Supporting Information

Bile Acid Profile and its Changes in Response to Cefoperazone Treatments in MR1 Deficient Mice

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Supporting Figure

Figure S1. The heat maps of fold changes of BAs in the intestinal, cecal contents and stool samples. Color indicates $\log_e$(intensity/mean for each BA in KO or WT). Gray indicates not detected.

Supporting Table

Table S1. Total BA intensity data (mean ± STD) in the intestinal contents, cecal contents and stool samples at different time points.

Table S2. p- and FDR values comparing the total BA intensity data at different scenarios.

Table S3. BAs intensity levels in the intestinal contents from KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when $p<0.05$ and FDR <0.2 were considered as statistical significance.

Table S4. BAs intensity levels in the cecum contents from $MR1^{-/-}$ KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when $p<0.05$ and FDR <0.2 were considered as statistical significance.

Table S5. BAs intensity levels in the stool samples from $MR1^{-/-}$ KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA

in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when $p<0.05$ and FDR <0.2 were considered as statistical significance.

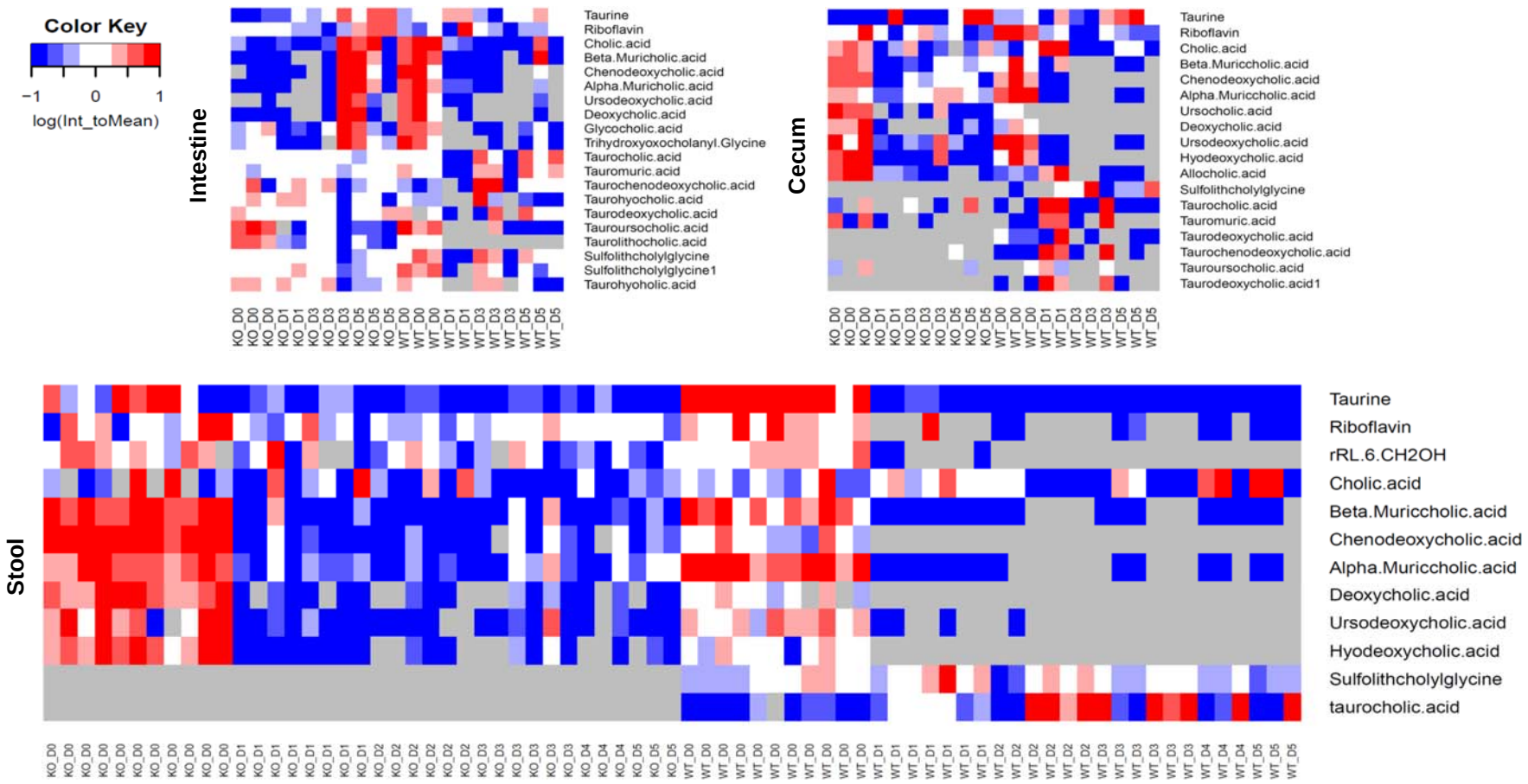

Figure S1. The heat maps of fold changes of BAs in the intestinal, cecal contents and stool samples. Color indicates $\log_e$(intensity/mean for each BA in KO or WT). Gray indicates not detected.

Table S1. Total BA intensity data (mean ± STD) in the intestinal contents, cecal contents and stool samples at different time points.

Intestine Total BA Intensity (Mean±STD)							
KO				WT			
D0	D1	D3	D5	D0	D1	D3	D5
6022.81±267.61	5880.26+12.06	5323.43+1242.46	5422.10+654.57	4769.22+283.51	174.60+36.64	3464.61+2873.41	4366.66+596.24
Cecum Total BA Intensity (Mean±STD)							
