components (R.S.)	Ref.
PG (root)	UAE (70% MeOH)	LC-MS	Waters 2695 HPLC/Thermo-Finngan LCQ-MS	Shiseido Capcell Pak C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.2% AA	25 (**7**)	36
PG	UAE (70% EtOH)	LC-MS	Agilent 1290 UHPLC-6550 Accurate Mass QTOF-MS	Waters BEH Shield RP18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-0.1% FA/H_2O-0.1% FA	50	257
PG	UAE (50% MeOH)	LC-MS	Agilent 1290 UHPLC/6520 QTOF MS	Agilent ZORBAX Eclipse Plus C18 (2.1 × 50 mm, 2.7 μm)	CH_3CN/H_2O-0.1% FA	14 (**14**)	258
PQ (root & suspension culturedcells)	HSE (80% MeOH, *n*-BuOH)	LC-MS	Agilent 1200 Infinity/6300 IT-MS	Kromasil C18 (4.6 × 250 mm, 5 μm)	CH_3CN-H_2O	10	259
PQ (root & berry)	HRE (70% MeOH)	LC-MS	Agilent 1100 HPLC/TOF-MS	Agilent Zorbax Extend-C18 (4.6 × 50 mm, 1.8 μm)	CH_3CN/H_2O-0.2% FA	70 (**13**)	47
PQ (root, stem leaf, & flower bud)	UAE (70% MeOH)	LC-MS	Ultimate 3000 UHPLC/Q Exactive Q-Orbitrap-MS	Waters CSH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O-0.1% FA	347 (**52**)	191
PN (root)	WDE (80% MeOH), UAE (80% CH_3CN)	LC-MS	Accela UHPLC, LTQ Orbitrap XL-MS	Phenomenex Kinetex C18 (2.1 × 150 mm, 2.1 μm)	CH_3CN/H_2O-0.1% FA	43 (**10**)	260

Analyte	Extraction Method	Analytical Technology	Instrument	Column	Mobile Phase	Identified Components (R.S.)	Ref.
PN (root)	UAE (75% EtOH)	LC-MS	Agilent 1260 HPLC/6530 QTOF-MS	Agilent Eclipse XDB-C18 (4.6 × 250 mm, 5 μm)	CH_3CN-0.1% FA/H_2O-0.1% FA	234 (**12**)	261
PJ	UAE (70% MeOH)	LC-MS	Waters ACQUITY UPLC I-Class/Vion IM-QTOF system	Waters BEH Shield RP18 column (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O-0.1%FA	178 (**60**)	208
PG (root, leaf, flower bud, & seed)	UAE (70% MeOH)	LC-MS	Waters ACQUITY UPLC I-Class/Xevo G2-S QTOF-MS	Waters CSH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-3mM AA/H_2O-3mM AA	164 (**40**)	250
DG, WG, RG	UAE (50% EtOH) SPE (MeOH)	LC-MS	Agilent 1200 HPLC/6520 QTOF-MS	Agilent Eclipse Plus C18 (4.6 × 50 mm, 1.8 μm)	CH_3CN/H_2O-0.1% FA	73 (**10**)	186
PG, PQ, PN	UAE (70% MeOH)	LC-MS	Ultimate 3000 Binary RSLC/LTQ-Orbitrap Velos Pro	Waters BEH C18 (2.1 × 100 mm,1.7 μm)	CH_3CN-3mM AA/H_2O-3mM AA	101 (**16**)	194
PG, PQ, PN (root, leaf, & flower bud)	UAE (70% MeOH)	LC-MS	Thermo Ultimate 3000 Binary RSLC/LTQ-Orbitrap Velos Pro	Waters UPLC BEH C18 (2.1 × 100 mm,1.7 μm)	CH_3CN-2mM AA/H_2O-2mM AA	178 (**15**)	195

Analyte	Extraction Method	Analytical Technology	Instrument	Column	Mobile Phase	Identified Components (R.S.)	Ref.
PG, PQ, PN	UAE (50% MeOH)	LC-MS	Thermo Surveyor HPLC /TSQ QQQ-MS	YMC-Pack ODS-A (4.6 × 250 mm, 5 μm)	CH_3CN/MeOH/ H_2O-1mM AA	87 (**18**)	262
PG, PQ, PN	UAE (70% MeOH)	LC-MS	Ultimate 3000 UHPLC/LTQ-Orbitrap Velos Pro	Waters UPLC BEH C18 (2.1 × 100 mm,1.7 μm)	CH_3CN/H_2O-0.1% FA	216 (**30**)	196
PG, PQ, PN	HRE (80% EtOH) LLE (petroleum ether and *n*-BuOH)	LC-MS	Agilent 1100 HPLC/Thermo Finnigan LCQ Advantage IT-MS	YMC-Pack ODS-A column (4.6 × 250 mm, 5 μm)	MeOH/ACN/H_2O-3 mM AA	623 (**33**)	192
PN (flower bud)	HRE (75% EtOH) LLE (petroleum ether)	LC-MS	Agilent 1290 UHPLC/6510 QTOF-MS	Agilent Eclipse Plus C18 (3.0 × 100 mm, 1.8 μm)	CH_3CN/H_2O-3mM AA	170 (**10**)	193
PG (root and callus)	UAE (70% MeOH)	LC-MS	Thermo Fisher Accela HPLC/Orbitrap-MS	Shimadzu GL Inertsil ODS-3 (2.1 × 150 mm, 5 μm), Tosoh TSKgel Amide 80 (2.0 × 150 mm, 3 μm)	CH_3CN/H_2O CH_3CN/H_2O-60m M AA	7 (**7**)	263
Notoginseng total saponins	50% MeOH	LC-MS	Waters ACQUITY UPLC H-Class/AB SCIEX Q-Trap 4500	Waters HSS T3 (2.1 × 100 mm, 1.8 μm)	CH_3CN-0.01% FA/H_2O-0.01% FA	107 (**27**)	198

Analyte	Extraction Method	Analytical Technology	Instrument	Column	Mobile Phase	Identified Components (R.S.)	Ref.
Raw ginseng, White ginseng, steamed, Korean red ginseng, raw AG, & steamed AG	UAE (70% MeOH)	LC-MS	Shimadzu LC-20A HPLC/AB SCIEX 5500 Qtrap	ACE UltraCore 2.5 Super C18	CH_3CN-0.1% FA/H_2O-0.1% FA	185 (**17**)	197
PG (Root, Stem, Leaf, and Berry)	UAE (70% MeOH)	LC-MS	Waters ACQUITY H-Class UPLC/Xevo G2-S QTOF-MS	Waters BEH C18 (2.1 × 100 mm, 1.7 µm)	CH_3CN-0.1% FA/H_2O-0.1% FA	58 (**58**)	264
PG, RG	UAE (70% MeOH)	2D LC-MS	Agilent 1260 HPLC and ACQUITY UPLC I-Class/Vion IM-QTOF-MS	Acchrom XAmide (4.6 × 150 mm, 5 µm); Waters HSS T3 (2.1 × 100 mm, 1.8 µm)	CH_3CN/H_2O-3mM AA CH_3CN/H_2O-0.1% FA	323 (**58**)	203
PG (stem leaf)	UAE (70% MeOH)	2D LC-MS	Agilent 1100 HPLC and Ultimate 3000 UHPLC/LTQ-Orbitrap Velos Pro	Waters XBridge Amide (4.6 × 150 mm, 3.5 µm); Waters BEH C18 (2.1 × 100 mm, 1.7 µm)	CH_3CN/H_2O-0.05 % AH CH_3CN/H_2O-2mM AA	646 (**33**)	104
PG (root)	UAE (80% MeOH)	2D LC-MS	Shimadzu LC/Thermo LTQ-Orbitrap XL	Tosoh Amide-80 (2.0 × 150 mm, 3.0 µm); Waters BEH C18 (2.1 × 100mm, 1.7 µm)	CH_3CN-0.05% AA/H_2O-0.05% AA	94 (**9**)	178

