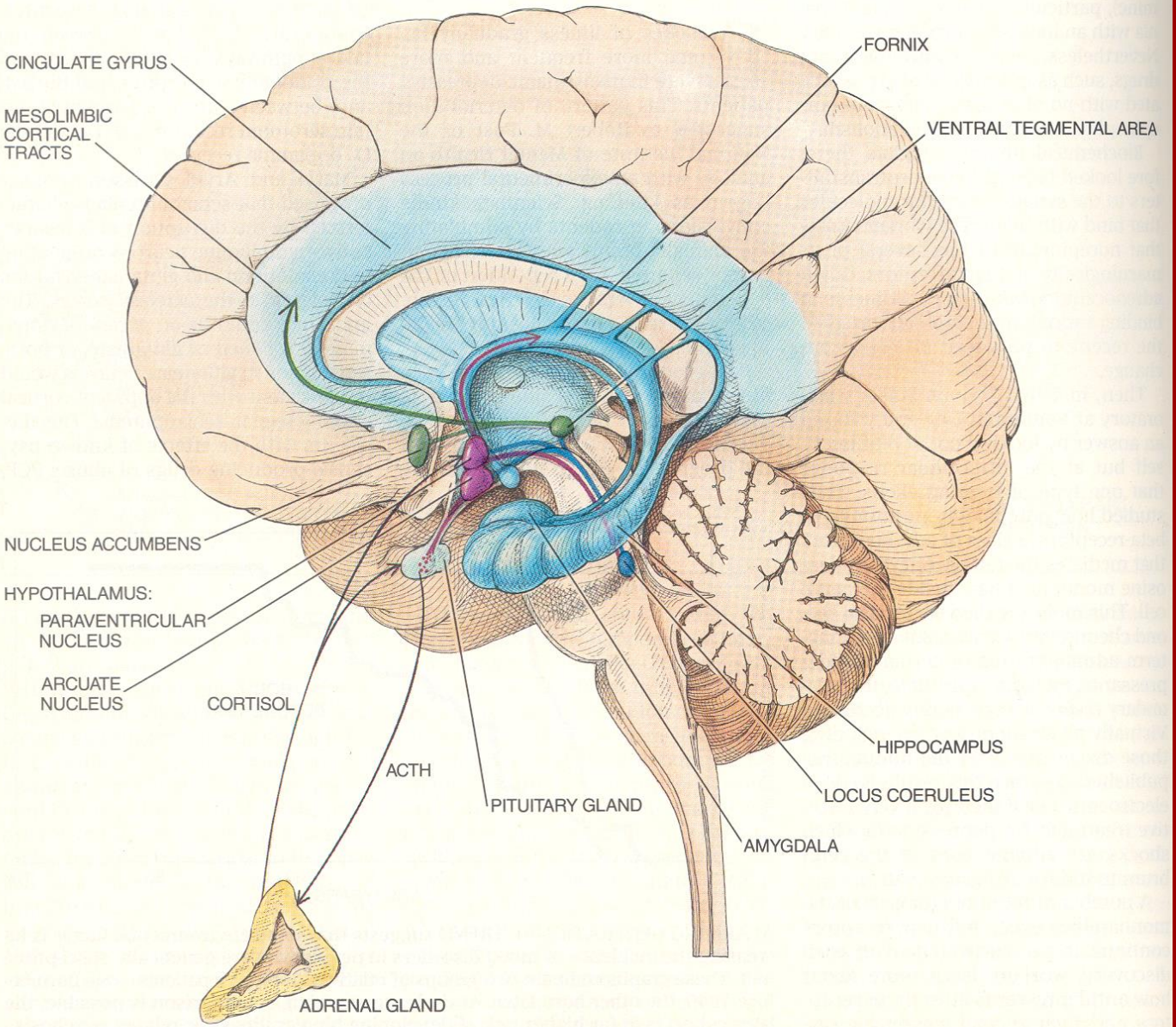
