
Knowledge
Category 5
Emotions
&
Stress

Paul Ekman's 6 universal and innate emotions

4 theories of emotion

- James-Lange
- Cannon-Bard
- Two-factor Schachter-Singer
- Cognitive Appraisal

James-Lange

Physiological symptoms first – labeling the emotion second

Evidence for: quadriplegics receive limit neuro input and often have blunted emotions

Evidence against: no consistent physiological markers for each emotion

Cannon-Bard

Physiological arousal & emotion occur simultaneously & independently

Evidence for: physiological reactions are very similar across all emotions

Evidence against: physical reactions can influence emotional experience, contradicting the theory's claim of independence

Two-factor Schachter-Singer

Which emotion is felt depends on the person's perception of the situation and physiological arousal only serves to intensify the emotion experienced

Evidence for: experimental evidence (e.g. the scary bridge study, epinephrine injections)

Evidence against: Some emotions may occur before conscious cognitive appraisal

Cognitive Appraisal Lazarus

Emotions are the result of a two-step cognitive process involving the appraisal of a situation and the subsequent interpretation of its personal relevance

Evidence for: changing our cognitive appraisals of a situation can alter our emotional response

Evidence against: Some emotions may occur before conscious cognitive appraisal, theory discounts social and cultural factors

Time

James-Lange Theory

Arousal (snake) → Heart pounding, sweating → Fear (emotion)

Cannon-Bard Theory

Arousal (snake) → Heart pounding, sweating
Arousal (snake) → Fear (emotion)

Schachter-Singer Two-Factor Theory

Arousal (snake) → Heart pounding, sweating → Fear (emotion)
Arousal (snake) → Cognitive label ("I'm scared") → Fear (emotion)

Lazarus' Cognitive-mediational Theory

Arousal (snake) → Appraisal → Fear/Heart pounding, sweating

Cognitive Appraisal Lazarus

stimulus
Stressor

Primary appraisal
challenge or *threat*?

challenge → Potential for gain or growth

positive emotion

threat → May lead to harm, loss, or negative consequences

Secondary appraisal
potential options and *how effective*?

