Skeletal Dysplasia: Sequencing Panel

**Test Code:** MM170

**Turnaround time:** 6 weeks

**CPT Codes:** 81406 x1, 81407 x1, 81408 x1

**Condition Description**

Skeletal dysplasias are a heterogeneous group of more than 450 disorders with complex mechanisms. Clinical and biochemical features continue to be used reliably to assign patients to this general disease category. Identification of the precise genetic defect is important; however, to permit carrier testing and early prenatal diagnosis. Molecular analysis is likely to expand the clinical spectrum of skeletal dysplasia and may also provide data relevant to prognosis and future therapeutic intervention.

Collectively, the incidence of skeletal dysplasia is estimated to be 1 in 5,000 births. Skeletal dysplasia is referred to as generalized disorders of cartilage and bone, frequently resulting in disproportionately short stature. These disorders can range greatly in severity, from precocious arthropathy in relatively average stature individuals to severe dwarfism with perinatal mortality. A variety of complications can be associated with skeletal dysplasia, including orthopedic, neurologic, auditory, visual, pulmonary, cardiac, renal, and psychological. Five major groups are included in this panel: proportionate short stature; disproportionate short stature; skeletal dysplasias with increased bone density; skeletal dysplasias with decreased bone density osteolysis; and limb malformations.

**References:**

**Genes**

ACAN, ACP5, AGPS, ALPL, ANKH, ANO5, ARHGAP31, ARSE, ATP6V0A2, B3GALT6, B4GALT7, BMP1, BMP2, BMPR1B, CA2, CANT1, CASR, CC2D2A, CDH3, CDKN1C, CEP290, CHST14, CHST3, CHSY1, CLCN5, CLCN7, COL1A1, COL1A2, COL2A1, COL9A1, COL9A2, COL9A3, COMP, CRTAP, CTSK, CULT, DOR2, DMPC24, DLL3, DLX3, DMP1, DYM, DYNC2H1, EBP, EIP2AK3, ENPP1, ESCO2, EVC, EVC2, EXTL1, EXTL2, FAM20C, FN1, FBXL1, FBN1, FBXW4, FERMT3, FGF10, FGF23, FGFR1, FGFR2, FGFR3, FKBP10, FLNA, FLNB, FN1, GALNT3, GDP5, GLI3, GNAS, GORAB, GPO6, GREM1, HDAC4, HES7, HOXD13, HPGD, HSPG2, ICC, IFITM5, IFT122, IFT140, IFT80, IHH, KIF22, KIF7, LMEM3, LFGN, LIIF, LMBR1, LMNA, LRPP, LRSP, MABF, MATN3, MESP2, MGP, MKS1, MMP3, MMP9, MYCN, NEK1, NIPBL, NKX3-2, NOG, NOTCH2, NPR2, OBSL1, OSTM1, P3H1, PAPSS2, PCNT, PHEX, PIGV, PITX1, PLOD2, PPIB, PRKAR1A, PTIR1, PTHLH, PTPTN1, PYCR1, RASGRF1, RECL4, ROR2, RORP11L, RUNX2, SALL1, SALL4, SERPINF1, SERPINH1, SH3PD2B, SHH, SHOX, SLC26A2, SLC34A3, SLC35D1, SLC39A13, SMARCAL1, SOST, SOX9, SPT, SULF1, TBCE, TBX15, TBX3, TBX5, TBX6, TBXAS1, TCRG1, TCTN3, TGBF1, THPO, TMEM216, TMEM67, TNFRSF11A, TNFRSF11B, TNFSF11, TP53, TREM2, TRIP11, TRPS1, TRPV4, TYRORB, WDR35, WISP3, WNT3, WNT5A, WNT7A, ZMPSTE24

**Indications**

This test is indicated for:
- Confirmation of a clinical diagnosis of skeletal dysplasias.
- Carrier testing in adults with a family history of skeletal dysplasias.

**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**

- Skeletal Dysplasia: Deletion/Duplication Panel