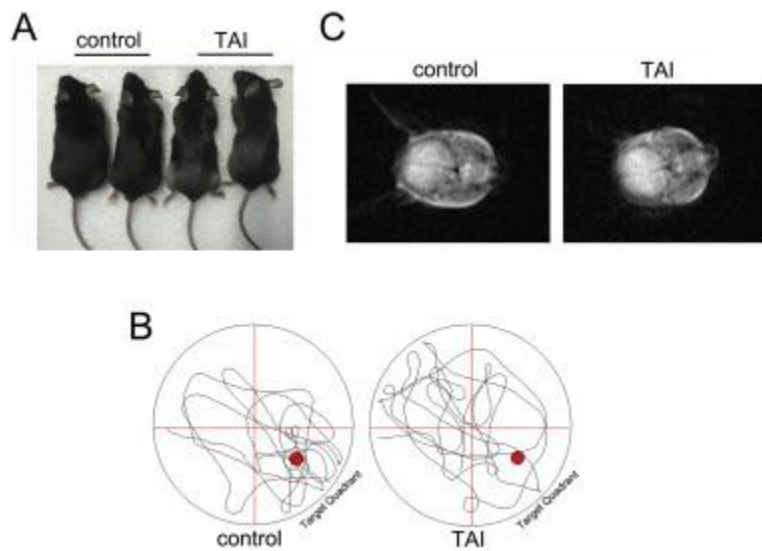


Figure 1S



**Figure S1. Total abdominal irradiation induces cognitive deficits in the mice.**

(A) The mice exposed to 10 Gy TAI (right) along with mice without irradiation (left). Note the body size. (B) The tracks in target quadrant and swimming traces in 60 s at day 6 of Morris water maze were shown. (C) NMR brain images of mice with or without TAI exposure.

