

**Table S1:** Concentration of internal target used for pretreatment of plasma samples.

Number	Internal standard	Concentration ( $\mu\text{g/mL}$ )
1	Acylcarnitine C10:0-d3	0.012
2	Acylcarnitine C16:0-d3	0.015
3	L-Citrulline-d4	8.400
4	L-Tryptophan-d5	4.000
5	L-Phenylalanine-d5	4.000
6	L-Leucine-d10	5.200
7	Succinic acid-d4	6.000
8	Cholic acid-d4 (CA-d4)	1.720
9	Chenodeoxycholic acid-d4 (CDCA-d4)	1.000
10	Stearic acid-d3	22.00
11	Palmitic acid-d3	24.00

Note: The internal standard number "1-6" is used for detection in positive ion mode of LC-MS, and the internal standard number "7-11" is used for detection in negative ion mode of LC-MS.

**Table S2:** Concentration of internal target used for pretreatment of lung tissues samples.

Label	Internal standard	Concentration ( $\mu\text{g/mL}$ )
1	Acylcarnitine C10:0-d3	0.01
2	Acylcarnitine C16:0-d3	0.01
3	L-Citrulline-d4	12.00
4	L-Tryptophan-d5	4.00
5	L-Phenylalanine-d5	4.00
6	L-Leucine-d10	5.20
7	Succinic acid-d4	6.00
8	Cholic acid-d4 (CA-d4)	1.80
9	Chenodeoxycholic acid-d4 (CDCA-d4)	2.60
10	Stearic acid-d3	24.00
11	Palmitic acid-d3	24.00

Note: The internal standard number "1-6" is used for detection in positive ion mode of LC-MS, and the internal standard number "7-11" is used for detection in negative ion mode of LC-MS.

**Table S3:** Statistical information of differential metabolites in lung tissues at 5d after WTI (X±SD).

Metabolite name	Control ( <i>n</i> =11)	10Gy ( <i>n</i> =10)	20Gy ( <i>n</i> =9)	35Gy ( <i>n</i> =9)
Palmitoylglycerol	5.68±1.08	6.13±1.30	6.41±1.30	7.26±0.93 <sup>**</sup> , #
L-Isoleucine	1.03±0.25	0.86±0.14 <sup>*</sup>	0.82±0.13 <sup>**</sup>	0.79±0.11 <sup>**</sup>
Cholesterol	6.41±0.69	7.81±1.02 <sup>**</sup>	7.48±0.89 <sup>**</sup>	7.53±0.67 <sup>**</sup>
3-Amino-2-oxazolidinone	2.96±0.61	2.56±0.24 <sup>*</sup>	2.41±0.35 <sup>**</sup>	2.37±0.26 <sup>**</sup>
4-Hydroxybenzenesulfonic acid	6.94±3.75	8.66±3.68	10.11±4.36 <sup>*</sup>	4.05±1.04 <sup>##</sup> , &&
Acylcarnitine C13:1	9.64±3.36	11.72±1.56 <sup>*</sup>	10.63±1.39	9.30±1.32 <sup>#</sup>
Acylcarnitine C15:0	1.98±0.57	2.55±0.58	3.04±0.62 <sup>**</sup>	3.03±0.80 <sup>**</sup>
Acylcarnitine C20:0	6.63±0.71	8.05±2.03	8.86±2.31 <sup>**</sup>	9.13±1.83 <sup>**</sup>
Acylcarnitine C20:1	4.12±0.59	4.65±0.94	5.33±0.81 <sup>**</sup>	5.03±1.38 <sup>*</sup>
Acylcarnitine C22:0	2.63±0.41	3.40±1.01	4.13±1.91 <sup>**</sup>	4.33±1.05 <sup>**</sup>
Acylcarnitine C5:0	5.85±1.47	4.25±0.95 <sup>**</sup>	4.57±1.08 <sup>*</sup>	2.97±0.90 <sup>**</sup> , #, &&
Acylcarnitine C9:1	2.34±0.71	1.57±0.62 <sup>**</sup>	1.36±0.58 <sup>**</sup>	1.31±0.29 <sup>**</sup>
Alanine	4.02±0.43	3.07±0.38 <sup>**</sup>	3.60±0.80 <sup>#</sup>	3.48±0.60 <sup>*</sup>
Arginine	5.09±1.11	4.37±0.91	4.15±0.82 <sup>*</sup>	4.19±0.49 <sup>*</sup>
Ascorbic acid	0.23±0.06	0.70±0.59	0.38±0.30	0.98±0.92 <sup>**</sup> , &
Asparagine	4.78±1.11	4.16±0.47	4.03±0.62 <sup>*</sup>	3.93±0.44 <sup>*</sup>
FFA22:5	5.08±0.83	5.18±0.89	5.63±0.63	6.15±0.73 <sup>**</sup> , #
Cytosine	4.92±0.82	4.10±0.84 <sup>*</sup>	4.55±1.02	3.93±0.49 <sup>*</sup>
Erucic acid	6.38±1.17	5.21±0.69 <sup>**</sup>	5.31±0.67 <sup>**</sup>	5.49±0.32 <sup>*</sup>
Indoxyl sulfate	1.89±0.44	2.88±0.73 <sup>**</sup>	2.65±0.94 <sup>*</sup>	1.70±0.53 <sup>##</sup> , &&
Leucine	5.49±1.34	4.75±0.57	4.57±0.69 <sup>*</sup>	4.47±0.50 <sup>*</sup>
LPC(O-18:0)	1.58±0.26	1.91±0.26 <sup>**</sup>	2.00±0.25 <sup>**</sup>	1.98±0.17 <sup>**</sup>
LPC(O-18:1)	1.90±0.34	2.18±0.29	2.51±0.52 <sup>**</sup>	2.49±0.33 <sup>**</sup>

PE(32:0)	1.73±0.41	1.43±1.23	1.11±0.30	1.06±0.40*
PE(36:5)	2.05±0.36	1.70±1.10	1.43±0.45*	1.34±0.39*
Phenylalanine	7.51±1.31	6.77±0.73	6.45±0.85*	6.35±0.69**
Proline	10.86±2.78	9.11±1.25*	9.33±1.96	8.73±1.24*
Serotonin	2.77±0.60	2.36±0.29*	2.36±0.27*	2.20±0.23**
Tauro- $\alpha$ -Muricholic acid	9.35±3.92	2.93±1.14**	3.52±2.23**	4.19±4.25**
Taurocholic acid	41.46±22.85	10.27±1.34**	13.83±6.43**	16.04±15.06**
Taurohyodeoxycholic Acid	8.09±3.25	2.18±0.61**	2.70±1.26**	3.02±2.27**
Threonine	5.52±1.00	4.54±0.44**	4.90±0.92	4.65±0.48*
Tryptophan	9.83±1.94	8.33±1.11*	8.31±0.96*	7.70±0.91**
Tauroursodeoxycholic acid	6.12±2.29	2.44±0.47**	2.10±0.87**	2.99±1.82**
Valine	10.92±2.51	8.81±0.90**	9.17±1.74*	8.73±1.14**
Xanthine	1.42±0.20	1.21±0.13**	1.22±0.17*	1.27±0.13
Urea	9.84±1.70	8.61±2.61	8.13±1.95	6.25±1.22*, #, &

Note: *n* represent the number of samples. LSD analysis. Compared with Control, \**p*<0.05, \*\**p*<0.01; Compared with 10Gy, #*p*<0.05, ##*p*<0.01; Compared with 20Gy, &*p*<0.05, &&*p*<0.01.

**Table S4:** Statistical information of differential metabolites in plasma at 1d after WTI (X±SD).

Metabolite name	Control ( <i>n</i> =13)	10Gy ( <i>n</i> =10)	20Gy ( <i>n</i> =11)	35Gy ( <i>n</i> =12)
Lysine	2.41±0.24	2.62±0.31	2.91±0.58 <sup>**</sup>	2.81±0.31 <sup>*</sup>
Glutamine	3.10±0.35	3.41±0.47	3.75±0.77 <sup>**</sup>	3.69±0.44 <sup>*</sup>
Tryptophan	2.52±0.26	2.35±0.27	2.25±0.42 <sup>*</sup>	2.64±0.28 <sup>#, &amp;&amp;</sup>
Tyrosine	3.58±0.67	4.37±0.71 <sup>*</sup>	4.56±0.78 <sup>**</sup>	4.74±0.77 <sup>**</sup>
Glycine	6.47±3.83	3.33±2.60 <sup>*</sup>	6.26±3.20 <sup>#</sup>	2.45±0.86 <sup>**</sup> , <sup>##</sup>
Cytosine	0.95±0.13	1.38±0.14 <sup>**</sup>	1.61±0.21 <sup>**</sup> , <sup>##</sup>	1.54±0.13 <sup>**</sup> , <sup>#</sup>
Adenine	3.35±0.10	3.42±0.14	3.42±0.11	3.31±0.08 <sup>#, &amp;</sup>
Ascorbic acid	2.01±0.35	2.01±0.36	1.94±0.44	2.78±0.78 <sup>**</sup> , <sup>##, &amp;&amp;</sup>
Acylcarnitine C12:1	3.59±1.06	5.19±1.31	6.75±3.89 <sup>**</sup>	5.30±0.80
Acylcarnitine C13:1	4.24±1.49	5.68±1.36	6.26±2.98 <sup>*</sup>	4.68±0.89 <sup>&amp;</sup>
Acylcarnitine C14:0	5.11±1.48	6.81±2.82	8.13±3.99 <sup>*</sup>	7.99±1.75 <sup>*</sup>
Acylcarnitine C14:1	4.08±1.19	5.20±1.82	7.27±4.68 <sup>**</sup>	5.86±1.16
Acylcarnitine C15:0	0.75±0.30	1.02±0.47	1.32±0.48 <sup>**</sup>	1.23±0.28 <sup>**</sup>
Acylcarnitine C16:0	0.57±0.21	0.80±0.26	0.93±0.49 <sup>*</sup>	1.04±0.24 <sup>**</sup>
Acylcarnitine C16:3	1.07±0.31	1.42±0.52	2.15±1.62 <sup>**</sup>	1.72±0.30
Acylcarnitine C18:0	2.62±1.14	3.32±1.68	4.38±1.95 <sup>**</sup>	4.70±0.77 <sup>**</sup> , <sup>#</sup>
Acylcarnitine C18:2	0.64±0.20	0.81±0.33	0.99±0.40 <sup>**</sup>	0.97±0.18 <sup>*</sup>
Acylcarnitine C20:0	1.57±0.63	1.80±1.13	2.92±0.95 <sup>**</sup> , <sup>##</sup>	2.77±0.74 <sup>**</sup> , <sup>#</sup>
Acylcarnitine C20:1	1.94±0.82	2.60±0.70	2.95±0.72 <sup>**</sup>	3.74±0.76 <sup>**</sup> , <sup>##, &amp;</sup>
Acylcarnitine C20:4	1.31±0.34	1.65±0.48	2.50±1.58 <sup>**</sup> , <sup>#</sup>	2.23±0.31 <sup>*</sup>
Acylcarnitine C6:0	7.94±1.89	10.03±3.41	10.95±3.61 <sup>*</sup>	11.27±2.95 <sup>*</sup>
Acylcarnitine C8:0	6.19±1.57	7.60±1.93	8.42±2.63 <sup>*</sup>	9.75±2.68 <sup>**</sup> , <sup>#</sup>
FFA22:5	1.32±0.31	1.68±0.30 <sup>**</sup>	1.37±0.24 <sup>##</sup>	1.44±0.22 <sup>#</sup>

