Proportionate Short Stature/Small for Gestational Age: Sequencing Panel

Test Code: MM012
Turnaround time: 6 weeks
CPT Codes: 81401 x1, 81406 x1

**Condition Description**

Short stature is defined as a height less than two standard deviations from the mean for a given age and gender (i.e. height is less than the third percentile on standard growth curves). Based on the clinical presentation, short stature can be broken down into three subcategories; small for gestational age (SGA), non-SGA proportionate short stature, and disproportionate short stature (e.g. skeletal dysplasias). SGA, which is sometimes called intrauterine growth restriction (IUGR), is used to describe a fetal weight below the 10th percentile when controlled for gender and gestational age. It can also be used to describe a newborn whose birth weight is below the 10th percentile.

Short stature can have either a non-genetic or a genetic etiology. Examples of non-genetic causes of short stature are malnutrition, infections, growth hormone deficiency and chronic diseases such as kidney disease and congenital heart disease. Examples of genetic causes of short stature are chromosome abnormalities such as Turner syndrome (45,X), epigenetic abnormalities such as aberrant methylation at 11p15.5 and uniparental disomy, as well as autosomal dominant, autosomal recessive and X-linked genetic defects. Short stature due to genetic causes can be an isolated finding or part of the clinical spectrum of a genetic syndrome.

This version of the short stature panel is comprised of a next generation sequencing (NGS) panel testing for syndromic and non-syndromic causes of short stature. For the complete version of the short stature panel, please see the Proportionate Short Stature/Small for Gestational Age Panel – Comprehensive webpage.

Please note that this panel only includes testing for SGA and non-SGA proportionate short stature subcategories and does not include testing for disproportionate short stature (e.g. skeletal dysplasias).

In addition, this panel does not include testing for growth hormone deficiency, which may be an integral part of the workup for an individual with short stature.

References:

**Genes**

- ATRX
- BLM
- BTK
- CREBBP
- CUL7
- DHCR7
- EP300
- ERCC6
- ERCC8
- FGD1
- GH1
- GHR
- GHRHR
- GLI2
- HESX1
- IGF1
- IGF1R
- INSR
- KDM6A
- KMT2D
- Kras
- LHX3
- NBN
- NIPBL
- PITX2
- POU1F1
- PROP1
- PTEN
- RAF1
- ROR2
- RPS6KA3
- SHOX
- SMARCAL1
- SMC1A
- SMC3
- SOS1
- SOX2
- SOX3
- SRCAP
- STAT5B
- TBCE
- THR8
- TRIM37
- WRN

**Indications**

This test is indicated for:
- Individuals with a clinical diagnosis of short stature.

**Methodology**

**Next Generation Sequencing**: In-solution hybridization of all coding exons is performed on the patient's genomic DNA. Although some deep intronic regions may also be analyzed, this assay is not meant to interrogate most promoter regions, deep intronic regions, or other regulatory elements, and does not detect single or multi-exon deletions or duplications. Direct sequencing of the captured regions is performed using next generation sequencing. The patient's gene sequences are then compared to a standard reference sequence. Potentially causative variants and areas of low coverage are Sanger-sequenced. Sequence variations are classified as pathogenic, likely pathogenic, benign, likely benign, or variants of unknown significance. Variants of unknown significance may require further studies of the patient and/or family members.

**Detection**

**Next Generation Sequencing**: Clinical Sensitivity: Unknown. Mutations in the promoter region, some mutations in the introns and other regulatory element mutations cannot be detected by this analysis. Large deletions/duplications will not be detected by this analysis. Results of molecular analysis should be interpreted in the context of the patient's clinical/biochemical phenotype.

Analytical Sensitivity: ~99%.

**Specimen Requirements**

Submit only 1 of the following specimen types

**Type**: Whole Blood
Specimen Requirements:

In EDTA (purple top) tube:
Infants (2 years): 3-5 ml
Older Children & Adults: 5-10 ml.

Specimen Collection and Shipping: Ship sample at room temperature with overnight delivery.

**Type: Isolated DNA**

Specimen Requirements:

In microtainer: 60 ug

Isolation using the Qiagen™ Puregene kit for DNA extraction is recommended.

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

**Related Tests**

- Individual sequencing analysis is available for the SHOX, NIPBL, SMC1A, CREBBP, EP300, DHCR7, KMT2D, PTPN11, RAF1, KRAS, SOS1, and FGD1 genes.
- Variations of this panel are available if previous genetic testing has been performed, including:
  - PSS/SGA Panel: Comprehensive
  - PSS/SGA Panel: EmArray Cyto + SNP & NGS
  - PSS/SGA Panel: Russell-Silver Panel & NGS
  - PSS/SGA Panel: NGS
- A next generation sequencing panel is also available for Noonan syndrome and related disorders.
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Proportionate Short Stature/Small for Gestational Age: Deletion/Duplication Panel.