effective options → Low threat

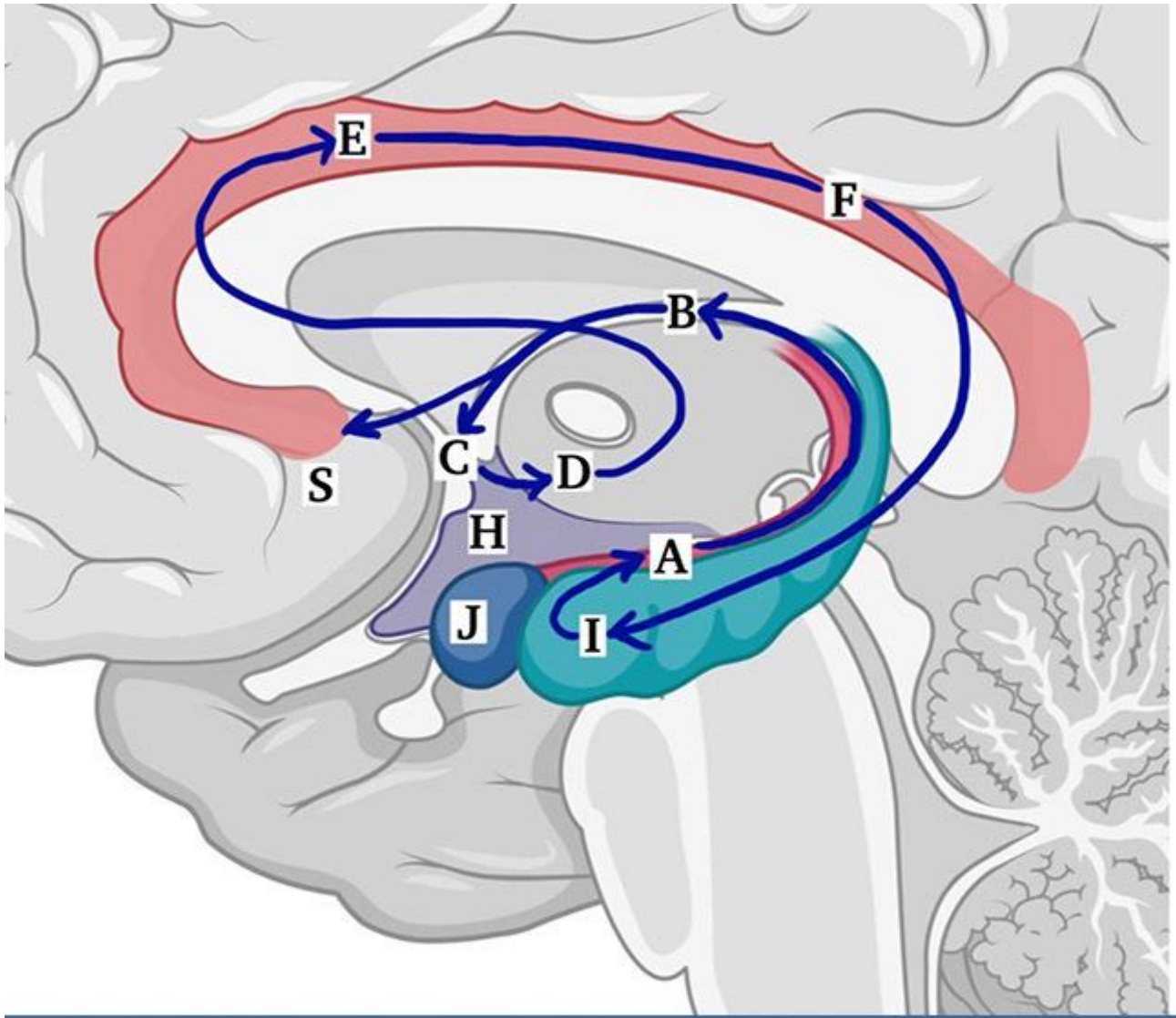
positive emotion

ineffective or no options → High threat

negative emotion

* Missing is reappraisal

Brain Mechanisms



Papez Circuit (1937)

Later added by others: cerebral cortex, amygdala, hypothalamus