KO				WT			
D0	D1	D3	D5	D0	D1	D3	D5
1264.27±40.49	279.34+36.56	650.33+224.21	497.30+172.38	742.32+152.40	3257.17+153.57	1415.48+2251.07	110.20+52.72

Stool Total BA Intensity (Mean±STD)					
KO					
D0	D1	D2	D3	D4	D5
1921.40±260.81	386.37+233.29	249.33+189.86	482.54+406.71	312.54+357.83	453.74+236.20
WT					
D0	D1	D2	D3	D4	D5
574.85+173.13	91.96+27.92	93.71+41.48	109.46+41.42	100.60+25.50	103.22+17.39

Table S2. p- and FDR values comparing the total BA intensity data at different scenarios.

Intestine	P	FDR	Cecum	p	FDR
KO,D0 - KO,D1	0.973048	0.973048	KO,D0 - KO,D1	0.0808	0.170718
KO,D0 - KO,D3	0.816466	0.973048	KO,D0 - KO,D3	0.36444	0.404934
KO,D0 - KO,D5	0.859322	0.973048	KO,D0 - KO,D5	0.206155	0.343591
WT,D0 - WT,D1	1.51E-06	1.51E-05	WT,D0 - WT,D1	0.085359	0.170718
WT,D0 - WT,D3	0.083789	0.209472	WT,D0 - WT,D3	0.253426	0.362037
WT,D0 - WT,D5	0.880091	0.973048	WT,D0 - WT,D5	0.011195	0.055975
WT,D0 - KO,D0	0.704556	0.973048	WT,D0 - KO,D0	0.481848	0.481848
WT,D1 - KO,D1	3.02E-06	1.51E-05	WT,D1 - KO,D1	0.009593	0.055975
WT,D3 - KO,D3	0.060628	0.202094	WT,D3 - KO,D3	0.348006	0.404934
WT,D5 - KO,D5	0.724243	0.973048	WT,D5 - KO,D5	0.048191	0.160638

Stool	p	FDR
KO,D0 - KO,D1	3.47E-09	2.35E-08
KO,D0 - KO,D2	1.7E-11	2.72E-10
KO,D0 - KO,D3	7.16E-09	2.64E-08
KO,D0 - KO,D4	2.89E-07	6.6E-07
KO,D0 - KO,D5	0.000433	0.000577
WT,D0 - WT,D1	4.41E-09	2.35E-08
WT,D0 - WT,D2	8.25E-09	2.64E-08
WT,D0 - WT,D3	9.34E-08	2.49E-07
WT,D0 - WT,D4	2.03E-05	4.05E-05
WT,D0 - WT,D5	2.92E-05	4.68E-05
WT,D0 - KO,D0	2.75E-05	4.68E-05
WT,D1 - KO,D1	0.000145	0.000211
WT,D2 - KO,D2	0.03379	0.036043
WT,D3 - KO,D3	0.004353	0.004975
WT,D4 - KO,D4	0.094676	0.094676
WT,D5 - KO,D5	0.002062	0.002538

Table S3. BAs intensity levels in the intestinal contents from KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when $p<0.05$ and FDR <0.2 were considered as statistical significance.