FFA21:0	1.48±0.51	1.50±0.34	1.02±0.32 <sup>**</sup> , ##	1.24±0.38
Indole-3-Lactic acid	0.87±0.22	1.09±0.43	1.81±0.95 <sup>**</sup> , #	2.53±0.87 <sup>**</sup> , ##, &
Indole	5.61±0.45	5.22±0.48	4.95±0.88 <sup>**</sup>	5.70±0.59 <sup>&amp;&amp;</sup>
PC(31:0)	2.56±0.82	2.84±1.12	3.65±0.98 <sup>**</sup>	3.06±0.85
LPE(16:0)	1.33±0.24	1.50±0.30	1.75±0.22 <sup>**</sup> , #	1.95±0.30 <sup>**</sup> , ##
LPE(17:0)	5.42±1.41	5.79±1.95	7.21±1.17 <sup>*</sup> , #	7.20±1.86 <sup>*</sup> , #
LPE(18:0)	2.88±0.71	2.82±0.90	3.67±0.62 <sup>*</sup> , #	3.86±0.88 <sup>**</sup> , ##
Pyruvate	1.58±0.38	1.99±0.55	2.15±0.41 <sup>*</sup>	2.61±0.64 <sup>**</sup> , &
Serotonin	2.99±0.29	2.77±0.31	2.59±0.49 <sup>*</sup>	3.05±0.29 <sup>&amp;&amp;</sup>
Spermine	0.90±0.21	0.86±0.21	0.97±0.31	1.17±0.33 <sup>*</sup> , #
2,3-Dihydroxybenzoate	4.64±1.81	3.30±1.97	2.46±1.86 <sup>**</sup>	1.50±0.57 <sup>**</sup> , #
3-Methylquinoline	1.02±0.09	0.94±0.09	0.90±0.17 <sup>*</sup>	1.04±0.10 <sup>&amp;&amp;</sup>
DL-P-Hydroxyphenyl lactic acid	2.11±0.35	2.69±0.43	3.63±2.03 <sup>**</sup>	3.54±0.46 <sup>**</sup>
Benzophenone	2.06±0.85	1.05±0.42 <sup>**</sup>	1.54±0.66	1.72±0.63 <sup>#</sup>
β-Nicotyrine	5.22±0.53	4.81±0.43	4.59±0.85 <sup>*</sup>	5.26±0.55 <sup>&amp;</sup>
Perfluorooctanesulfonic acid	7.57±1.06	8.55±0.97	7.58±0.75	8.99±1.79 <sup>**</sup> , &&
Urea	5.62±1.44	4.97±0.94	4.07±0.63 <sup>*</sup> , #	3.16±0.77 <sup>**</sup> , ##, &

Note: *n* represent the number of samples. LSD analysis. Compared with Control, \**p*<0.05, \*\**p*<0.01; Compared with 10Gy, #*p*<0.05, ##*p*<0.01; Compared with 20Gy, &*p*<0.05, &&*p*<0.01.

**Table S5:** Statistical information of differential metabolites in plasma at 2d after WTI (X±SD).

Metabolite name	Control ( <i>n</i> =13)	10Gy ( <i>n</i> =10)	20Gy ( <i>n</i> =11)	35Gy ( <i>n</i> =12)
Phenylalanine	3.07±0.28	2.81±0.28*	2.71±0.21**	2.88±0.33
Pro-Leu	4.68±0.68	3.90±0.66*	3.88±0.57*	4.52±1.03
Proline	1.61±0.36	1.25±0.21**	1.34±0.23*	1.25±0.22**
Kynurenic acid	4.69±0.57	4.22±0.39*	4.14±0.64*	3.99±0.51**
Lysine	2.33±0.47	2.73±0.54	3.01±0.50**	2.81±0.45*
Methionine	1.01±0.11	0.76±0.10**	0.91±0.16#	0.90±0.18#
Glutamine	2.92±0.51	3.39±0.69	3.68±0.70**	3.60±0.54**
Glycine	7.56±2.23	2.44±1.00	9.56±12.09#	3.34±2.38&
Hippuric acid	5.84±1.45	3.47±1.22**	2.14±0.62**, #	3.55±1.42**, &&
Histidine	0.98±0.14	1.05±0.10	1.00±0.10	0.89±0.14##, &
Threonine	3.22±0.50	2.70±0.53	3.80±1.09*, ##	2.79±0.55&&
Tryptophan	2.27±0.29	2.06±0.21	1.98±0.28*	2.05±0.26*
Tyrosine	3.85±0.88	4.38±0.52	4.91±0.44**	4.92±1.34**
Cytosine	8.46±1.01	7.10±0.72**	6.91±0.84**	6.21±0.69**, #
Acylcarnitine C10:0	3.97±1.00	6.87±1.19**	6.98±1.55**	7.05±1.58**
Acylcarnitine C10:1	1.61±0.40	2.43±0.43**	2.37±0.46**	2.35±0.44**
Acylcarnitine C10:2	1.17±0.24	1.51±0.20**	1.46±0.28**	1.40±0.19*
Acylcarnitine C12:0	10.74±2.54	16.17±2.34**	15.93±2.42**	16.96±3.64**
Acylcarnitine C12:1	3.11±0.80	4.39±0.67**	4.73±0.77**	4.57±1.14**
Acylcarnitine C14:0	4.28±1.24	6.45±0.79**	6.76±0.88**	7.62±2.19**
Acylcarnitine C14:2	4.69±1.59	7.52±1.09**	7.25±0.99**	7.74±1.86**
Acylcarnitine C15:0	0.65±0.21	1.06±0.23**	1.20±0.17**	1.20±0.32**
Acylcarnitine C16:0	4.06±0.95	6.42±0.76**	6.96±1.16**	7.94±2.05**, #

Acylcarnitine C16:1	1.42±0.51	2.43±0.35**	2.50±0.40**	2.84±0.82**
Acylcarnitine C16:2	1.57±0.60	2.62±0.46**	2.62±0.44**	3.09±1.01**
Acylcarnitine C16:3	0.90±0.33	1.49±0.28**	1.44±0.23**	1.49±0.31**
Acylcarnitine C16:4	1.23±0.35	1.81±0.31**	1.65±0.29**	1.73±0.24**
Acylcarnitine C18:0	2.70±0.47	4.15±0.53**	5.23±1.03**, #	5.41±1.56**, ##
Acylcarnitine C18:1	3.73±1.49	5.91±0.82**	6.42±1.21**	7.56±1.92**, #
Acylcarnitine C18:2	4.14±1.50	6.68±1.07**	7.10±0.95**	8.07±2.36**, #
Acylcarnitine C18:3	3.17±1.13	5.27±1.07**	5.32±0.83**	6.07±1.42**
Acylcarnitine C20:0	1.16±0.39	1.73±0.18**	2.51±0.55**, ##	2.59±0.62**, ##
Acylcarnitine C20:1	1.17±0.37	1.79±0.29**	2.36±0.53**, ##	2.35±0.44**, ##
Acylcarnitine C20:4	1.05±0.36	1.66±0.23**	1.70±0.23**	1.76±0.33**
Acylcarnitine C5:0	10.28±1.27	7.12±0.84**	7.84±3.44**	5.71±1.64**, &
Acylcarnitine C6:0	4.53±1.41	8.16±1.61**	8.75±2.35**	8.18±1.87**
Acylcarnitine C2:0	2.00±0.21	2.27±0.21*	2.51±0.51**	2.35±0.26**
Acylcarnitine C4:0	2.17±0.41	1.92±0.26	1.80±0.56*	1.71±0.31**
Acylcarnitine C8:0	3.81±1.15	6.60±1.34**	7.10±1.72**	6.87±1.63**
β-Linoleic acid	2.95±1.32	4.14±1.18	5.15±1.91**	4.68±1.70**
Linolenic acid	2.93±1.31	4.08±1.40	4.72±1.75**	4.44±1.73*
Erucic acid	6.46±1.89	7.91±1.89	7.99±2.17	6.08±1.79*, &
Palmitic acid	1.57±0.24	2.07±0.35*	2.38±0.59**	2.07±0.54**
Oleic acid	1.55±0.50	2.35±0.63*	3.03±1.19**	2.67±1.01**
FFA20:2	0.77±0.23	1.07±0.25	1.38±0.59**	1.20±0.43*
FFA20:3	0.73±0.23	1.13±0.30*	1.33±0.54**	1.18±0.47**
FFA22:5	2.70±0.88	4.05±1.02*	4.88±2.19**	4.63±1.89**
FFA22:6	0.63±0.22	0.82±0.18	0.98±0.41**	0.94±0.36*



Glycohyodeoxycholic acid	1.14±1.36	1.07±1.04	0.94±0.71	2.16±1.07*, #, &&
Deoxycholic acid	2.33±1.76	1.86±0.76	3.12±1.36	5.63±3.59**, ##, &&
Indole-3-Lactic acid	7.26±1.28	5.14±1.18**	5.27±1.77**	4.64±0.73**
Indole	5.35±0.70	4.94±0.40	4.69±0.54**	4.86±0.59*
LPA(14:0)	3.92±2.41	2.75±0.40*	2.50±0.50*	2.39±0.52**
LPC(O-18:1)	2.82±0.44	2.51±0.24	2.90±0.41#	2.59±0.31&
LPC(18:2)	2.45±0.14	2.13±0.10**	2.31±0.38	2.19±0.10**
LPC(20:3)	2.53±0.40	2.34±0.21	2.41±0.46	2.10±0.37**
LPE(16:0)	1.71±0.14	1.87±0.16	2.11±0.30**, #	2.24±0.33**, ##
LPE(17:0)	7.21±1.90	7.54±1.04	9.11±1.35**, #	8.29±1.36
LPE(18:0)	3.54±0.57	3.67±0.47	4.36±0.81**, #	4.31±0.69**, #
PC(O-36:5)	1.28±0.27	1.22±0.08	1.90±0.78**, ##	1.23±0.09&&
PC(O-36:6)	5.09±1.37	4.01±0.58**	4.46±0.90	4.20±0.61*
PC(O-38:4)	7.02±1.78	9.90±0.99**	9.17±0.82**	8.26±1.13*, ##
PC(34:0)	0.88±0.22	0.91±0.07	1.10±0.17**, #	1.03±0.12*
PC(34:3)	2.31±0.56	2.55±0.30	3.17±1.02**, #	2.67±0.46
PC(38:1)	2.15±0.46	2.35±0.25	2.87±0.48**, ##	2.38±0.20&&
PC(38:5)	4.03±0.72	5.15±0.35**	4.67±0.30**, #	4.57±0.62*, #
PC(38:7)	1.90±0.42	2.49±0.23**	2.34±0.32*	2.45±0.53**
PC(39:4)	0.93±0.24	1.29±0.17**	1.23±0.17**	1.19±0.14**
PC(40:6)	5.48±0.98	6.59±0.79**	5.91±0.47#	6.08±0.63
PE(36:3)	2.28±0.78	1.59±0.33*	2.62±1.30##	2.00±0.46
PE(36:4)	5.17±1.60	4.97±0.99	6.68±2.12*, #	6.52±1.28*, #
PE(36:5)	1.19±0.24	0.95±0.09**	1.14±0.25#	1.14±0.15#
PE(38:4)	3.13±0.93	4.28±1.02*	5.50±1.78**, #	5.37±1.33**

Serotonin	2.50±0.34	2.35±0.18	2.19±0.24**	2.28±0.27*
Spermine	7.27±1.23	7.40±1.18	8.02±1.26	9.15±2.53**, #
1-Aminocyclopropanecarboxylic acid	5.47±0.92	4.68±0.61*	4.08±1.07**	4.68±0.97*
2,3-Dihydroxybenzoate	5.47±1.88	2.06±0.72**	1.01±0.46**, #	1.42±0.86**
3-Amino-2- oxazolidone	2.48±0.25	2.35±0.17	2.19±0.20**	2.36±0.29
3-Methylquinoline	1.02±0.13	0.95±0.07	0.89±0.11**	0.93±0.12*
Benzophenone	2.41±1.45	0.99±0.47**	0.63±0.38**	1.28±0.51**
3-Aminobutyric acid	6.04±0.80	6.20±0.77	5.88±0.97	5.34±0.96#
DL-P-Hydroxyphenyl lactic acid	1.74±0.34	2.02±0.34	1.93±0.46	2.19±0.33**
D-Pipecolinic acid	2.86±0.33	3.24±0.38*	3.30±0.34**	3.28±0.33**
Urea	6.89±0.91	5.02±0.77**	5.85±2.17	4.43±1.66**

Note: *n* represent the number of samples. LSD analysis. Compared with Control, \**p*<0.05, \*\**p*<0.01; Compared with 10Gy, #*p*<0.05, ##*p*<0.01; Compared with 20Gy, &*p*<0.05, &&*p*<0.01.