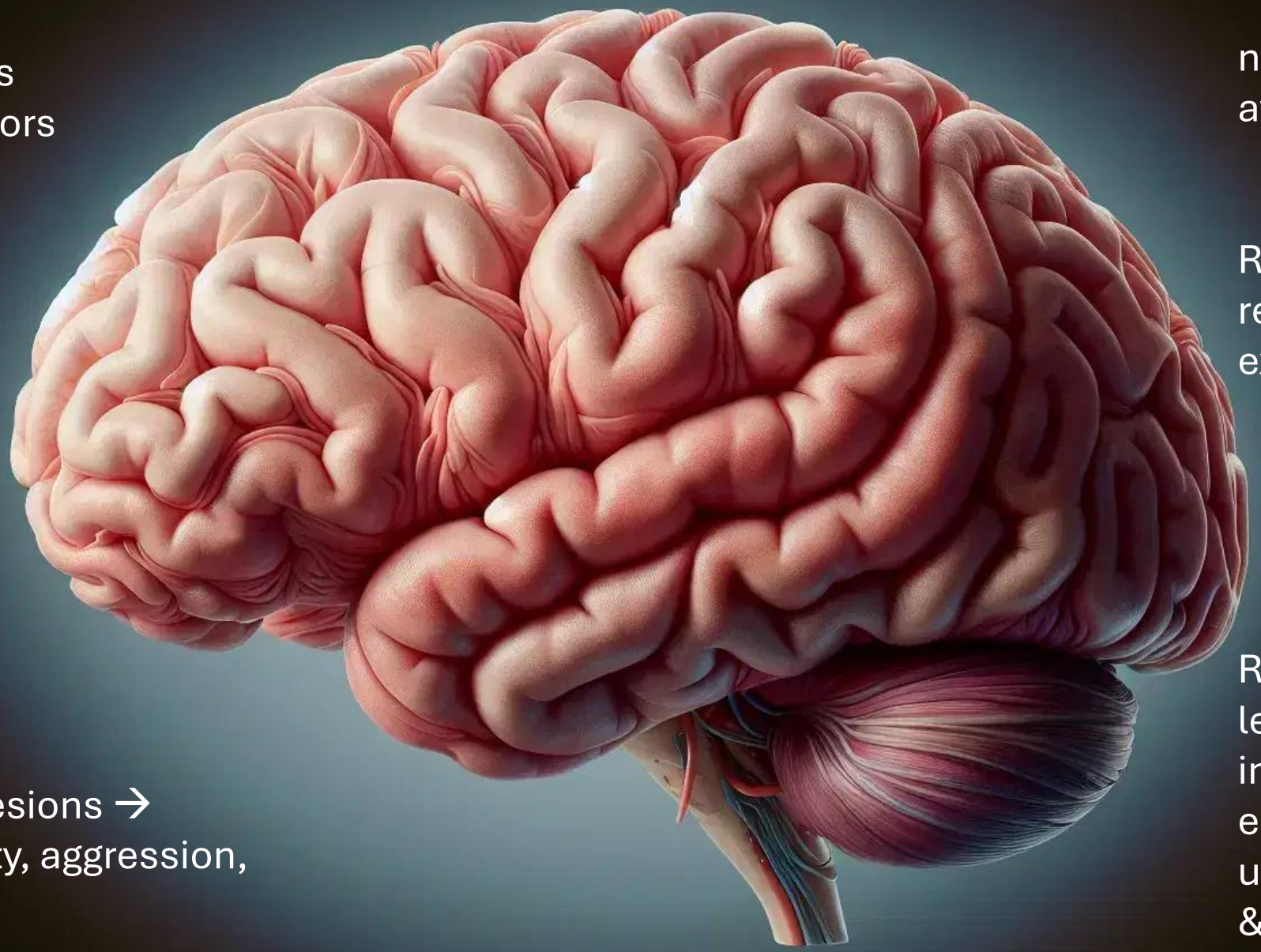
A - Hippocampal Formation
B - Fornix
C - Mammillary Body
D - Anterior Thalamic Nucleus
E - Cingulate Gyrus
F - Cingulum
I - Parahippocampal Gyrus
H - Hypothalamus
J - Amygdala
S - Septal Area