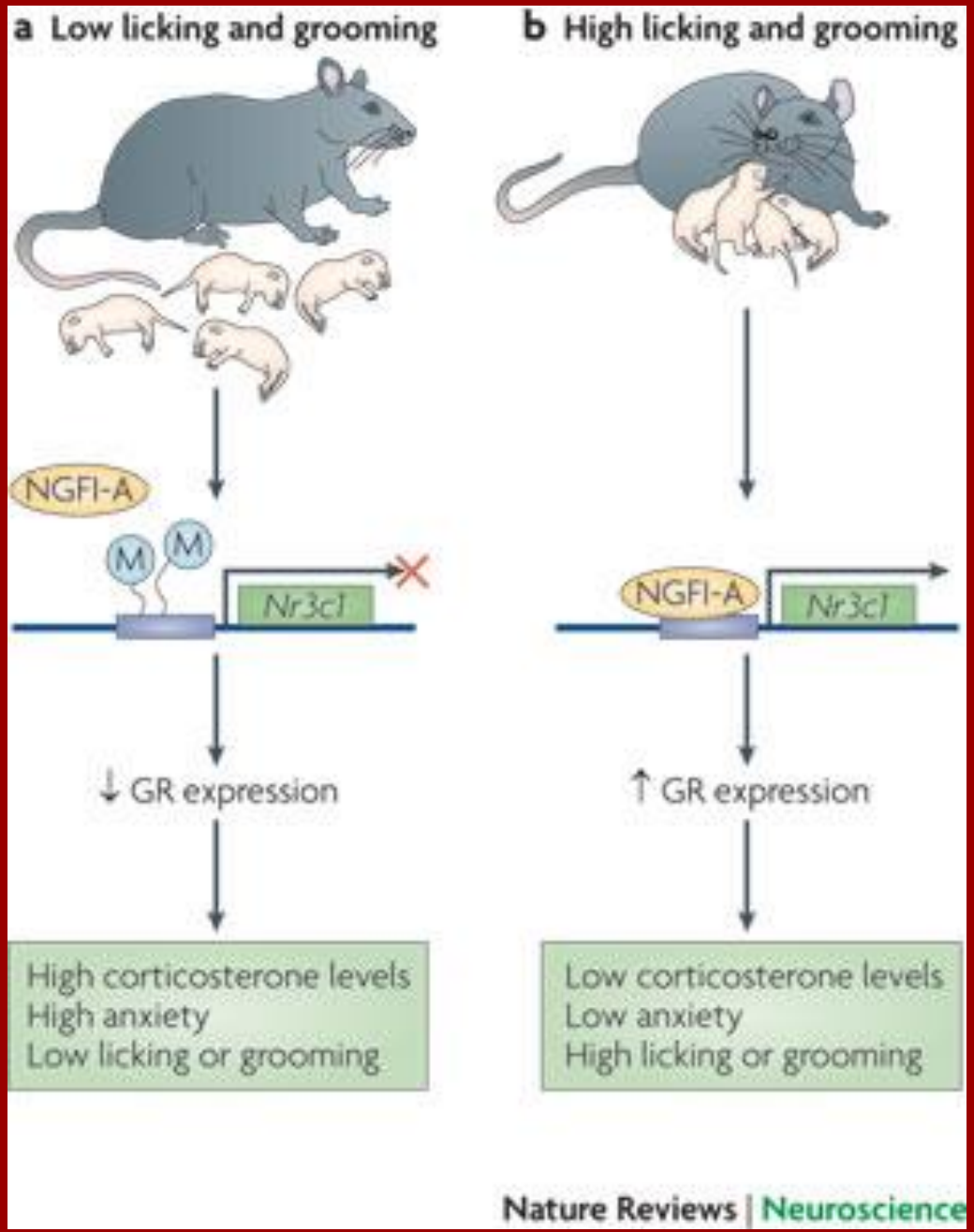
How experience can get under the skin

