Patient ID	Patient Name		Birth Date	Gender	Age
SA00099237	SAMPLEREPORT, THEVP		1971-01-05	M	46
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SA00099237	SA00099237	CLIENT, CLIENT			
Account Information		**Collected**			
C7028846 DLMP Rochester		16 Oct 2017 13:30			

Alpha-Globin Gene Analysis

Alpha-Globin Gene Analysis (ATHL)

Result Summary

MCR

NEGATIVE

Result

MCR

No deletions or duplications within the alpha globin gene cluster were identified. Neither the Hb Constant Spring nor the alphaT Saudi alterations were identified.

Interpretation

1 MCR

This result reduces the likelihood, but does not rule out a diagnosis of or positive carrier status for alpha thalassemia.

This assay does not detect non-deletion types of mutations, such as point mutations other than the alphaT Saudi and Hb Constant Spring. Therefore, this result should be interpreted in the context of clinical presentation and results of other laboratory tests [e.g. hemoglobin electrophoresis and mean corpuscular volume (MCV)].

A genetic consultation may be of benefit.

ADDITIONAL INFORMATION

An online research opportunity called GenomeConnect (genomeconnect.org), a project of ClinGen, is available for the recipient of this genetic test. This patient registry collects de-identified genetic and health information to advance the knowledge of genetic variants. Mayo Clinic is a collaborator of ClinGen. This may not be applicable for all tests.

Test results should be interpreted in the context of clinical findings, family history, and other laboratory data. Misinterpretation of results may occur if the information provided is inaccurate or incomplete.

Rare polymorphisms exist that could lead to false-negative or false-positive results. If results obtained do not match the clinical findings, additional testing should be considered.

Bone Marrow transplants from allogenic donors will interfere with testing. Call Mayo Clinic Laboratories for instructions for testing patients who have received a bone marrow transplant.

Multiple in-silico evaluation tools may have been used to assist in the interpretation of these results. Of note, the sensitivity and specificity of these tools for the determination of pathogenicity is currently unvalidated.

Specimen

MCR

WB Whole Blood

Method

MCR

Dosage analysis (PCR and MLPA) was used to detect deletion and duplication-type mutations and the Hb Constant Spring and alphaT Saudi point mutations within the alpha globin gene cluster(GenBank accession number NM_000517; build GRCh37 (hg19)). This method uses multiple probes that hybridize throughout the alpha-gene locus on chromosome 16 from the HS-40 regulatory region through the 3' hypervariable region (3'HVR).

Released By

MCR

VICTORIA WAUGH

Received: 16 Oct 2017 13:51 **Reported:** 16 Oct 2017 14:20

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	William G. Morice M.D. Ph.D	24D0404292

Patient ID	Patient Name		Birth Date	Gender	Age
SA00099237	SAMPLEREPORT, THEVP		1971-01-05	M	46
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SA00099237	SA00099237	CLIENT, CLIENT			
Account Information		**Collected**			
C7028846 DLMP Rochester		16 Oct 2017 13:30			

Thalassemia Summary Interpretation

Thalassemia Summary Interpretation

MCR

The summary interpretation integrates additional testing results with initial findings reported in the Thalassemia/ Hemoglobinopathy Evaluation.

Hb A2 and Hb F are normal and there are no features of a hemoglobin variant by protein analysis. Molecular testing was performed due to patient's reported microcytic anemia.

MOLECULAR RESULTS:

Alpha-1 Gene Sequencing (HBA1): Negative
Alpha-2 Gene Sequencing (HBA2): Negative
Beta Gene Sequencing (HBB): Negative
Alpha Cluster Deletion/Duplication: Negative
Beta Cluster Deletion/Duplication: Negative

INTERPRETATION:

1. A cause for microcytic anemia is not evident. DNA sequence analysis of the alpha and beta globin genes and Multiplex Ligand dependent Probe Amplification (MLPA) assays of the Alpha Globin Gene Cluster and Beta Globin Gene Cluster did not detect any mutations. Findings supportive of hemoglobin-based cause for this patient's anemia are NOT present.

2. Ferritin level is not supportive of iron deficiency. Correlation with iron studies is recommended.

Reviewed by MCR

Koren Melcher

Received: 16 Oct 2017 13:28 **Reported:** 16 Oct 2017 16:00

Thalassemia and Hemoglobinopathy Ev

Hemoglobinopathy Interpretation

2 MCR

Reviewed by Koren Melcher

1) No abnormal hemoglobin variant or beta thalassemia detected by protein methods.

2) The ferritin level is not supportive of iron deficiency.

3) A cause for microcytosis is not evident. Molecular testing is pending and the results will be correlated in a subsequent report.