**Table S6:** Statistical information of differential metabolites in plasma at 3d after WTI (X±SD).

Metabolite name	Control ( <i>n</i> =13)	10Gy ( <i>n</i> =10)	20Gy ( <i>n</i> =11)	35Gy ( <i>n</i> =12)
Tryptophan	2.60±0.31	2.40±0.17	2.13±0.29 <sup>*, #</sup>	1.98±0.31 <sup>*, ##</sup>
Tyrosine	3.76±0.50	4.10±0.79	5.08±1.05 <sup>*, ##</sup>	4.64±0.53 <sup>**</sup>
Valine	3.65±0.62	3.49±0.40	3.23±0.63	2.84±0.37 <sup>*, ##</sup>
Proline	2.31±0.45	2.17±0.26	1.80±0.20 <sup>*, ##</sup>	1.75±0.12 <sup>*, ##</sup>
Serine	4.01±0.52	4.26±1.20	3.67±0.72	3.35±0.66 <sup>*, ##</sup>
Phenylalanine	3.61±0.30	3.63±0.58	3.23±0.30 <sup>*, #</sup>	2.80±0.33 <sup>*, ##, &amp;</sup>
Ornithine	1.19±0.20	1.05±0.12	0.98±0.16 <sup>**</sup>	0.86±0.16 <sup>*, ##</sup>
Methionine	1.29±0.23	1.18±0.17	0.97±0.17 <sup>*, #</sup>	0.93±0.09 <sup>*, ##</sup>
Kynurenic acid	5.07±0.63	5.19±0.70	4.47±0.44 <sup>*, ##</sup>	3.91±0.41 <sup>*, ##, &amp;</sup>
Leucine	7.68±1.28	6.81±0.83	6.65±1.07 <sup>*</sup>	5.68±1.00 <sup>*, #, &amp;</sup>
Glycine	9.70±5.34	11.89±5.77	4.94±2.34 <sup>*, ##</sup>	2.82±1.25 <sup>*, ##</sup>
Asparagine	3.97±0.68	3.60±0.42	3.47±0.48 <sup>*</sup>	3.04±0.53 <sup>*, #</sup>
Cytosine	1.59±0.17	1.50±0.21	1.24±0.18 <sup>*, ##</sup>	1.29±0.13 <sup>*, ##</sup>
Aspartic acid	2.52±0.33	2.37±0.30	2.26±0.33	2.10±0.31 <sup>**</sup>
Hippuric acid	5.10±1.83	5.40±2.75	4.07±1.12	3.11±0.83 <sup>*, ##</sup>
Histidine	1.20±0.09	1.26±0.06	1.18±0.16	0.98±0.13 <sup>*, ##, &amp;&amp;</sup>
Hydroxyproline	1.62±0.21	1.46±0.14	1.40±0.21 <sup>**</sup>	1.18±0.18 <sup>*, ##, &amp;&amp;</sup>
Adenine	3.61±0.13	3.56±0.11	3.52±0.12	3.47±0.11 <sup>**</sup>
Acylcarnitine C10:0	5.69±1.97	7.42±2.35 <sup>*</sup>	7.69±1.16 <sup>*</sup>	8.25±2.17 <sup>**</sup>
Acylcarnitine C10:1	2.23±0.61	2.79±0.42 <sup>**</sup>	2.89±0.51 <sup>**</sup>	2.63±0.36 <sup>*</sup>
Acylcarnitine C10:2	1.52±0.30	1.83±0.19 <sup>**</sup>	1.65±0.27	1.48±0.21 <sup>##</sup>
Acylcarnitine C12:1	3.94±1.36	5.15±1.76 <sup>*</sup>	5.30±1.04 <sup>*</sup>	5.08±1.17 <sup>*</sup>
Acylcarnitine C14:2	0.64±0.27	0.87±0.45	0.92±0.19 <sup>*</sup>	0.92±0.17 <sup>*</sup>

Acylcarnitine C15:0	0.81±0.39	1.07±0.64	1.19±0.31*	1.41±0.34**
Acylcarnitine C16:0	4.82±1.41	5.82±3.49	6.05±1.17	8.24±1.54**, ##, &
Acylcarnitine C16:1	2.07±0.92	2.72±1.95	3.05±0.69*	3.36±0.78**
Acylcarnitine C18:0	2.24±0.37	3.00±1.23	3.39±1.16**	4.09±0.88**, ##
Acylcarnitine C18:1	0.53±0.26	0.79±0.50	0.75±0.21	1.12±0.27**, #, &&
Acylcarnitine C18:2	0.66±0.32	0.83±0.51	1.00±0.27*	1.08±0.20**
Acylcarnitine C18:3	4.20±2.17	5.56±3.37	6.64±2.08*	6.56±1.42*
Acylcarnitine C20:0	0.67±0.16	0.96±0.32	1.25±0.59**	1.68±0.71**, ##, &
Acylcarnitine C20:1	1.48±0.61	2.01±0.78	2.31±0.74**	3.20±0.64**, ##, &&
Acylcarnitine C20:4	1.53±0.55	1.99±0.83	2.40±0.54**	2.39±0.39**
Acylcarnitine C5:0	13.74±3.31	14.59±2.67	9.95±2.47**, ##	6.65±1.68**, ##, &&
Acylcarnitine C6:0	0.71±0.26	0.95±0.30*	0.97±0.19*	0.95±0.22*
Acylcarnitine C9:1	5.49±1.13	6.18±1.05	4.90±1.22##	4.02±0.73**, ##, &
Acylcarnitine C2:0	2.72±0.38	3.07±0.42*	3.11±0.28**	2.95±0.23
Acylcarnitine C3:0	1.02±0.16	1.11±0.25	0.95±0.19#	0.77±0.09**, ##, &
Acylcarnitine C4:0	2.37±0.43	2.38±0.45	2.13±0.58	1.54±0.25**, ##, &&
Acylcarnitine C6:1	1.50±0.21	1.70±0.27	1.42±0.30#	1.34±0.19##
Acylcarnitine C8:0	55.50±17.12	75.08±21.50*	77.62±13.51**	79.45±20.01**
Acylcarnitine C8:1	3.63±0.82	3.68±0.58	2.94±0.77*, #	2.17±0.52**, ##, &
Choline	2.15±0.36	2.16±0.27	1.82±0.36*, #	1.66±0.23**, ##
N-Acetylneuraminic acid	1.49±0.73	1.43±0.49	0.84±0.46**, #	1.01±0.36*
Erucamide	7.12±3.85	5.30±1.93	10.15±9.12#	3.28±0.73&&
Erucic acid	5.13±1.03	5.97±0.91	8.09±2.65**, ##	5.99±1.20&&
Palmitic acid	1.85±0.50	1.91±0.54	2.65±0.65**, ##	2.24±0.19
Myristic acid	0.70±0.24	0.74±0.24	1.03±0.33**, #	0.81±0.14&

Biliverdin	1.98±0.66	1.88±0.55	1.20±0.46 <sup>**</sup> , ##	1.99±0.47 <sup>&amp;&amp;</sup>
β-Linoleic acid	3.80±1.54	3.66±1.79	6.17±1.99 <sup>**</sup> , ##	5.23±1.21 <sup>*</sup> , #
Linolenic acid	3.72±1.49	3.61±1.70	5.85±2.07 <sup>**</sup> , ##	4.91±1.26
FFA20:0	1.64±0.81	1.47±0.55	1.85±0.60	3.20±1.57 <sup>**</sup> , ##, &&
Oleic acid	1.95±0.77	1.88±0.97	3.24±1.06 <sup>**</sup> , ##	2.59±0.64
FFA19:0	0.64±0.29	0.57±0.18	0.74±0.19	1.11±0.49 <sup>**</sup> , ##, &&
FFA20:2	0.89±0.31	0.81±0.34	1.43±0.46 <sup>**</sup> , ##	1.11±0.30 <sup>&amp;</sup>
FFA20:3	1.08±0.37	0.96±0.41	1.70±0.55 <sup>**</sup> , ##	1.34±0.42 <sup>#</sup>
FFA20:4	2.67±0.49	2.46±0.56	3.10±0.51 <sup>#</sup>	2.93±0.55 <sup>#</sup>
FFA22:5	3.17±1.10	3.06±1.39	4.79±1.20 <sup>**</sup> , ##	4.50±0.90 <sup>**</sup> , ##
FFA22:6	0.76±0.25	0.74±0.29	1.07±0.23 <sup>**</sup> , ##	0.95±0.19 <sup>#</sup>
FFA21:0	4.89±2.86	4.12±1.60	5.67±2.16	9.11±4.80 <sup>**</sup> , ##, &
Glycohydoxycholic acid	1.34±1.85	2.97±2.36 <sup>*</sup>	2.90±1.62 <sup>*</sup>	3.19±1.24 <sup>*</sup>
Deoxycholic acid	3.40±1.82	4.78±2.36	4.79±2.49	6.95±3.75 <sup>**</sup>
Tauro-α-Muricholic acid	5.28±1.87	3.36±1.81 <sup>**</sup>	2.42±1.39 <sup>**</sup>	1.92±1.56 <sup>**</sup>
Taurohydoxycholic acid	6.45±2.04	4.63±2.48	2.82±2.04 <sup>**</sup>	4.54±4.13
Pantothenic acid	2.22±0.37	2.29±0.36	1.98±0.24	1.98±0.42 <sup>#</sup>
Indole-3-Lactic acid	6.61±1.27	5.85±1.85	4.98±1.03 <sup>**</sup>	5.13±1.65 <sup>*</sup>
Indole	5.25±0.58	5.03±0.50	4.35±0.47 <sup>**</sup> , ##	3.93±0.57 <sup>**</sup> , ##
Indoxyl sulfate	1.77±0.34	2.51±0.65 <sup>**</sup>	1.58±0.45 <sup>#</sup>	1.37±0.39 <sup>*</sup> , ##
LPA(14:0)	4.46±0.86	3.64±1.18 <sup>*</sup>	3.41±0.54 <sup>**</sup>	2.92±0.76 <sup>**</sup>
LPA(20:1)	2.78±0.54	2.16±0.59 <sup>**</sup>	3.07±0.46 <sup>#</sup>	2.44±0.44 <sup>&amp;&amp;</sup>
LPC(O-18:0)	3.64±0.46	3.65±0.71	4.37±0.72 <sup>**</sup> , #	3.92±0.63
LPC(O-18:1)	2.81±0.29	2.33±0.49 <sup>**</sup>	2.90±0.33 <sup>#</sup>	2.37±0.22 <sup>**</sup> , &&
LPC(16:0)	1.45±0.14	1.30±0.20 <sup>*</sup>	1.62±0.13 <sup>*</sup> , ##	1.46±0.21 <sup>#</sup> , &