Analyte	Extraction Method	Analytical Technology	Instrument	Column	Mobile Phase	Identified Components (R.S.)	Ref.
PN	HRE (H_2O) SPE (MeOH)	2D LC-MS	Agilent 1200 HPLC and Waters ACQUITY UPLC/Quattro Micro MS	Acchrom XAmide (4.6 × 150 mm, 5 μm); Waters UPLC BEH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O CH_3CN-0.1% FA/H_2O	224	49
PG (leaf)	Hydro distillation	GC-MS	Agilent 6890N/5973i GC-MS	Agilent DB-1 (0.25 mm × 30 m, 0.25 μm)	He	54	27

Abbreviations: SPE: solid phase extraction; HRE: heat reflux extraction; UAE: ultrasound-assisted extraction; HSE: heating solvent extraction; LLE: liquid-liquid extraction; WDE: water decoction extraction;

Table S4 Detailed information of the researches regarding the authentication and identification of various ginseng drugs.

Multi-batch species	Characteristic components	Differential components	Ref.
PJ (root and rhizome: 20)	**PJ:** yesanchinoside G, majonoside R2 isomer, 20-glc-G-Rf isomer, G-Re1, Re2, Re3, noto-N, noto-M isomer, noto-Q, m-Ra1, Pjs-4, G-Ra6	G-Rf, F3, chikusetsusaponin-IV	213
PJm (root and rhizome: 20)	**PJm:** floral G-M, floral G-N, pseudoginsenoside RT1 butyl ester, acetyl yesanchinoside E, noto-Fc, m-Rc, m-Rb2, m-Rf, 20(*S*)-Rg3, G-Re1, Re2, Re3, noto-N, noto-M isomer		
P. zingiberensis (root and rhizome: 10)	**PZ:** vina G-R6, yesanchinoside C, vina G-R2, stipuleanoside R2 isomer, G-Rb3		
PG (root: 32)	**PG:** G-Rs1, m-Rc, m-Rb2	chikusetsusaponin IV, 20-O-glc-Rf, G-Re, Rb2, Rb1, Rc, Rg1, Rd; noto-R1, noto-R2	262
PQ (root: 30)	**PQ:** pseudoginsenoside F11		
PN (root: 23)	**PN:** G-Ra3		

Multi-batch species	Characteristic components	Differential components	Ref.
PG (root: 20) PQ (root: 20) PN (root: 20)	-	trilinolein TG(18:2/18:2/18:2), 1,2-dilinoleoyl-3-palmitin TG(18:2/18:2/16:0), 1,2-dilinoleoyl-3-olein TG(18:2/18:2/18:1), DG(18:2/18:2), TG(20:2/18:2/18:2), 18:2-sitosterol I, DG(18:2/16:0), TG(18:1/18:0/18:3), DG(18:2/18:2), MG(18:2), PC(16:0/18:2), DG(18:1/18:2), TG(15:0/18:2/18:2), 1-palmitoyl-2-oleoyl-3-linolein TG (16:0/18:1/18:2), TG(22:1/18:2/18:2), PC(16:0/16:0), TG(16:0/16:0/18:2), 18:2-glucosyl-3-sitosterol, TG(18:2/18:2/20:1), glucosyl-3-sitosterol, DG(18:2/16:0), linoleic acid fatty acid (18:2), palmitic acid fatty acid(16:0), linoleic acid-iso	246
PG (root: 8) PN (root: 9) PQ (root: 13)	-	myristic acid, pentadecanoic acid, palmitic acid, palmitoleic acid, heptadecanoic acid, stearic acid, oleic acid, linoleic acid, α-linolenic acid, arachidic acid, eicosadienoic acid	270
PG (root: 41, leaf: 37, flower bud: 10 & berry: 35)		G-Re, Rg1, Rd, Rg2, Rc, Rf, F1, Ro; m-Rd, m-Re, m-Rb2, m-Rc, m-Rb2, 20(*R*)noto-R2, vina-R3, acetyl-Rh13/Rh19, isomer of m-Rd, and floral-G-I/J; flavonoid	250
PG (roots) (raw ginseng: 5) (white ginseng: 5)		**G:** G-Re, Rg1, Rb1, Rb2, Ro, Rg2, Rd **WG:** G-Re, Rg1, Rb1, Rb2, Ro, Rg2, Rd **SG:** G-Rh1, Rg3	197

Multi-batch species	Characteristic components	Differential components	Ref.
(steamed ginseng: 5) (Korean red ginseng: 5) PQ (roots) (raw AG: 5) (fermented AG: 5)		**KG:** G-Rh1, Rg3 **RAG:** G-Re, Rb1, Rd, F2, Rf, Rb2 **SAG:** G-Re, Rb1, Rd, F2, Rf, Rb2	
PN (fibrous root: 6, rhizome: 8, branch root: 4, root: 20)		G-Rg1, Rb1, Rb2, Rd, Ra1, Ra3; m-Rb1, noto-K, noto-R4, chikusetsusaponin L5, PPT-glc-pentose, OA-glc-pentose-glurA-glc and PPT-glc-glc-pentose-pentose, 11.31_1033.5240n and 13.59_842.5016n.	271
PG (flower bud: 14) PQ (flower bud: 14) PN (flower bud: 14)		G-Rb3, Ra1, Rb1, Rc, F3, Rb2, Rf, isomer of m-Rc/m-Rb2/m-Rb3, isomer of G-Ra1/Ra2, isomer of G-Ra3, isomer of G-Ra1/Ra2, isomer of G-Ra1/Ra2, isomer of m-Ra3, noto-Q/S or isomer, dimal-Rc/Rb2/Rb3 or isomer, isomer of m-Rc/m-Rb2/m-Rb3, noto-Q/S or isomer, isomer of m-Rc/m-Rb2/m-Rb3, isomer of m-Rb1, isomer of m-Rc/m-Rb2/m-Rb3, m-Ra2 or isomer, dimal-Rc/Rb2/Rb3 or isomer, noto-Q/S or isomer, m-kaempferol-glcglc, isomer of m-Rc/m-Rb2/m-Rb3, isomer of G- Ra1/Ra2, chikusetsusaponin IVa, unknown, 24(*R*)-pseudoginsenoside F11, noto-D/T or isomer, m-Ra2 or isomer.	245

