IMMUNOSCIENCES LAB, INC.
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REFERRING PHYSICIAN

PATIENT NAME

AGE 37Y SEX F

ACCESSION NO.	D.O.B.	COLLECTION DATE	LOG-IN DATE	TEST DATE	REPORT DATE
		01/05/2022	01/07/2022	01/11/2022	01/11/2022

TEST	RESULTS NORMAL	RESULTS ABNORMAL	REFERENCE RANGE	UNITS
THE AUTOIMMUNE TRIO				
IgG SARS-COV-2		1.24	<0.9	INDEX

SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2 (SARS-CoV-2) IS THE ETIOLOGICAL AGENT FOR CORONAVIRUS DISEASE 2019 (COVID-19), THE DISEASE THAT BECAME A MODERN PANDEMIC INFECTING AND KILLING MILLIONS OF PEOPLE WORLDWIDE. A SIGNIFICANT HETEROGENEITY IN IMMUNE REPONSE AGAINST PATHOGENS, IN PARTICULAR, SARS-CoV-2, EXISTS AMONG THE GENERAL POPULATION. IN FACT, THREE COMPLETELY DIFFERENT IMMUNOTYPES WERE REPORTED IN PATIENTS HOSPITALIZED WITH COVID-19:

1) WITH ROBUST CD4 AND HIGHLY ACTIVATED CD8+ T CELLS, AND HIGH LEVEL OF ANTIBODY PRODUCTION.

2) WITH ROBUST CD8+T CELLS, BUT LESS ACTIVATED CD4 T CELLS AND LOWER LEVEL OF ANTIBODY PRODUCTION.

3) WITH MINIMAL LYMPHOCYTE ACTIVATION AND RESPONSE TO SARS-CoV-2, AND POSSIBLY LACK OF ANTIBODY PRODUCTION.

THIS HETEROGENEITY IN IMMUNE REPSONSE TO SARS-CoV-2 MAY RESULT IN DIFFERENT RESPONSES TO THE VIRUS AS WELL AS TO VACCINE ANTIGENS.

DETECTION OF LOW OR HIGH LEVELS OF IgG ANTIBODY MADE AGAINST SARS-CoV-2 SPIKE PROTEIN AND NUCLEOPROTEIN IN THE BLOOD IS THE MOST PRACTICAL APPROACH FOR THE ASSESSMENT OF AN INDIVIDUALS IMMUNE RESPONSE TO SARS-CoV-2, INDICATING RECENT OR PRIOR RESPONSE TO SARS-CoV-2 ANTIGENS. ELEVATIONS IN IgG ANTI-SARS-CoV-2 ABOVE THE REFERENCE RANGES INDICATES EXPOSURE TO SARS-CoV-2 OR VACCINATION.

A LOW LEVEL OF IgG AGAINST SARS-CoV-2 ANTIGENS AFTER INFECTION WITH COVID-19 OR VACCINATION MAY INDICATE A LACK OF IMMUNE RESPONSE TO THE VIRAL ANTIGENS.

THIS TEST IS NOT FOR THE DETECTION OF SARS-CoV-2, BUT FOR ANTIBODIES AGAINST IT.

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REFERENCES

HALPERT G, SHOENFELD Y. SARS-CoV-2, THE AUTOIMMUNE VIRUS. AUTOIMMUNE REVIEWS, 2020. DOI: 10.1016/J.AUTREV.2020.2020.102695.

VOJDANI A, VOJDANI E, KHARRAZIAN D. REACTION OF HUMAN MONOCLONAL ANTIBODIES TO SARS-CoV-2 PROTEINS WITH TISSUE ANTIGENS: IMPLICATIONS FOR AUTOIMMUNE DISEASES. FRONTIERS IN IMMUNOLOGY, JANUARY 2021. DOI: 10.3389/FIMMU.2020.61789.

IgG REPORTED AS 0.91-1.09 ARE CONSIDERED EQUIVOCAL.