LPC(18:2)	2.46±0.15	2.17±0.31**	2.30±0.21	2.11±0.16**, &
LPC(20:3)	2.73±0.37	2.12±0.56**	2.60±0.56 <sup>#</sup>	1.98±0.40**, &&
LPE(16:0)	0.93±0.11	1.00±0.18	1.07±0.27	1.18±0.19**, #
LPE(20:2)	1.66±0.13	1.36±0.23**	1.33±0.16**	1.29±0.25**
PC(O-36:5)	1.09±0.13	1.15±0.20	1.16±0.13	0.96±0.16 <sup>##</sup> , &&
PC(O-36:6)	4.61±0.94	3.94±0.95	4.43±0.80	3.04±0.61**, #, &&
PC(O-38:4)	0.65±0.13	0.75±0.11	0.82±0.15**	0.69±0.18&
PC(34:0)	7.10±1.74	6.46±1.06	8.90±2.31*, ##	7.03±1.90&
PC(34:3)	2.43±0.54	2.27±0.36	2.87±0.72 <sup>#</sup>	2.22±0.48&&
PC(35:1)	3.80±0.71	3.58±0.56	4.39±0.87 <sup>#</sup>	3.31±0.85&&
PC(36:3)	3.01±0.37	2.66±0.36*	2.97±0.40	2.34±0.35**, #, &&
PC(36:5)	4.08±0.82	3.66±0.64	4.16±1.22	3.13±0.64**, &&
PC(38:1)	2.09±0.22	2.30±0.40	2.59±0.29**, #	2.10±0.28&&
PC(38:5)	4.60±0.63	4.64±0.41	5.24±0.80*, #	4.45±0.64&&
PC(38:7)	2.15±0.39	2.34±0.42	3.08±0.68**, ##	2.46±0.48&&
PC(39:4)	7.76±1.89	8.72±1.77	10.47±2.34**	8.47±2.83&
PC(40:6)	6.27±0.83	6.36±0.91	7.21±0.86*, #	6.08±0.86&&
PC(40:8)	2.55±0.35	2.37±0.50	3.07±0.59*, ##	2.33±0.45&&
PE(36:3)	1.68±0.48	1.21±0.34**	1.45±0.40	1.11±0.31**, &
PE(36:5)	1.19±0.18	1.00±0.14**	1.07±0.16	0.93±0.14**, &
PE(38:4)	2.38±0.65	2.02±0.55	3.08±1.23*, ##	2.77±0.80&
Piperidine	4.15±0.41	3.97±0.40	3.58±0.50**	2.81±0.48**, ##, &&
Pyruvate	1.95±0.32	2.08±0.30	1.90±0.31	2.41±0.45**, #, &&
Serotonin	2.92±0.34	2.81±0.27	2.38±0.21**, ##	2.24±0.28**, ##
Spermine	0.70±0.08	0.76±0.14	0.75±0.11	1.00±0.37**, #, &&

DL-P-Hydroxyphenyl lactic acid	1.33±0.23	1.52±0.23	1.69±0.32**	1.74±0.33**
2,3-Dihydroxybenzoate	4.18±0.96	4.48±3.11	2.64±1.09*, #	1.19±0.53**, ##, &
2-Hydroxybutyric acid	3.88±0.67	4.17±1.27	3.40±0.55#	3.08±0.50*, ##
3-Amino-2- oxazolidone	2.29±0.21	2.39±0.38	2.10±0.22#	1.74±0.21**, ##, &&
3-Aminobutyric acid	7.03±1.09	7.21±0.91	5.82±0.97**, ##	5.46±0.83**, ##
3-Methylquinoline	9.88±1.10	9.48±0.95	8.28±0.87**, ##	7.41±1.01**, ##, &
4-Hydroxybenzenesulfonic acid	6.48±1.76	11.53±6.53**	6.34±3.31##	4.62±1.94##
4-Pyridoxic acid	7.72±2.36	10.64±3.76*	6.59±2.49##	5.94±1.88##
5-Hydroxyindole	1.74±0.67	3.35±1.42**	1.30±0.66##	1.11±0.40##
β-Nicotyrine	4.98±0.55	4.72±0.48	4.09±0.45**, ##	3.71±0.51**, ##
Urea	5.95±0.34	4.93±1.08*	4.50±1.36*	3.16±0.79**, ##, &

Note: *n* represent the number of samples. LSD analysis. Compared with Control, \**p*<0.05, \*\**p*<0.01; Compared with 10Gy, #*p*<0.05, ##*p*<0.01; Compared with 20Gy, &*p*<0.05, &&*p*<0.01.

**Table S7:** Statistical information of differential metabolites in plasma at 5d after WTI (X±SD).

Metabolite name	Control (n=13)	10Gy (n=10)	20Gy (n=11)	35Gy (n=12)
Valine	3.67±0.54	3.49±0.44	3.40±0.46	2.73±0.51 <sup>**</sup> , ##, &&
Betaine	6.34±0.93	7.35±0.61 <sup>**</sup>	7.81±0.64 <sup>**</sup>	7.24±0.97 <sup>**</sup>
Arginine	2.55±0.41	2.31±0.35	2.21±0.41 <sup>*</sup>	2.47±0.29
Asparagine	4.51±0.58	3.88±0.41 <sup>*</sup>	3.46±0.41 <sup>**</sup>	2.90±0.78 <sup>**</sup> , ##, &
Tryptophan	2.77±0.37	2.37±0.27 <sup>**</sup>	2.31±0.29 <sup>**</sup>	1.91±0.27 <sup>**</sup> , ##, &&
Leucine	8.36±0.97	7.30±0.84 <sup>*</sup>	6.56±0.56 <sup>**</sup>	5.50±1.34 <sup>**</sup> , ##, &
Tyrosine	3.61±0.53	4.34±0.74 <sup>**</sup>	4.34±0.42 <sup>**</sup>	4.29±0.47 <sup>**</sup>
Methionine	1.20±0.14	1.13±0.20	0.97±0.10 <sup>**</sup> , ##	0.98±0.11 <sup>**</sup> , #
Ornithine	1.22±0.22	1.12±0.16	1.07±0.18	0.90±0.17 <sup>**</sup> , ##, &
Serine	4.22±0.70	3.92±0.71	3.93±0.58	3.25±0.66 <sup>**</sup> , #, &
Citrulline	0.94±0.10	1.04±0.14 <sup>*</sup>	1.07±0.12 <sup>**</sup>	0.99±0.11
Kynurenic acid	5.12±0.48	4.45±0.29 <sup>**</sup>	4.02±0.45 <sup>**</sup>	3.61±0.68 <sup>**</sup> , ##
Glycine	12.95±5.45	8.49±5.79 <sup>*</sup>	8.69±3.50 <sup>*</sup>	4.65±3.45 <sup>**</sup> , &
Histidine	1.05±0.07	1.10±0.11	0.98±0.07 <sup>##</sup>	0.86±0.15 <sup>**</sup> , ##, &
Phenylalanine	3.55±0.36	3.22±0.22 <sup>*</sup>	3.03±0.31 <sup>**</sup>	2.60±0.43 <sup>**</sup> , ##, &&
Hydroxyproline	1.69±0.22	1.46±0.14 <sup>*</sup>	1.49±0.41	1.17±0.20 <sup>**</sup> , #, &&
Cytosine	1.76±0.17	1.72±0.19	1.49±0.16 <sup>**</sup> , ##	1.31±0.11 <sup>**</sup> , ##, &
Pro-Leu	4.50±0.56	4.92±0.43	4.81±0.69	5.44±0.79 <sup>**</sup> , &
Uridine	4.07±0.87	4.82±0.77 <sup>*</sup>	4.76±0.58 <sup>*</sup>	4.95±0.93 <sup>**</sup>
Acylcarnitine C10:0	0.53±0.16	0.65±0.16	0.64±0.09	0.81±0.21 <sup>**</sup> , #, &
Acylcarnitine C10:1	2.17±0.61	2.72±0.51 <sup>*</sup>	2.66±0.23 <sup>*</sup>	2.99±0.65 <sup>**</sup>
Acylcarnitine C12:0	1.30±0.35	1.57±0.37	1.53±0.22	1.77±0.40 <sup>**</sup>
Acylcarnitine C12:1	4.00±1.13	5.38±1.03 <sup>*</sup>	5.91±1.31 <sup>**</sup>	5.50±1.48 <sup>**</sup>



Acylcarnitine C13:1	5.29±1.63	6.81±1.23**	7.17±1.09**	5.41±0.82 <sup>#, &amp;&amp;</sup>
Acylcarnitine C14:0	0.57±0.16	0.67±0.16	0.69±0.13	0.80±0.21**
Acylcarnitine C14:1	4.37±1.48	5.68±1.33*	6.14±1.00**	6.67±1.73**
Acylcarnitine C14:2	0.58±0.19	0.79±0.17**	0.84±0.11**	0.92±0.22**
Acylcarnitine C15:0	0.78±0.26	1.15±0.31*	1.31±0.44**	1.28±0.28**
Acylcarnitine C16:0	4.74±1.15	5.79±1.21	6.14±1.12*	7.38±1.66 <sup>*, ##, &amp;</sup>
Acylcarnitine C16:1	1.96±0.73	2.37±0.66	2.57±0.48*	2.88±0.81**
Acylcarnitine C16:2	2.02±0.76	2.72±0.63*	2.97±0.48**	3.28±0.89**
Acylcarnitine C16:3	1.05±0.37	1.47±0.34**	1.54±0.22**	1.60±0.32**
Acylcarnitine C16:4	1.47±0.45	1.81±0.42*	1.97±0.29**	1.83±0.28*
Acylcarnitine C18:0	2.10±0.53	2.58±0.43	2.93±1.13*	3.51±0.97 <sup>*, #</sup>
Acylcarnitine C18:1	0.49±0.17	0.64±0.11*	0.72±0.12**	0.81±0.18 <sup>*, #</sup>
Acylcarnitine C18:2	0.75±0.27	1.00±0.21*	1.16±0.19**	1.21±0.26 <sup>*, #</sup>
Acylcarnitine C18:3	3.82±1.36	4.97±1.14*	5.52±0.86**	5.76±1.63**
Acylcarnitine C20:0	1.36±0.45	2.08±0.52*	2.31±1.17**	2.83±1.00 <sup>*, #</sup>
Acylcarnitine C20:1	1.92±0.64	2.80±0.45**	3.20±0.47**	3.44±0.65 <sup>*, #</sup>
Acylcarnitine C20:4	1.53±0.48	1.97±0.39**	2.17±0.25**	2.19±0.37**
Acylcarnitine C5:0	11.81±1.68	10.99±2.60	9.03±1.92 <sup>*, #</sup>	7.07±1.81 <sup>*, ##, &amp;</sup>
Acylcarnitine C6:0	0.63±0.22	0.76±0.20	0.79±0.14	0.93±0.26**
Acylcarnitine C9:1	6.82±1.41	6.20±1.48	5.45±1.44*	4.92±0.89 <sup>*, #</sup>
Acylcarnitine C2:0	2.43±0.31	2.63±0.25	2.61±0.18	2.75±0.23**
Acylcarnitine C4:0	2.09±0.21	1.98±0.44	1.66±0.45 <sup>*, #</sup>	1.54±0.19 <sup>*, ##</sup>
Acylcarnitine C8:0	5.09±1.58	6.31±1.55	6.09±0.86	7.81±2.12 <sup>*, #, &amp;</sup>
Acylcarnitine C8:1	3.84±0.74	3.54±0.82	3.08±0.88*	2.44±0.52 <sup>*, ##, &amp;</sup>
Gluconic acid	1.06±0.41	1.63±0.54*	1.58±0.72*	1.84±0.69**

