The Neuroscience of Mindfulness

Carl Fulwiler Center for Mental Health Services Research Department of Psychiatry UMass Medical School

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Stress response and wellness

- Amygdala is the fight or flight center
- Activation triggers cascade of neural, neuroendocrine, neuroimmune and behavioral responses
- Chronic activation of this circuitry responsible for effects of stress on health outcomes

MBSR increases left-sided cortical activation



Davidson, et al. Alterations in brain and immune function produced by mindfulness meditation Psychosomatic Medicine 65(4):564-70, 2003 Jul-Aug

Increased immune response



Davidson, et al. Alterations in brain and immune function produced by mindfulness meditation Psychosomatic Medicine 65(4):564-70, 2003 Jul-Aug

Immune changes correlate with shift in prefrontal activation



Davidson, et al. Alterations in brain and immune function produced by mindfulness meditation Psychosomatic Medicine 65(4):564-70, 2003 Jul-Aug

Stress reduction correlates with structural changes in the amygdala

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Emotion regulation

- Amygdala is also the fear center
- Input from prefrontal cortex and anterior cingulate modulate emotional responses
- Disorders of emotional regulation exhibit abnormal activation patterns in these regions

Neural Correlates of Dispositional Mindfulness and Affect Labeling Creswell et al. (2007) Psychosomatic Medicine



Emotion Detection

Gender Detection



Creswell et al., 2007



Creswell et al., 2007

Neural deactivation to sadness provocation



Farb et al., 2010

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