XLMR 94: *GRIA3* Gene Sequencing

**Test Code:** SGRI3  
**Turnaround time:** 6 weeks  
**CPT Codes:** 81479 x1

### Condition Description

Mutations in the *GRIA3* gene (Xq25-q26) ([OMIM #305915](https://omim.org/entry/305915)) have been associated with syndromic X-linked intellectual disability (XLID) ([OMIM #300699](https://omim.org/entry/300699)). In a study of 400 males with XLID who had normal karyotype and negative fragile X testing, missense *GRIA3* mutations were found in four males and a 0.4 Mb deletion of the *GRIA3* gene was found in 3 males. Phenotypic features common in the males with *GRIA3* mutations included moderate intellectual disability, poor muscle bulk, muscle weakness, asthenic body habitus, and hyporeflexia. Other features included seizures, macrocephaly, myoclonic jerks, and autistic behavior.

A partial duplication of the *GRIA3* gene was also reported in a family with X-linked intellectual disability. Two affected brothers had delayed psychomotor development with severely delayed and poor language acquisition. One of the brothers also had dysmorphic features and fits of anger. The mother of the affected individuals displayed facial hypotonia, language and learning disabilities and moderately short upper lip. An apparently balanced t(X;12)(q24;q15) translocation that disrupted the *GRIA3* gene was identified in a woman with intellectual disability, bipolar disorder, seizures, and cyclic vomiting. A partial tandem duplication of exons 1-6 of the *GRIA3* gene was found in a boy with nonsyndromic intellectual disability. His carrier mother was unaffected.

For patients with suspected *GRIA3*-Related-XLMR, sequence analysis is recommended as the first step in mutation identification. For patients in whom mutations are not identified by full gene sequencing, deletion/duplication analysis is appropriate.

### References:

- [OMIM# 305915](https://omim.org/entry/305915): *GRIA3* gene
- [OMIM# 300699](https://omim.org/entry/300699): XLMR 94 Genes

### Indications

This test is indicated for:

- Confirmation of a clinical diagnosis of XLMR 94.
- Carrier testing in adults with a family history of XLMR 94.

### Methodology

PCR amplification of 15 exons contained in the *GRIA3* gene is performed on the patient's genomic DNA. Direct sequencing of amplification products is performed in both forward and reverse directions, using automated fluorescence dideoxy sequencing methods. The patient's gene sequences are then compared to a normal reference sequence. Sequence variations are classified as mutations, benign variants unrelated to disease, or variations of unknown clinical significance. Variants of unknown clinical significance may require further studies of the patient and/or family members. This assay does not interrogate the promoter region, deep intronic regions, or other regulatory elements, and does not detect large deletions.

### Detection

Clinical Sensitivity: In a study of 400 males with XLID who had normal karyotype and negative fragile X testing, missense *GRIA3* mutations were found in four males and a 0.4 Mb deletion of the *GRIA3* gene was found in 3 males.

Mutations in the promoter region, some mutations in the introns and other regulatory element mutations cannot be detected by this analysis. Large deletions will not be detected by this analysis. Results of molecular analysis should be interpreted in the context of the patient's clinical and/or biochemical phenotype.

Analytical Sensitivity: ~99%

### Specimen Requirements

Submit only 1 of the following specimen types

**Type: Saliva**

**Specimen Requirements:**  
Oragene™ Saliva Collection Kit  
Oragene™ Saliva Collection Kit used according to manufacturer instructions. Please contact EGL for a Saliva Collection Kit for patients that cannot provide a blood sample.

**Specimen Collection and Shipping:**
Please do not refrigerate or freeze saliva sample. Please store and ship at room temperature.

**Type: DNA, Isolated**

**Specimen Requirements:**
Microtainer
8µg
Isolation using the Perkin Elmer™Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended.

**Specimen Collection and Shipping:**
Refrigerate until time of shipment in 100 ng/µL in TE buffer. Ship sample at room temperature with overnight delivery.

**Type: Whole Blood (EDTA)**

**Specimen Requirements:**
EDTA (Purple Top)
Infants and Young Children (2 years of age to 10 years old): 3-5 ml
Older Children & Adults: 5-10 ml
Autopsy: 2-3 ml unclotted cord or cardiac blood

**Specimen Collection and Shipping:**
Ship sample at room temperature for receipt at EGL within 72 hours of collection. Do not freeze.

**Related Tests**

- Deletion/duplication analysis of the GRIA3 gene by CGH array is available for those individuals in whom sequence analysis is negative.
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Prenatal testing is available only for known familial mutations to individuals who are confirmed carriers of mutations. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal specimen.
- X-Linked Intellectual Disability panels are available for 30, 60, and 90 genes.