Figure S2

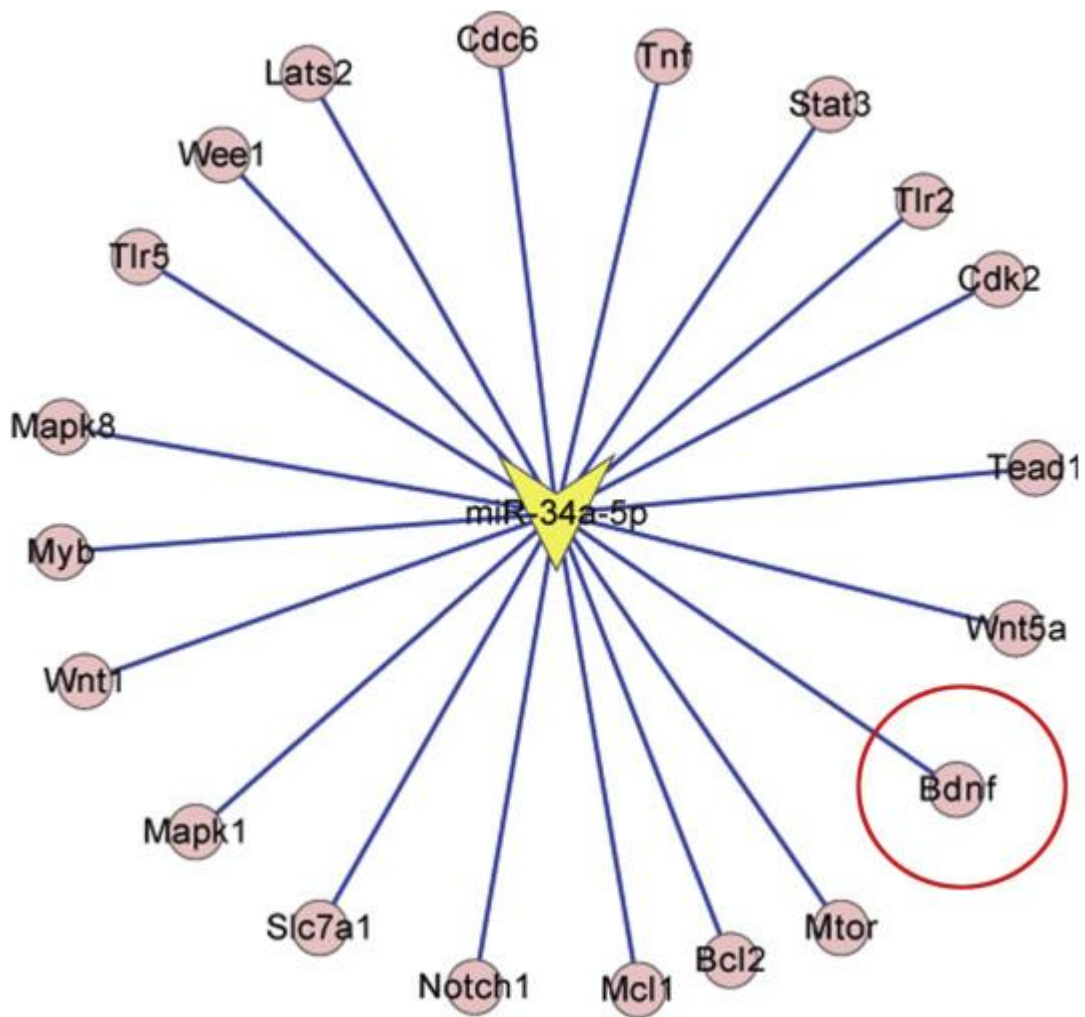
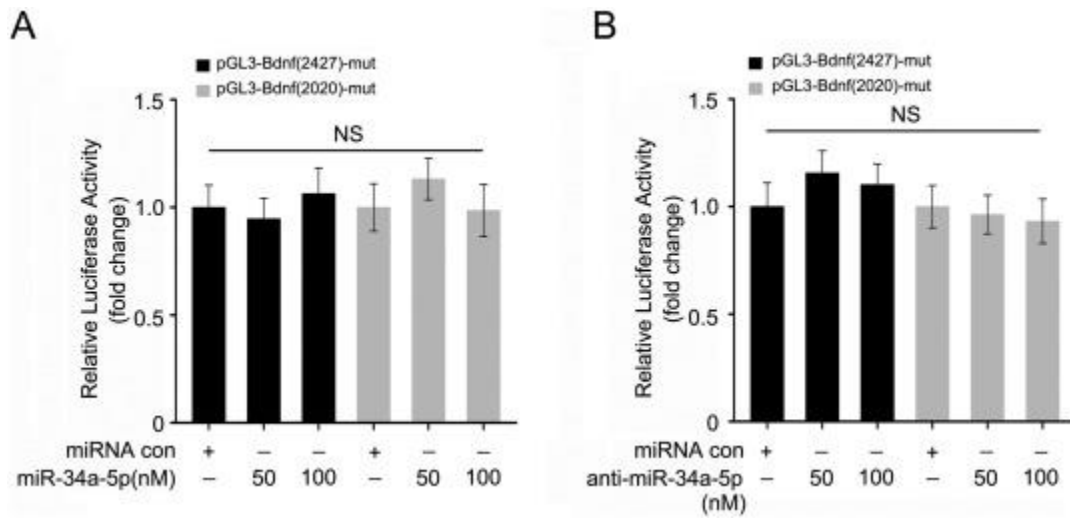


Figure S2. The target genes of miR-34a-5p are predicted by bioinformatics tools.

Figure S3



**Figure S3. miR-34a-5p modulates the expression of *Bdnf* via targeting its 3'UTR.**

(A, B) The effect of miR-34a-5p (or anti-miR-34a-5p) on the pGL3-Bdnf-2427-mut and pGL3-Bdnf-2020-mut reporters in 3T3 cells were measured by luciferase reporter assays. Each experiment was repeated at least three times. Statistically significant differences are indicated: NS, no significant; Student *t*-test.