All around the cobbler's bench
The monkey chased the weasel,
The monkey thought 'twas all in fun
Pop! Goes the weasel.

Cerebral Cortex

Left hemisphere

positive emotions
Approach behaviors
(e.g. anger)



Left hemisphere lesions → depression, anxiety, aggression, paranoia

Right hemisphere

negative emotions
avoidance behaviors

Right hemisphere recognizing and expressing emotions

Right hemisphere lesions → indifference, apathy, emotional lability, undue cheerfulness & joking

Amygdala

Attaches emotion to memory

Lesions – blunted emotions

Electrical stim. fear & rage

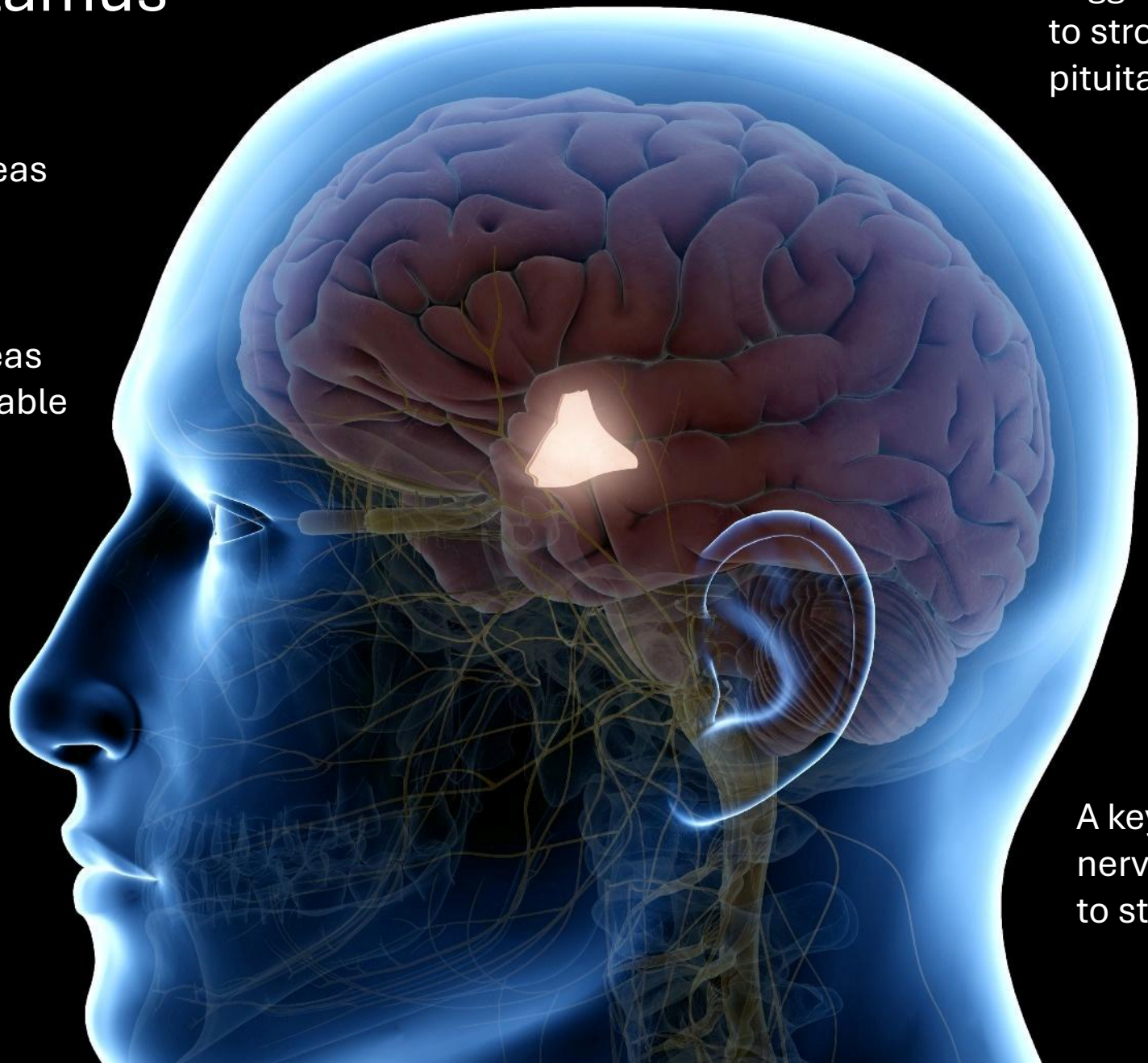
Evaluates incoming sensory information to assess level of threat
Helps mediate the emotional response