IgG HHV-6 (HERPES TYPE-6)	<9.00		<37.00	EU

RESULTS REPORTED AS <8 EU ARE CONSIDERED WITHIN THE LOWER LIMIT OF DETECTION AND FROM 8-37 ARE CONSIDERED NEGATIVE. RESULTS >37 MAY INDICATE AN IMMUNE RESPONSE AGAINST HERPES 6.

IgM HHV-6 (HERPES TYPE-6)		40.80	<24.00	EU

RESULTS REPORTED AS <8 EU ARE CONSIDERED WITHIN THE LOWER LIMIT OF DETECTION AND FROM 8-24 ARE CONSIDERED NEGATIVE. RESULTS >24 MAY INDICATE AN IMMUNE RESPONSE AGAINST HERPES 6.

HUMAN HERPESVIRUS TYPE 6 (HHV-6) TYPE A AND TYPE B ARE NEUROTROPHIC VIRUSES THAT CAUSE THE COMMON CHILDHOOD DISEASE KNOWN AS ROSEOLA. BY AGE 3, 90-100% OF HUMANS ARE INFECTED BY HHV-6 VIA THE NASAL CAVITY. THE OLFACTORY PATHWAY IS THE MAJOR ROUTE OF ENTRY INTO THE NERVOUS SYSTEM. THE VIRUS PERSISTS IN A VARIETY OF CELLS, INCLUDING GLIAL CELLS, FOR THE REST OF THE AFFLICTED PERSONS LIFE. IMMUNE REACTION AGAINST HHV-6 RESULTS IN THE PRODUCTION OF BOTH IgM AND IgG ANTIBODIES.

HHV-6 A REACTIVATION DOCUMENTED BY IgM ANTIBODY ELEVATION

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HAS BEEN SHOWN TO ALTER MITOCHONDRIAL FRAGMENTATION IN PATIENTS WITH CHRONIC FATIGUE SYNDROME OR MYALGIC ENCEPHALOMYELITIS. HHV-6 B IS LINKED TO SEVERAL AUTOIMMUNE AND NEURODEGENERATIVE DISORDERS VIA MOLECULAR MIMICRY AND OTHER MECHANISMS. THESE INCLUDE, MS, GUILLAIN-BARRE SYNDROME, LUPUS, SJOGRENS SYNDROME, HASHIMOTOS THYROIDITIS, ALZHEIMERS DISEASE, PARKINSONS DISEASE, EPILEPSY, AND ENCEPHALITIS, INCLUDING MYALGIC ENCEPHALLOMYELITIS (ME/CFS). IN THE PRESENCE OF SIGNIFICANT ELEVATIONS IN IgG ANTIBODY AGAINST ANTIGENS OF HHV-6 TYPE A OR TYPE B, THE BINDING OF THESE IgG ANTIBODIES TO HUMAN TISSUE ANTIGENS MAY RESULT IN AUTOIMMUNE REACTTIVITY.

REFERENCES

BROCCOLO F, FUCETTI L, CECCHERINI-NELLI L. POSSIBLE ROLE OF HUMAN HERPESVIRUS 6 AS A TRIGGER OF AUTOIMMUNE DISEASE. SCIENTIFIC WORLD JOURNAL, 2013; 2013:867389. DOI: 10.1155/2013/867389.

SEPULVEDA N ET AL. MYALGIC ENCEPHALOMYELITIS/CHRONIC FATIGUE SYNDROME AS A HYPER-REGULATED IMMUNE SYSTEM DRIVEN BY AN INTERPLAY BETWEEN REGULATORY T CELLS AND CHRONIC HUMAN HERPESVIRUS INFECTIONS. FRONTIERS IN IMMUNOLOGY, NOVEMBER 2019. DOI: 10.3389/FIMMU.2019.02684.

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The performance characteristics of the HHV-6 Antibody tests were established through validation by Immunosciences Lab., Inc. It has not been cleared or approved by the US Food and Drug Administration. Immunosciences Lab., Inc. is regulated under the Clinical Laboratory Improvement Amendments of 1988 (CLIA) as qualified to perform high complexity clinical testing.

