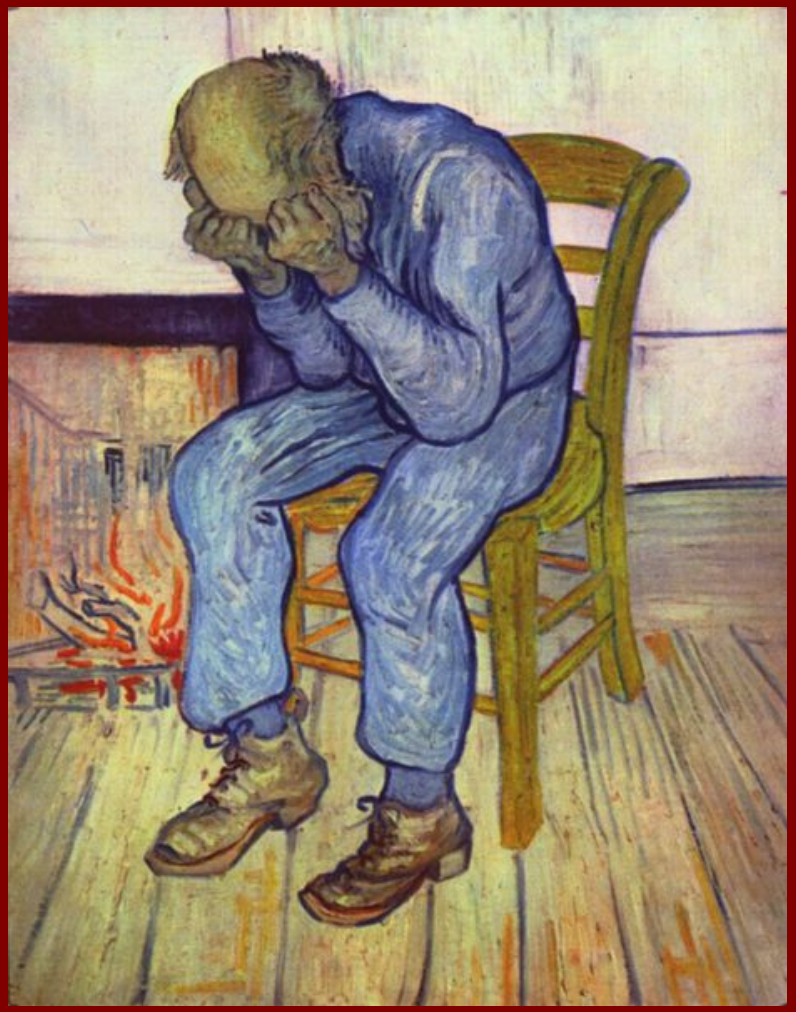
Depression:
Voluntary or involuntary?



(Involuntary) emotional cognition in depression

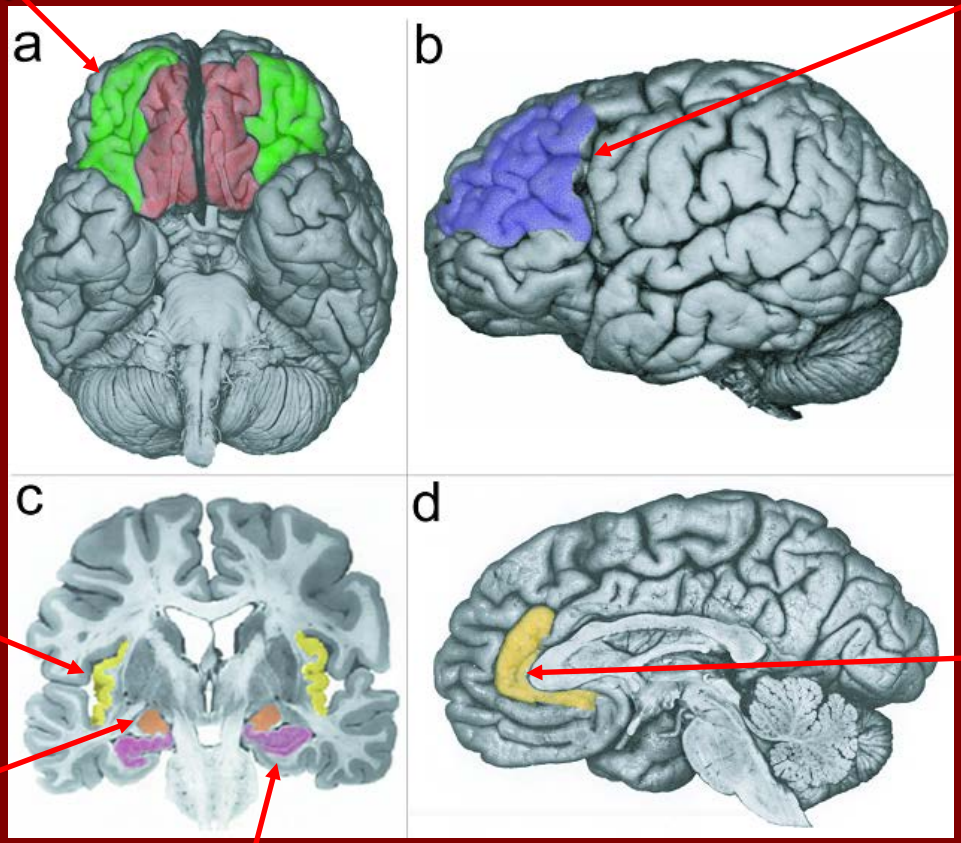
- Inward-focused attention
- Rumination
- Difficulty with cognitive reappraisal & emotion regulation
- Negative cognitive bias
  - Interpretation bias
  - Memory bias