Citric Acid	4.53±0.67	5.15±1.06	3.92±0.55 <sup>#</sup>	4.75±0.94 <sup>&amp;</sup>
Malic acid	1.94±0.48	3.43±1.78 <sup>**</sup>	2.16±1.29 <sup>#</sup>	2.07±0.82 <sup>##</sup>
Lactic acid	5.15±1.10	7.21±2.44 <sup>**</sup>	5.49±1.27 <sup>#</sup>	6.20±1.77
α-Ketoglutaric acid	4.98±0.92	5.50±0.68	4.91±0.98	4.55±0.63 <sup>##</sup>
Succinic acid	0.70±0.13	1.57±1.40 <sup>*</sup>	0.96±1.00	0.83±0.44 <sup>#</sup>
Creatinine	1.28±0.12	1.38±0.15 <sup>*</sup>	1.22±0.11 <sup>##</sup>	1.37±0.11 <sup>&amp;&amp;</sup>
Choline	2.21±0.26	2.19±0.33	1.96±0.24 <sup>*</sup>	1.56±0.26 <sup>**, ##, &amp;&amp;</sup>
Acetylcholine	9.42±1.35	7.76±1.40 <sup>**</sup>	7.21±1.08 <sup>**</sup>	6.82±1.35 <sup>**</sup>
FFA22:5	1.11±0.24	1.26±0.22	1.47±0.47 <sup>*</sup>	1.40±0.34 <sup>*</sup>
Oleic acid	1.80±0.57	2.07±0.58	2.13±0.43	2.72±0.95 <sup>**, #, &amp;</sup>
β-Linoleic acid	3.37±1.13	4.06±1.01	4.11±0.77	5.33±1.90 <sup>**, #, &amp;</sup>
FFA20:2	0.87±0.24	1.05±0.31	1.06±0.17	1.23±0.42 <sup>**</sup>
FFA20:3	0.99±0.31	1.12±0.31	1.12±0.24	1.40±0.51 <sup>**</sup>
Linolenic acid	3.28±1.09	3.86±1.14	3.93±0.97	4.83±1.67 <sup>**</sup>
LPA(14:0)	4.94±0.63	4.13±0.97 <sup>*</sup>	3.50±1.11 <sup>**</sup>	2.90±0.38 <sup>**, ##</sup>
LPA(20:1)	2.66±0.44	2.25±0.35 <sup>**</sup>	1.98±0.31 <sup>**</sup>	2.17±0.31 <sup>**</sup>
LPC(O-18:1)	3.08±0.34	2.76±0.36 <sup>*</sup>	2.51±0.28 <sup>**</sup>	2.51±0.28 <sup>**</sup>
LPC(18:2)	2.61±0.27	2.44±0.18	2.40±0.24 <sup>*</sup>	2.33±0.14 <sup>**</sup>
LPC(20:3)	2.85±0.46	2.22±0.39 <sup>**</sup>	2.03±0.42 <sup>**</sup>	1.93±0.29 <sup>**</sup>
PC(O-36:5)	1.16±0.16	1.41±0.09 <sup>**</sup>	1.23±0.15 <sup>##</sup>	1.17±0.12 <sup>##</sup>
PC(O-36:6)	5.21±0.71	5.45±0.62	4.72±0.94 <sup>#</sup>	4.23±0.70 <sup>**, ##</sup>
PC(O-38:4)	0.72±0.27	1.08±0.14 <sup>**</sup>	0.98±0.14 <sup>**</sup>	0.98±0.21 <sup>**</sup>
PC(34:3)	2.61±0.38	3.27±0.69 <sup>*</sup>	3.20±0.52	3.40±1.16 <sup>*</sup>
PC(38:1)	2.15±0.39	2.87±0.28 <sup>**</sup>	2.56±0.37 <sup>**, #</sup>	2.63±0.34 <sup>**</sup>
PC(38:7)	2.15±0.28	2.91±0.35 <sup>**</sup>	3.12±0.49 <sup>**</sup>	3.42±1.15 <sup>**</sup>

PC(39:4)	0.92±0.40	1.44±0.17**	1.19±0.21*	1.32±0.41**
PE(38:4)	2.40±0.58	2.49±0.57	2.80±0.98	3.97±2.09**, ##, &
PI(18:1/22:6)	1.12±0.31	2.06±0.42**	1.60±0.36**, #	1.74±0.46**
PI(36:4)	2.54±0.40	3.41±0.38**	2.65±0.61##	2.91±0.74#
PI(34:2)	1.58±0.40	1.99±0.43*	1.50±0.40#	1.67±0.45
Serotonin	2.93±0.35	2.49±0.36**	2.37±0.30**	1.97±0.33**, ##, &&
Indole	5.31±0.65	4.54±0.45**	4.33±0.54**	3.67±0.56**, ##, &&
Glycohyodeoxycholic acid	1.51±1.86	3.11±1.65*	3.78±1.71**	2.34±0.80&
Deoxycholic acid	2.85±1.42	3.48±1.52	5.71±2.51**, ##	3.58±1.49&&
Tauro- $\alpha$ -Muricholic acid	3.83±1.35	1.38±0.56**	1.89±0.76**	1.32±0.36**
Taurocholic acid	9.47±4.61	2.71±0.73**	3.60±1.30**	2.64±1.05**
Taurohyodeoxycholic acid	4.48±1.53	1.80±0.62**	1.89±0.65**	1.53±0.57**
$\alpha$ -Muricholic acid	3.30±3.92	4.46±2.85	6.74±4.02*	3.56±1.80&
Cholic acid	4.76±4.07	6.48±2.93	9.07±4.02**	5.70±2.12&
Indoxyl sulfate	1.66±0.30	2.34±0.73**	2.05±0.62	1.36±0.31##, &&
1-Aminocyclopropanecarboxylic acid	5.12±0.64	6.09±0.93**	6.29±0.95**	5.81±0.92*
2,3-Dihydroxybenzoate	3.67±1.21	3.77±1.29	2.85±1.21	1.58±0.85**, ##, &
2-Hydroxy-2-Methylbutyric Acid	3.27±0.62	4.10±0.73**	3.48±0.77	3.31±0.77#
2-Hydroxybutyric acid	3.45±0.29	2.91±0.36**	3.15±0.55	2.89±0.34**
3-Amino-2-oxazolidone	2.04±0.22	1.86±0.12*	1.72±0.17**	1.50±0.26**, ##, &
3-Aminobutyric acid	7.46±0.89	7.17±1.05	6.44±0.84**	5.17±0.83**, ##, &&
4-Hydroxybenzenesulfonic acid	5.90±1.96	8.40±3.57*	8.21±2.76*	3.91±0.96*, ##, &&
4-Pyridoxic acid	8.59±1.96	9.33±2.66	7.60±2.87	6.44±2.46*, ##
5-Hydroxyindole	2.17±0.67	3.43±1.40**	2.66±0.96	1.53±0.47##, &&
DL-P-Hydroxyphenyl lactic acid	1.35±0.22	1.75±0.34**	1.80±0.39**	1.73±0.34**

Pantothenic acid	1.91±0.29	2.20±0.55	1.82±0.54 <sup>#</sup>	1.55±0.30 <sup>*,##</sup>
Piperidine	3.65±0.40	3.42±0.35	3.26±0.38 <sup>*</sup>	2.84±0.29 <sup>*,##,&amp;&amp;</sup>
Phosphoric acid	3.23±0.43	3.20±0.23	2.73±0.40 <sup>**,##</sup>	2.88±0.31 <sup>*,#</sup>
Benzophenone	16.88±6.02	10.53±3.50 <sup>**</sup>	9.43±3.71 <sup>**</sup>	7.56±3.69 <sup>**</sup>
Glycolic acid	5.13±0.53	5.45±0.91	4.83±0.50 <sup>#</sup>	4.51±0.64 <sup>*,##</sup>
3-Hydroxybutyric acid	3.55±1.51	5.17±2.59	7.00±6.13	9.50±5.02 <sup>*,#</sup>
Glycerol	7.80±2.03	9.96±2.84 <sup>*</sup>	7.77±1.37 <sup>#</sup>	11.14±1.98 <sup>*,&amp;&amp;</sup>
Uracil	1.31±0.39	1.75±0.59 <sup>*</sup>	1.30±0.41 <sup>#</sup>	1.15±0.32 <sup>##</sup>
Threonic acid	5.86±1.74	7.52±2.64	10.17±5.02 <sup>*</sup>	9.33±4.57 <sup>*</sup>
Hypotaurine	5.94±1.09	7.16±2.84	5.14±1.14 <sup>#</sup>	5.22±1.57 <sup>#</sup>
Myo-Inositol	5.58±1.09	7.01±1.79 <sup>**</sup>	5.26±0.53 <sup>##</sup>	5.50±0.97 <sup>##</sup>
Mannitol	5.15±2.80	5.39±2.75	2.11±1.12 <sup>**,##</sup>	1.43±0.77 <sup>**,##</sup>
Stearic acid	2.33±0.32	2.39±0.29	2.06±0.31 <sup>*,#</sup>	2.50±0.33 <sup>&amp;&amp;</sup>
Cholesterol	6.78±1.82	10.33±2.75 <sup>**</sup>	7.56±2.71 <sup>#</sup>	9.76±1.90 <sup>*,&amp;</sup>
5-Hydroxytryptophan	4.00±4.93	6.07±4.88	2.56±2.69	8.13±6.42 <sup>&amp;</sup>
M-Cresol	7.77±4.76	17.75±8.61 <sup>**</sup>	9.45±4.26 <sup>##</sup>	7.43±2.71 <sup>##</sup>
Heptanoic acid	8.50±0.86	9.17±1.18	9.73±1.67	10.24±1.71 <sup>**</sup>
Trehalose	1.10±0.74	1.55±0.37	1.16±0.57	2.37±0.77 <sup>**,##,&amp;&amp;</sup>
Galacturonic acid	5.50±0.98	7.51±2.39 <sup>*</sup>	8.48±1.91 <sup>**</sup>	8.43±1.87 <sup>**</sup>
Glucuronic acid	1.59±0.29	2.65±0.37 <sup>**</sup>	2.64±0.44 <sup>**</sup>	2.87±0.51 <sup>**</sup>
3-Aminoisobutyric acid	10.37±1.08	11.88±2.01 <sup>*</sup>	10.40±1.13 <sup>#</sup>	10.56±0.71 <sup>#</sup>
Ribose	5.17±2.53	9.53±6.23 <sup>**</sup>	4.34±1.92 <sup>##</sup>	6.77±2.19
Xylitol	6.24±0.70	6.72±1.58	5.40±0.89 <sup>##</sup>	6.03±0.77
Ribose-5-phosphate	7.03±1.34	8.74±2.03 <sup>**</sup>	6.65±0.59 <sup>##</sup>	6.92±1.19 <sup>##</sup>
Glutamine	2.90±0.55	3.48±0.83	3.20±0.80	4.04±0.82 <sup>*,&amp;</sup>

3-Indoleacetic acid	2.79±0.98	2.64±1.12	2.32±0.50	1.71±0.70 <sup>*, #</sup>
3-Indolepropionic acid	2.15±0.60	2.53±0.55	1.48±0.41 <sup>*, ##</sup>	1.80±0.92 <sup>#</sup>
β-Linoleic acid	6.57±0.77	6.95±1.20	7.07±1.05	8.05±1.26 <sup>*, #, &amp;</sup>
FFA22:6	6.20±1.38	7.49±0.79	7.53±1.84	8.82±2.44 <sup>**</sup>
Urea	6.05±0.48	5.63±1.08	4.64±1.29 <sup>*</sup>	3.49±0.60 <sup>*, ##</sup>

Note: *n* represent the number of samples. LSD analysis. Compared with Control, <sup>\*</sup>*p*<0.05, <sup>\*\*</sup>*p*<0.01; Compared with 10Gy, <sup>#</sup>*p*<0.05, <sup>##</sup>*p*<0.01; Compared with 20Gy, <sup>&</sup>*p*<0.05, <sup>&&</sup>*p*<0.01.

**Table S8:** Correlation analysis of differential metabolites in plasma and lung tissues at 5d after WTL.

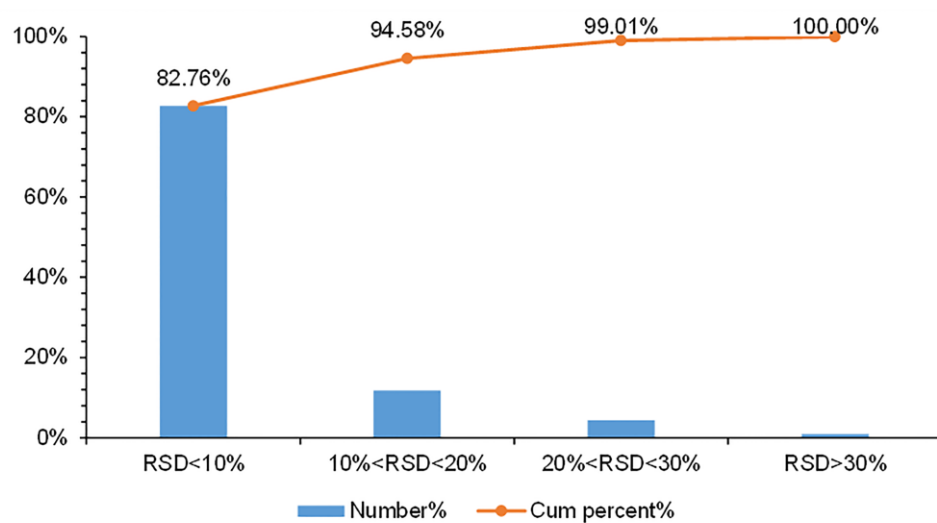
Number	Compound Name	Correlation Coefficient ( <i>r</i> )	<i>p</i> Value
1	Acylcarnitine C9:1	0.766	0.000
2	Tauro- $\alpha$ -Muricholic acid	0.743	0.000
3	Taurocholic acid	0.740	0.000
4	Acylcarnitine C5:0	0.719	0.000
5	Urea	0.676	0.000
6	Acylcarnitine C20:0	0.568	0.000
7	Taurohyodeoxycholic acid	0.540	0.001
8	Acylcarnitine C20:1	0.505	0.002
9	Leucine	0.378	0.023
10	Asparagine	0.332	0.048

Note: Pearson or Spearman correlation analysis.

