B6-Chr1^{ZZ2}

Strain Name：B6/JGpt-Chr1^{ZZ2}/Gpt

Strain Type：CSSL (Chromosome Segment Substitution Lines)

Strain Number：D000765

Background：Wild mice×C57BL/6JGpt

Description

In collaboration with Xiao's laboratory of Donghua University, GPT constructed a chromosome replacement line D000765 model based on B6 mice, which is an experimental mouse model with a richer genetic background. Chromosome 1 of D000765 was derived from wild mice, and the remaining chromosomes were still B6 chromosomes [1]. The establishment of replacement lines can study the genomic function of chromosome 1 systematically. Compared with normal B6 mice, D000765 mice exhibit stronger spatial and cognitive memory and richer genetic diversity. D000765 mice have good heritability and can be propagated with other mouse models of neurological diseases with B6 background. As background mice, D000765 mice can be used for the study of neurological diseases.

Application

1. Functional study and evaluation of chromosome 1 genome

2. Genetic diversity of neurological disease

Data Support

1. Behavioral test of B6-Chr1^{ZZ2} mice

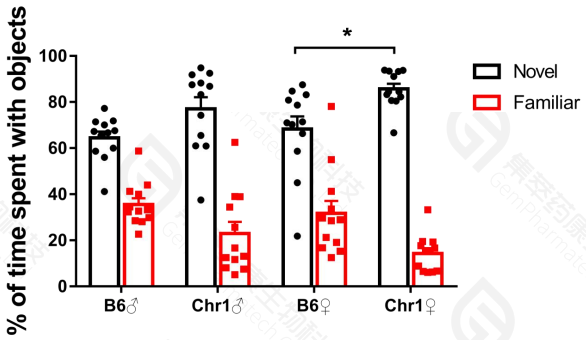

Fig.1 New object recognition test of B6-Chr1^{ZZ2} mice aged 3 months.

The 3-month-old mice were used to adapt to and explore new and old objects, and the exploration tendency and the degree of fineness and sensitivity of recognition memory were detected (B6(M)=12, Chr1(M)=12, B6(F)=12, Chr1(F)=12). The results showed that Chr1 mice spent longer time in the process of recognizing new and old objects than B6 mice, and there was a significant difference among female mice (Fig.1), that is, Chr1 mice had stronger recognition memory.

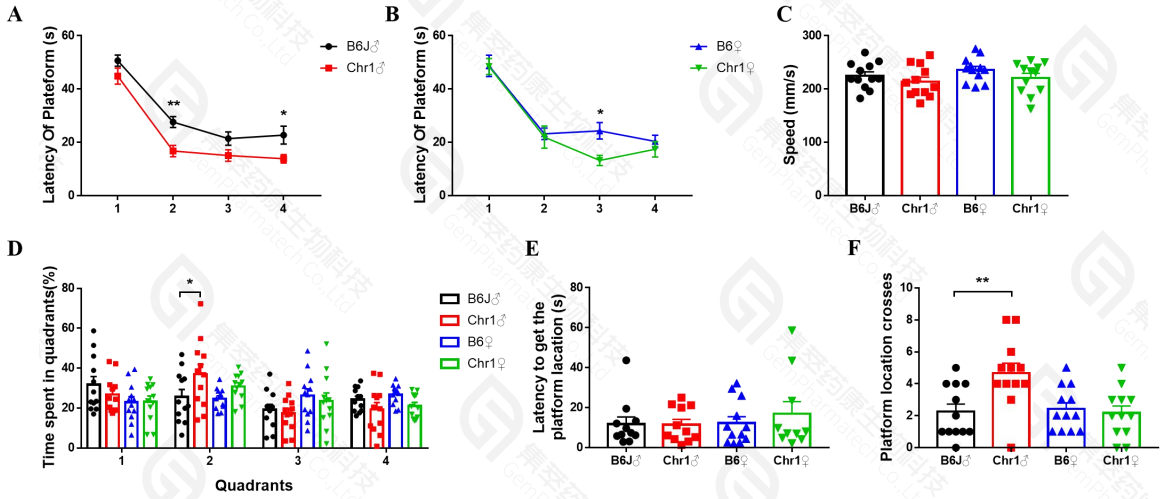

Fig.2 Morris water maze test of B6-Chr1^{ZZ2} mice aged 3 months.

In Morris water maze, 3-month-old mice were subjected to place navigation and spatial probe test, and their learning and memory ability were detected (B6(M)=12, Chr1(M)=12, B6(F)=12, Chr1(F)=12). The results showed that Chr1 mice had faster learning speed and better learning effect when finding the platform compared with B6 mice in the place navigation test, among which male mice showed significant differences (Fig.2 A, B). In the spatial probe test, Chr1 mice spent significantly more time in the target quadrant and crossed the platform times than B6 mice (Fig.2 D, F). There was no difference in the latency of first reaching the platform (Fig.2 E), and no difference in swimming speed (Fig.2 C). In other words, Chr1 mice had stronger learning and cognitive abilities than B6 mice.

