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Client: Example Client ABC123
123 Test Drive
Salt Lake City, UT 84108
UNITED STATES

Physician: Doctor, Example

Patient: Patient, Example

DOB	Unknown
Gender:	Unknown
Patient Identifiers:	01234567890ABCD, 012345
Visit Number (FIN):	01234567890ABCD
Collection Date:	00/00/0000 00:00

Beta Globin (HBB) Sequencing and Deletion/Duplication

ARUP test code 2010117

Beta Globin (HBB) Seq, Del/Dup Spcm	Whole Blood

Beta Globin (HBB) Seq, DelDup Interp

Negative

TEST PERFORMED - 2010117
TEST DESCRIPTION - Beta Globin (HBB) Sequencing and Deletion/Duplication
INDICATION FOR TEST - Confirm Diagnosis

RESULT
No pathogenic variants were detected in the HBB gene.

INTERPRETATION
No pathogenic variants were detected in the beta globin (HBB) gene through bidirectional sequencing the coding region, intron/exon boundaries, proximal promoter and untranslated regions. None of the additional targeted HBB pathogenic variants, IVS-II-654, IVS-II-705, and IVS-II-745 were detected. No large deletions involving the genes of the beta globin gene cluster (HBB, HBD, HBG1, HBG2 and HBE1) or its locus control region were detected. This result significantly decreases the probability of, but does not exclude, beta thalassemia or beta thalassemia trait. Please refer to the background information included in this report for the clinical sensitivity and limitations of this test.

RECOMMENDATIONS
Medical management should rely on clinical findings and family history. Genetic consultation is recommended.

COMMENTS
Reference Sequences: GenBank # NM_000518.4 (HBB), # NG_000007.3 (Beta globin gene cluster)
Nucleotide numbering begins at the "A" of the ATG initiation codon.
Likely benign and benign variants are not included in this report, but are available upon request.

This result has been reviewed and approved by Rong Mao, M.D.

H=High, L=Low, *=Abnormal, C=Critical

BACKGROUND INFORMATION: Beta Globin (HBB) Sequencing and Deletion/Duplication
CHARACTERISTICS: Beta thalassemia is caused by decreased or absent synthesis of the hemoglobin beta-chain resulting in variable clinical presentations ranging from mild anemia to transfusion dependence. Structural hemoglobinopathies may result in sickling disorders, microcytic or hemolytic anemia, cyanosis, or erythrocytosis. Hereditary persistence of fetal hemoglobin (HPFH) is a clinically benign condition caused by variants within the beta globin gene cluster that alter normal hemoglobin switching and result in persistent fetal hemoglobin (Hb F) production.
INCIDENCE: Varies by ethnicity.
INHERITANCE: Usually autosomal recessive, infrequently autosomal dominant.
CAUSE: Pathogenic variants within the HBB gene or variants involving the beta globin gene cluster and its regulatory elements.
CLINICAL SENSITIVITY: 99 percent for beta thalassemia and hemoglobinopathies associated with the HBB gene.
METHODOLOGY: Bidirectional sequencing of the HBB coding regions, intron-exon boundaries, 5proximal promoter and untranslated region, 3polyadenylation signal and intronic variants c. 93-21 (IVS-I-110), c.316-197 (IVS-II-654), c.316-146 (IVS-II-705), c.316-106 (IVS-II-745), and c.316-86_316-85 (IVS-II-765 L1). Multiplex ligation-dependent probe amplification (MLPA) of the beta globin gene cluster (HBB, HBD, HBG1, HBG2, HBE1) and its locus control region.
ANALYTICAL SENSITIVITY AND SPECIFICITY: 99 percent.
LIMITATIONS: Diagnostic errors can occur due to rare sequence variations. Breakpoints of large deletions will not be determined; therefore, the precise clinical phenotype associated with a particular deletion (eg., HPFH vs. delta-beta thalassemia) may not be known. Intragenic deletions in the beta globin cluster genes, other than HBB, may not be detected. This assay does not assess for sequence variants within the coding or regulatory regions of HBD, HBG1, HBG2 or HBE1. Apparent copy number changes detected by probes solely in the HBG1-HBG2 region will not be reported, as they can result from benign sequence variants or gene conversion events.

Test developed and characteristics determined by ARUP Laboratories. See Compliance Statement C: aruplab.com/CS

VERIFIED/REPORTED DATES

Procedure	Accession	Collected	Received	Verified/Reported
Beta Globin (HBB) Seq, Del/Dup Spcm	20-036-104862	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00
Beta Globin (HBB) Seq, DelDup Interp	20-036-104862	00/00/0000 00:00	00/00/0000 00:00	00/00/0000 00:00

END OF CHART

H=High, L=Low, *=Abnormal, C=Critical