- HPA axis – supply side & receiver side
- Proof of concepts -- Michael Meaney's program of research in rodents
  - Early experience has effects on stress hormones & neuroplasticity into adulthood
  - Lasting effects are due to epigenetic modifications
  - Early experience alters relation between stress hormones & synaptic neuroplasticity
- Human research on early adverse caregiving, stress hormones, and emotional learning

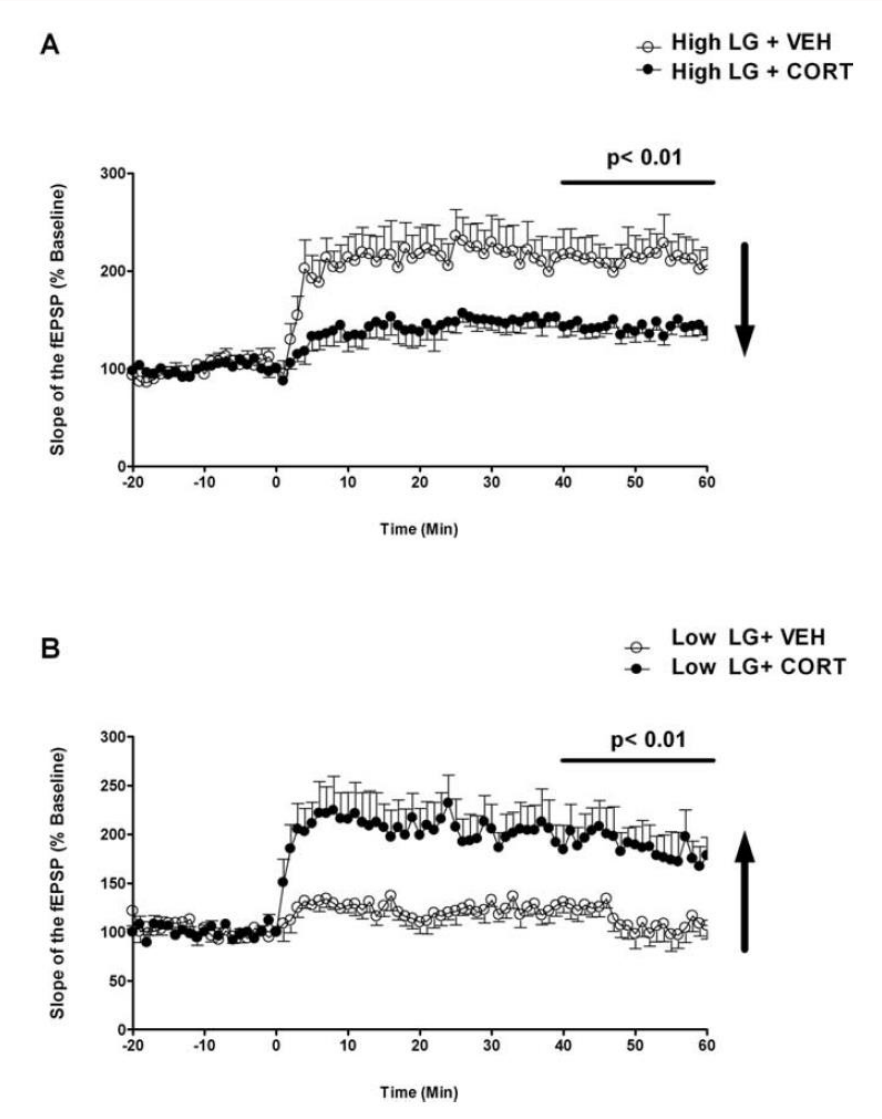

CINGULATE GYRUS
MESOLIMBIC CORTICAL TRACTS
FORNIX
VENTRAL TEGMENTAL AREA
NUCLEUS ACCUMBENS
HYPOTHALAMUS:
PARAVENTRICULAR NUCLEUS
ARCUATE NUCLEUS
CORTISOL
ACTH
PITUITARY GLAND
HIPPOCAMPUS
LOCUS COERULEUS
AMYGDALA
ADRENAL GLAND