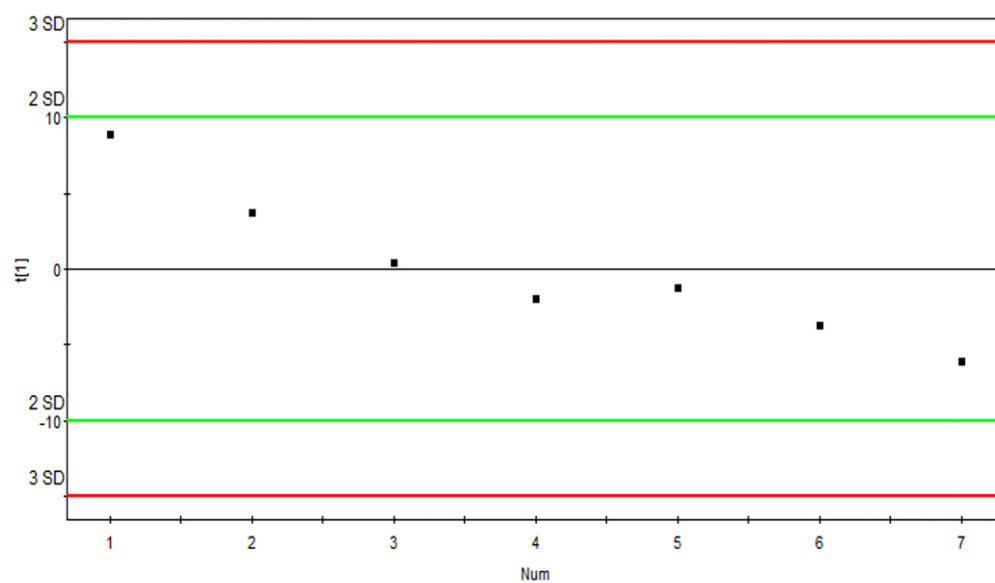
**Table S9:** Stimulation of RILI classification after WTL.

Given dose (Gy)	0	10	20	35
Exposure dose (Gy)	<6	6-16	16-26	>26
Triage	Control	Mild	Moderate	Severe

A



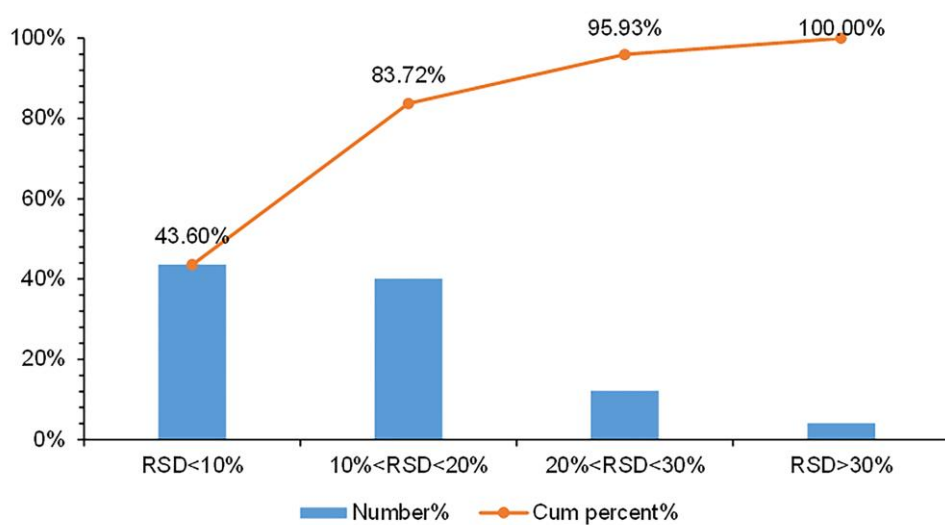
B



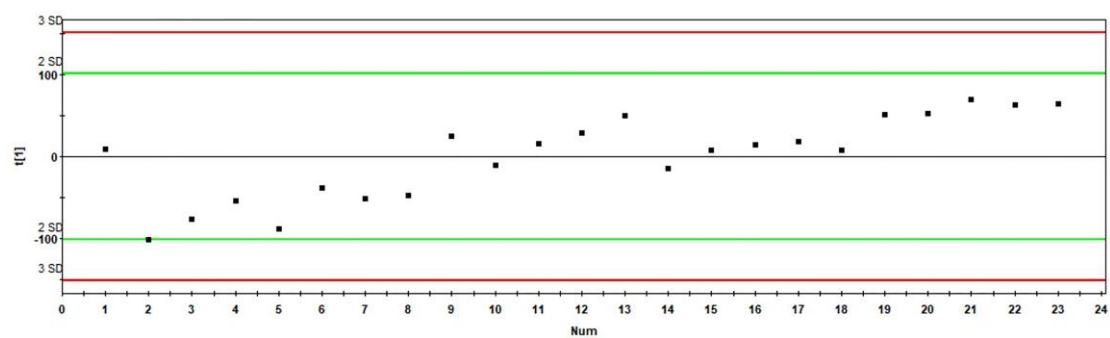
**Figure S1.** Reproducibility and stability of metabolic profiling in lung tissues were assessed. (A) RSD distribution of the QC samples. (B) PCA score plots of the QC samples distributions in LC-MS.