Figure S4

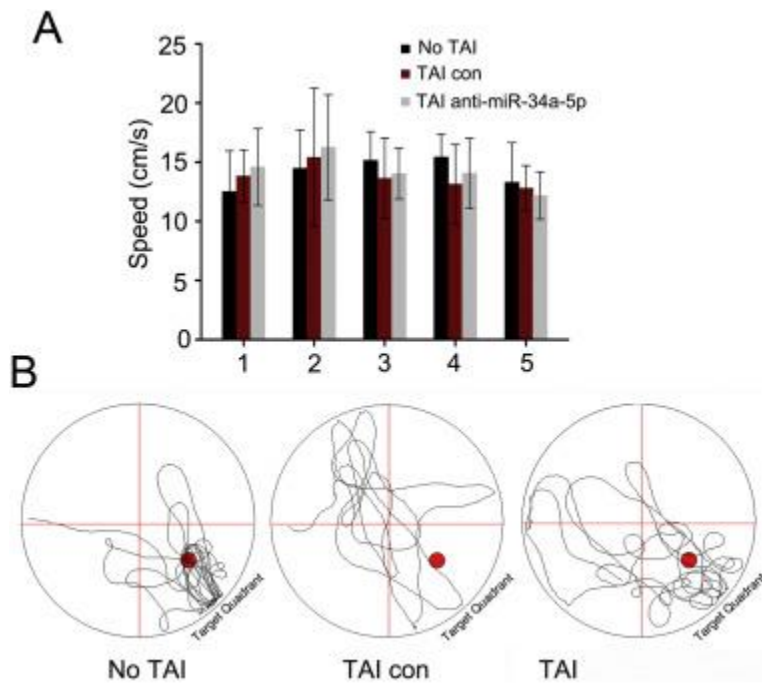
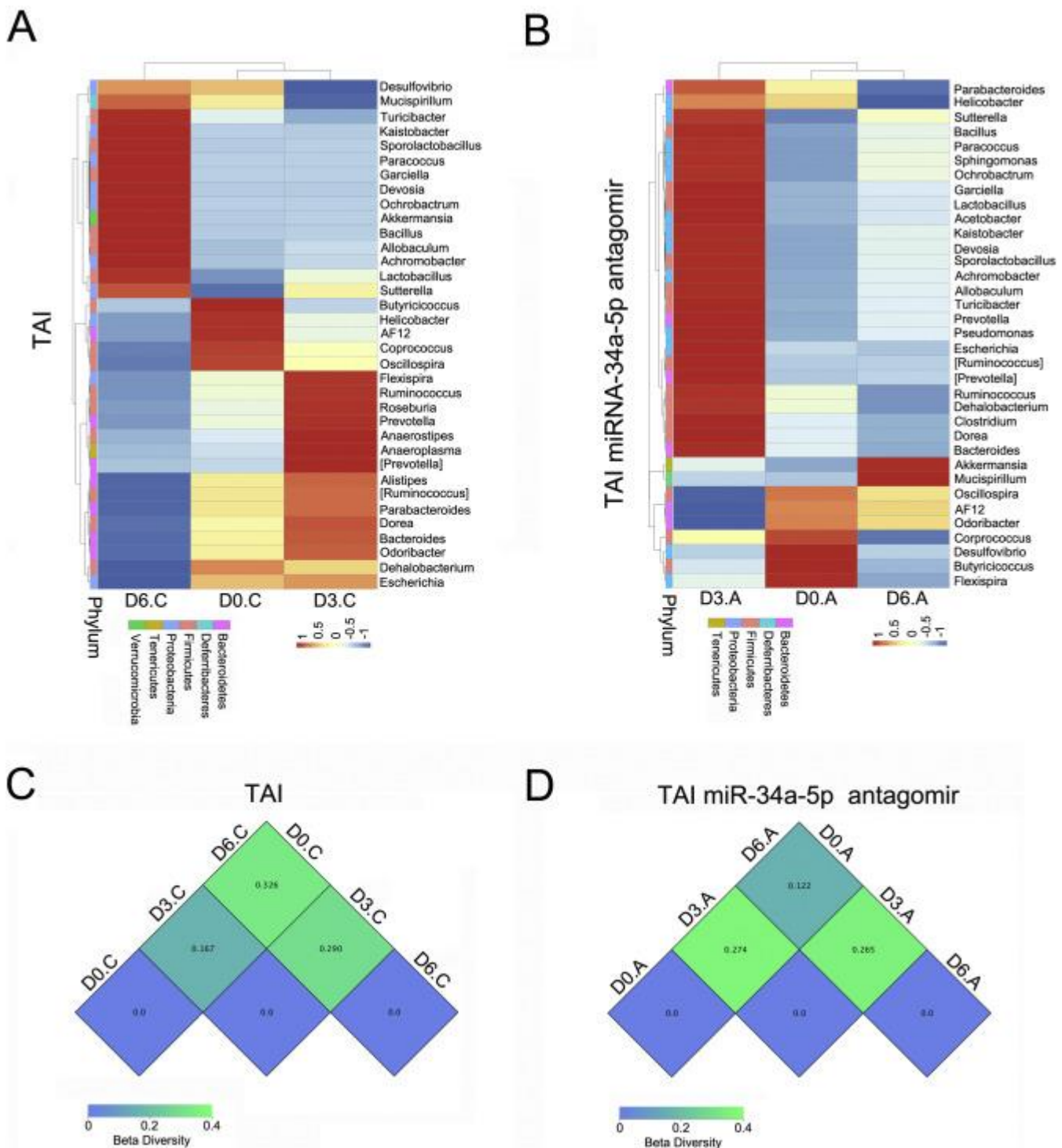