High levels of maternal care

Low levels of maternal care



Hackman, Farah, & Meaney.
Nat Rev Neurosci. 2010



History of *high* maternal care: CORT *decreases* LTP

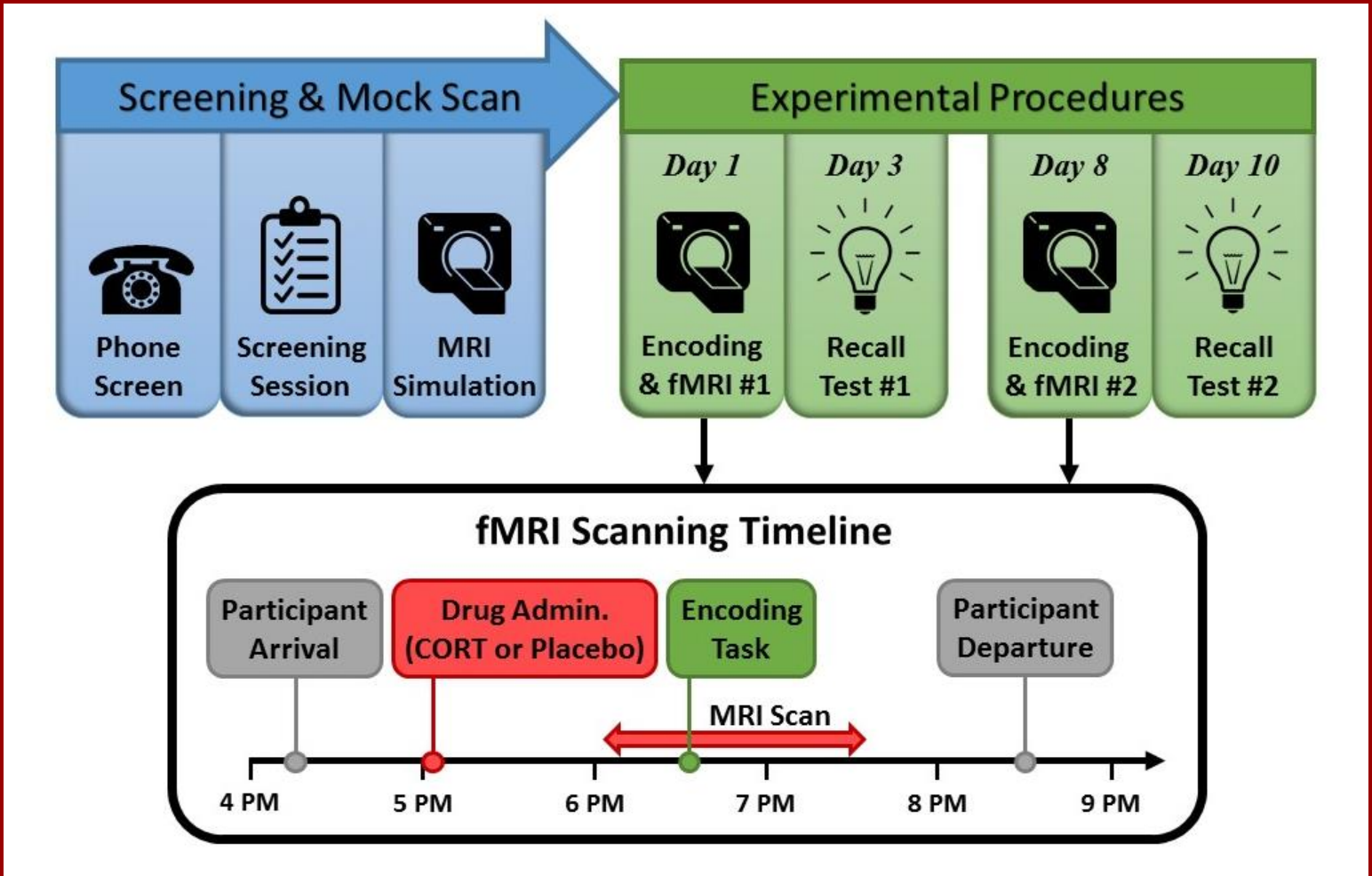
History of *low* maternal care: CORT *increases* LTP

Champagne et al., 2008 J Neuroscience.