Hypothalamus

Triggers physiological responses to strong emotions via the pituitary gland

Lesions to some areas produce RAGE

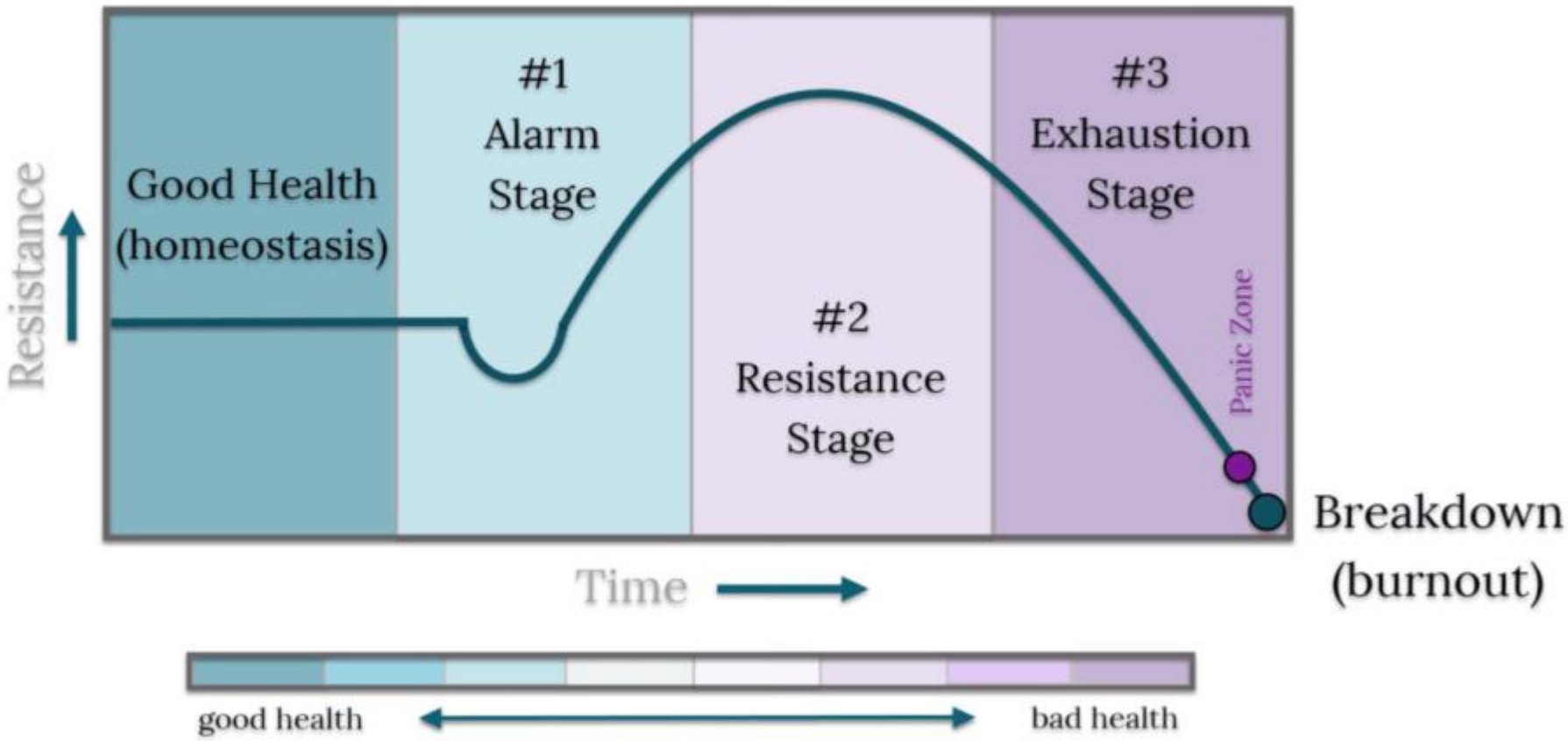
Lesions to other areas produce uncontrollable LAUGHTER



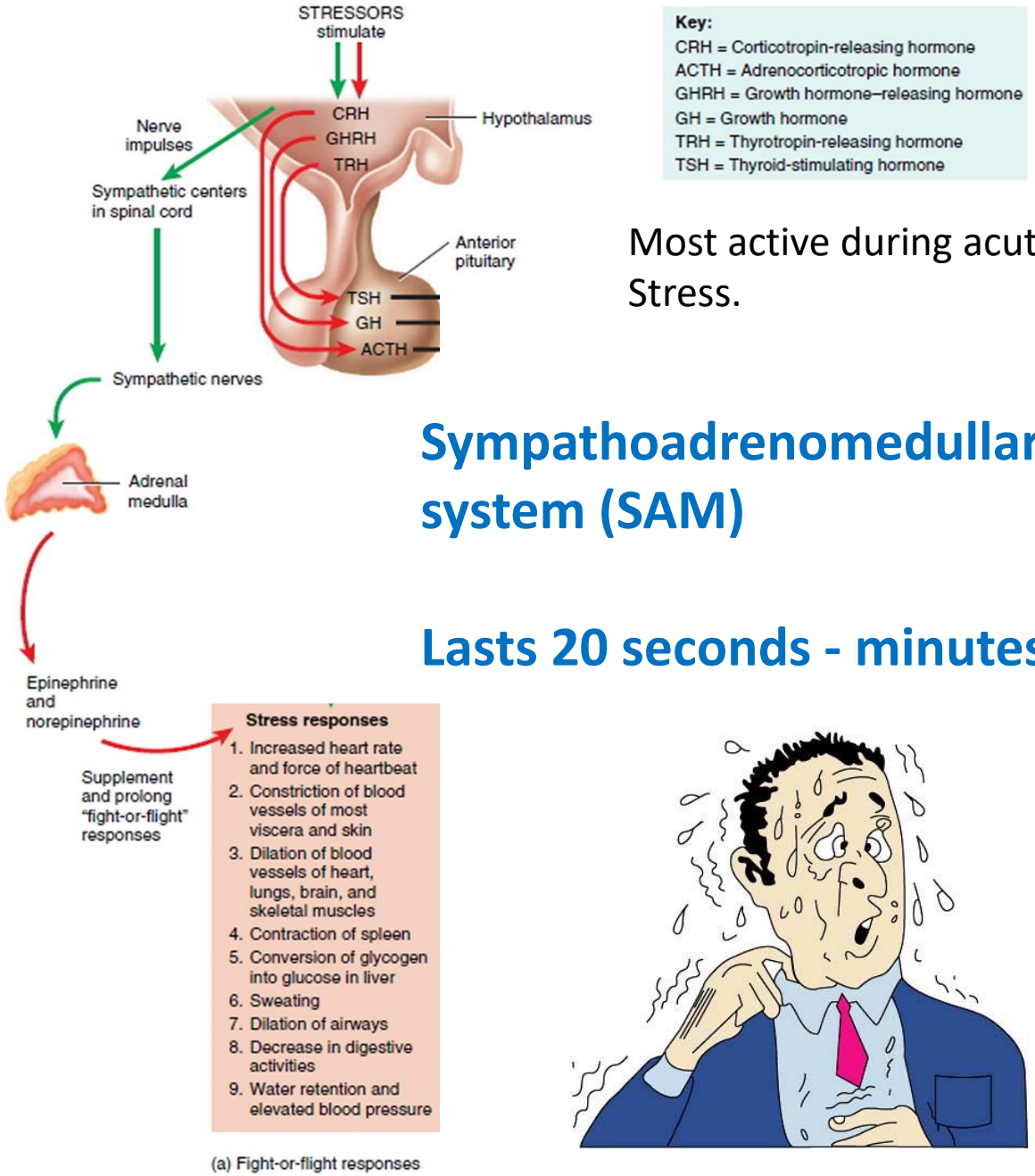
A key structure of the autonomic nervous system and reactions to stress