Figure S4. The swimming speed during the 5 days of Morris water maze test. (A) The mice were treated with TAI in the absence or presence of miRNA-34a-5p antagomir.  $n = 12$  mice/group. (B) The tracks in target quadrant and swimming traces in 60 s at day 6 of Morris water maze were shown.

Figure S5



**Figure S5. Tail intravenous injection of miRNA-34a-5p antagomir reestablishes the intestinal bacterial composition after TAI.** (A) The alteration of intestinal bacterial patterns in TAI treated mice was assessed using 16S high throughput sequencing after radiation at day 5 and day 10,  $n = 5$ . (B) The difference of intestinal bacterial structure in phylum level of mice on the day before TAI, three days and six days after TAI was performed using 16S high throughput sequencing,  $n = 5$ . (C, D) The shift of intestinal bacterial flora profile in above two cohorts was assessed using 16S rRNA sequencing.

Figure S6

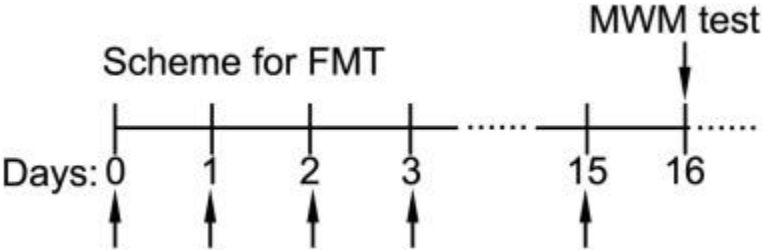


Figure S6. The scheme for FMT.

**Supplementary Table 1.** List of primers used in this paper.

<b>Gene</b>	<b>Primer</b>	<b>Sequence (5'-3')</b>
<b>Primers for PCR</b>		
<i>Bdnf</i>	forward	GTCACAGCGGCAGATAAAA
	reverse	GATTGGGTAGTTCGGCATTG
<i>IL-6</i>	forward	TGTGCAATGGCAATTCTGAT
	reverse	GGTACTCCAGAAGACCAGAGGA
<i>MyD88</i>	forward	CCCACTCGCAGTTTGTGGGA
	reverse	GATGCCTCCAGTTCCTTTG
<i>GAPDH</i>	forward	TGTTTCCTCGTCCCCTAGA
	reverse	CAATCTCCACTTTGCCACTG
miR-34a-5p	forward	TGGCAGTGTCTTAGCTGGTTGT
	reverse	GCGAGCACAGAATTAATACGAC
U6	forward	AGAGCCTGTGGTGTCCG
	reverse	CATCTTCAAAGCACTTCCCT
<b>Primers for clone</b>		
pGL3- <i>Bdnf</i> (2427)	forward	CTAGTCTAGAGGCCTAACAGTGTTTGCAGA
	reverse	GGGGGCCGGCCTGTTAGGTAATGTAGGCACT
pGL3- <i>Bdnf</i> (2020)	forward	CTAGTCTAGACCGGAGTAGGGATGGAGAAA
	reverse	GGGGGCCGGCCAATGACACACATTGTTTCATC
pGL3- <i>Bdnf</i> (2427)-mut	forward	CTTAGATAAGTGGTCGGTTCCTGTGACGGATTGAAATAGG
	reverse	CCTATTTCAATCCGTCACAGGAACCGACCACTTATCTAAG
pGL3- <i>Bdnf</i> (2020)-mut	forward	CTGAATTTAATCGA CACTCGTGAGGGATGATGTATCT
	reverse	AGATACATCATCCCGTCACGAGTGTGTCGATTAAATTCAG
<b>Primers for sequencing</b>		
515F		GTGCCAGCMGCCGCGGTAA
806R		GGACTACHVGGGTWTCTAAT

