

## **Cerebral Vascular Function Demonstrated by Depression Symptom Severity in Young Adults with Depression**

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### **ABSTRACT**

Cerebral dilation has been shown to be blunted in adults with major depressive disorder (MDD). This blunted dilation has been shown to lead to an increase in cerebral vascular disease (CVD) risk. This disease risk has primarily been shown in older adults with MDD. Previous research from our group has shown that young otherwise healthy adults with MDD exhibit signs of vascular dysfunction in the periphery. Additionally, this dysfunction has been shown to be correlated with MDD symptom severity. Research has yet to show whether this dysfunction exists in the cerebral circulation and if it correlates with symptom severity. **PURPOSE:** Therefore, the purpose of our research is to investigate whether cerebral dilatory responsiveness is blunted in individuals with MDD compared to that of healthy adults (HA) without MDD and whether the limited dilation correlated with MDD symptom severity. **METHODS:** We measured cerebral dilation via a cerebral vasomotor reactivity (CVMR) test using a hypercapnic stimulus in 10 subjects with MDD ( $22 \pm 2$ y; 2Males) and 9 HA ( $22 \pm 2$ y; 3Males). Cerebral dilation was assessed using cerebral vascular conductance index (CVCi;  $MCAv \cdot MAP^{-1}$ ) as calculated by middle cerebral artery velocity (MCAv) measured by transcranial doppler ultrasound on the left temple and beat to beat mean arterial pressure (MAP; finger photoplethysmography). Hypercapnia was determined by an increase in peak end tidal carbon dioxide (PETCO<sub>2</sub>; capnograph) of  $\Delta 9$  mmHg. Subject's depression symptoms were assessed using the self-reported Patient Health Questionnaire (PHQ-9). **RESULTS:** PHQ-9 scores of subjects with MDD ( $10 \pm 7$ ), 5 of who were in the midst of a depressive episode during testing as illustrated by PHQ-9 scores  $>6$  ( $16 \pm 5$ ) and HA ( $3 \pm 3$ ). There is a high correlation between HA CVCi%<sub>b</sub> and PHQ-9 scores ( $r^2 = 0.796$ ,  $p = 0.001$ ) while there is no correlation between all MDD and PHQ-9 scores ( $r^2 = 0.059$ ,  $p = 0.498$ ). When MDD subjects are separated based on symptom severity these data show there is a moderately high correlation between MDD subjects with PHQ-9 of  $>6$  ( $r^2 = 0.649$ ,  $p = 0.100$ ). **CONCLUSION:** These data currently indicate that subjects who are in the midst of a current depressive episode are more likely to have cerebral vascular dysfunction, in the form of a blunted dilatory response than that of their HA counterpart, and those with MDD not currently suffering from a major depressive episode.