Multi-batch species	Characteristic components	Differential components	Ref.
PG (root: 15) PQ (root: 15) PN (root: 15)	m-Rc, m-Rb2, iso-m-Ra1, iso-m-Ra3, iso-m-Rb1, m-floral-Rd4, iso-m-Rg1, iso-floral-Rb2, m-Rb1, m-Rd		194
PG (root: 20) PQ (root: 20) PN (root: 20)	noto-R1**,** iso-noto-R1, Ra3, iso-Ra3, noto-R4, 20(*S*)-san-A5, iso-5,6-di-Rb1, Re3, 20(*S*)-noto-R2, 20-O-glu-Rf, iso-Re3, 20(*S*)-Rg2, Rd, Rb1, Re, pseudoginsenoside F11, iso-Ra1-2, iso-Ra1-1, Rb2, Rc, Rf		196
PG (root: 17)	**PG:** G-Rf, Rb2 and Rc together with their isomers and derivatives	**PG:** G-Ra3, Ro, Rc, 20-*β*-D-glc-G-Rf, floralquinquenoside B and zingibroside R1 **PQ:** noto-R1, noto-Rw2; G-Rd, Rd isomer, 20(*S*)-Rg3	267
PQ (root: 21)	**PQ:** G-Rb1, pseudoginsenoside F11, G-Rd together with their isomers and derivatives		
PQ (roots) (landrace 1: 22) (landrace 2: 23) (landrace 3: 20) (landrace 4: 23) (landrace 5: 22) PG (root: 8)	sucrose, overall ginsenoside (especially G-Rb1) and maltose		247
PG (root: 5) PQ (root: 5) PN (root: 5)	-	monosaccharide, oligosaccharides, polysaccharides	269
PN (rhizome: 16) (main root: 29)	-	G-Rg1, Re, Rg2, Rb1, Rb2, Rd, Ra3; noto-Fa; m-Rd, m-Rb1	268

Multi-batch species	Characteristic components	Differential components	Ref.
PN (rhizome: 12) (main root: 12) (branch root: 12) (fibrous root: 12)	-	G-Rf, Rg1, Re, Rg2, Rh1, Rb1, Rb2, Rd, Rg3; noto-A, noto-Fa, noto-Fc, noto-I, noto-K, noto-R1, noto-R2, noto-R4, noto-Rw1; m-Rb1, m-Rd	226
PQ (root: 12) (stem leaf: 12) (flower bud: 12)		G-Rg2, Rb1, Ro, Rb3, Rd, Rb2, Rg1, Re; m-Rb1, m-Rb2, m-Rb1 isomer, m-Rc, m-Rb3, m-Rd; noto-R1, PPD-3glc-xyl-mal, pseudoginsenoside F11, PPD-3glc-xyl-dimalonyl, PPD-3glc-xyl-dimalonyl, chikusetsusaponin IVa	191
PG (root) (Antu country: 9), (Dunhua city: 9) (Changbai country: 9) (Ji'an city: 9)	-	G-Rg1, Rb1, Rb2, Rc, Rb3, 20(*S*)-Rf, 20(*S*)-Rh1	210
PG (root: 5) PQ (roots) (cultivated American ginseng: 15) (wild American ginseng: 11)	-	arginine, choline, 2-oxoglutarate and malate	272

Table S5 Detailed information of the researches regarding the quantitative assays of multiple markers of various ginseng drugs.

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
PG (root)	HSE and UAE (H_2O: MeOH= 100:70)	LC-MS	Agilent 1200 RRLC/6520 QTOF MS	Agilent Eclipse Plus C18column (2.1 × 150 mm, 3.5 μm)	CH_3CN/H_2O-0.1% FA	G-Rg3, Rc, Rg1, Rf, Rb2, Rb1, Re, Rd (**8**)	224
PG (flower bud)	HSE (95% EtOH-H_2O)	LC-UV	Waters 1525 binary HPLC	Phenomenex Gemini C18 110A (4.6 × 250 mm, 10 μm)	CH_3CN/H_2O	G-Rb1, Rb2, Rc, Rd, Re, Rf, Rg1, Rg2, and Rh1 **(9)**	274
PG (root)	UAE (H_2O-saturated *n*-BuOH)	LC-UV	Waters Alliance HPLC, Shimadzu LC-20A	Shimadzu Inertsil ODS-3 C18 (4.6 × 250 mm, 5 μm), Agela Venusil XBP C18 (4.6 × 250 mm, 5 μm), Waters SunFire C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Rg1, Re, Rf, Rg2, Rb1, Rc, Rb2, Rb3, Rd **(9)**	275
PG (root)	UAE (20% MeOH)	LC-MS	Dionex Ultimate 3000 HPLC/Qtrap 3200	Thermo Acclaim 120 C18 (2.1 × 150 mm, 3 μm)	CH_3CN/H_2O-0.5% FA	G-Rg1, Rf, Re, Rb1, noto-R1, pseudoginsenoside F11 **(6)**	266
PG (root)	CSE, SE, HRE, MAE, UAE (70% MeOH)	LC-UV	Agilent 1100 HPLC	Cosmosil C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.05M KH_2PO_4	G-Rb1, Rb2, Rc, Rd, Re, Rg1, Ro, m-Rb1, m-Rb2, m-Rc, m-Rd **(11)**	39
PG (root)	UAE (MeOH) LLE (Et_2O and *n*-BuOH)	LC-UV	Agilent 1200 HPLC	Agilent Zorbax SB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-1mM KH_2PO_4	G-Rg1, Re, Ro, Rf, Rd, Rb1, Rg2, Rc, Rb2, noto-R2 **(10)**	276
PG	SE (80% MeOH)	LC-UV	Waters 1525 binary HPLC/ 2996	Waters Pico·tak C18 (3.9 × 150 mm, 4 μm)	CH_3CN/H_2O	G-Rb1, Rb2, Rc, Rg2 **(4)**	277

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
PG	HRE (EtOH)	LC-UV	photodiode array detector Waters 1525 Binary HPLC/ 2489 UV/VIS detector	Waters SunFire C18 (2.1 × 50 mm, 5 μm)	CH_3CN/H_2O	G-Rg18, Rg3, Rs11, Re7 **(4)**	278
PG (root)	HSE (80% MeOH), LLE (EtOAc)	LC-UV	Jasco HPLC system	Waters SunFire C18 4.6 × 250 mm, 5 μm)	CH_3CN-0.5% AA/H_2O-2% AA	Maltol **(1)**	265
PG (root)	HRE (MeOH)	FT-NIR LC	FT-NIR, Waters 1525 HPLC	Agilent Zorbax SB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Rg1, Rb1, Re, Rf, Rc, Rb2, Rg2, Rb3, Rd **(9)**	279
PG (root, rhizome)	CSE (MeOH)	NIRS LC-UV	NIRS, Waters 1525 HPLC	Agilent Zorbax SB-C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Rg1, Re, Rf, Rg2, Rb1, Rc, Rb2, Rb3, Rd **(9)**	280
PG (root)	WDE	LC-CAD	Thermo Dionex Ultimate 3000 $UHPLC^+$	Thermo Dionex Acclaim RSLC 120 C18 (2.1 × 150 mm, 2.2 μm)	CH_3CN/H_2O-0.2% FA	G-Rg1, Re, Rh1, Rb1, F1, Rd, Rh2, CK, PPT, PPD **(10)**	281
PG (root)	SE (Et_2O)	LC-MS	Agilent 1200 RRLC-MS	Thermo Scientific Hypersil Gold C18 (3.0 × 100 mm, 1.8 μm)	CH_3CN-0.1% FA/H_2O-0.1 % FA	G-Rg1, Re, Rb1, Rc, Rd **(5)**	29
PG (root)	UAE (20% MeOH)	LC-MS	Ultimate 3000 HPLC/QTrap 3200-MS	Thermo Acclaim RSLC 120 C18 (2.1 × 150 mm, 3 μm)	CH_3CN/H_2O-0.1% FA	G-Rg1, Rf, Re, Rb1 **(4)**	282

