

Functional dysconnectivity of frontal cortex to striatum predicts ketamine infusion response in treatment-resistant depression

Mu-Hong Chen, M.D., Ph.D., Pei-Chi Tu, M.D., Ph.D., Cheng-Ta Li, M.D., Ph.D., Tung-Ping Su, M.D.

Department of Psychiatry, Taipei Veterans General Hospital, Taipei, Taiwan

Department of Medical Research, Taipei Veterans General Hospital, Taipei, Taiwan

Background

Frontostriatal dysconnectivity plays a crucial role in the pathophysiology of major depressive disorder. However, whether the baseline functional connectivity (FC) of the frontostriatal network could predict the treatment outcome of low-dose ketamine infusion remained unknown.

Aims & Objectives

To investigate whether the baseline FC of the frontostriatal network could predict the treatment outcome of low-dose ketamine infusion in patients with treatment-resistant depression.

Methods

In total, 48 patients with TRD were randomly divided into three treatment groups (a single-dose 40-min intravenous infusion) as follows: 0.5 mg/kg ketamine, 0.2 mg/kg ketamine, and saline placebo infusion. Patients were subsequently followed up for 2 weeks. Resting-state functional magnetic resonance imaging was performed for each patient before infusion administration. In addition, the baseline frontostriatal FC of patients with TRD was also compared with that of healthy controls.

Results

Compared with the healthy controls, patients with TRD had a decreased FC in the frontostriatal circuits, especially between the right superior frontal cortex and executive region of the striatum and between the right paracingulate cortex and rostral-motor region of the striatum. The baseline hypoconnectivity of the bilateral superior frontal cortex to the executive region of the striatum was associated with a greater reduction of depression symptoms after a single 0.2 mg/kg ketamine infusion.

Discussion & Conclusion

Reduced connectivity of the superior frontal cortex to the striatum predicted the response to ketamine infusion among patients with TRD.