Stress

Hans Selye's General Adaptation Syndrome (1956)



High levels of chronic stress = high stress hormones (e.g. cortisol) inhibits immune cell production (e.g. T cells and antibodies) → disease and illness



Key:
CRH = Corticotropin-releasing hormone
ACTH = Adrenocorticotropic hormone
GHRH = Growth hormone–releasing hormone
GH = Growth hormone
TRH = Thyrotropin-releasing hormone
TSH = Thyroid-stimulating hormone

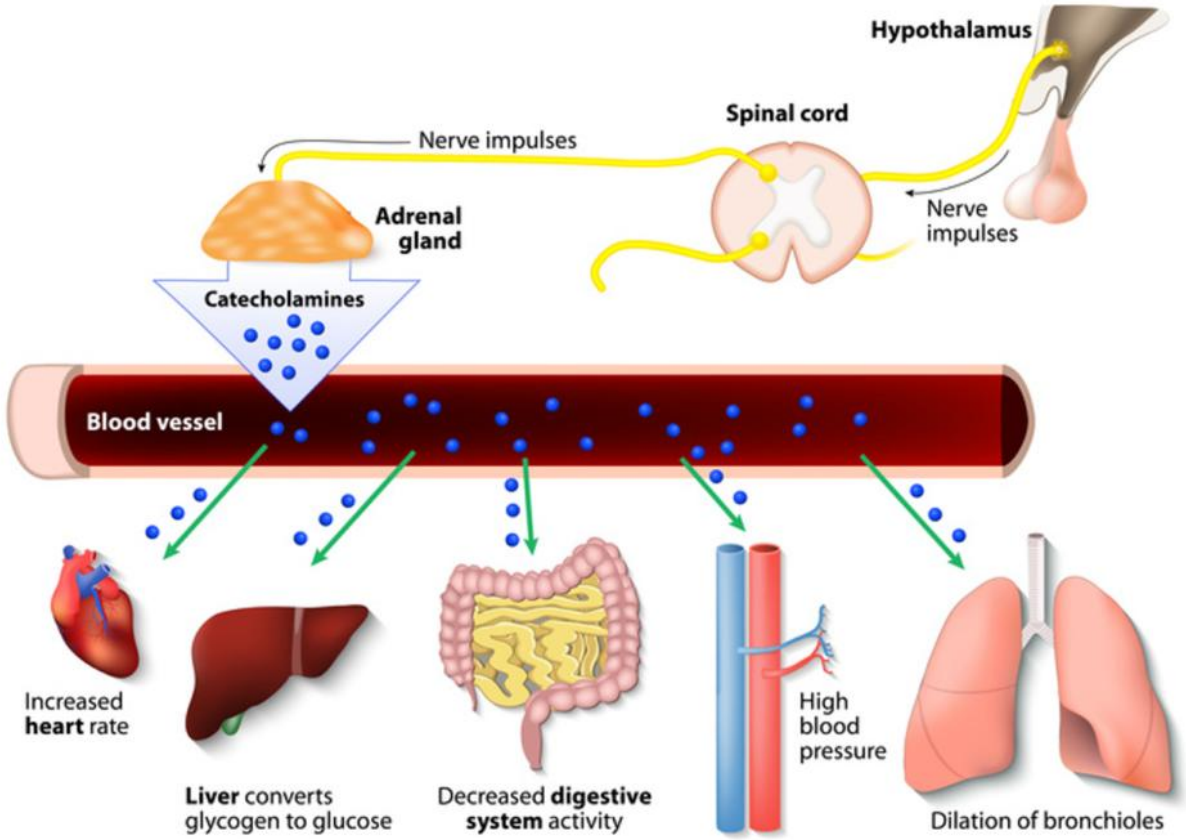
Most active during acute Stress.