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
PG (root)	HRE (75% EtOH)	LC-MS	Agilent-1100 HPLC, 1200 RRLC/ 6410A QQQ MS	Sharpsil-T C18 (4.6 × 250 mm, 5μm), Agilent Eclipse XDB-C18 (4.6 × 50 mm, 1.8 μm)	CH_3CN/H_2O-0.1% FA	G-Re, Rg1, Rb1, Rf, Rc, Rb2, Ro, Rb3, Rd, Rg6, Rh4, Rk1, 20(*S*)-Rg3, 20(*R*)-Rg3, 20(*S*)-Rh1 **(15)**	223
PG (Root, Stem, Leaf, and Berry)	UAE (70% MeOH)	LC-MS	Waters ACQUITY H-Class UPLC/Xevo G2-S QTOF-MS	Waters BEH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-0.1% FA/H_2O-0.1 % FA	G-Rf, Rg1, Re, Rf, vR4, F5, Rh1, Rg2, F3, 20(*R*)-Rg2, F1, Ra2, Ra3, Rb1, Rc, Ra1, Ro, Rb2, Rb3, Rd, CO, Rg4, F4, F2, Rg3, Mc, CY, CK, Rk1, Rg5, Rh2, 20(*R*)-Rh1, noto-R1, noto-R2, noto-R4, m-Rb1, m-Rc, m-Rd, m-Rb2 **(39)**	264
PG, RG	HRE (50% MeOH), SPE (50% MeOH), SE (MeOH), HBE (50% MeOH)	LC-UV	LaChrom Ultra L-2000	Hitachi LaChrom Ultra C18 (2 × 50 mm, 2 μm), LaChrom Ultra C18 (2 × 100 mm, 2 μm)	20% CH_3CN/ 80% CH_3CN	G-Rg1, Re, Rf, 20(*S*)-Rh1, 20(*S*)-Rg2, 20(*R*)-Rg2, 20(*R*)-Rh1, Rb1, Rc, F1, Rb2, R b3, Rd, F2, 20(*S*)-Rg3, 20(*R*)-Rg3, PPT(*S*), PPT(*R*), CK, 20(*S*)-Rh2, 20(*R*)-Rh2, PPD **(22)**	40
AG(PG), AMG(PQ), NG(PN)	SE (MeOH)	LC-UV	Waters 2960 HPLC	Phenomenex Prodigy ODS (3.2 × 250 mm, 5 μm)	CH_3CN/ H_2O	G-Rh2, Rg5, Rk1, 20(*S*)-Rg3, 20(*R*)-Rg3, Rh4, Rk3, Rd, Rb3, Rb2, Rc, Rb1, 20(*S*)-Rg2,	28

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
						20(*R*)-Rg2, Rh1, Rf, Re, Rg1, noto-R1 **(19)**	
FG, WG, TG, RG.	UAE (50% MeOH)	LC-UV	Acme 9000 Vitamin Analyzer HPLC Agilent 1100 HPLC	YMC-Pack ODS AM-303 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-10mM MP CH_3CN-0.1% AA/H_2O-0.1 % AA	G-Re, Rc, Ro, Rf, Rb1, Rg2, Rh1, Rb2, Rb3, F1, F2, Rh2, noto-R1 **(13)**	283
PG, PQ, PN (steamed root)	UAE (Water), PLE, MAE	LC-UV	Agilent 1100 HPLC	Eprogen Synchropak WAX (4.6 × 250 mm, 6 μm)	H_2O-50mM NaH_2PO_4	dencichine **(1)**	273
PG, PQ, PN	HBE (C_6H_{12}, 13%BF_3/ MeOH)	GC-MS	Agilent 6890 GC/5973-MS	Supelco Omegawax 250 (0.25 mm × 30 m, 0.25 μm)	N_2	myristic acid, pentadecanoic acid, palmitic acid, palmitoleic acid, heptadecanoic acid, stearic acid, oleic acid, linoleic acid, α-linolenic acid, arachidic acid, eicosadienoic acid **(11)**	270
RG	HRE (H_2O) LLE (*n*-BuOH)	LC-UV	Waters 1525 binary HPLC	Knauer Eurospher 100-5 C18 (3 × 250 mm)	CH_3CN/H_2O	G-Rb1, Rb2, Rd, Re, Rf, Rg1, Rg2, 20(*S*)-Rg3, 20(*R*)-Rg3, Rg5, Rg6, Rc, Rh1, Rh4, Rk1, Rk3, F4 **(17)**	25
RG, PQ	CSE (70% MeOH)	LC-UV	Agilent 1100 HPLC	Shiseido UG 80 Capcell Pak NH2 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Re, Rh1, Rg2, Rg1, Rf **(5)**	284

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
PQ (root)	HSE (80% MeOH)	LC-UV	Agilent HP 1100 HPLC	Waters μBondapak C18 (4.6 × 150 mm,10 μm)	CH_3CN/H_2O	G-Rg1, Re, Rb1, Rc, and Rd **(5)**	239
PQ (root)	UAE (80% EtOH)	LC-MS	Waters UPLC H-Class /4000 Qtrap-MS	Waters HSS T3 (2.1 × 150 mm, 1.8 μm)	CH_3CN-0.1% FA/H_2O-0.1 % FA	G-Rb1, Rb3, Rh2, Rc, Vina-R4, Re, Rd, noto-Fe, Rd2, Rg1, F2, Rg3, Rg2, F5, F3, F4, F1, Rh1, CK, pseudoginsenoside RT1, pseudoginsenoside F11, chikusetsusaponin IVa **(22)**	214
PQ (root)	UAE (20% MeOH)	LC-MS	Ultimate 3000 HPLC/QTrap 3200-MS	Thermo Acclaim RSLC 120 C18 (2.1 × 150 mm, 3 μm)	32%CH_3CN-0.34% FA	pseudoginsenosides F11, RT5 **(2)**	285
PQ	UAE (60% MeOH)	LC-MS	Thermo Surveyor Plus HPLC System/TSQ Quantum Ultra Mass Spectrometer	Thermo Hypersil Gold column (2.1 × 150 mm, 5 μm)	MeOH/H_2O-0.01% FA	G-Rg1, Re, Rb1, Rb3 (**4**)	217
PN (leaf)	UAE (70% EtOH)	LC-MS	Agilent 1100 HPLC/IT-MS	Grace Alltima C18 (7 × 53 mm, 3 μm)	CH_3CN-0.05 % FA/H_2O-0.05 % FA	G-Rg1, Rb1, Rc, Rb2, Rb3, Rd, Fe, Fd, F2, 20(*S*)-Rg3, 20(*R*)-Rg3, noto-R1 **(13)**	286
PN	/	LC-MS	Agilent UHPLC/6540 QTOF-MS	Waters BEH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-0.1% FA/H_2O-0.1 %FA	G-Rg1, Re, Rb1, Rb2, Rd, 20(*S*)-Rh1, 20(*S*)-Rg2, noto-R1 **(8)**	258

