



Biology of Stress: Implications for Brain Health

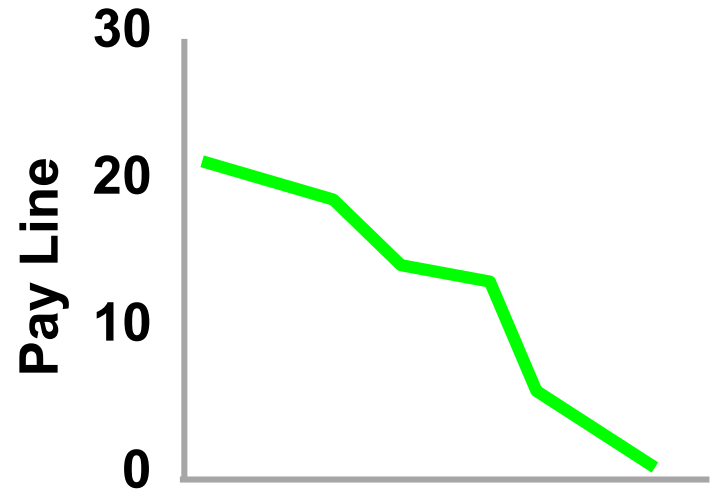
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Reed Saxon / AP file

NIH Funding



Framing Strategy: Coping in Context



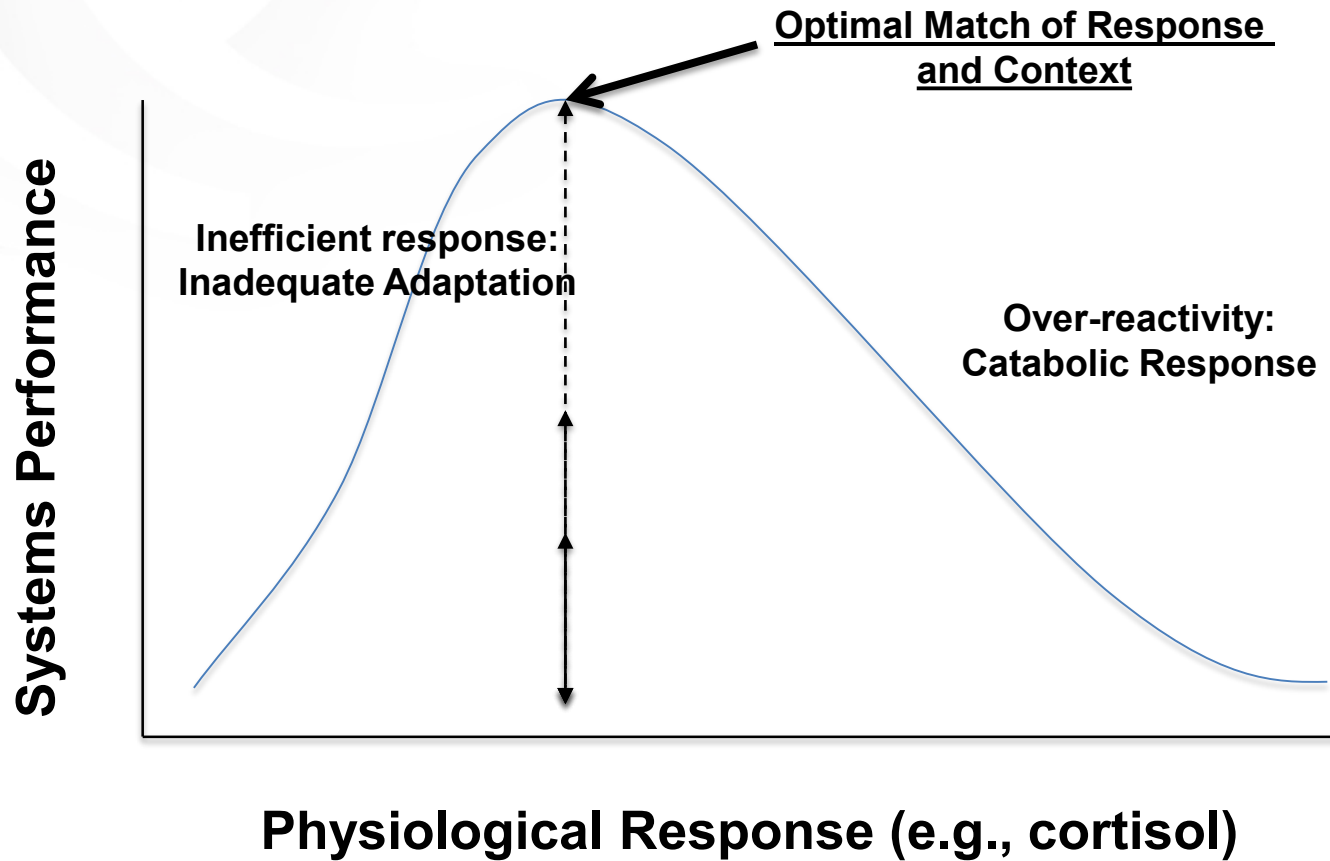
**Black Bear: Make noise,
pepper spray**