Tutorial: Neuroanatomy of Emotion

Key Brain Areas and Their Affect-related Functions

Orbitofrontal cortex:
Affective evaluation; decoding punishment and reward value

Dorsolateral PFC:
Approach- and/or withdrawal-related affect



Insula:
Representation of the body's internal state; interoception

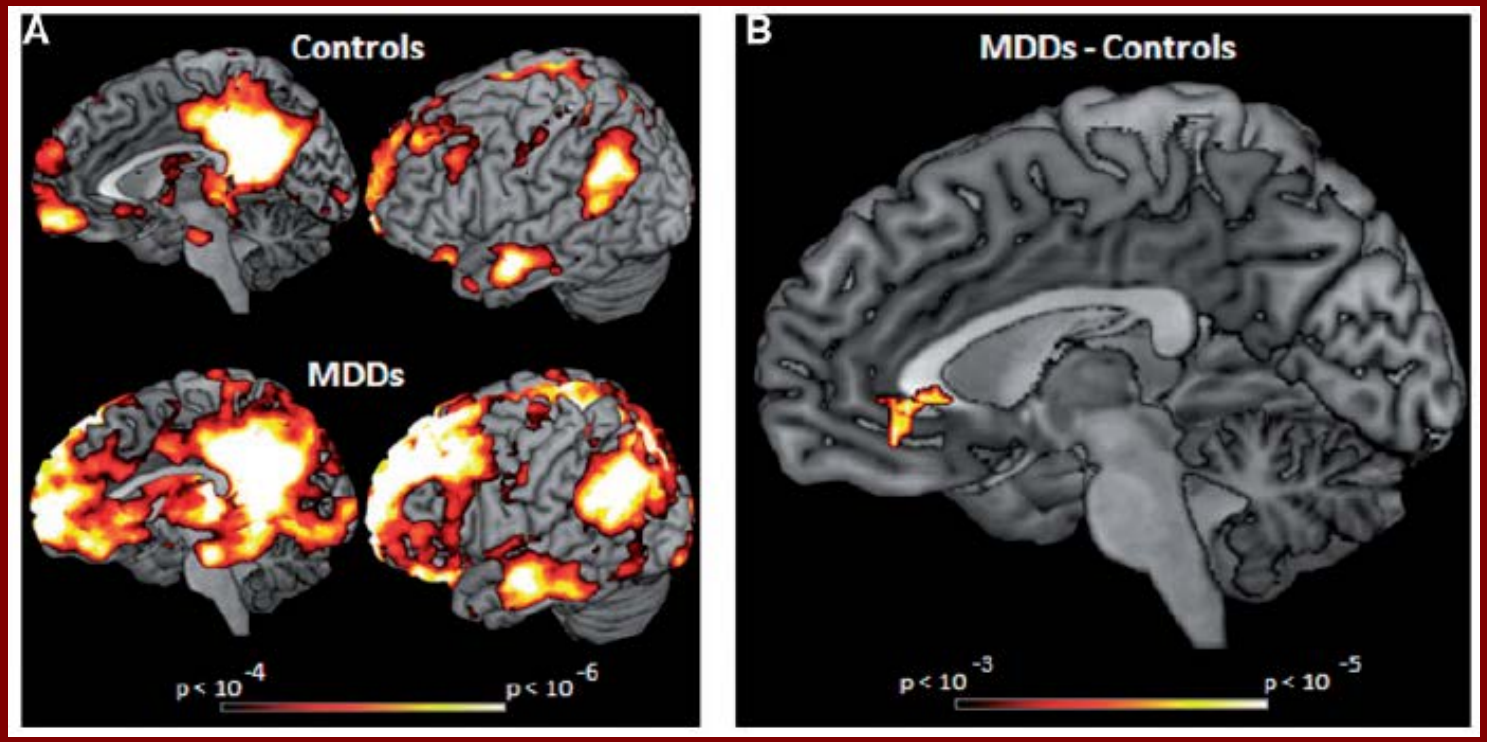
Anterior cingulate cortex (ACC):
Top-down modulation; conflict detection; perception of "self"