Analyte	Extraction Method	Analysis Technology	Instrument	Column	Mobile Phase	Quantitative Markers	Ref.
PN (flower)	UAE (MeOH or H_2O)	LC-UV	Waters Alliance e2695 HPLC	Agilent Zorbax SB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Rb1, Rc, Rb2, Rb3, Rd2, F2 and Rd, gypenoside-XVII, noto-Fc, noto-Fe, noto-Fd **(11)**	287
PN (rhizome)	HRE (70% EtOH)	LC-UV	Agilent 1260 HPLC	Waters CSH C18 (2.1 × 50 mm,1.7 μm)	CH_3CN-0.01% FA/H_2O-0.01% FA	G-Rd, Rg1, Re, Rb1, noto-R1 **(5)**	288
PN (root)	UAE (70% MeOH)	LC-UV	Agilent 1100 HPLC	Waters Symmetry C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O	G-Rg1, Re, Rb1, Rd, noto-R1 **(5)**	289
PN (root)	UAE (70% MeOH)	LC-UV	Agilent 1100 HPLC	Agilent Zorbax C18 (4.6 × 50 mm, 1.8 μm)	CH_3CN/H_2O	G-Rb1, Rd, Re, Rg1, noto-R1 **(5)**	290
PJ (root)	UAE (70% MeOH)	LC-UV	Agilent 1200 HPLC	Agilent Eclipse XDB-C18 (4.6 × 150 mm, 5 μm)	CH_3CN/H_2O-0.05% TFA	CS-V, PG-RT1, CS-IV, CS-IVa **(4)**	291
PJ (cell-suspension culture)	CSE (70% EtOH), LLE (EtOAc and *n*-BuOH)	LC-MS	Perkin Elmer Series 200 HPLC, Agilent 1200 HPLC/QTOF-MS	Tosoh Ultropac TSK ODS-120T (4.6 × 250 mm, 5 μm) Agilent Zorbax SB C18(2.1 × 150 mm, 1.8 μm)	CH_3CN/H_2O-4mM KH_2PO_4 CH_3CN/H_2O-0.1% FA	G-Rg1, Ro, Rb1, Rc, Rb2, Rd, m-Rb1 **(7)**	292
PS, PB (rhizome)	CSE (MeOH)	LC-UV	Dionex UltiMate 3000 BioRS HPLC	Waters XBridge amide (4.6 × 150 mm, 3.5 μm)	CH_3CN/H_2O	G-Rg1, Rg2, Rf, Re, Rd, Rc, Rb1, Rb2 **(8)**	293

Abbreviations: SPE: solid phase extraction; SE: Soxhlet extraction; HRE: heat reflux extraction; MAE: microwave-assisted extraction; UAE: ultrasound-assisted extraction; HBE: heating-block extraction; CSE: cold-soaked extraction; HSE: heating solvent extraction; LLE: liquid-liquid

extraction; WDE: water decoction extraction; PLE: Pressurized liquid extraction;

Table S6 Detailed information of the researches regarding the quality evaluation of various ginseng-containing Chinese patent medicines.

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Xiaochai hu Decoction (**PG**)	WDE, UAE (50% MeOH)	Agilent 1200 HPLC/Bruker QTOF-MS	Dikma Diamonsil C18 (4.6 × 200 mm, 5 μm)	CH_3CN/H_2O-0.1 % FA	79 (22)	/	306
Dushen Tang (**PG**)	UAE (40% EtOH), LLE (CH_2Cl_2)	Dionex Ultimate 3000 HPLC/AB SCIEX Qtrap 3200-MS	Thermo Acclaim RSLC 120 C18 (2.1 × 150 mm, 2.2 μm)	CH_3CN/H_2O-0.1 % FA	15 (8)	/	307
Dingzhixiao Wan (**PG**)	UAE (EtOAc), LLE (95% EtOH, *n*-BuOH)	Waters ACQUITY UPLC/SYNAPT G2 QTOF-MS	Nouryon Kromasil C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.1 % FA	64 (6)	/	308
Soshiho Decoction (**PG**)	/	Dionex HPLC/Thermo TSQ Quantum Ultra MS	Shiseido C18 (4.6 × 250 mm, 5 μm); Waters Atlantis dC18 (2.0 × 150 mm, 3 μm)	CH_3CN/H_2O-0.1 % TFA	/	homogentisic acid, baicalin, glycyrrhizin, saikosaponin A, 6-Gingerol, G-Rg3 **(6)**	309
Dushen Tang (**PG**)	HRE (H_2O)	Agilent 1200 RRLC/6410A QQQ-MS	Agilent Zorbax SB C18 (2.1 × 100 mm, 1.8 μm)	CH_3CN/H_2O-0.05 % FA	/	G-Re, Rg1, Rb1, Rc, Rb2, Rd, Rf **(7)**	219
Sijunzi Tang (**PG**)	WDE	Waters ACQUITY UPLC H-Class	Waters UPLC BEH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O-0.1 % PA	/	G-Rg1, Re, Rb1, liquiritin, liquiritigenin, glycyrrhizic acid, atractylenolide I, atractylenolide II, atractylenolide III, pachymic acid **(10)**	310

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Huannao Yicong Fang (**PG**)	UAE (70% MeOH)	Shimadzu UFLC-ESI/MS	Shimadzu Shim-pack XR-ODS (2.0 × 100 mm, 5 μm)	CH_3CN/H_2O-0.1% FA	*In vitro*: 7 (7) *In vivo* (rat plasma): 7 (7)	G-Rg1, Re, Rb1, ferulic acid, 2,3,5,4'-tetrahydroxystilbene-2-*O*-*β*-D-glucoside, berberine, hydrochloride, emodin **(7)**	222
Shexiang Tongxin Dropping Pill (**PG**)	UAE (MeOH)	Shimadzu LC20AT HPLC/micro-TOF-QII-MS; Waters ACQUITY UPLC H-Class/Xevo TQD QQQ-MS	GL Science Inertsil ODS-SP C18 (4.6 × 250 mm, 5 μm); Waters Cortecs C18 (2.1 × 100 mm, 1.6 μm)	CH_3CN/H_2O-0.1% FA	41 (15)	G-Rg1, Rk3, cinobufagin, arenobufagin, bufalin, resibufogenin, tanshinone IIA, taurine, tauroursodeoxycholic acid, taurocholic acid, cholic acid, deoxycholic acid, chenodeoxycholic acid **(13)**	216
Shenshao Pian (**PG**)	UAE (70% MeOH); SPE (Water, 5% MeOH, MeOH)	Agilent 1100 HPLC/Thermo LCQ Advantage IT-MS	Agilent Eclipse XDB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.1% FA	*In vitro*: 82 (20) *In vivo* (rat plasma): 7 *In vivo* (rat urine): 24	/	189
Qili Qiangxin Capsule (**PG**)	UAE (MeOH)	Waters ACQUITY I-Class UPLC/SYNAPT QTOF-MS	Waters UPLC BEH C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-0.1% FA/H_2O-0.1% FA	*In vitro*: 173 (44) *In vivo* (rat plasma): 38 *In vivo* (rat urine): 82 *In vivo* (rat feces): 47	/	311
Yiqi Fumai Powder Injection	UAE (80% MeOH)	Agilent 1290 Infinity UHPLC/6530 Q-TOF-MS	Grace Alltima C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.1% AA	9 (6)	/	312