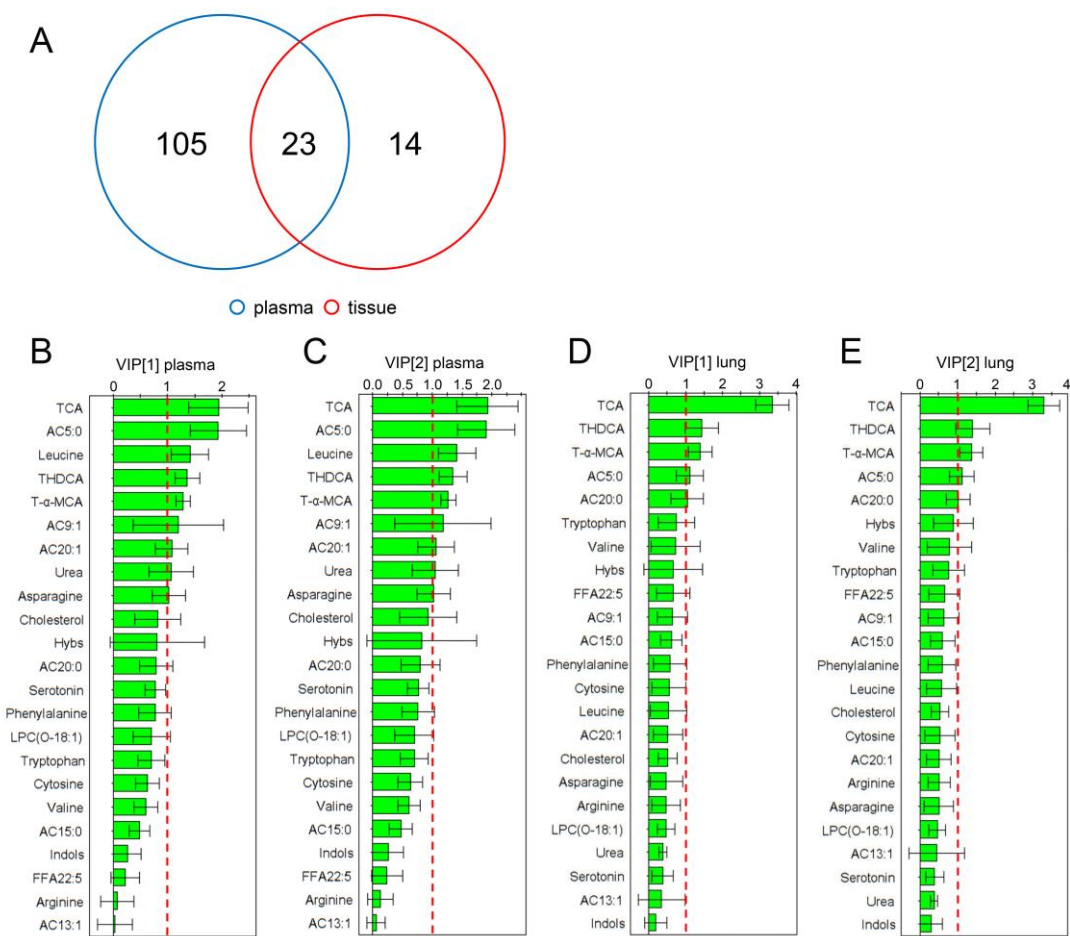
A



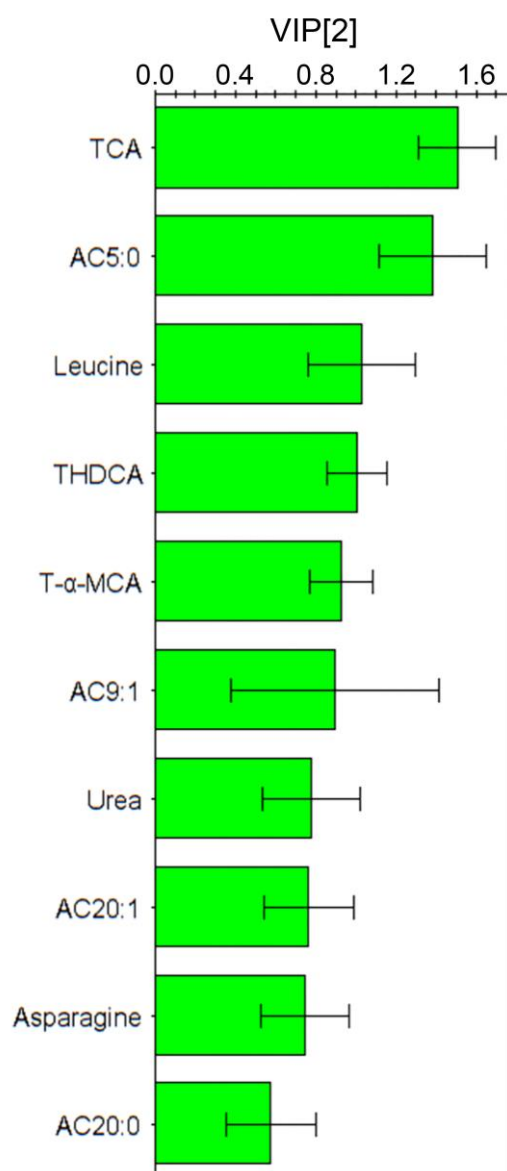
B



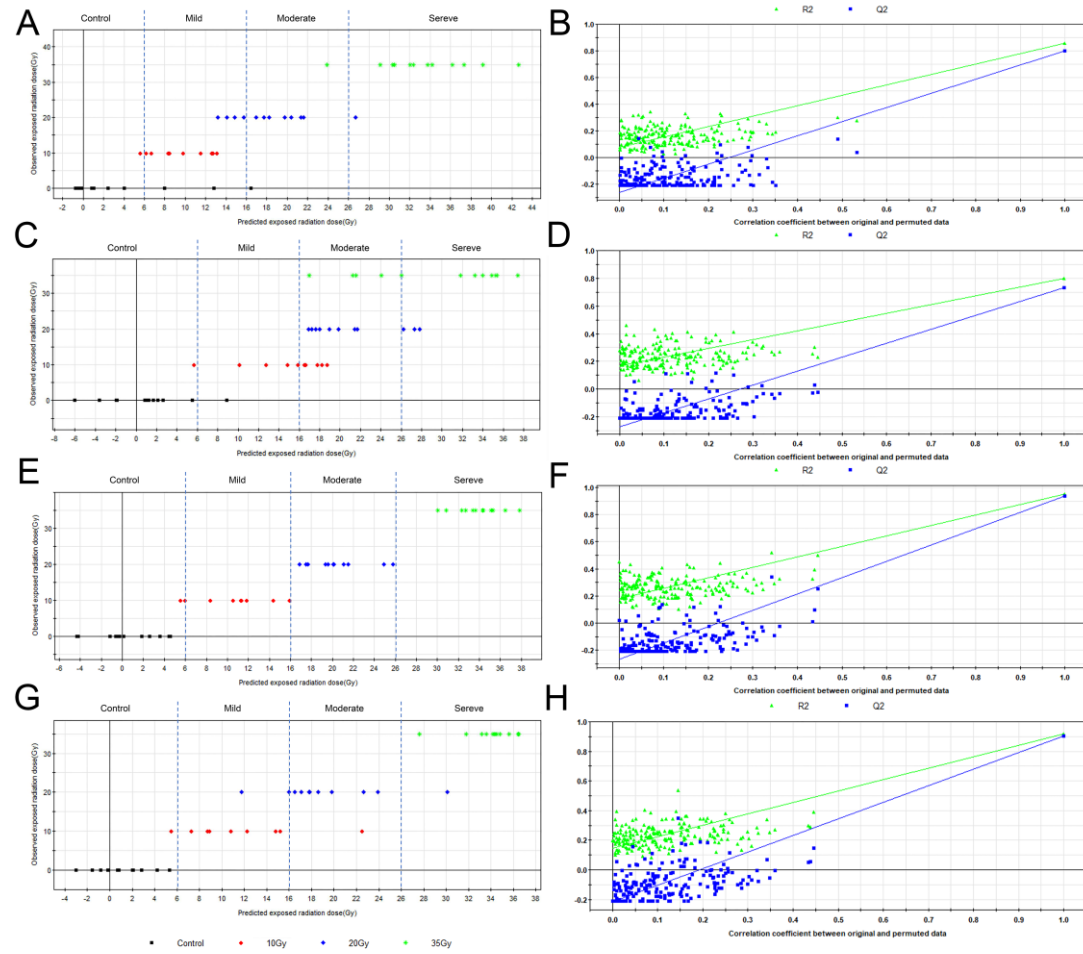
**Figure S2.** Reproducibility and stability of metabolic profiling in plasma were assessed. (A) RSD distribution of the QC samples. (B) PCA score plots of the QC samples distributions in LC-MS.



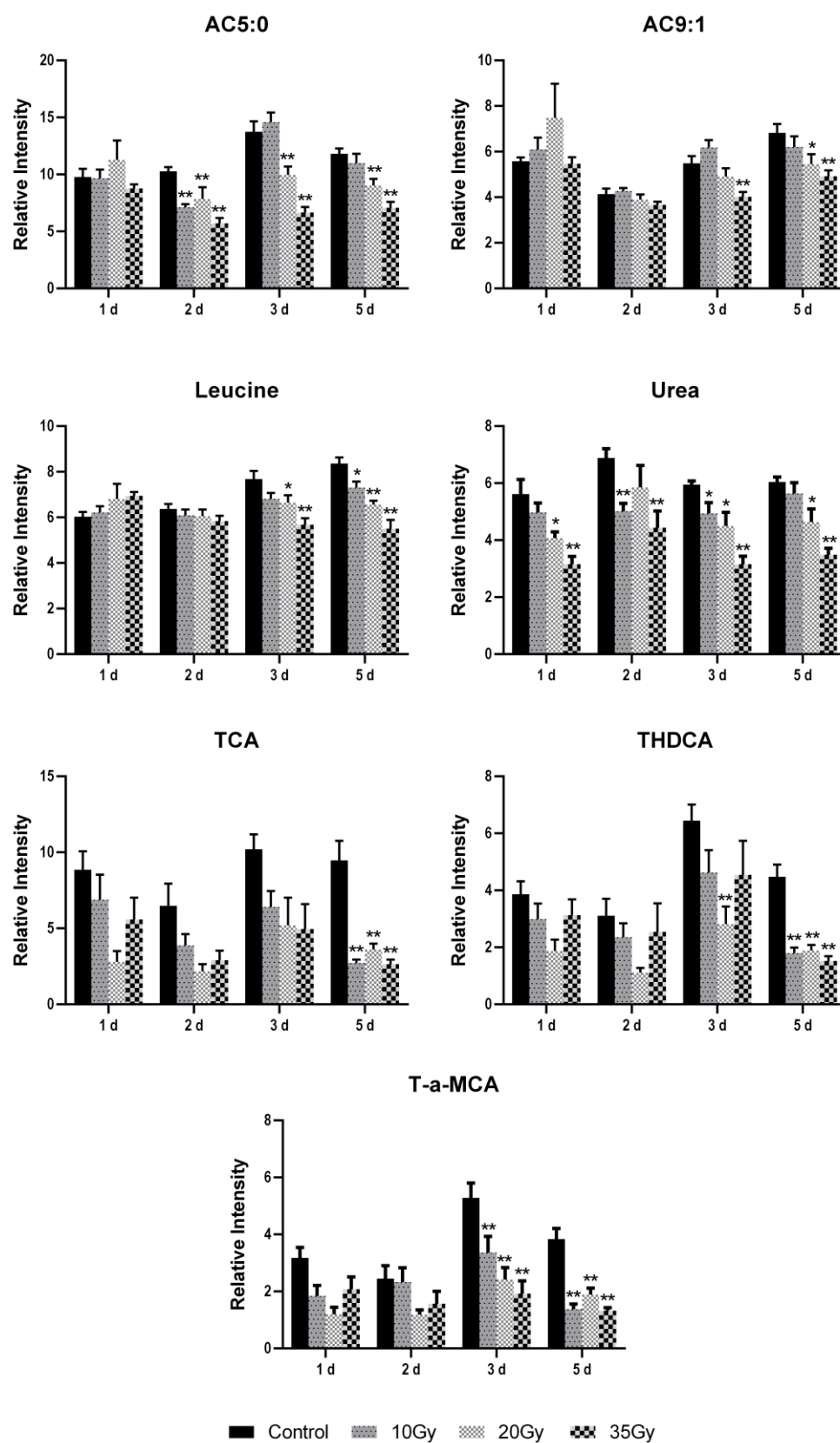
**Figure S3.** Screen of biomarkers in plasma. **(A)** Venn diagram showing the shared and unique metabolites between plasma and lung tissues. **(B, C, D, E)** Column plots of VIP value in plasma and lung tissues, metabolites with VIP [1] and VIP [2] > 1 were selected.



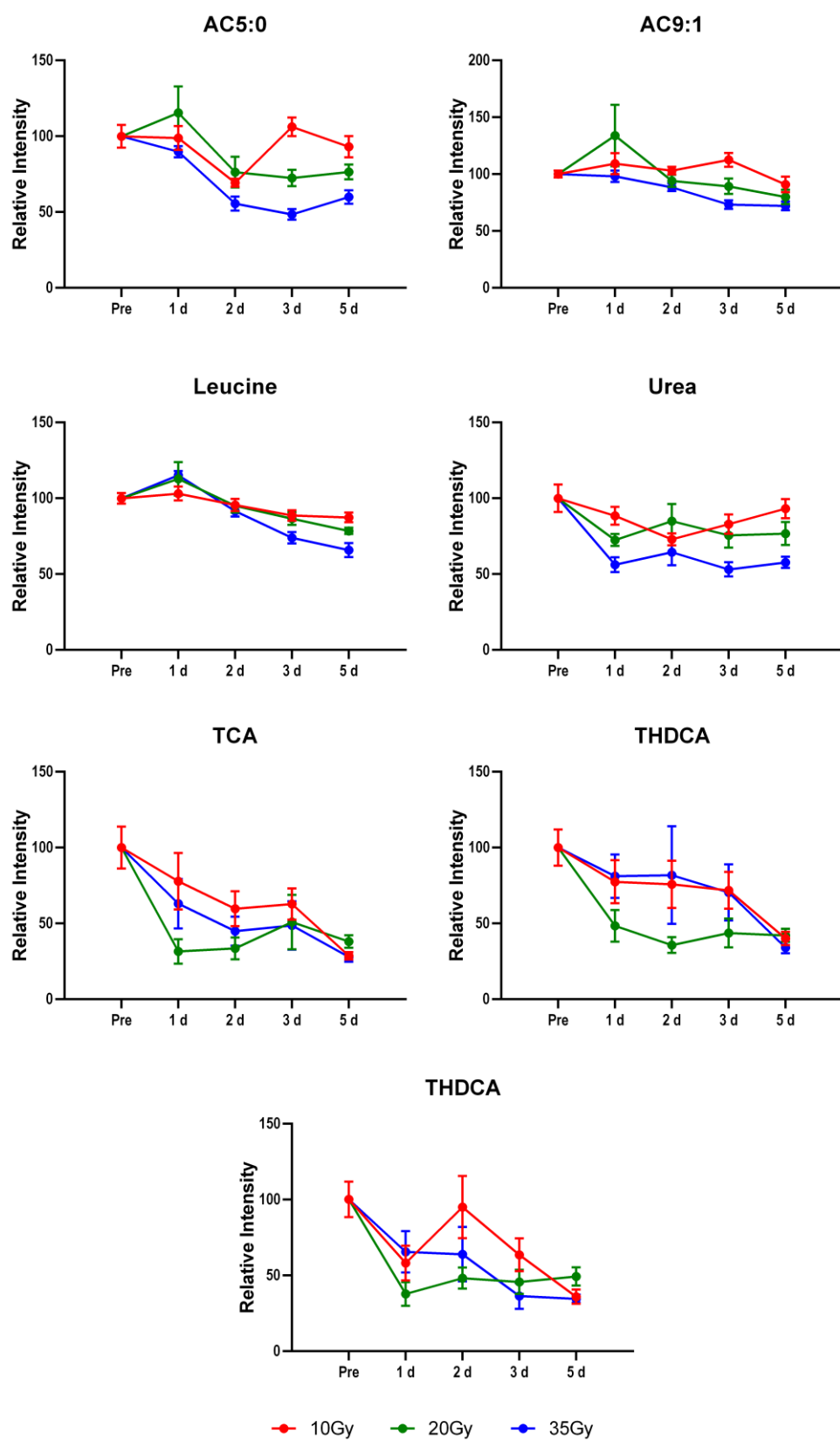
**Figure S4.** Column plots of VIP value in plasma, metabolites with more importance were selected as biomarkers.



