The SYNGAP1 floxed allele has loxP sites flanking exons 6-7 of the synaptic RasGAP (SynGAP) gene. Removal of the floxed sequence disrupts expression of full-length SynGAP and results in expression of a truncated/inactive SynGAP protein. These mice may be useful in Cre-lox studies of synapse development (specifically in dendritic spine), cognitive and behavioral maturation, intellectual disability and autism spectrum disorder.

Donating Investigator
Gavin Rumbaugh, The Scripps Research Institute
Mutations that cause intellectual disability (ID) and autism spectrum disorder (ASD) are commonly found in genes that encode for synaptic proteins. *Syngap1* encodes a synaptic RasGAP (SynGAP) that is largely localized to dendritic spines in neocortical pyramidal neurons, where it suppresses signaling pathways linked to NMDA receptor (NMDAR)-mediated synaptic plasticity and AMPA receptor (AMPA) membrane insertion. *Syngap1* has alternative transcriptional start sites and several alternatively spliced C-terminal exons that result in many possible SynGAP isoforms. Human SYNGAP1 haploinsufficiency results from a truncation of the full-length protein. Exon 7 contains the first common methionine present in the shortest splice variant.

The SYNGAP1^fl^ allele has *loxP* sites flanking exons 6-7 of the *Syngap1* gene. Mice homozygous for the SYNGAP1^fl^ allele are viable and fertile with no reported abnormalities. When bred to mice that express Cre recombinase, the resulting offspring may be useful in generating tissue-specific disruption of full-length SynGAP and expression of a truncated/inactive SynGAP protein. For example, when SYNGAP1^fl^ are bred to germline Cre-expressing mice, the resulting heterozygous offspring express a SynGAP protein truncated after exon 5 (known to be an inactivate SynGAP protein), as well as diminished levels of functional SynGAP (from the wildtype allele). Therefore, the heterozygous phenotype is the same as mice heterozygous for the global knockout allele, and both are a model of human SYNGAP1 haploinsufficiency - exhibiting normal synaptic transmission, modest defects in synaptic plasticity, enhanced synaptic function (accelerated rate of glutamatergic synapse maturation) during early neural development and profound cognitive and behavioral abnormalities. Specifically, heterozygous SynGAP-deficiency significantly disrupts excitatory/inhibitory (E/I) balance in the neural networks that support cognition and behavior. Abnormal behavioral phenotypes can be observing as early as 21 days of age with ~100% penetrance (although physiological abnormalities can be measured even earlier through other methods such as electrophysiological recordings). Furthermore, mice homozygous for the germine deletion of exons 6-7 are phenotypically the same as global knockout homozygotes - exhibiting complete postnatal lethality between 2-5 days of age.

In addition, to explore the behavioral contribution of *in vivo* SynGAP1 dysfunction in distinct cellular populations, SYNGAP1^fl^ mice may be bred to Emx1^Cre^ mice (forebrain glutamatergic neurons and glia; Stock No. 005628), Gad2-ires-Cre mice (developing GABAergic neurons; see Stock Nos. 010802 / 028867) and/or PV-Cre mice (parvalbumin-positive neurons; see Stock Nos. 008069 / 017320).
Mice homozygous for the floxed allele are viable and fertile with no reported abnormalities. When maintaining a live colony, heterozygous mice may be bred together, to wildtype mice from the colony or to C57BL/6J inbred mice (Stock No. 000664). Alternatively, homozygous mice may be bred together.

Additional Breeding and Husbandry Support

Mating System
Homozygote x Homozygote

Citation
When using the SYNGAP1\textsuperscript{\textregistered} mouse strain in a publication, please cite the originating article(s) and include JAX stock #029303 in your Materials and Methods section.

Animal Health Reports

Facility Barrier Level Descriptions

*Production of mice from cryopreserved embryos or sperm occurs in a maximum barrier room, G200*
Pricing & Availability

Typically mice are recovered in 10-14 weeks. Contact Customer Service to place an order or for more information.

**CRYORECOVERY - DOMESTIC PRICING**

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**RELATED PRODUCTS AND SERVICES**

| Frozen Mouse Embryo     | STOCK Syngap1<tm1.1Geno>/RumbJ       | $2,595.00 |

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Terms are granted by individual review and stated on the customer invoice(s) and account statement. These transactions are payable in U.S. currency within the granted terms. Payment for services, products, shipping containers, and shipping costs that are rendered are expected within the payment terms indicated on the invoice or stated by contract. Invoices and account balances in arrears of stated terms may result in The Jackson Laboratory pursuing collection activities including but not limited to outside agencies and court filings.

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The Jackson Laboratory has rigorous genetic quality control and mutant gene genotyping programs to ensure the genetic background of JAX® Mice strains as well as the genotypes of strains with identified molecular mutations. JAX® Mice strains are only made available to researchers after meeting our standards. However, the phenotype of each strain may not be fully characterized and/or captured in the strain data sheets. **Therefore, we cannot guarantee a strain's phenotype will meet all expectations.** To ensure that JAX® Mice will meet the needs of individual research projects or when requesting a strain that is new to your research, we suggest ordering and performing tests on a small number of mice to determine suitability for your particular project. We do not guarantee breeding performance and therefore suggest that investigators order more than one breeding pair to avoid delays in their research.

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