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
(**PG**)							
Sijunzi Decoction (**PG**)	WDE, UAE (MeOH)	Agilent 1260 UHPLC	Kromat Universal XB C8 (2.1 × 150 mm, 1.8 μm)	CH_3CN/H_2O-0.2 % FA	120 (9)	/	184
Shenfu Tang & Dushen Tang (**PG**)	HRE (H_2O)	Waters ACQUITY UPLC/Xevo TQ-S QQQ-MS	Waters UPLC BEH C18 (2.1 × 100 mm, 1.8 μm)	CH_3CN-0.1% FA/H_2O-0.1% FA	/	G-Rb1, Rb2, Rb3, Rc, Rd, Rg1, Re, Rf, Rg2, Rg3, Rh1, F2 **(12)**	212
Shenshao Tablet (**PG**)	UAE (70% MeOH)	Agilent 1100 series HPLC/Finnigan LCQ Advantage 3D ion-trap MS	Agilent Eclipse XDB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.1 % FA	82 (20)	/	313
Shengmai San (**RG**)	WDE, LLE (*n*-BuOH)	Waters Alliance HPLC/ Micromass Quattro micro™ API QQQ MS	Grace Alltima C18 (4.6 × 250 mm, 5 μm)	CH_3CN-0.02% AA/H_2O-0.02% AA	*In vitro*: 53 (32) *In vivo* (rat plasma): 25	/	314
Shengmai San (**RG**)	WDE, UAE (50% CH_3CN)	Waters ACQUITY UPLC/ SYNAPT QTOF-MS	Waters HSS T3 C18 (2.1 × 100 mm, 1.8 μm)	CH_3CN-0.01%FA/ H_2O-0.01% FA	92 (28)	/	201

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Weifuchun Tablet (**RG**)	UAE (MeOH), WDE	Agilent 1100 HPLC/Thermo LCQ DecaXP^{plus}-MS	Agilent Zorbax SB C18 (4.6 × 250 mm, 5 μm)	CH_3CN/H_2O-0.05 % FA	57 (13)	/	315
Naosaitong Pill (**RG**)	LLE ($CHCl_3$, *n*-BuOH)	Bruker MPA NIRS spectrometer/Agilent 1100 HPLC	Grace Alltima C18 (4.6 × 250 mm, 5 μm)	CH_3CN-H_2O	/	G-Rg1, Re **(2)**	316
Shenfu Injection (**RG**)	/	Agilent 1100 HPLC/6520 QTOF-MS	Agilent Zorbax SB-C18 (4.6 × 250 mm, 5 μm)	CH_3CN-10mM FA/H_2O-0.1% FA	44 (21)	G-Rg1, Re, Rf, Rb1, Rb2, 20(*S*)-Rh1, Rg2, Rc, Rb3, 20(*R*)-Rh1, Rd, 20(*S*)-Rg3, 20(*R*)-Rg3, songorine, fuziline, neoline, talatisamine, guanfubase H, benzoylmesaconine, benzoylaconine, benzoylhypaconine, mesaconitine, aconitine, hypaconitine **(24)**	317
Xinyue Jiaonang (**PQ**)	UAE (H_2O)	Shimadzu HPLC	Thermo Hypersil BDS-C18 (3 × 100 mm, 3 μm**)**	CH_3CN-0.01% FA/H_2O-0.01% FA	/	G-Rb1, Rb2, Rc, Rd, Re, Rg1 **(6)**	318
Qijing Shengbai Granule (**PQ**)	UAE (MeOH)	Waters I-class UPLC/Xevo G2-XS QTOF-MS	Waters BEH C18 (2.1 × 100 mm, 1.7 μm); Waters UPLC HSS T3 (2.1 × 100 mm, 2.1 μm)	CH_3CN/H_2O-0.1 % FA	*In vitro*: 143 (51) *In vivo* (rat plasma): 42	/	199

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Xinkeshu (**PN**)	UAE (80% MeOH)	Thermo Finnigan Surveyor HPLC/LTQ-Orbitrap-MS	Waters SunFire ODS C18 (2.1 mm × 150 mm, 5 μm)	CH_3CN/H_2O-0.1 % FA	52 (15)	G-Rg1, Rg2, Re, Rb1, Rd, noto-R1, danshensu, protocatechuicalhydryde, salvianolic acid B, chlorogenic acid, puerarin, 3'-ethoxypuerarin, daidzin, daidzein, genistein, **(15)**	190
Xueshuantong Injection (**PN**)	/	Agilent 1290 Infinity UHPLC/6520 QTOF-MS	Waters UHPLC BEH Shield RP18 (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O-0.1 % FA	/	G-Rg1, Re, Rb1, Rd, noto-R1 **(5)**	319
Fufang Xueshuantong Capsule (**PN**)	UAE (75% MeOH)	Agilent 1200 HPLC/AB SCIEX 3200 Q-Trap-MS	Phenomenex Kinetex XB-C18 (3.0 × 75 mm, 2.6 μm)	CH_3CN-CH_3OH/ H_2O-0.1%FA-1 mM AA	8 (8)	G-Rg1, Rb1, noto-R1, tanshinone IIA, salvianolic acid B, astragaloside IV, harpagide, harpagoside **(8)**	320
Yanghuo Sanqi Tablet (**PN**)	HRE (MeOH)	Agilent 1100 HPLC	Agilent Zorbax SB-C18 (4.6 × 250 mm, 5 μm)	CH_3CN-H_2O	/	G-Rgl, Rb1, noto-R1, icariin, epimedin A, epimedin B, epimedin C, baohuoside I **(8)**	321
Sanqi Panax Notoginseng Injection (**PN**)	/	Waters 1525 HPLC	Waters C18 (4.6 × 250 mm, 5 μm)	CH_3CN-H_2O	/	G-Rg1, Re, Rb1, noto-R1 **(4)**	322
Fufang Danshen preparations (**PN**)	UAE (70% MeOH)	Waters ACQUITY UPLC/Quattro Premier XE QQQ-MS	Waters UPLC HSS T3 (2.1 × 100 mm, 1.8 μm)	CH_3CN/H_2O-0.1 % FA	16 (16)	G-Rg1, Re, Rb1, Rd, noto-R1, danshensu, protocatechuic acid, protocatechuicaldehyd, caffeic acid, rosmarinic acid,	220

