FVB.129P2-Pde6b \cdot Tyr \circ \text{ch Fmr1}^\text{im1Gfr/J}

Stock No: 004624 | Fmr1 KO

- Congenic, Spontaneous Mutation, Targeted Mutation

AVAILABLE

PLACE ORDER

Live mice available in varying quantities. Ask Customer Service for details.
Also Known As: FraX, FMRP K0, fmr-tm1Cgr, Fmr1 K0

Fmr1-knockout (Fmr1-K0) mice may be useful for studying behavioral and synaptic abnormalities associated with Fragile X Syndrome.

Donating Investigator
William T. Greenough, Beckman Institute

<table>
<thead>
<tr>
<th>GENETIC OVERVIEW</th>
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<tbody>
<tr>
<td>Genetic Background</td>
<td>Generation</td>
<td></td>
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<tr>
<td></td>
<td>N11+N1F35</td>
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<tr>
<td><strong>Fmr1</strong>&lt;sup&gt;tm1Cgr&lt;/sup&gt;</td>
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<tr>
<td>Allele Type</td>
<td>Gene Symbol</td>
<td>Gene Name</td>
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<tr>
<td>Targeted (Null/Knockout)</td>
<td>Fmr1</td>
<td>fragile X mental retardation 1</td>
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<tr>
<td><strong>Pde6b</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
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<td>Gene Symbol</td>
<td>Gene Name</td>
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<tr>
<td>Not Applicable</td>
<td>Pde6b</td>
<td>phosphodiesterase 6B, cGMP, rod receptor, beta polypeptide</td>
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<td><strong>Tyr</strong>&lt;sup&gt;c-ch&lt;/sup&gt;</td>
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<tr>
<td>Spontaneous</td>
<td>Tyr</td>
<td>tyrosinase</td>
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**RESEARCH APPLICATIONS**
Dermatology Research  
Developmental Biology Research  
Mouse/Human Gene Homologs  
Neurobiology Research  
Sensorineural Research

**BASE PRICE**  
Starting at:  
$0.00 Domestic price for male

**Details**

**Important Note**  
This Fmr1 knockout is also available on a C57BL/6 genetic background: B6.129P2-Fmr1^{tm1CGtr}J (Stock No. 003025).

**Detailed Description**

These mice have a knockout allele of the fragile X mental retardation syndrome 1 gene (Fmr1) on the X chromosome. Fmr1-knockout mice (homozygous females and hemizygous males) show many phenotypic characteristics of the Fragile X Syndrome in humans that lack the fragile X mental retardation protein (FMRP) as a result of a mutation in the FMR1 gene. FMRP is an RNA binding protein whose function is shown to be involved in translational regulation of specific dendritic mRNAs. Certain regions of the brain in these mice are characterized by the presence of long, thin dendritic spines on excitatory neurons.

Behavioral traits include deficits in classical delay eye-blink conditioning, autistic-like core symptoms of altered social interaction and occurrence of repetitive behaviors with additional hyperactivity, reduced anxiety, and increased errors in a learning assay. Whole-cell patch-clamp recordings in the anterior cingulate cortex show that long-term potentiation is completely abolished. A similar decrease in long-term potentiation is found in the lateral amygdala, another structure along with the anterior cingulate cortex implicated in fear memory. Failure of the startle response to develop after 4th postnatal week is seen.

Cellular defects include abnormalities in neurogenesis that are seen in the embryonic FMRP-deficient brain; neural progenitors accumulate abnormally in the subventricular zone of the embryonic neocortex.

Fmr1-knockout (Fmr1-KO) mice exhibit abnormalities of dendritic spines in multiple regions of the brain; absence of FMRP induces an over-activation of RAC1, a protein of the Rho GTPase subfamily that plays a critical role in dendritic morphology and synaptic function. Inhibitory synaptic abnormalities in the amygdala as a result of defective GABAergic neurotransmission have also been reported.

The absence of FMRP also causes defects of protein synthesis-dependent plasticity seen as an impairment of long-term potentiation in the cortex and hippocampus, as well as an augmentation of long-term depression in the hippocampus and cerebellum.
Presynaptic abnormalities at excitatory hippocampal synapses in the knock-out mice also lead to defects in short-term plasticity and information processing.

Studies of Fmr1-knockout have revealed that over-activation of class I metabotropic glutamate receptor signaling is a primary defect in the cerebral cortex and hippocampus affecting synaptic plasticity. Enhanced tyrosine kinase B (TrkB) expression and brain derived neurotrophic factor (BDNF)-induced intracellular calcium responses in cortical neural progenitor cells lacking FMRP as well as changes in the expression of TrkB are seen in embryonic Fmr1-KO mice. Mammalian target of rapamycin (mTOR) phosphorylation and activity are elevated in the hippocampus of juvenile Fmr1-KO mice. Brains from Fmr1-KO mice display higher levels of reactive oxygen species, nicotinamide adenine dinucleotide phosphate (NADPH)-oxidase activation, lipid peroxidation and protein oxidation than brains from wild-type mice.

Fmr1-knockout mice are viable and fertile. These mice possess the wildtype Pde6b allele and do not suffer from blindness due to retinal degeneration. Expected coat color is pigmented (gray) as the mice carry the Tyr<sup>c-ch</sup> allele (chinchilla). This mutant mouse strain has proven useful in studies related to Fragile X Syndrome.
Genotyping Protocols
Standard PCR: Fmr1<sup>tm1Ggr</sup>
MELT: Generic Pde6b Alternate1
Genotyping resources and troubleshooting

Dietary Information
LabDiet® 5K52 formulation (6% fat)

Breeding Considerations
These mice have a knockout allele of the fragile X mental retardation syndrome 1 gene (Fmr1) on the X chromosome. This strain is maintained by breeding Fmr1-knockout mice together (i.e., homozygous females are bred with hemizygous males) are viable and fertile. Fmr1-knockout mice are viable and fertile. These mice possess the wildtype Pde6b allele and do not suffer from blindness due to retinal degeneration. Expected coat color is pigmented (gray) as the mice carry the Tyr<sup>c-ch</sup> allele (chinchilla).

Additional Breeding and Husbandry Support
Mating System
Homozygote x Hemizygote

Citation
When using the Fmr1<sup>KO</sup> mouse strain in a publication, please cite the originating article(s) and include JAX stock #004624 in your Materials and Methods section.

Animal Health Reports
Facility barrier level descriptions
AX11 (Maximum)

Pricing & Availability
Live mice available in varying quantities. Ask Customer Service for details.

Domestic | International
Pricing effective for USA, Canada and Mexico shipping destinations

<table>
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<th>AGE</th>
<th>SEX</th>
<th>GENOTYPE</th>
<th>PRICE</th>
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<td>Approx 4-8 weeks</td>
<td>Female</td>
<td>Homozygous for Fmr1&lt;sup&gt;tm1Ggr&lt;/sup&gt;</td>
<td>$236.78</td>
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<tr>
<td>Approx 4-8 weeks</td>
<td>Male</td>
<td>Hemiagyous for Fmr1&lt;sup&gt;tm1Ggr&lt;/sup&gt;</td>
<td>$236.78</td>
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Related Products and Services
Frozen Mouse Embryo $2,595.00 per straw or vial

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