ERBA MANNHEIM SCIENTIFIC BULLETIN

IMPORTANT LABORATORY PARAMETERS FOR CORONAVIRUS DISEASE (COVID-19)

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INTERNATIONAL CLINICAL STUDIES OF PATIENTS WITH COVID-19 HAVE IDENTIFIED A NUMBER OF LABORATORY FINDINGS ASSOCIATED WITH UNFAVORABLE OUTCOMES.

International clinical studies of patients with COVID-19 have identified a number of laboratory findings associated with unfavorable outcomes. Here we review these studies and highlight the significance of key parameters including D-Dimer and Neutrophil-to-Lymphocyte Ratio (NLR).

Novel corona virus infection (COVID-19) has impacted the lives of people in nearly every country of the world. It has placed a heavy strain on the healthcare systems of all affected regions and contributed to significant mortality in many countries.

The clinical characteristics of **COVID-19** have been broadly defined, and as with many other acute conditions, laboratory medicine plays an essential role in the early detection, diagnosis and management of the disease.

Various publications are now available in international scientific & clinical journals which have identified key laboratory findings that are associated with a poor prognosis.

In a letter to the editor, Prof. Giuseppe Lippi of the University Hospital of Verona, highlighted 14 laboratory parameters that were found to be abnormal in patients with unfavourable progression of the disease.[1] Some of the findings outlined in this list include the identification of lymphopenia, anaemia, elevated d-dimer and CRP.

Many of these markers are associated with the activation of inflammatory processes. The presence of elevated levels of acute phase proteins is a typical finding in viral infection and explains the frequency of the finding in COVID-19 patients.[2]

Important laboratory findings in patients with unfavourable progression (COVID-19)

Increased White Blood Cell Count	Increased Creatinine
Increased Neutrophil Count	Increased Cardiac Troponin
Decreased Lymphocyte Count	Increase Creatine Kinase - MB (CK-MB)
Decreased Albumin	Increased D-Dimer
Increased Lactate Dehydrogenase (LDH)	Increased Prothrombin Time (PT)
Increased Alanine Aminotransferase (ALT)	Increased Procalcitonin (PCT)
Increased Aspartate Aminotransferase (AST)	Increased C-Reactive Protein (CRP)
Increased Total Bilirubin	

NEUTROPHIL-TO-LYMPHOCYTE RATIO (NLR)

A paper by Jingyuan Liu et. al.[3] has suggested that the Neutrophil-to-Lymphocyte Ratio (NLR) can be used as an early marker of poor prognosis in COVID-19 patients. This parameter is widely available and allows quick assessment of the inflammatory status of patients.

Jingyuan Liu found that normal NLR values (0.78-3.53) were exceeded in severe COVID-19 patients (3.6 (range 2.5-5.4)).[4] The incidence of severe illness was 9.1% in NLR < 3.13 patients and 50% in patients with NLR ≥ 3.13. It was concluded that patients over 50 years of age with a NRL ≥3.13 are at risk of severe illness, and they should get rapid access to intensive care unit if required.

One of the contributing causes of altered Neutrophil-to-Lymphocyte ratios is the presence of decreased absolute lymphocyte counts. Qin et.al.[5] studied 458 COVID-19 patients and identified lymphopenia in many severe cases. Investigations revealed that CD4+ T-cells were reduced leading to the conclusion that the COVID-19 virus may directly damage lymphocytes, leading to an impairment of the immune system.

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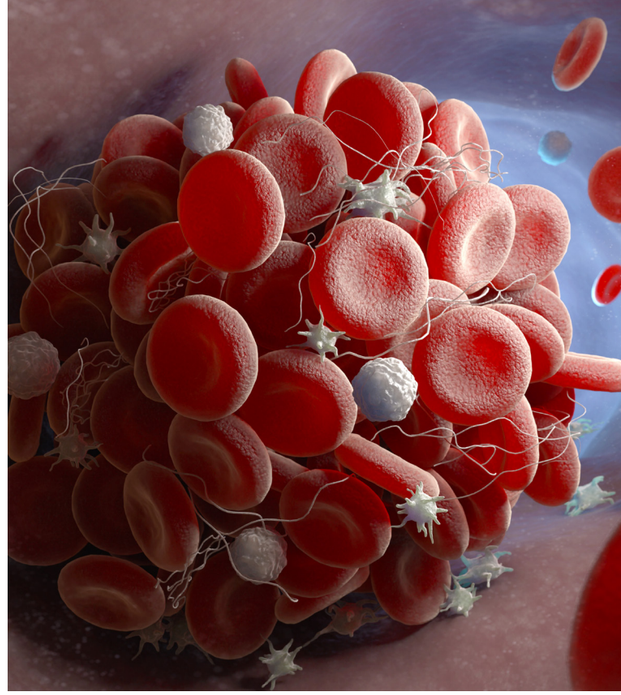