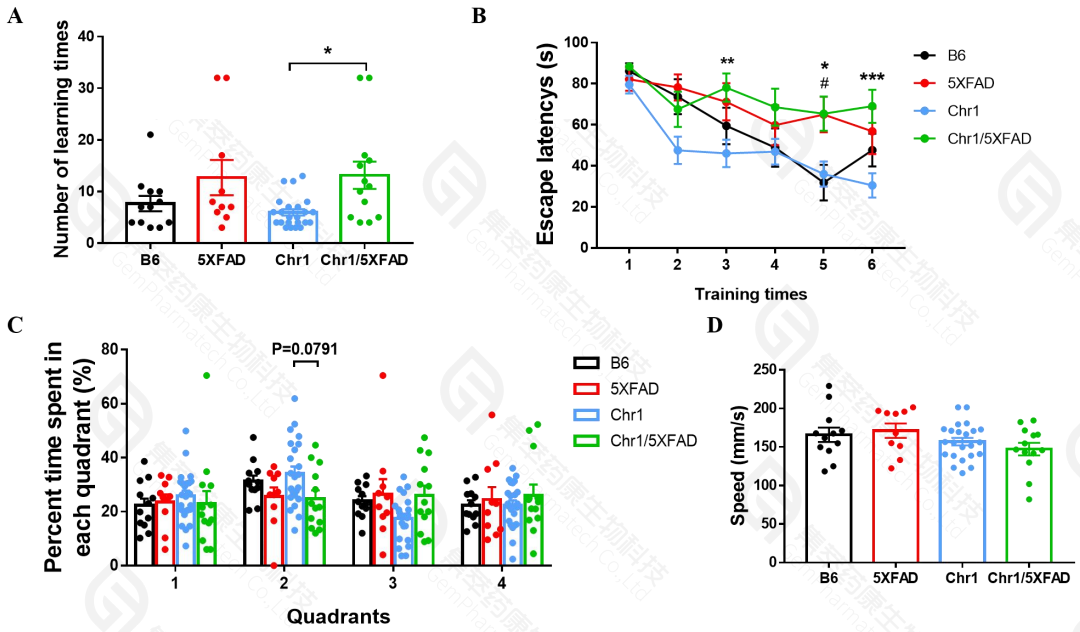

Fig.3 Morris water maze test of B6-Chr1^{ZZ2} and B6-Chr1^{ZZ2}/5XFAD mice aged 6 months.

The 6-month-old mice were subjected to the place navigation and spatial probe test in the Morris water maze. The short-term learning ability and memory of the mice were detected (B6(M)=12, 5xFAD(M)=13, Chr1 (M)=25, Chr1/5XFAD(M)=15). The results show that the number of learning times of Chr1/5XFAD mice to learn to find the platform increased significantly compared with Chr1 mice (Fig.3 A), and the escape latency of Chr1/5XFAD mice was significantly higher than that of Chr1 mice (Fig.3 B) in the first six learning times, that is, Chr1/5XFAD mice showed learning disabilities at the age of 6 months. In the spatial probe test, the time spent by 5XFAD mice in the target quadrant showed a downward trend without significant difference, while the time spent by Chr1/5XFAD mice was significantly reduced (Fig.3 C), that is, the learning and cognitive abilities of Chr1/5XFAD mice decreased. **Data is obtained from third-party collaborators.**

2. Pathological detection of B6-Chr1^{ZZ2} mice

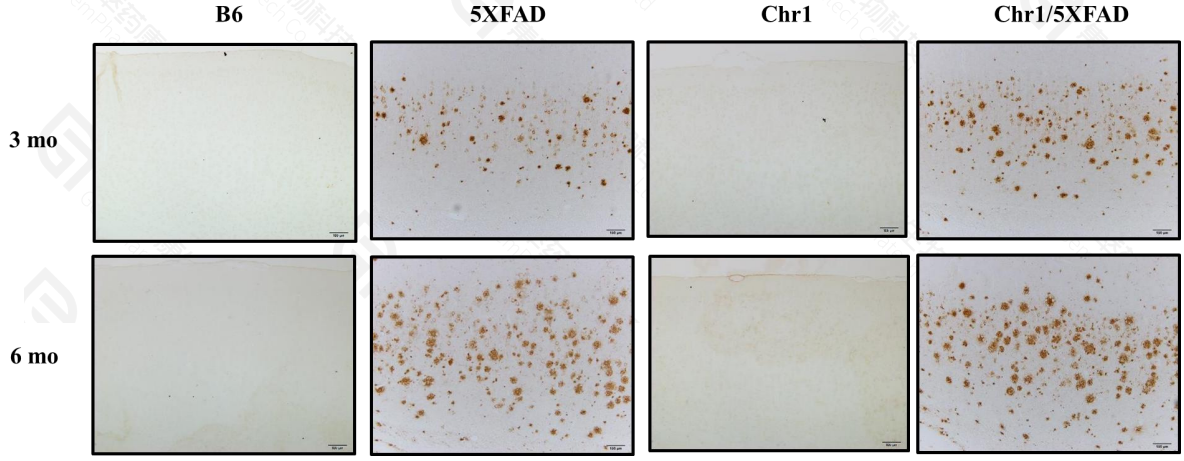

Fig.4 Analysis of Aβ deposition in the brain region of B6-Chr1^{ZZ2} and B6-Chr1^{ZZ2}/5XFAD mice.

A large amount of Aβ deposition could be detected in Chr1/5XFAD mice at 3 months old, which was significantly more than that of 5XFAD mice. The deposition of Aβ gradually increased with the increase of age. **Data is obtained from third-party collaborators.**

References

1. Junhua Xiao，Yinming Liang，Kai Li, et al. A novel strategy for genetic dissection of complex traits:the population of specific chromosome substitution strains from laboratory and wild mice. Mamm Genome (2010) 21:370–376.
2. Oakley H, Cole SL, Logan S, Maus E, Shao P, Craft J, Guillozet-Bongaarts A, Ohno M, Disterhoft J, Van Eldik L, Berry R, Vassar R. Intraneuronal beta-amyloid aggregates, neurodegeneration, and neuron loss in transgenic mice with five familial Alzheimer's disease mutations: potential factors in amyloid plaque formation. J Neurosci. 2006 Oct 4;26(40):10129-40.
3. Xu, F., Hu, S., Chao, T. et al. Sequence analysis of chromosome 1 revealed different selection patterns between Chinese wild mice and laboratory strains. Mol Genet Genomics 292, 1111–1121 (2017).