	KO (mean ± STD)					WT (mean ± STD)			
ID	**D0** (n=3)	**D1** (n=2)	**D3** (n=3)	**D5** (n=3)		**D0** (n=3)	**D1** (n=2)	**D3** (n=3)	**D5** (n=3)
Cholic acid (CA)	29.7 ± 59.8	26.6 ± 28.4	118.3 ± 165.1	120.5 ± 99.2		254.2 ± 59.8	58.5 ± 7.8	8.2 ± 10.4	66.4 ± 96.0
Beta-Muricholic acid (βMCA)	4.7 ± 22.4	4.0 ± 5.6	57.7 ± 96.0	53.3 ± 46.0		93.8 ± 22.4	17.4 ± 3.3	**0.4 ± 0.4**	44.6 ± 65.9
Chenodeoxycholic acid (CDCA)	0.6 ± 14.0	1.4 ± 1.8	20.3 ± 33.7	17.1 ± 20.2		34.3 ± 14.0	2.7 ± 0.6	0.2 ± 0.2	6.6 ± 10.0
Alpha-Muricholic acid (αMCA)	1.3 ± 21.1	1.3 ± 1.8	41.7 ± 71.2	32.4 ± 30.0		66.5 ± 21.1	15.6 ± 0.5	**0.2 ± 0.2**	7.5 ± 11.2
Ursodeoxycholic acid (UDCA)	0.1 ± 15.1	0	7.5 ± 12.6	6.4 ± 7.6		30.5 ± 15.1	1.7 ± 0.2	**0**	**2.8 ± 4.2**
Deoxycholic acid (DCA)	4.6 ± 43.8	0.7 ± 1.0	52.4 ± 89.2	27.9 ± 39.1		99.7 ± 43.8	**1.4 ± 2.0**	**0**	**0.5 ± 0.8**
Glycocholic acid	11.1 ± 1.6	4.9 ± 0.3	14.3 ± 16.0	9.9 ± 8.8		12.8 ± 1.6	**0**	**2.0 ± 1.8**	4.1 ± 2.5
Trihydroxyoxocholanyl-Glycine	4.3 ± 1.7	1.7 ± 0.2	3.8 ± 5.5	5.1 ± 3.1		5.2 ± 1.7	**0**	**0.4 ± 0.6**	1.7 ± 1.1
Taurocholic acid (TCA)	1340.3 ± 51.7	1461.3 ± 99.0	1246.3 ± 187.6	1280.1 ± 270.6		953.0 ± 51.7	**21.8 ± 6.0**	856.2 ± 740.7	1340.0 ± 692.1
Tauromuric acid (TMCA)	1379.0 ± 134.0	1554.7 ± 107.5	1521.3 ± 307.4	1616.1 ± 339.9		1172.1 ± 134.0	**43.5 ± 21.2**	933.8 ± 734.1	1393.6 ± 728.4
Taurochenodeoxycholic acid (TCDCA)	416.5 ± 30.1	442.0 ± 44.5	322.6 ± 244.2	315.8 ± 57.9		136.4 ± 30.1	**1.1 ± 1.5**	383.6 ± 317.7	277.8 ± 139.9
Taurohyocholic acid (THCA)	280.0 ± 49.7	328.0 ± 2.8	213.3 ± 100.1	127.0 ± 109.6		133.8 ± 49.7	**0**	222.0 ± 293.2	54.2 ± 34.4
Tauroursodeoxycholic acid (TUDCA)	475.7 ± 179.5	416.2 ± 68.5	306.2 ± 268.6	531.8 ± 153.0		203.2 ± 179.5	1.5 ± 2.2	**155.3 ± 239.7**	302.9 ± 190.3
Taurodeoxycholic acid (TDCA)	612.2 ± 30.7	47.6 ± 67.3	187.5 ± 125.2	114.0 ± 73.3		127.8 ± 30.7	**0**	29.4 ± 49.3	21.9 ± 12.4
Taurolithocholic acid (TLCA)	3.2 ± 0.2	1.0 ± 0.2	**1.3 ± 0.8**	**1.2 ± 0.8**		1.6 ± 0.2	**0**	**0**	**0**
Sulfolithocholylglycine	783.1 ± 105.6	824.1 ± 14.7	634.0 ± 302.4	637.4 ± 152.9		687.7 ± 105.6	**8.8 ± 4.6**	508.0 ± 429.1	452.7 ± 247.3
Sulfolithocholylglycine isomer	596.7 ± 98.8	695.5 ± 50.6	524.2 ± 203.8	481.3 ± 106.9		741.9 ± 98.8	**0.6 ± 0.8**	353.8 ± 302.1	382.3 ± 216.6
Taurohyocholic acid (THCA)	79.8 ± 2.9	69.4 ± 22.5	50.9 ± 28.9	44.8 ± 4.9		14.7 ± 2.9	**0**	11.3 ± 9.8	7.2 ± 4.8

Table S4. BAs intensity levels in the cecum contents from MR1$^{-/-}$ KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when $p<0.05$ and FDR <0.2 were considered as statistical significance.