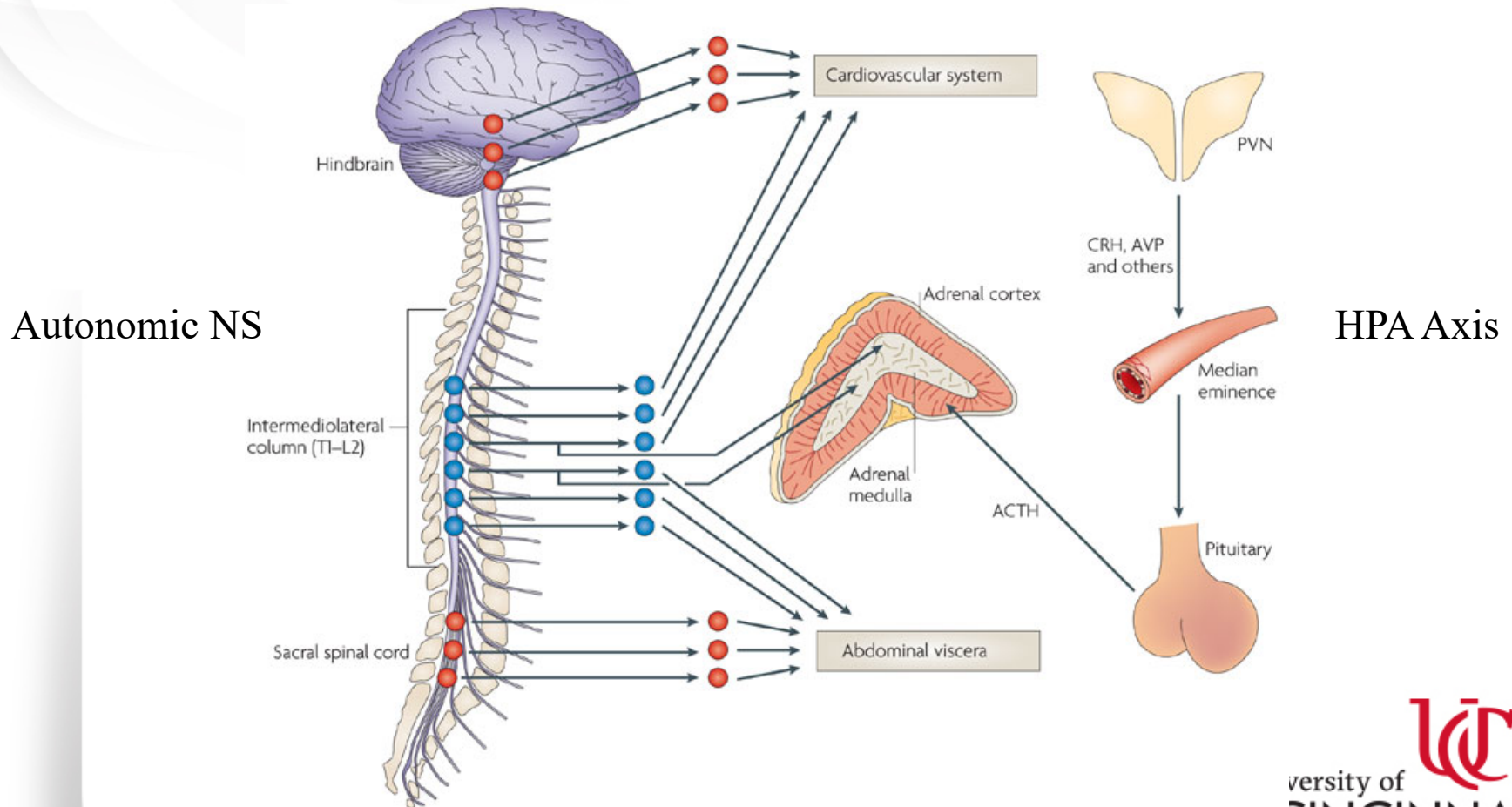
**Grizzly Bear: Play dead
(or have MI on spot)**