Hemoglobin A2 and F

Result Name	Value	Unit	Reference Value	Performing Site
Hemoglobin A2	2.3	%	2.0–3.3	MCR
Hemoglobin F	0.7	%	0.0–0.9	2 MCR

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	William G. Morice M.D. Ph.D	24D0404292

Patient ID	Patient Name		Birth Date	Gender	Age
SA00099237	SAMPLEREPORT, THEVP		1971-01-05	M	46
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SA00099237	SA00099237	CLIENT, CLIENT			
Account Information		**Collected**			
C7028846 DLMP Rochester		16 Oct 2017 13:30			

Hemoglobin Electrophoresis, B

Result Name	Value	Unit	Reference Value	Performing Site
Hemoglobin A	97.0	%	95.8–98.0	MCR
Variant	0.0	%	No abnormal variants	MCR

Result Name	Value	Unit	Reference Value	Performing Site
Ferritin, S	200	mcg/L	24–336	MCR

Received: 16 Oct 2017 13:28

Reported: 16 Oct 2017 15:52

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	William G. Morice M.D. Ph.D	24D0404292

Patient ID	Patient Name		Birth Date	Gender	Age
SA00099237	SAMPLEREPORT, THEVP		1971-01-05	M	46
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SA00099237	SA00099237	CLIENT, CLIENT			
Account Information		**Collected**			
C7028846 DLMP Rochester		16 Oct 2017 13:30			

Alpha Globin Gene Sequencing, B

Alpha Globin Gene Sequencing Result

MCR

Negative. See interpretation

Interpretation

1 MCR

No sequence alterations were detected in the following:
Alpha-1 Globin Gene (HBA1) Alpha-2 Globin Gene (HBA2)

Negative Result. No mutations associated with an alpha chain hemoglobin or non-deletional alpha thalassemia are detected by DNA sequencing analysis.

A statement of benign polymorphisms identified in this individual is available upon request.

See THEVA/Thalassemia Summary Interpretation for a Summary Interpretation of this case including correlation with protein analysis and clinical phenotype, if provided.

Signing Pathologist: Melissa Tricker-Klar

ADDITIONAL INFORMATION

Bi-directional sequence analysis was performed to test for the presence of a mutation in all coding regions and non-coding portions of the alpha-1 hemoglobin (HBA1) and alpha-2 hemoglobin (HBA2) genes with reported mutations. HGVS mutation nomenclature is based on human assembly GRCh37(hg19) and RefSeq accession number NM_000518.4.

Received: 16 Oct 2017 13:51 **Reported:** 16 Oct 2017 16:55

Beta Globin Cluster Locus Del/Dup,B

Beta Globin Cluster Locus Del/Dup

MCR

Negative. See interpretation

Reviewed by

MCR

Koren Melcher

Interpretation

1 MCR

Negative result. No large deletions or duplications were detected in the beta globin cluster locus.

Molecular genetic interpretation seen in consultation with Linda Hasadsri, M.D., Ph.D.

ADDITIONAL INFORMATION

Multiplex Ligation-dependent Probe Amplification (MLPA) was used to detect large deletion and duplication-type mutations within the beta-globin cluster locus on chromosome 11. This method uses multiple probes that hybridize throughout the region including the 5'HS/locus control region (LCR), epsilon (HBE), G-gamma (HBG2), A-gamma (HBG1), pseudobeta (HBBP1), delta (HBD), and beta (HBB) globin genes to beyond 3'HS1. This assay only detects large deletions and duplications and does not detect point mutations or other small mutations. Test resolution is limited by probe density and copy number variations present in between adjacent probes will not be detected. This test provides a size range and does not confirm breakpoints or definitive size of the mutation; therefore, multiple different mutations can give the same result. Rare polymorphisms exist that could lead to false-negative or false-positive results. Isolated HBG1/HBG2 regional deletions/duplications are considered benign polymorphisms and will not be reported.

It is imperative to interpret the results in the context of hemoglobin electrophoresis and red blood cell indices findings. Clinical and family history correlation are important to establish the significance of test results. If results obtained do not match the clinical findings, additional testing should be considered.

Bone marrow transplants from allogenic donors will interfere with the testing. Call Mayo Clinic Laboratories for instructions for testing patients who have received a bone marrow transplant.

Received: 16 Oct 2017 13:28 **Reported:** 16 Oct 2017 15:52

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	William G. Morice M.D. Ph.D	24D0404292

Patient ID	Patient Name		Birth Date	Gender	Age
SA00099237	SAMPLEREPORT, THEVP		1971-01-05	M	46
Order Number	**Client Order Number**	**Ordering Physician**	**Report Notes**		
SA00099237	SA00099237	CLIENT, CLIENT			
Account Information		**Collected**			
C7028846 DLMP Rochester		16 Oct 2017 13:30			

Beta Globin Gene Sequencing, B

Beta Globin Gene Sequencing Result

MCR

Negative. See interpretation

Interpretation

[1] MCR

No sequence alterations were detected in the following:
Beta Globin Gene (HBB)

Negative result. No mutations associated with a beta chain hemoglobin variant or beta thalassemia are detected by DNA sequence analysis.

See THEVA/Thalassemia Summary Interpretation for a Summary

Interpretation of this case including correlation with protein analysis and clinical phenotype, if provided.

Signing Pathologist: Melissa Tricker-Klar

ADDITIONAL INFORMATION

Bi-directional sequence analysis was performed to test for the presence of a mutation in all coding regions and non-coding portions of the beta hemoglobin gene (HBB) with reported mutations. HGVS mutation nomenclature is based on human assembly GRCh37(hg19) and RefSeq accession number NM_000518.4.

Received: 16 Oct 2017 13:51 **Reported:** 16 Oct 2017 16:56

Laboratory Notes

[1] This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

[2] This test has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

Performing Site Legend

Code	Laboratory	Address	Lab Director	CLIA Certificate
MCR	Mayo Clinic Laboratories - Rochester Main Campus	200 First Street SW, Rochester, MN 55905	William G. Morice M.D. Ph.D	24D0404292