	KO (mean ± STD)					WT (mean ± STD)			
ID	**D0** (n=3)	**D1** (n=2)	**D3** (n=3)	**D5** (n=3)		**D0** (n=3)	**D1** (n=2)	**D3** (n=3)	**D5** (n=3)
Cholic acid (CA)	108.3 ± 14.1	31.8 ± 21.1	52.5 ± 34.2	48.3 ± 54.6		21.6 ± 6.2	113.5 ± 25.8	3.1 ± 2.4	22.6 ± 18.5
Beta_Muriccholic acid (βMCA)	136.7 ± 19.0	**18.4 ± 2.9**	**52.7 ± 32.1**	***61.2 ± 16.4***		65.1 ± 28.8	41.0 ± 34.8	**0**	**6.6 ± 5.9**
Chenodeoxycholic acid (CDCA)	515.3 ± 38.6	**115.1 ± 25.5**	260.8 ± 90.1	***192.3 ± 144.6***		323.3 ± 79.3	**1.7 ± 1.0**	**0**	**0**
Alpha_Muriccholic acid (αMCA)	195.9 ± 42.1	**82.9 ± 5.8**	180.3 ± 25.9	*151.5 ± 55.1*		197.9 ± 32.9	**15.3 ± 5.7**	**0**	**1.0 ± 0.9**
Ursocholic acid (UCA)	20.0 ± 3.3	**1.5 ± 2.1**	**5.9 ± 7.6**	***2.0 ± 0.6***		1.7 ± 1.5	0	0	0
Deoxycholic acid (DCA)	59.6 ± 24.3	**1.1 ± 1.6**	**0**	***9.6 ± 9.2***		16.3 ± 6.2	**0**	**0**	**0**
Ursodeoxycholic acid (UDCA)	88.7 ± 38.7	**16.4 ± 7.8**	45.6 ± 32.2	***16.2 ± 11.0***		69.8 ± 13.8	**2.4 ± 1.5**	**0**	**0.4 ± 0.4**
Hyodeoxycholic acid (HDCA)	126.3 ± 23.7	**8.9 ± 0.1**	**50.7 ± 47.7**	***15.0 ± 12.0***		27.2 ± 9.2	**1.1 ± 0.3**	**0**	**0**
Allocholic acid (ACA)	10.1 ± 0.9	3.2 ± 0.3	**1.4 ± 1.2**	***0.2 ± 0.4***		2.8 ± 0.2	**14.5 ± 9.0**	**0.1 ± 0.2**	**0.6 ± 0.5**
Sulfolithocholylglycine	0	0	0	*0*		0.4 ± 0.7	8.5 ± 12.1	**18.4 ± 17.7**	**16.0 ± 10.0**
Taurocholic acid (TCA)	0.4 ± 0.5	0	0.3 ± 0.3	*0.4 ± 0.7*		3.7 ± 3.3	**1143.6 ± 24.9**	**584.4 ± 869.5**	**60.7 ± 67.1**
Tauromuric acid (TMCA)	2.0 ± 1.2	0.2 ± 0.2	0.2 ± 0.4	0		0.8 ± 0.7	**1393.0 ± 90.9**	579.9 ± 1004.3	0
Tauroursodeoxycholic acid (TUDCA)	0	0	0	0		9.1 ± 2.1	35.1 ± 45.4	**1.8 ± 3.2**	**1.9 ± 2.4**
Taurochenodeoxycholic acid (TCDCA)	0	0	0	0.3 ± 0.6		1.3 ± 0.2	**435.3 ± 157.8**	208.6 ± 360.2	**0.3 ± 0.5**
Taurodeoxycholic acid (TDCA)	1.0 ± 1.0	0	0	0.3 ± 0.4		0.8 ± 1.4	2.4 ± 1.1	**0.8 ± 1.4**	0
Tauroursoycholic acid	0	0	0	0		0.5 ± 0.4	**49.7 ± 14.3**	18.3 ± 31.8	0.3 ± 0.5

Table S5. BAs intensity levels in the stool samples from MR1$^{-/-}$ KO and WT mice. Numbers in red: increased vs D0; numbers in blue: decreased vs D0; bold: significantly changed vs D0; BA in red: significantly increased at D0 in KO vs WT; BA in blue: significantly decreased at D0 in KO vs WT; when p<0.05 and FDR <0.2 were considered as statistical significance.

