



Research Update

Biomarkers

Cardiac troponin

Source: **Tersalvi et al.**, Journal of Cardiac Failure, 2020; **Lippi et al.**, Prog Cardiovasc Dis, 2020; **Huang et al.**, Lancet, 2020; **Han et al.**, medRxiv, 2020; **Guo et al.**, JAMA, 2020

↑ in severe COVID-19

heart damage raises troponin levels (and may explain increased mortality in COVID-19)

in China those with ↑ troponin were: older, comorbid, more likely to be admitted to ICU and to die

187
↑ troponin in 28% of patients

341
↑ troponin (25.6ng/L) in severe patients

41
↑ troponin in 5 patients with cardiac injury

47
↑ troponin in severe cases upon admission

D-dimer

Source: **Yao et al.**, Research Square, 2020; **Yu et al.**, Research Square, 2020; **Huang et al.**, Lancet, 2020; **Han et al.**, medRxiv, 2020; **Tang et al.**, J Thromb Haemost, 2020; **Wang et al.**, JAMA, 2020; **Zhou et al.**, Lancet, 2020

↑ in severe COVID-19

>2mg/L reported in most studies

clot breakdown increases levels of d-dimers (D-D)

248
↑ D-dimer in 75% of patients, where >2.14mg/L predicted mortality

57
↑ D-dimer in COVID-19 vs CAP, (decreased with treatment)

41
↑ D-dimer in ICU patients 2.4mg/L vs 0.5mg/L (4 days post admission)

47
↑ D-dimer in severe patients upon admission

183
↑ D-dimer in severe 2.12mg/L vs mild 0.61mg/L

138
↑ D-dimer in severe 4.14mg/L vs mild 1.66mg/L

191
↑ D-dimer in those who died 5.2mg/L vs survived 0.6mg/L

Lymphocyte Count

Source: **Han et al.**, medRxiv, 2020; **Yang et al.**, medRxiv, 2020; **Guan et al.**, New Engl J Med, 2020; **Ruan et al.**, Intensive Care Medicine, 2020

↓ in severe COVID-19 and appears to predict severity and mortality

Lymphocytes move to lymph nodes during viral infection

47
↓ lymphocytes counts below $1.045 \times 10^9/L$ identified severe patients

52
Lymphopenia in 80% of severe patients

1099
Lymphopenia in 83% of all admitted patients, but worse in severe patients

150
↓ lymphocytes in those that died ($0.6 \times 10^9/L$) vs discharged ($1.42 \times 10^9/L$) (but were also older)

Blood IL-6

Source: **Herold et al.**, medRxiv, 2020; **Gao et al.**, J Med Virol, 2020

↑ in severe COVID-19

IL-6 Released by immune cells during infection

40
↑ IL-6 >80pg/mL associated with mechanical ventilation and 92% risk of respiratory failure

43
↑ IL-6 in severe (36pg/mL) vs mild (11pg/mL)

LDH

Source: **Han et al.**, medRxiv, 2020; **Zhang et al.**, Eur Radiol, 2020

↑ in severe COVID-19

LDH converts lactate to pyruvate and is a marker of tissue damage

47
↑ serum LDH in severe patients >283U/L and correlated with clinical severity, APACHE II and SOFA scores

120
↑ serum LDH in severe patients with 70% >250U/L (odds ratio 2.5)

Fibrinogen

Source: **Spiezia et al.**, Coagulation and Fibrinolysis, 2020; **Wang et al.**, Lancet, 2020; **Gao et al.**, J Med Virol, 2020

↑ in severe COVID-19

66
↑ fibrinogen in severe patients 517mg/dL vs healthy 297mg/dL (healthy not in ICU)

69
↑ fibrinogen in severe patients (but unclear severity)

43
↑ fibrinogen in severe patients 3.84g/L vs mild 3.11g/L

Serum Amyloid A

Source: **Huan et al.**, Journal of Infection, 2020

↑ in severe COVID-19

hepatocytes SAA SAA is released by hepatocytes, recruits immune cells and has anti-microbial effects

132
↑ SAA and CRP in all COVID-19 patients (no control group comparison) and correlated with disease progression and poor CT scan