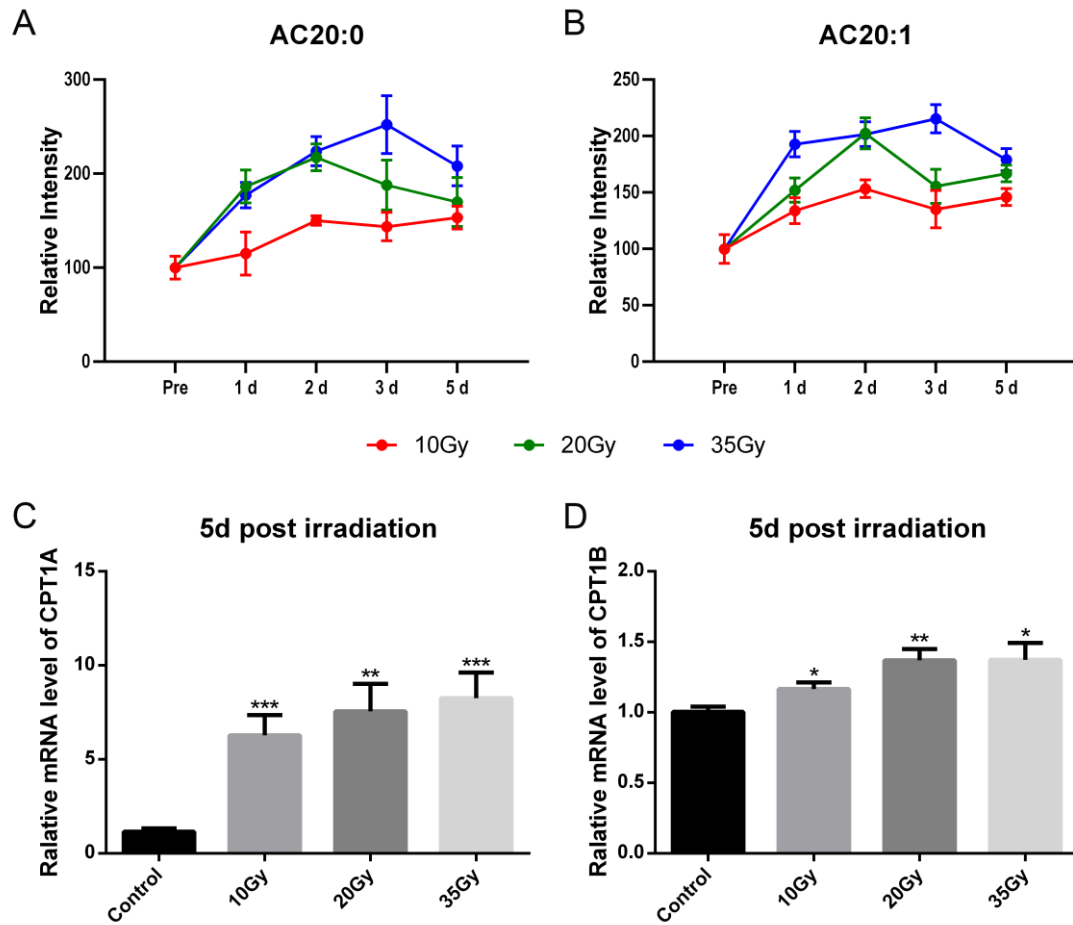
**Figure S5.** (A, C, E, G) Comparison between the predicted radiation doses and observed values in plasma at 1d, 2d, 3d and 5d after WTL. (B, D, F, H) Validation plots obtained from 200 permutation tests based on the panel of these 7 biomarkers, and the model parameters showed the predictive ability of model.



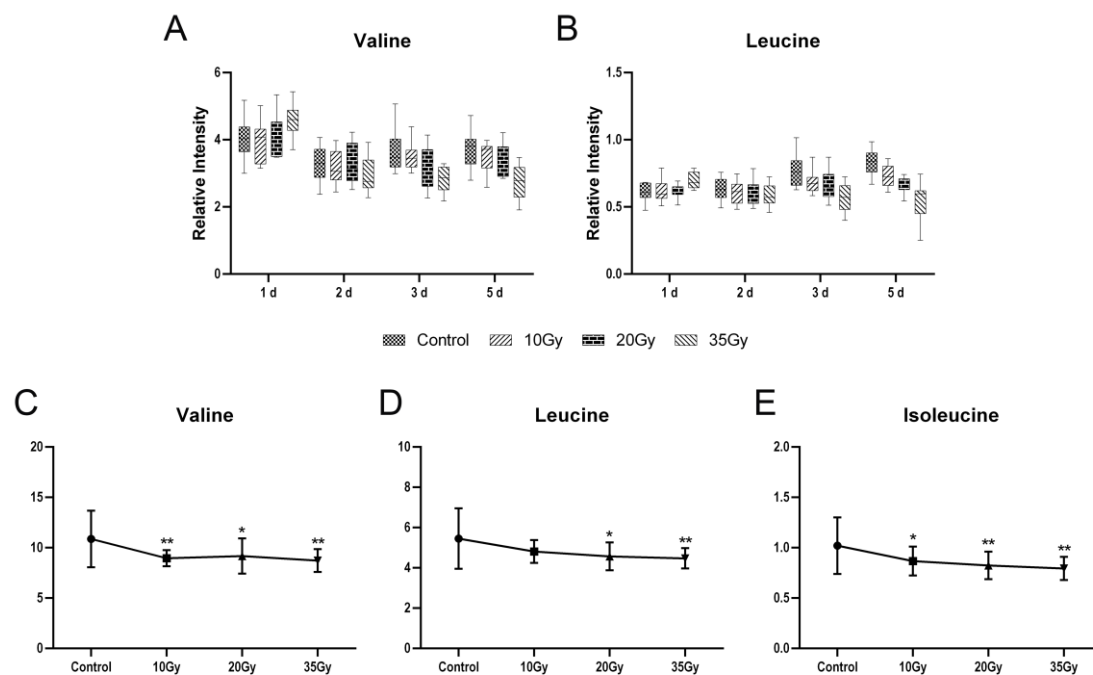
**Figure S6.** Dynamic changes of these 7 potential biomarkers in plasma. Compared with Control, \* $p < 0.05$ , \*\* $p < 0.01$ .



**Figure S7.** Dynamic changes of these 7 potential biomarkers in plasma (normalized by control group).

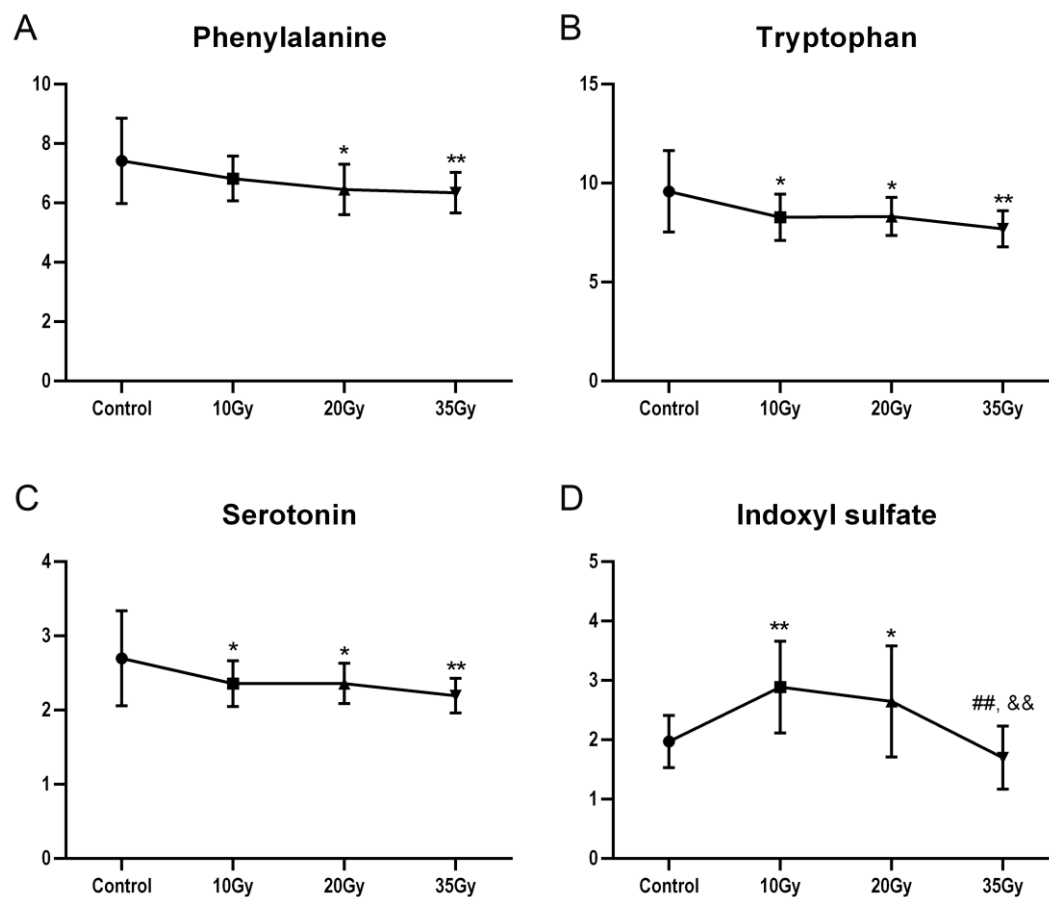


**Figure S8.** (A, B) Dynamic changes of Acylcarnitine C20:0 and Acylcarnitine C20:1 in plasma (normalized by control group). (C, D) The mRNA level of CPT1A and CPT1B in lung tissues at 5d after different radiation doses exposure. Compared with Control, \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

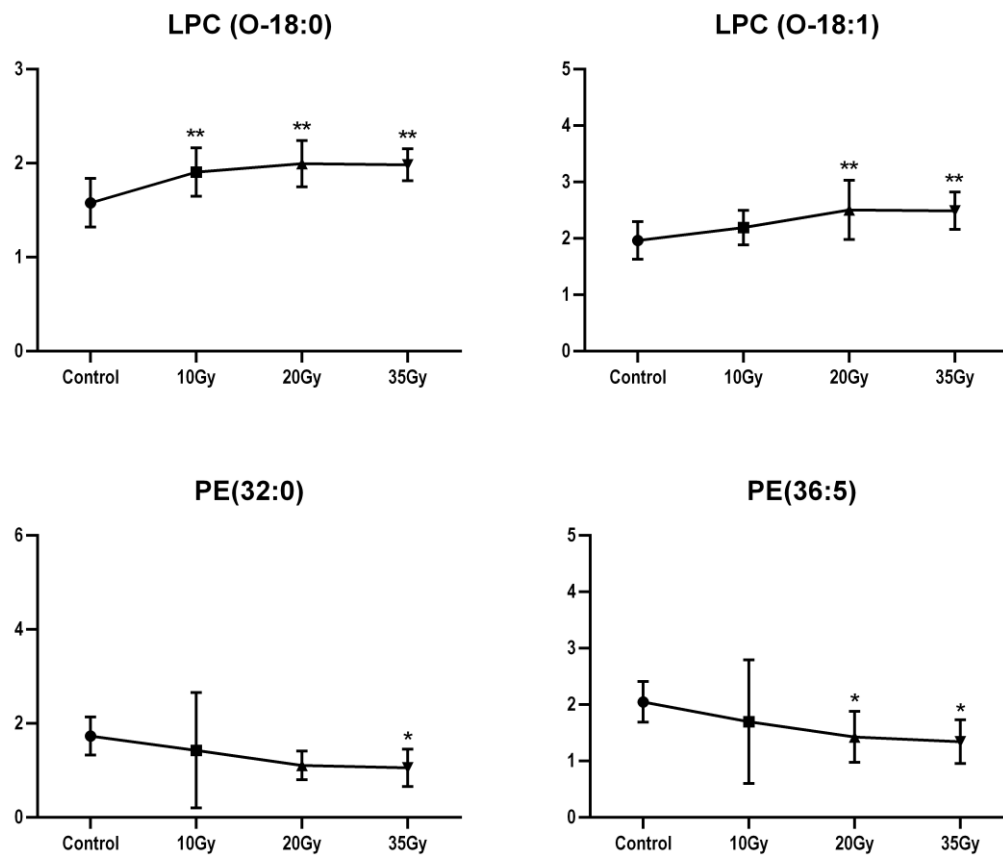


**Figure S9.** (A, B) Dynamic changes of valine and leucine in plasma. (C, D, E) Changes of valine, leucine and isoleucine in lung tissues. Compared with Control, \* $p < 0.05$ , \*\* $p < 0.01$ .





**Figure S10.** (A, B) Changes of aromatic amino acids (phenylalanine and tryptophan) in lung tissues. (C, D) Changes of Tryptophan-related metabolites (serotonin and indoxyl sulfate) in lung tissues. Compared with Control, \* $p < 0.05$ , \*\* $p < 0.01$ ; Compared with 10Gy, ## $p < 0.01$ ; Compared with 20Gy, && $p < 0.01$ .



**Figure S11.** Changes of lipids (LPC (0-18:0, LPC (O-18:1), PE (32:0) and PE (36:5)) in lung tissues. Compared with Control, \*p<0.05, \*\*p<0.01.