	KO (mean ± STD)					
ID	**D0** (n=11)	**D1** (n=8)	**D2** (n=6)	**D3** (n=6)	**D4** (n=3)	**D5** (n=3)
Cholic acid (CA)	71.2 ± 130.5	65.3 ± 72.7	43.2 ± 35.6	21.7 ± 9.3	31.8 ± 16.3	34.7 ± 1.4
Beta_Muriccholic acid (βMCA)	256.8 ± 80.4	**52.7 ± 47.4**	**22.5 ± 14.1**	**56.7 ± 58.1**	**31.3 ± 17.8**	***49.0 ± 14.4***
Chenodeoxycholic acid (CDCA)	913.20±121.05	**124.6 ± 96.3**	**89.55±119.43**	**196.35±181.55**	**116.77±194.51**	**160.70±140.53**
Alpha_Muriccholic acid (αMCA)	400.7 ± 74.1	**110.4 ± 47.6**	**75.4 ± 45.7**	**152.5 ± 120.9**	**108.0 ± 115.2**	***176.0 ± 58.6***
Deoxycholic acid (DCA)	83.9 ± 22.6	**7.1 ± 7.7**	**6.0 ± 8.7**	**15.1 ± 14.2**	**7.9 ± 13.2**	**9.8 ± 8.9**
Ursodeoxycholic acid (UDCA)	93.8 ± 78.0	**14.8 ± 8.6**	**5.0 ± 6.7**	**20.9 ± 25.2**	**9.3 ± 12.8**	**11.1 ± 8.3**
Hyodeoxycholic acid (HDCA)	101.9 ± 42.4	**11.5 ± 6.7**	**7.7 ± 10.6**	**19.5 ± 18.6**	**7.5 ± 13.0**	**12.4 ± 11.8**
Sulfolithocholylglycine	0	**0**	**0**	**0**	**0**	**0**
Taurocholic acid (TCA)	0	**0**	**0**	**0**	**0**	**0**
	WT (mean ± STD)					
ID	**D0** (n=11)	**D1** (n=8)	**D2** (n=6)	**D3** (n=6)	**D4** (n=3)	**D5** (n=3)
Cholic acid (CA)	27.3 ± 37.9	24.6 ± 8.8	8.1 ± 8.6	10.2 ± 12.0	33.4 ± 24.5	35.1 ± 28.6
Beta_Muriccholic acid (βMCA)	64.4 ± 50.0	**7.9 ± 2.8**	**1.5 ± 2.3**	**2.2 ± 2.7**	**5.2 ± 3.0**	***6.5 ± 6.0***
Chenodeoxycholic acid (CDCA)	163.45±68.89	**0**	**0**	**0**	**0**	**0**
Alpha_Muriccholic acid (αMCA)	242.3 ± 67.1	**6.5 ± 3.4**	**0.3 ± 0.7**	**0.9 ± 1.5**	**2.6 ± 2.3**	***3.2 ± 2.8***
Deoxycholic acid (DCA)	10.3 ± 6.1	**0**	**0**	**0**	**0**	**0**
Ursodeoxycholic acid (UDCA)	29.0 ± 7.8	**0.8 ± 1.1**	**0.1 ± 0.2**	**0**	**0**	**0**
Hyodeoxycholic acid (HDCA)	12.1 ± 3.4	**0**	**0**	**0**	**0**	**0**
Sulfolithocholylglycine	9.4 ± 3.1	13.6 ± 8.3	9.8 ± 4.5	8.1 ± 1.2	6.6 ± 0.8	6.0 ± 0.9
Taurocholic acid (TCA)	16.6 ± 9.2	**38.6 ± 11.3**	**73.9 ± 48.4**	**88.1 ± 54.7**	**52.8 ± 51.3**	**52.4 ± 52.8**