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
						lithospermic acid, salvianolic acid B, salvianolicacid A, salvianolic acid C, cryptotanshinone, tanshinone IIA **(16)**	
Xuesaitong Injection (**PN**)	/	Agilent 1100 HPLC/Thermo Finnigan LCQ Deca XP^{plus} IT-MS	Welchrom Ultimate XB-C18 (4.6 × 250 mm, 5 μm)	CH_3CN-0.01% AA/H_2O-0.01% AA	27 (10)	G-Rg1, Rg2, Rh1, Rb1, Rb2, Rd, Re, 20(*S*/*R*)-Rg3, noto-R1 **(10)**	323
Qishen Yiqi Dropping Pill (**PN**)	UAE (MeOH)	Agilent 1290 UHPLC/6460 QQQ-MS	Agilent Eclipse Plus C18 (2.1 × 50 mm, 1.8 μm)	CH_3CN/H_2O-0.1 % FA	/	G-Rg1, Re, Rb1; noto-R1, danshensu, protocatechualdehyde, caffeic acid, rosmarinic acid, salvianolic acid B, salvianolic acid A, astragaloside IV, calycosin-7-*O*-*β*-D-glucoside, ononin, calycosin, formononetin, dihydrotanshinone I, cryptotanshinone, tanshinone I, tanshinone IIA **(19)**	221
Fufang Xueshuanton g Capsule (**PN**)	UAE (70% MeOH)	Waters ACQUITY UPLC I-Class/ Vion IMS-QTOF-MS	Agilent Zorbax SB C18 (2.1 × 100 mm, 1.8 μm)	CH_3CN-0.1% FA/H_2O-0.1% FA	230 (85)	/	209

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Naoluoxinton g Decoction (**PN**)	HSE (H_2O)	Agilent 1290 UHPLC	Waters CSH-C18 (2.1 × 100 mm, 1.7 μm)	MeOH/H_2O-0.02 % FA	35 (8)	calycosin, calycosin-7-O-β-D-glucoside, 4-hydroxbenzyl alcohol, ligustrazine, ferulic acid, syringin, parishin A, ononin **(8)**	324
Fufang Danshen Dropping Pill (**PN**)	UAE (30% MeOH)	Bruker Avance 500 NMR spectrometer	/	/	/	G-Rg1, Rb1, protocatechuic aldehyde, danshensu, salvianolic acid A, rosmarinic acid, L-(-)-borneol, isoborneol **(8)**	325
Shuxiong Tablets *etc*. (8, **PN**)	UAE (50% EtOH)	Dionex Ultimate 3000 HPLC system	^{1}D: Agilent Poroshell SB C18 (2.1 × 100 mm, 2.7 μm); ^{2}D: Agilent Zorbax SB-Aq (4.6 × 100 mm, 3.5 μm)	^{1}D: CH_3OH/H_2O ^{2}D: CH_3CN/H_2O	/	Rg1, Re, Rb1, Rd, noto-R1 **(5)**	183
Shuxiong tablet (**PN**)	UAE (70% MeOH)	Waters ACQUITY I-Class UPLC/Xevo G2-S QTOF-MS	Phenomenex Kinetex XB-C18 (2.1 × 100 mm, 1.7 μm)	CH_3CN/H_2O-0.1 % FA	73 (73)	noto-R1, Rg1, Rb1 **(3)**	326
Xueshuanton g injection *etc*. (**PN**)	CSE (50% MeOH)	Waters ACQUITY I-Class UPLC/Xevo G2-S Q-TOF-MS	ACQUITY UPLC HSS T3 (2.1 × 100 mm, 1.8 μm)	CH_3CN/H_2O-0.1 % FA	20 (20)	/	271

Analyte	Extraction Method	Analysis Technology (Instrument)	Chromatographic Column	Mobile Phase	Identified Components (R.S.)	Quantitative Markers	Ref.
Ren-shen-yang-rong pills *etc*. (60, **PG**/**RG**/**PQ**/**PN**)	UAE (50% MeOH)	Surveyor HPLC/TSQ QQQ-MS	YMC-Pack ODS-A (4.6 × 250 mm, 5 μm)	CH_3CN/MeOH/H_2O-1 mmol/L AA	87 (18)	/	262
Ren-shen-yang-rong pills *etc*. (15, **PG**/**RG**/**PQ**/**PN**)	HSE (70% MeOH)	ACQUITY UPLC I-Class/Vion IMS-QTOF-MS	BEH Shield RP18 (2.1 × 100 mm, 1.7 μm)	CH_3CN-0.05% FA/H_2O-0.05% FA	58 (58)	/	228

Abbreviations: SPE: solid phase extraction; HRE: heat reflux extraction; UAE: ultrasound-assisted extraction; CSE: cold-soaked extraction; HSE: heating solvent extraction; LLE: liquid-liquid extraction; WDE: water decoction extraction.

Table S7 The primary metabolites and secondary metabolites of saponins *in vivo* and *in vitro*.

Analyte	Metabolites	Ref.
G-Rb1	G-Rd, Rg3, F2; CK, Gypenoside XVII, PPD	327,335
G-Re	G-Rg2, Rg6, F4, Rh1, Rg1, F1, Rk3, Rh4, PPT	340
G-Rg1	G-Rh1, F1, Rk3, Rh4; Hydroxy-G-Rg1, Lactic acid-G-Rg1, PPT	335
G-Rg5	2'-dehydroxyl, 17-de-1,5-dimethyl-1,4-hexadienyl G-Rh3-12-*O*-sulfate, G-Rg5-12-*O*-glc, G-Rh3-12-*O*-glc, 5''-dehydroxymethyl G-Rg5-12-*O*-glc, 17-de-1,5-dimethyl-1,4-hexadienyl G-Rg5, 17-de-1,5-dimethyl-1,4-hexadienyl G-Rh3-12-*O*-glc, 2'-dehydroxyl, 17-de-1,5-dimethyl-1,4-hexadienyl G-Rh3-12-*O*-glc	332
G-Rk1	G-Rk1-12-*O*-glc, G-Rk2-12-*O*-glc, 5''-dehydroxymethyl G-Rk1-12-*O*-glc, G-Rk2-12-*O*-sulfate, G-Rk3	332
noto-R1	G-F1, Rg1, Rh1, Rk3, Rh4, F1; noto-R2, Hydroxy-noto-R1, PPT	330,335
G-CK	20(*S*)-PPD	337,338
PN extract	G-Rg1, Rb1, Rg2, Rd, F1, Rb3, Rh1, Rh2, Rc, Rd, Re, F1, noto-R1, CK, PPT, 20(*S/R*)-Rg3, 20(*S*)-PPD	330,333,334,339
PQ extract	G-F1, F2, Rk1, Rg5; 20(*S/R*)-Rg2, 20(*S/R*)-Rh1, 20(*S/R*)-Rg3, CK, 20(*S/R*)-Rh2	328
RG extract	G-Rc, Rg3, Rh2; CK, CRa2, CY, CMc, CO, CIX, F2, Gypenoside XVII, CRa1, CMX, 20(*R*) -Rd, 20(*S*) -Rg2, 20(*S*) -Rh1	329,336,342
PG extract	20-Glc-Rf, Rg1, Re, Rf, R2, Rg2, Rb1, Ro, Rc	343
G-Ro	G-Ro, Chikusetsusaponin IVa, Zingibroside R1, Silphioside F, Glucosyl oleanolate, Oleanolic acid	344
G-Rg2	ginsenotransmetin A	331

Table S8 Detailed information of the researches regarding the metabolites of single ginsenoside and ginseng extracts.

