

D-Amino acids: Signaling severity in viral infection

Researchers led by Osaka University and National Institutes of Biomedical Innovation, Health and Nutrition (NIBIOHN) investigate the potential of D-amino acids in the evaluation and treatment of severe COVID-19 and influenza infection

Osaka, Japan – Just as bricks are key components in constructing a building, molecules known as amino acids are essential components in constructing proteins in the body. Recently, researchers in Japan investigated the role of a particular group of amino acids, known as D-amino acids, in the progression of viruses like influenza A virus (IAV) and Sars CoV-2, the virus responsible for COVID-19.

In a new study published in *BBA – Molecular Basis of Disease*, the research team have uncovered a relationship between D-amino acids and severe viral infection in both animals and humans.

While our understanding of COVID-19 has evolved during the COVID-19 pandemic, methods to predict disease severity and treat severe COVID-19 infection have been somewhat limited. D-amino acids have been previously shown to function as biomarkers for diseases such as kidney disease. However, the significance of D-amino acids in viral infection has not yet been explored, spurring the research team to investigate whether D-amino acids are affected during severe IAV infection or COVID-19.

“We first assessed serum levels of D-amino acids in a mouse model of severe IAV infection and found that D-amino acids were greatly reduced in these mice compared with uninfected mice,” says lead author of the study Shihoko Kimura-Ohba. “When we evaluated serum from patients with severe COVID-19, we also found reduced levels of D-amino acids compared to those of healthy control subjects.”

The researchers next explored the effects of supplementation with a specific D-amino acid known as D-alanine in mouse models of IAV infection and COVID-19. IAV mice exhibited a severe reduction in body weight that was mitigated by D-alanine treatment, while survival rates were improved in COVID-19 mice who received D-alanine treatment.

“Our results indicate that D-amino acids may serve as biomarkers to reflect the severity of viral infection,” says senior author Tomonori Kimura. “Additionally, although the

observed effects of D-alanine supplementation were limited, treatment with D-alanine may help to improve clinical outcomes in patients with severe viral infection.”

The mechanism of D-alanine in the improvement of viral prognosis has yet to be elucidated. However, the research team’s findings indicate that D-amino acids represent promising biomarkers and therapeutic options for the evaluation and treatment of severe viral infections, including those associated with COVID-19.

The article, “D-Alanine as a biomarker and a therapeutic option for severe influenza virus infection and COVID-19,” was published in *BBA – Molecular Basis of Disease* at DOI: <https://doi.org/10.1016/j.bbadis.2022.166584>.

Title: D-Alanine as a biomarker and a therapeutic option for severe influenza virus infection and COVID-19

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Summary: The research team investigated the role of D-amino acids in severe viral infection. Mouse models of influenza A and COVID-19 infection and patients with severe COVID-19 demonstrated reduced D-amino acid levels in the blood. Supplementation with D-alanine mitigated body weight reduction in IAV model mice and improved survival in COVID-19 model mice. D-amino acids may represent potential biomarkers and therapeutic agents for the treatment of severe viral infection.

Primary Keyword: Health and Medicine

Additional Keywords: Viruses, Viral infections, Coronavirus, SARS CoV 2, COVID 19, Influenza Viruses, Amino Acids, Biomarkers

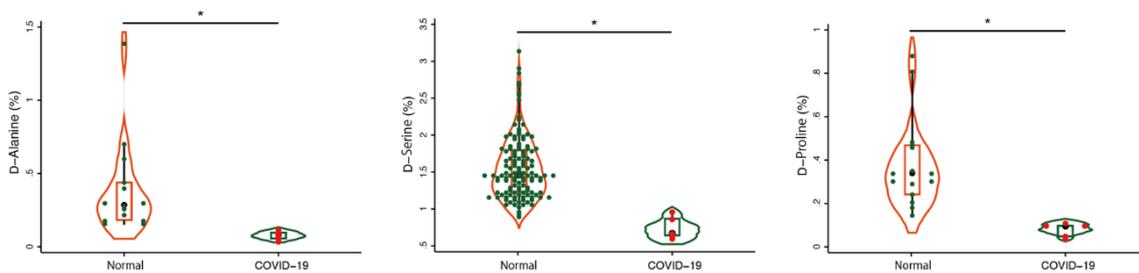


Fig. 1
Serum levels of D-amino acids decrease in patients with severe COVID-19. Credit: *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease* (2022). DOI: 10.1016/j.bbadis.2022.166584

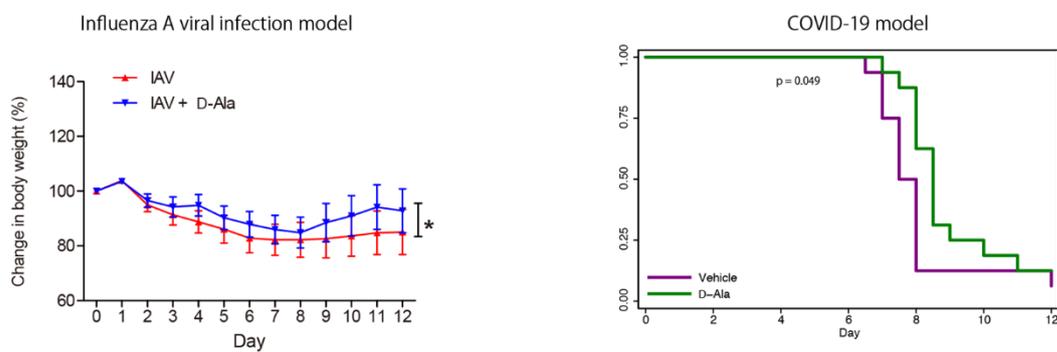


Fig. 2
Supplementation of D-alanine mitigated the severe body weight reduction in Influenza A virus (IAV) infection mice model, and improved survival in COVID-19 mice model. Credit: *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease* (2022). DOI: 10.1016/j.bbadis.2022.166584

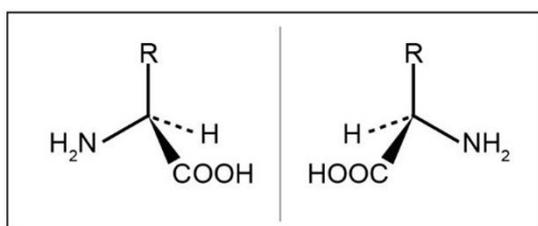


Fig. 3
Chiral amino acids. L-and D-amino acids are same in molecular weight, bond angle, bond length, but different in characteristics. Only L-amino acids have been regarded to be present in the body until recently. Credit: Dr Kimura.