Amygdala:
Vigilance for motivationally salient events; threat detection; emotional memory

Hippocampus:
Declarative memory; spatial navigation; contextual fear

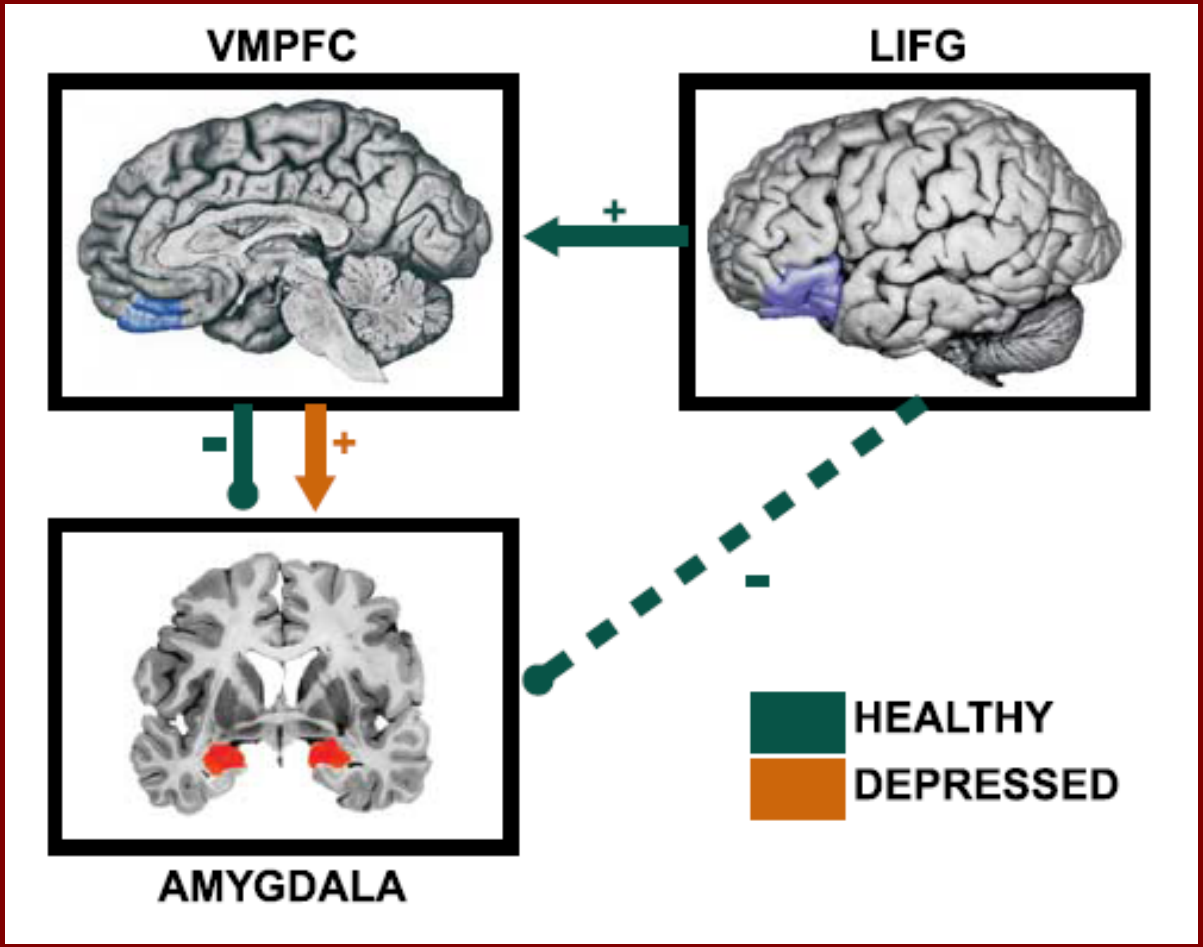
Insula and ACC:
Integration of sensory, affective, cognitive, and autonomic processing