Low maternal care in rats causes:

- Epigenetic modification of the GR gene promotor, which can persist into adulthood and can be passed to offspring
- Glucocorticoid insensitivity & altered HPA functioning
- Alterations in glucocorticoid effects on synaptic neuroplasticity in hippocampus

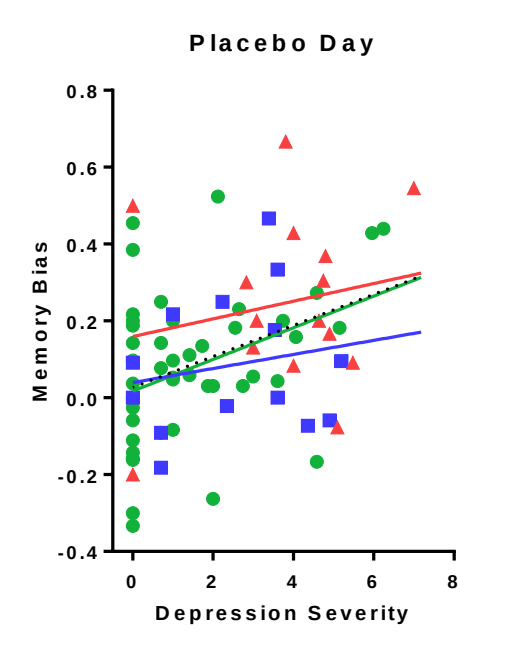
DASH
Depression, Adversity, & Stress Hormones

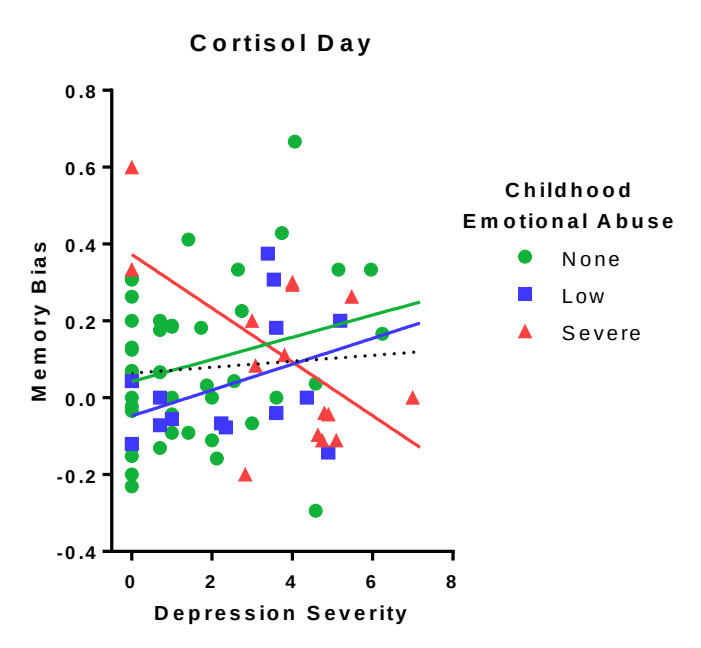


Sample of women with childhood maltreatment and/or depression

	CTQ Emotional Abuse Groups		
	Low (n=46)	Moderate (n=14)	Severe (n=15)
Age, mean (SD), y	26.1 (6.4)	31.4 (7.1)	28.6 (7.9)
Lifetime Depressive Disorder, No. (%)	23 (50.0)	9 (64.3)	14 (93.3)

CORT abolished the relation between depression severity and memory bias





CORT normalized memory for pleasant stimuli in women with severe childhood maltreatment

	CTQ Emotional Abuse Groups		
	Low (n=46)	Moderate (n=14)	Severe (n=15)
Recall pleasant pictures, mean (SD)			
Placebo	10.8 (4.1)[a]	11.9 (6.1)[a]	7.5 (3.4)[a,b]
CORT	11.1 (4.9)	12.9 (4.8)	10.4 (4.0)[b]
Recall unpleasant pictures, mean (SD)			
Placebo	12.9 (4.8)	13.4 (4.9)	11.67 (3.8)
CORT	12.8 (4.6)	13.5 (3.7)	12.3 (2.6)

Early experience gets under the skin

- **Meaney's program of research in rats**
  - Lasting effects of EXPERIENCE on biological and behavioral functioning
  - "Nurture" becomes "nature"
  - Alterations in stress hormone effects on neuroplasticity
- **Translation to primates**
  - Non-human primates more complex
    - Karen Parker – Stress innoculation
    - Mar Sanchez – Abuse
  - Humans
    - Cortisol elevations are not "good" or "bad"
    - Effects vary based on early life experience