ABNORMAL COAGULATION PARAMETERS

A retrospective study by Tang et.al.[6] investigated the coagulation results and outcomes of 183 patients with confirmed COVID-19 infection.

Review of the coagulation results on admission found that non-survivors presented with significantly elevated PT, D-Dimer and FDP levels. Initial D-Dimer results of 2.12 µg/ml (range 0.77-5.27 µg/ml) were found in the non-survivors, compared to 0.61 µg/ml (range 0.35-1.29 µg/ml) in the survivors with a lab normal range of <0.50 µg/ml.

Fifteen (71.4%) of these cases met the International Society on Thrombosis and Haemostasis (ISTH) diagnostic criteria for disseminated intravascular coagulation (DIC) with a score of >5 points during the later stages of the disease. The median time from admission to was DIC of 4 days (range 1-12 days).

These and other findings have been extensively studied by the ISTH and have led to the publication of an Interim Guidance document on the recognition and management of coagulopathy in COVID-19 patients.[7] This document recommends the measurement of D-Dimers, prothrombin time and platelet count (decreasing order of importance) in all patients who present with COVID-19 infection as well as outlining an algorithm for assessment of patients based on the results.

REAGENT / INSTRUMENT DATA

Erba Mannheim is committed to helping clinicians the world over with diagnostic equipment and assays that can be used in the fight against COVID-19. Further information about the assays mentioned can be found in the links below or through your local Erba partner.

Assay/Parameter	Erba Assay/ Instrument	Product No.	Product information
Albumin	ALB 440	XSYS0001	Diagnostic reagent for quantitative in-vitro determination of Albumin in human serum, plasma and urine. Find out more.
Lactate Dehydrogenase (LDH)	LDH 110	XSYS0013	Diagnostic reagent for quantitative in vitro determination of LDH in human serum and plasma. Find out more.
Alanine Aminotransferase (ALT)	ALT/GPT 330	XSYS0017	Diagnostic reagent for quantitative in-vitro determination of ALT/GPT (Alanine Aminotransferase) in human serum and plasma. Find out more.
Aspartate Aminotransferase (AST)	AST/GOT 330	XSYS0016	Diagnostic reagent for quantitative in-vitro determination of AST/GOT (Aspartate Aminotransferase) in human serum and plasma. Find out more.
Total Bilirubin	BIL T 330	XSYS0023	This reagent is intended for in-vitro quantitative determination of Bilirubin Total in human serum. Find out more.
Creatinine	CREA 275	XSYS0076	Diagnostic reagent for in-vitro determination of Creatinine in human serum, plasma and urine. Find out more.
Cardiac Troponin	ELISA	IME00051	The ErbaLisa Troponin I ELISA is intended for the quantitative determination of cardiac Troponin I in human serum.
Creatine Kinase - MB (CK-MB)	ELISA	IME00047	The ErbaLisa CKMB ELISA is intended for the quantitative determination of CKMB in human serum.
C-Reactive Protein (CRP)	CRP	XSYS0047	Quantitative determination of C-Reactive Protein in human serum by turbidimetric immunoassay. Find out more.
White Blood Cell Count	Elite 580 H560	INS00071 INS00078	Five-part differential CBC analysers. Find out more.
Neutrophil Count			
Lymphocyte Count			
Neutrophil-to-Lymphocyte Ratio (NLR)			
D-Dimer	Erba DDimer R	EHL00011	Erba DDimer R is an immunoturbidimetric assay used for the quantitative determination of the fibrin degradation products that contain D-dimer in human plasma. Find out more.
Prothrombin Time (PT)	Erba Protime LS	EHL00046	The PT is used as a screening tool and as a quantitative test for coagulation factors in the extrinsic and common pathways. Find out more.

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