Increased subgenual PFC connectivity in depression: Rumination & inward-focused attention



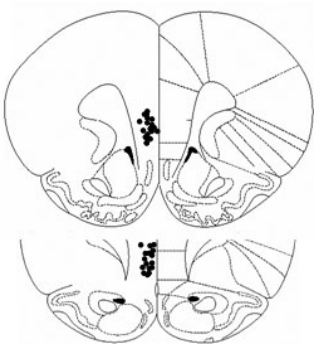
Berman et al. (2011) *SCAN.*

Loosening of regulatory control of PFC over subcortical circuitry

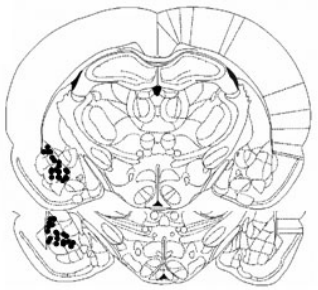


Johnstone et al. (2007) *J Neuroscience*.

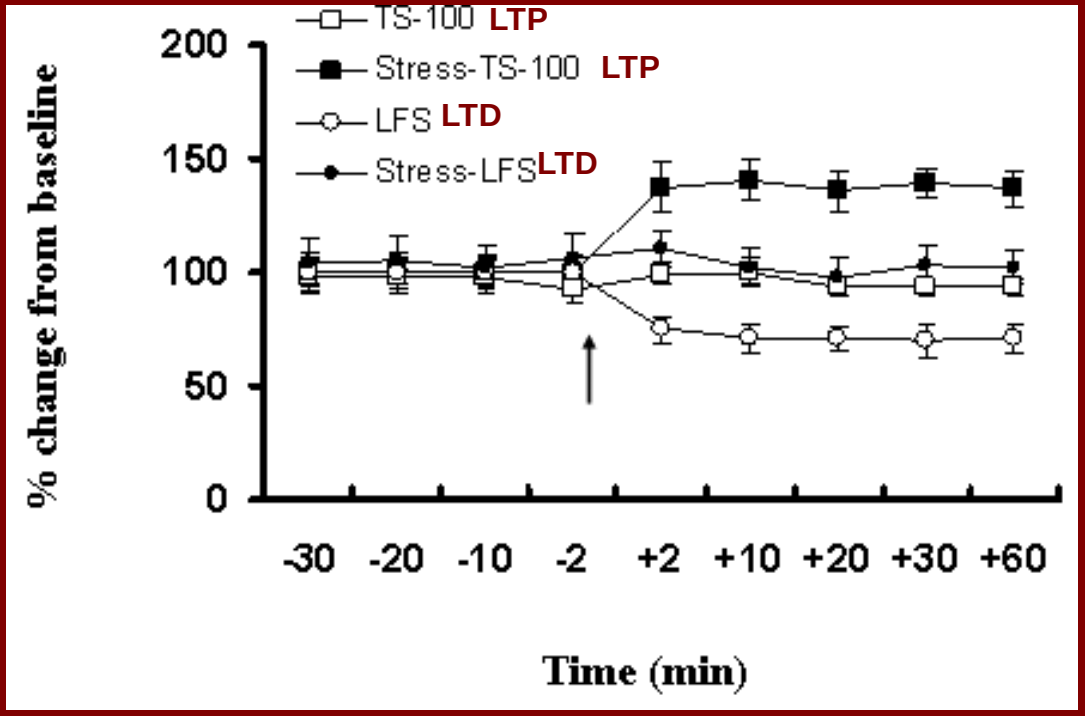
vmPFC stimulating electrodes



