Expedited Medical EmExome: Clinical Exome Sequencing, Family Trios

Test Code: EXMX3  
Turnaround time: 3 weeks  
CPT Codes: 81416 x1, 81415 x1

### Condition Description

**What is the Medical EmExome?**

The human exome is the complete coding (exonic) region of the genome. It is estimated to encompass approximately 1-2% of the genome, yet contains approximately 85% of disease-causing pathogenic variants. Current off-the-shelf exome kits used for clinical exome sequencing cover 92% of the exome. Traditionally, gene discovery has been done in research laboratories; however, now with the ability to sequence nearly the entire coding region of the human genome, it is possible for clinical laboratories to use this information to identify a previously unrecognized cause of disease.

The Medical EmExome is the next level in clinical exome sequencing offered by EGL Genetics (EGL). The exome sequencing design provides >97% coverage of 22,000 genes, with a mean read depth of 100X. Of the ~4600 disease-associated genes analyzed, 3000 have 100% coverage (≥20X) of all exons; twice the number of genes with complete coverage offered by competitors, making it the most comprehensive exome sequencing test available. This is also the highest coverage offered by any clinical exome sequencing performed in a CLIA-/CAP-certified laboratory.

**What gene coverage levels can be expected?**

The Exome Coverage Tool can be used to view typical depth of sequence coverage obtained by exome sequencing performed by EGL. To access this tool, please click [here](#).

**Will EGL release raw exome data?**

Yes, upon request.

**Will EGL re-analyze data?**

Yes, upon request.

**What options are available for Medical EmExome testing?**

- EXOMT - Medical EmExome: Clinical Exome Sequencing, Trios
- EXOME - Medical EmExome: Clinical Exome Sequencing, Proband Only
- EXOMA - Medical EmExome: Clinical Exome Sequencing, Additional Family Member (EXOMT should be order first or at the same time)
- EXODD - Medical EmExome Array: Deletion/Duplication Analysis
- EXSAN - Sanger Confirmation and Interpretation Only
- EXINT - Interpretation Only (Exome or Genome)
- EXOMR - Medical EmExome: Clinical Exome Reanalysis
- EXMX - Expedited Medical EmExome: Clinical Exome Sequencing, Proband Only

**How is the Medical EmExome performed?**

Medical EmExome is performed on genomic DNA, using the Agilent V5 Plus designed to target the exome with greater coverage of known disease-associated genes. These targeted regions are then sequenced using the Illumina HiSeq 2500 sequencing system, with 100 basepair (bp) paired-end reads (similar to bidirectional Sanger sequencing) and an average coverage of 100X in the target region. (The target region includes the exon and 10 bp of flanking intronic region). The DNA sequence is mapped to, and analyzed in, comparison with the published human genome build UCSC hg19 reference sequence. The targeted coding exons and splice junctions of the known protein-coding RefSeq genes are assessed for the depth of coverage and data quality threshold values. The Medical EmExome bioinformatics analysis pipeline is used to compare sequence changes in the individual being tested to the reference sequence. All potential positive sequence variants in the proband are confirmed by conventional di-deoxy DNA sequence analysis (Sanger sequencing) using a separate DNA isolation.

The interpretation service is offered for exomes sequenced outside Emory, in either clinical or core laboratories. The exome data is mapped to, and analyzed in, comparison with the published human genome build UCSC hg19 reference sequence. The targeted coding exons and splice junctions of the known protein-coding RefSeq genes are assessed for the depth of coverage and data quality threshold values. The Medical EmExome bioinformatics analysis pipeline is used to compare sequence changes in the individual being tested to the reference sequence.

**Indications**

The EmExome is indicated when there is a suspicion of a genetic etiology contributing to the proband’s manifestations.

**Methodology**

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associated genes. These targeted regions are then sequenced using the Illumina HiSeq 2500 sequencing system, with 100 basepair (bp) paired-end reads (similar to bidirectional Sanger sequencing) and an average coverage of 100X in the target region. (The target region includes the exon and 10 bp of flanking intronic region). The DNA sequence is mapped to, and analyzed in, comparison with the published human genome build UCSC hg19 reference sequence. The targeted coding exons and splice junctions of the known protein-coding RefSeq genes are assessed for the depth of coverage and data quality threshold values. The Medical EmExome bioinformatics analysis pipeline is used to compare sequence changes in the individual being tested to the reference sequence. All potential positive sequence variants in the proband are confirmed by conventional di-deoxy DNA sequence analysis (Sanger sequencing) using a separate DNA isolation.

**Detection**

Unknown.

**Specimen Requirements**

**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: 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: Liquid Buccal Swab**

Specimen Requirements:
- ORAcollect-DX (OCD-100)|Assisted saliva collection kit

DNA Genotek ORAcollect-DX 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: 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.

**Special Instructions**

Please submit medical records or clinical summary notes, and a signed consent form when ordering exome testing. Testing will not be initiated until these documents are received.

If parental samples are not received at the same time as the proband’s sample, the testing will be changed to Expedited Medical EmExome: Clinical Exome Sequencing, Proband Only.