Stress Dynamics: Balancing Cost, Context, and Coping



Anatomy of Stress Responses: Neural and Hormonal Systems



Physiological Responses to Stress

- **Principle goal: redistribute energy to meet immediate needs**
- **There is no true physiological ‘stress system’: the response engages systems that serve other functions**

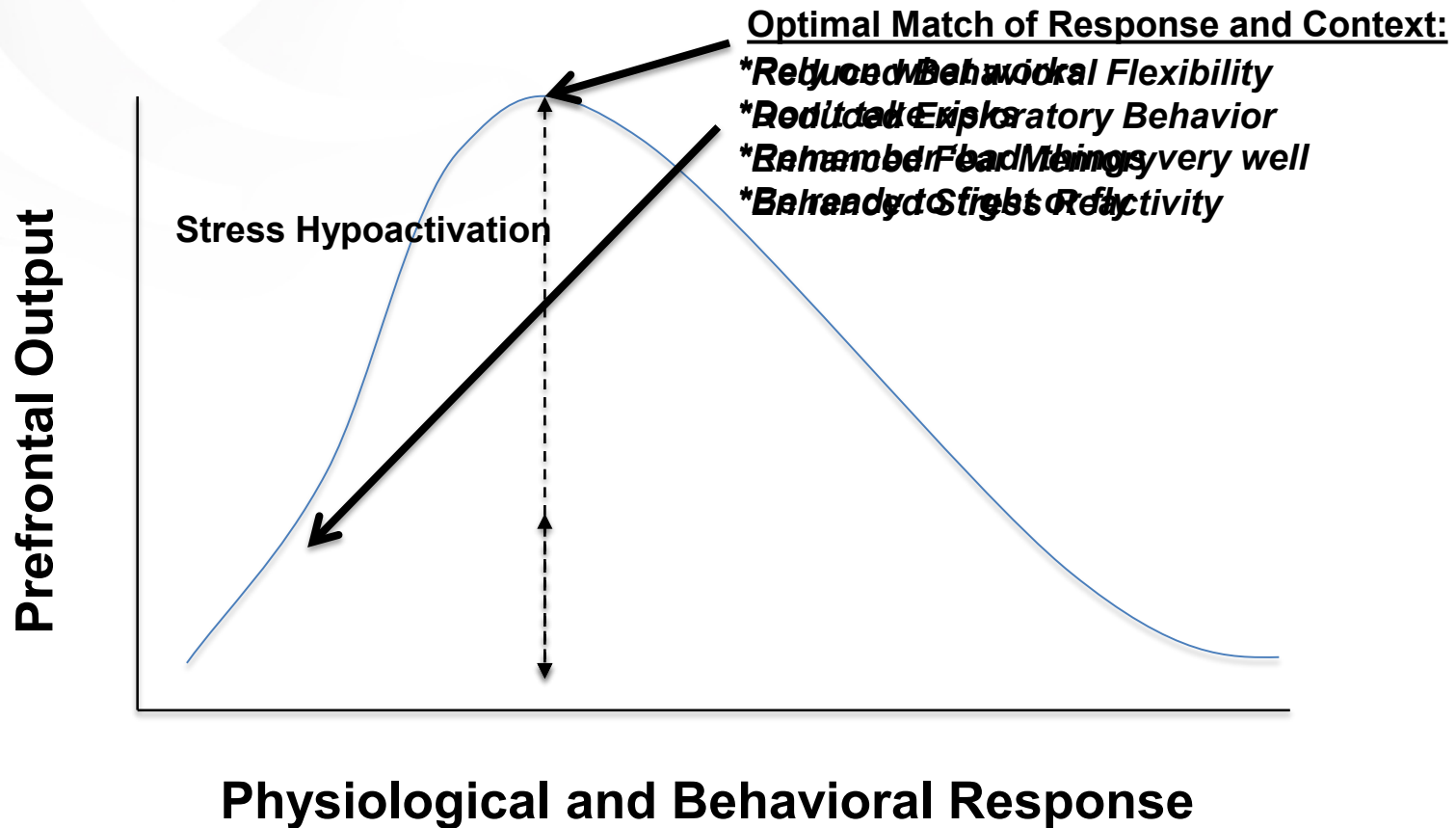
The Stress Response: Benefits

- **Normal and appropriate response to physiological challenges**
- **Normal and appropriate response to psychological challenges as well**
- **Absolutely required for adaptation and survival**
- **Promotes widespread adaptive changes in various time domains**
 - **Rapid: neurotransmission**
 - **Prolonged: modulation of gene expression**