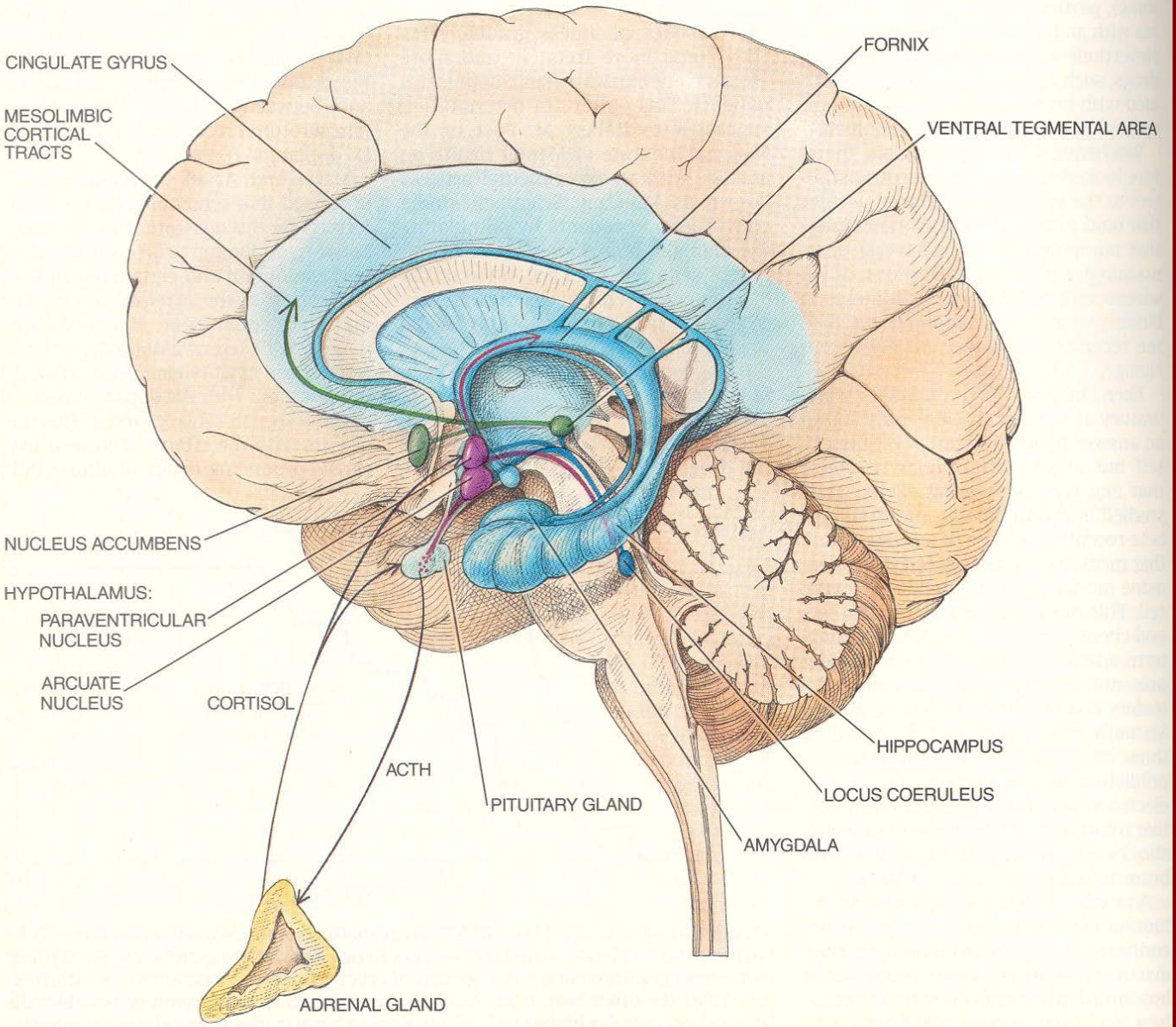
amygdala recording electrodes



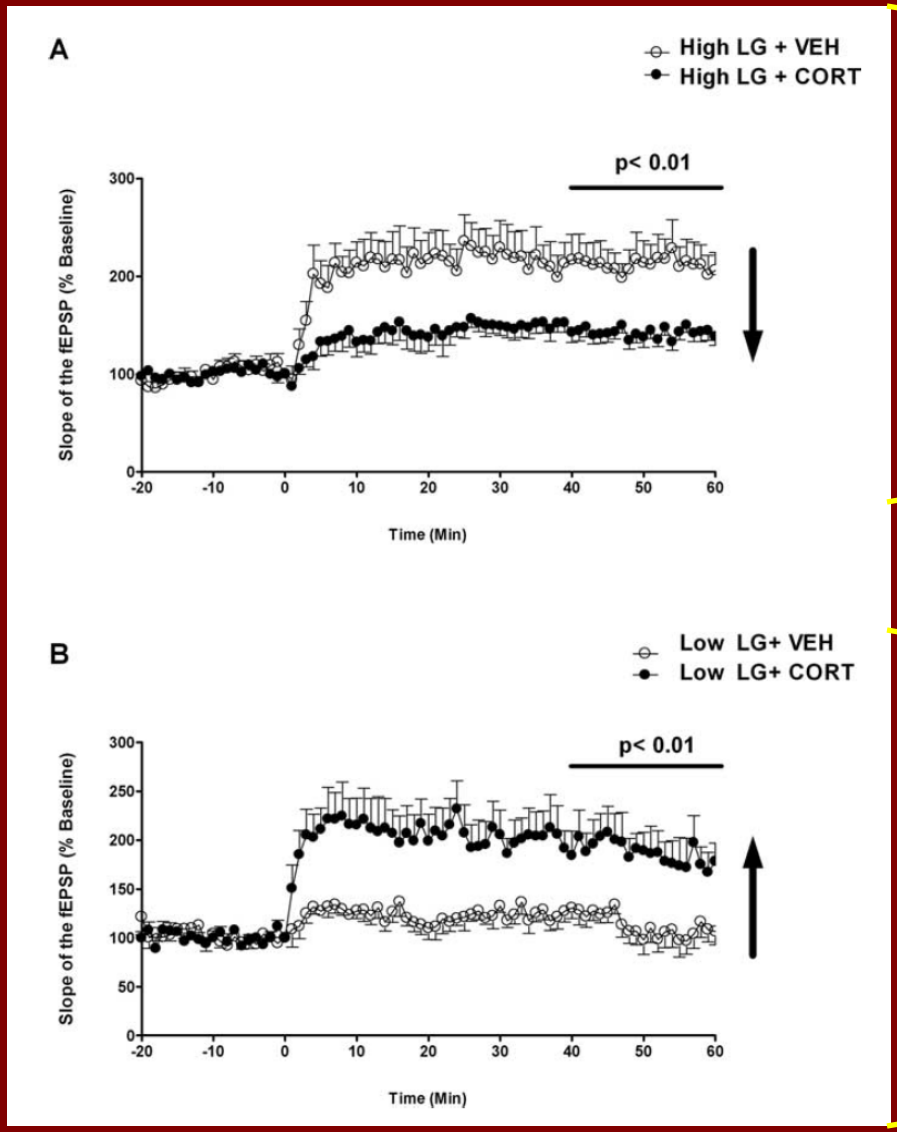
In rats, stress reverses PFC-amygdala plasticity



Maroun (2006) *European J Neuroscience*.


CINGULATE GYRUS
MESOLIMBIC CORTICAL TRACTS
FORNIX
VENTRAL TEGMENTAL AREA
NUCLEUS ACCUMBENS
HYPOTHALAMUS:
PARAVENTRICULAR NUCLEUS
ARCUATE NUCLEUS
CORTISOL
ACTH
PITUITARY GLAND
HIPPOCAMPUS
LOCUS COERULEUS
AMYGDALA
ADRENAL GLAND

CORT effects on hippocampal neurons



History of *high* maternal care: cort *decreases* synaptic strength

History of *low* maternal care: cort *increases* synaptic strength

Champagne et al., 2008 J Neuroscience.

fMRI & pharmacological manipulation of cortisol

Adult participants:
19 depressed (10 women)
41 healthy (23 women)