Analyte	Biological sample	Analysis Technology (Instrument)	Chromatographic Column	PK Markers	Ref.
G-Rh4, Rk3	rat plasma	Agilent 1200/AB SCIEX 3200 Qtrap MS	Agilent Poroshell 120 EC-C18 (4.6 ×50 mm, 2.7μm)	/	346
25-OCH_3-PPD, 25-OH-PPD	dog plasma	Shimadzu LC/Thermo Finnigan TSQ MS	Phenomenex C18 (2.0 × 50 mm, 4 μm)	/	347
Neopanaxadiol	beagle dog plasma	Agilent 1290/Bruker micrOTOF QII MS	Aglient Zorbax C18 (2.1 × 50 mm, 1.8 μm)	/	348
26-OH-PPD	rat plasma	Waters ACQUITY UPLC/Xevo TQ-S MS/MS	Waters ACQUITY BEH C18 (2.1 × 50 mm, 1.7 μm)	/	349
PPD	rat plasma	Shimadzu UFLC/MS-8030 plus	Shimadzu Shim-pack XR-ODS III (75 × 2.0 mm, 1.6 μm)	/	350
24-hydroxy-PPD	rat plasma/tissue	Waters ACQUITY UPLC system/Xevo TQ-S MS	Waters ACQUITY BEH C18 (2.1 × 50 mm, 1.7 μm)	/	351
G-Rb3	rat plasma	Agilent 1200 RRLC/6520 Q-TOF MS	Agilent SB-C18 (3.0 × 100 mm, 1.8 μm)	G-Rb3, F2, CK	352
G-Rc	rat urine/feces/plasma	Agilent 1200 RRLC/6520 Q-TOF MS	Agilent SB-C18 (3.0 ×100 mm, 1.8 μm)	G-Rc, CK	353
G-Rc	rat plasma	Thermo Surveyor HPLC/Thermo Finnigan TSQ Quantum QQQ MS	Agilent Zorbax SB-C18 (2.1 × 150 mm, 3.5 μm)	/	354
noto-Fc	rat plasma	Waters ACQUITY UPLC/Synapt G2 Q-TOF MS/MS	Waters ACQUITY HSS T3 (2.1 × 150 mm, 1.8 μm)	/	355

Analyte	Biological sample	Analysis Technology (Instrument)	Chromatographic Column	PK Markers	Ref.
G-CK	human plasma	Agilent 1200 HPLC/AB SCIEX API 4000	Phenomenex Luna C18 (2 × 100 mm, 3 μm)	/	336
G-Rb1, CK	human blood	Thermo Finnigan TSQ Quantum Discovery MAX MS/MS	Imtakt Cadenza ODS (2.0 × 100 mm, 3.0 μm)	/	356
G-Ocotillol, RT5, F11	rat/beagle dog plasma	Agilent 1200 HPLC/AB SCIEX API 3200 Q-Trap-MS	Shimadzu Shim-pack GIST C18 (2.1 × 150 mm, 2 μm)	/	357
G-Rd	rat plasma	Waters HPLC	Thermo Hypersil BDS C18	/	358
white ginseng, frozen ginseng, red ginseng	rat plasma/tissue	Waters UPLC/Xeve TQ	Waters ACQUITY BEH C18 (2.1 × 50 mm, 1.7 μm)	G-Rg1, Re, Rb1, Rd	342
fermented & nonfermented ginseng	human plasma	Agilent 1200 HPLC/AB SCIEX 4000 MS/MS	Phenomenex Gemini 3 μm C18 110A (2.0 × 50 mm, 3 μm)	20-*O*-*β*-D-glucopyranosyl-20(*S*)-protopanaxadiol	359
fermented & nonfermented ginseng	human plasma	Shimadzu LC-30AD/AB SCIEX QTRAP 6500	Shiseido Capcell Pak C18 MGIII (2.0 ×50 mm, 5μm)	G-Rb1, CK, Rb2, Rc, Rg1, Re	360
total ginsenosides	rat/mice plasma	Waters UPLC/Xevo G2-XS QTOF MS	/	protopanaxadiol, protopanaxatriol, G-Rh2, Rg3, Rd, Rc, Rb1, F1, Rg1, Re	361
RG extract	rat plasma	Agilent 1200 HPLC/6470 QqQ MS	Phenomenex Polar RP column (2.0 × 150 mm, 4.0 μm)	20(*S*)-Rb1, Rb2, Rc, Rd, Re, Rf, Rg3, Rh1, Rh2, F1, F2, CK, PPD, PPT	362
RG extract	rat liver	Agilent 1260 HPLC/6470 QqQ	Phenomenex Synergi Polar RP	G-Rb1, Rb2, Rc, Rd	363

Analyte	Biological sample	Analysis Technology (Instrument)	Chromatographic Column	PK Markers	Ref.
		MS	(2.0 × 150 mm, 4 μm)		
RG	rat plasma	Shimadzu 30 UFLC/8050 QqQ-MS	Waters ACQUITY BEH Shield RP-C18 (2.1 × 100 mm, 1.7 μm)	G-Rb1, Rb2, Rc, Rd, Re, Rg1, Rg5, Rh4, Rk1, Rk3, Rh3, CK; 20(*S*)-Rf, Rg3, Rh1, noto-R2, Rh2, PPT, PPD; 20(S/*R*)-Rg2	364
PQ	human plasma	Agilent 1200 UPLC/TOF-MS	Agilent ZORBAX Extend-C18 UPLC (2.1 × 50 mm, 1.8 μm)	G-Rb1, Rb2, Rb3, Rc, Rd, Re, Rg1, Rg2, CK, 20(*R*)-Rg2, Rg3, Rh1, Rh2, pseudoginsenoside F11	365
saponins (PN)	rat plasma	Thermo Ultimate 3000 HPLC/AB SCIEX 4000QTrap QQQ-MS	Thermo BDS Hypersil C18 (2.1 × 100 mm, 2.4 μm)	G-Rg1, Rd, 20(*S/R*)-Rh1, Rg2, Rg3	366
saponins (PN)	rat brain homogenate	Thermo Accela HPLC/TSQ Quantum Access tandem MS	Waters ACQUITY BEH C18 (2.1 × 100 mm, 1.7 μm)	noto-R1, G-Rg1, Rb1, Re, Rd	367
saponins (PN)	rat plasma	Shimadzu Class VP HPLC-MS-MS	Thermo C18 (4.6 × 10 mm, 2.4 μm)	noto-R1, Rg1, Rb1	368
saponins (PN)	rat fecal	Shimadzu LC 30A/AB SCIEX 5600 TOF-MS	Phenomenex Luna C18 (2.1 × 150 mm, 5 μm)	G-Rb1, Rb2, Rd, Re, Rf, Rg1, noto-R1	369
saponins (PN)	dog plasma	Agilent 1100 HPLC/ABI MS	/	G-Rg1, Rb1, R1	370