IgG EPSTEIN-BARR VCA		3.17	<0.9	ISR
IgM EPSTEIN-BARR VCA	0.00		<0.9	ISR
IgG EARLY ANTIGEN		3.65	<0.9	ISR
IgG EB NUCLEAR ANTIGEN		2.57	<0.9	ISR
IgM EB NUCLEAR ANTIGEN	0.60		<0.9	INDEX

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INTERPRETATIONS OF SEROLOGIC PATTERNS IN EBV INFECTION

AB	Patients EBV Status: Susceptible	Primary EBV	Convalescent (3 mo.)	Past	Reactivated
VCA-IgM	-	+	+ or -	-	-
VCA-IgG	-	+	+	+	+
EA-D	-	-	+	-	+
EBNA-IgG	-	-	+ or -	+	+
EBNA-IgM	-	+	+ or -	-	+

* * * * * * * * * * *

[ ] Test results may indicate no viral infection.

[ ] Test results may indicate past viral infection.

[ ] Test results may indicate on-going viral infection.

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EPSTEIN-BARR VIRUS (EBV) OR HERPES TYPE 4 IS A UBIQUITOUS HUMAN VIRUS THAT INFECTS ALMOST ALL HUMANS DURING THIER LIFTIME. EBV IN CHILDREN AND IN SOME ADULTS CAUSES THE INFECTION CALLED MONONUCLEOSIS, WHICH RESULTS IN THE PRODUCTION FIRST OF IgM AND THEN IgG ANITBODIES AGAINST VIRAL CAPSID ANTIGEN (EBV-VCA). FOLLOWING THE ACUTE PHASE, THE VIRUS PERSISTS MAINLY IN THE EPITHELIAL CELLS AND B LYMPHOCYTES FOR THE REST OF THE AFFLICTED PERSONS LIFE.

UNDER A VARIETY OF CONDITIONS THAT NEGATIVELY AFFECT THE IMMUNE SYSTEM, REACTIVATION OF EBV CAN OCCUR, RESULTING IN THE EXPRESSION OF EARLY ANTIGEN (EBV-EA) AND THE PRODUCTION OF ANTIBODY AGAINST EA.

EPSTEIN-BARR NUCLEAR ANTIGEN (EBNA) IS ANOTHER ANTIGEN THAT INDUCES THE PRODUCTION AND PROLIFERATION OF B CELLS, WHICH ARE RESPONSIBLE FOR THE GENERATION OF ANTIBODIES IN THE BODY.THIS IS WHY EBV IS ASSOCIATED WITH DIFFERENT

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PROLIFERATIVE AND AUTOIMMUNE DISORDEWRS, INCLUDING LYMPHOMAS, RHEUMATOID ARTHRITIS, GRAVES DISEASE, HASHIMOTOS DISEASE, LUPUS, MULTIPLE SCLEROSIS (MS), INFLAMMATORY BOWEL DISEASE, CELIAC DISEASE, TYPE 1 DIABETES, AND SJOGRENS SYNDROME. THE ELEVATION OF IgM ANBTIBODY AGAINST EBV ANTIGENS MAY INDICATE ONGOING VIRAL INFECTION OR VIRAL REACTIVATION. IN THE CASE OF VERY HIGH LEVELS OF IgG ANTIBODY AGAINST EBV ANTIGENS, IF THESE ANTIGENS MANAGE TO BIND TO SELF-TISSUE ANTIGENS DUE TO CROSS-REACTIVITY, THE RESULT MAY BE AUTOIMMUNE REACTIVITY.

REFERENCES

HOUEN G, TRIER NH. EPSTEIN-BARR VIRUS AND SYSTEMIC AUTO-IMMUNE DISEASES. FRONTIERS IN IMMUNOLOGY, JANUARY 2021. DOI:103389/FIMMU.2020.587380.

HARLEY JB ET AL. TRANSCRIPTION FACTORS OPERATE ACROSS DISEASE LOCI, WITH EBNA2 IMPLICATED IN AUTOIMMUNITY. NATURE GENETICS, 50:699-707, 2018.

IgG AND IgM REPORTED AS 0.91-1.09 ARE CONSIDERED EQUIVOCAL.

*Specimens received as hemolytic, lipemic, bacterially contaminated, or heat inactivated, are rejected for analysis.

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