Counterbalanced

Hydrocort

Placebo

15 mg

Phone Screen

Screening Visit

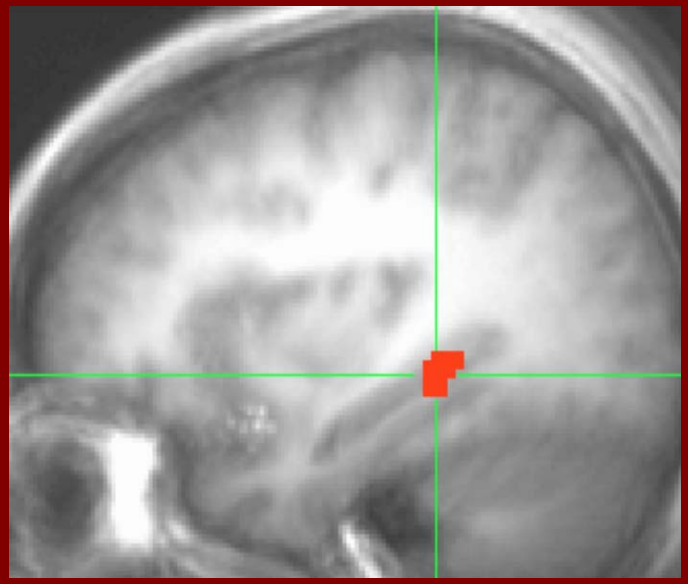
MRI Simulation

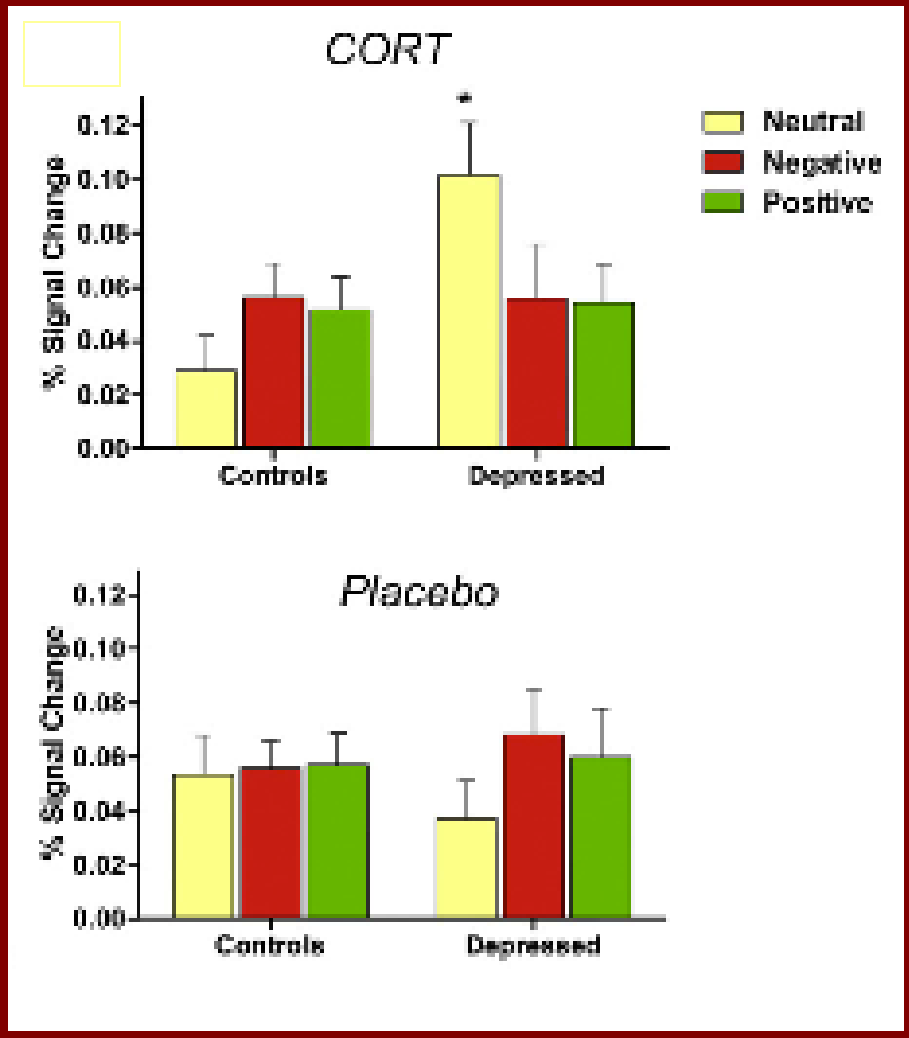
Memory Test

Beginning 4:30 PM

Encoding of emotional & neutral words

CORT increased hippocampal activation in response to NEUTRAL words in depressed women





Abercrombie et al. (2011)
J Psychiatric Research.

Depressogenic cognition: Voluntary or involuntary?

- Increased subgenual PFC connectivity
  - inward-focus
  - rumination
- Loosening of PFC “control” over amygdala
  - Difficulty with emotion regulation
  - But remember, the vmPFC – amygdala circuit is highly plastic
- Altered effects of stress hormones on neuroplasticity & emotional learning