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Regional cerebral blood flow patterns during performance of an attention-focused cognitive task in patients resistant and responsive to antidepressant therapy

Daniel Silverman¹, Kristen Willeumier², Nare Torosyan¹, Sravya Mallam¹, Cyrus Raji¹, Magnus Dahlbom¹ and Daniel Amen²

¹ UCLA David Geffen School of Medicine, Los Angeles, CA ² Amen Clinics, Inc., Newport Beach, CA

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Objectives: To assess regional patterns of cerebral blood flow (rCBF) predictive of therapy-resistant versus therapy-responsive unipolar depression.

Methods: Forty patients with a clinical diagnosis of depression and Beck Depression Inventory (BDI) II score ≥ 25 underwent 99mTc-HMPAO SPECT. Brain images were acquired before initiation of therapy on a Picker 3-headed camera at rest and during an attention-focusing cognitive task. Half ($n=20$; av. age 43, range 20-66) were responsive (BDI ≤ 13 or reduced by 50% 6 months post-treatment) to therapy, and half ($n=20$; av. age 41, range 19-59) were non-responsive to therapy. The regional pattern of blood flow in the brain of each patient was assessed by quantification of mean activity in each of 47 standardized volumes of interest, relative to mean whole brain activity, and differences between therapy-resistant and therapy-responsive groups were statistically assessed by two-tailed Student t-test.

Results: There were no significant differences ($p>0.3$) in BDI II scores between responders (32.6 ± 1.6 , av. \pm SEM) and non-responders (30.7 ± 1.0) before therapy. After 6 months of treatment, however, the BDI II score was significantly lower ($p<0.00000000003$) in responders (7.4 ± 1.0) versus non-responders (26.5 ± 1.8). During the attention-focusing task, the left lentiform nucleus (ILN) was the region having rCBF that differed most significantly between responders and non-responders (1.19 ± 0.01 and 1.16 ± 0.01 respectively, $p<0.02$). No difference was seen in the ILN at rest when comparing responders to non-responders (1.18 ± 0.01 for each). Correspondingly, the ILN was also the region in which the change between the rest and attention-focusing task

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was most significantly different between therapy-resistant and therapy-responsive groups ($p < 0.03$).

Conclusions: Higher level of lentiform nucleus blood flow during an attention-focusing task was predictive of clinical response to anti-depressant therapy six months later.

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