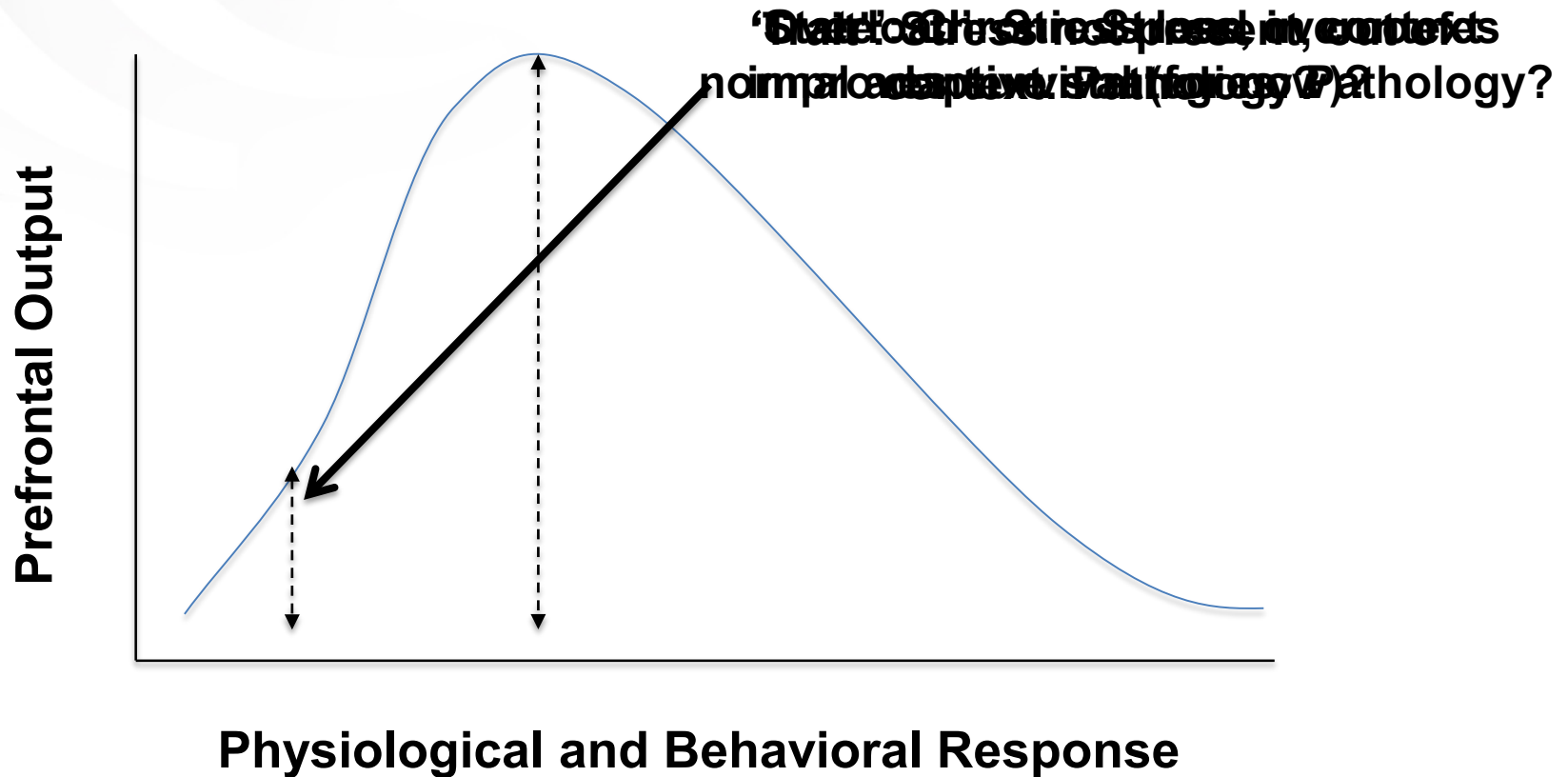
The Stress Response: Costs

- **Stress responses consume energy reserves at the cellular and systemic level**
- **Processes initiated by stress responses can place brain cells at risk for damage**
 - **Can make existing pathologies worse**
 - **Can trigger emergence of pathologies**
- **Inappropriate, 'out of context' stress responses can impact brain circuits controlling mood and emotion**

Balancing 'Cost, Context and Coping' in the Prefrontal Cortex



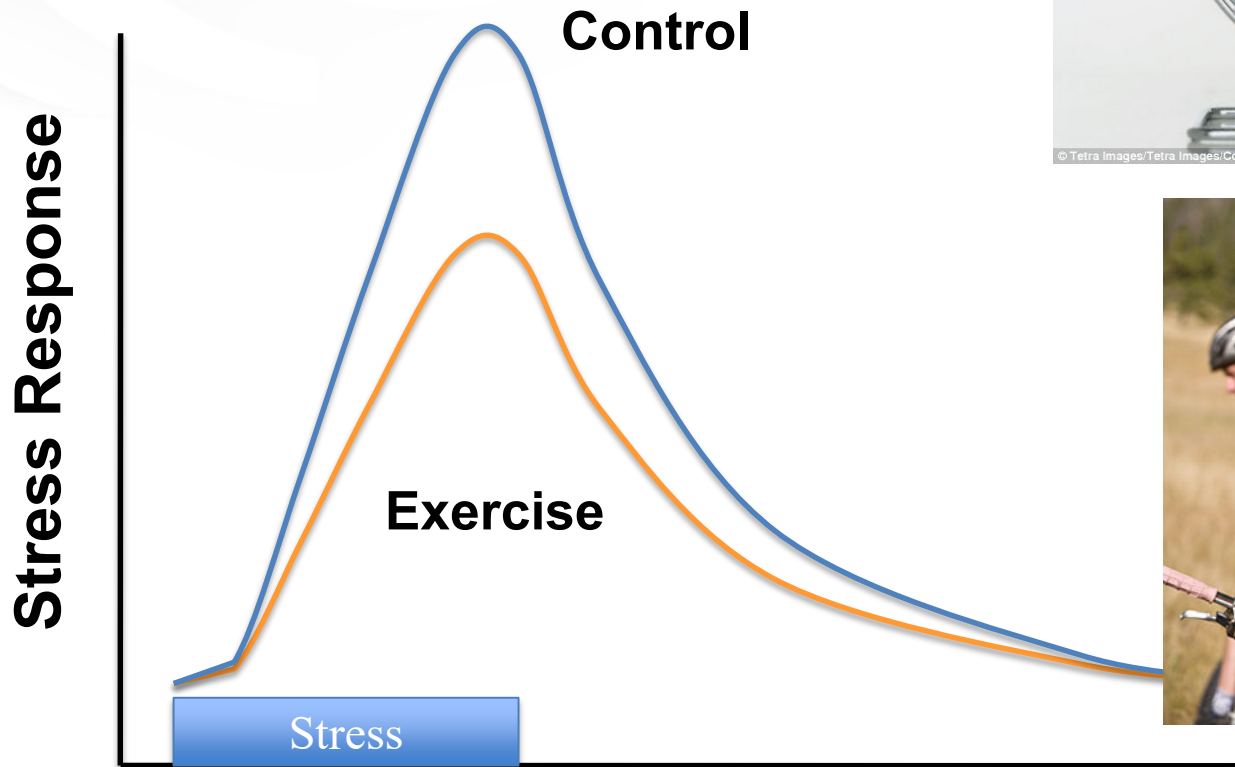
Prefrontal Cortex, Context and Pathology



Stress and Sex: A Context Problem

- ***The sexes differ in terms of biological priorities***
- ***Arguably, stress is a bigger problem for females***
 - ***affects ability to reproduce and nurture***
 - ***lower body mass and fat mass***
- ***The impact of stress will likely differ for females and males***

Stress Management: Voluntary Exercise



Stress Management: Reward