Sympathoadrenomedullary system (SAM)

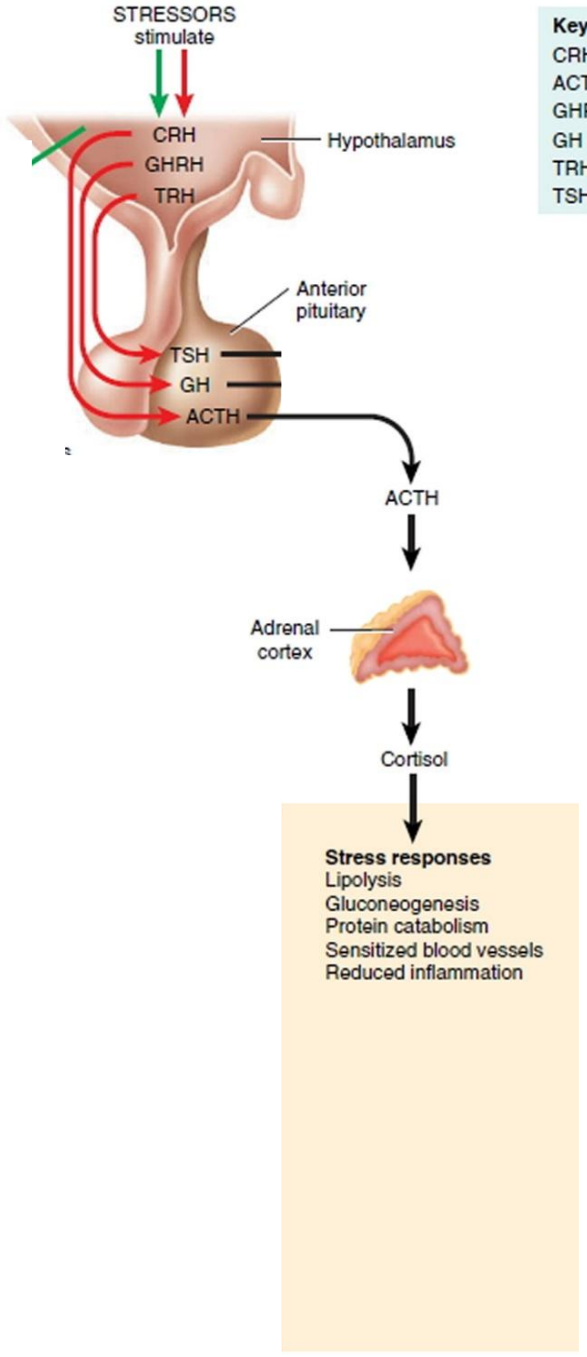
Lasts 20 seconds - minutes

Alarm Phase

Sympatho-Adrenomedullary System



A neural response to Stress



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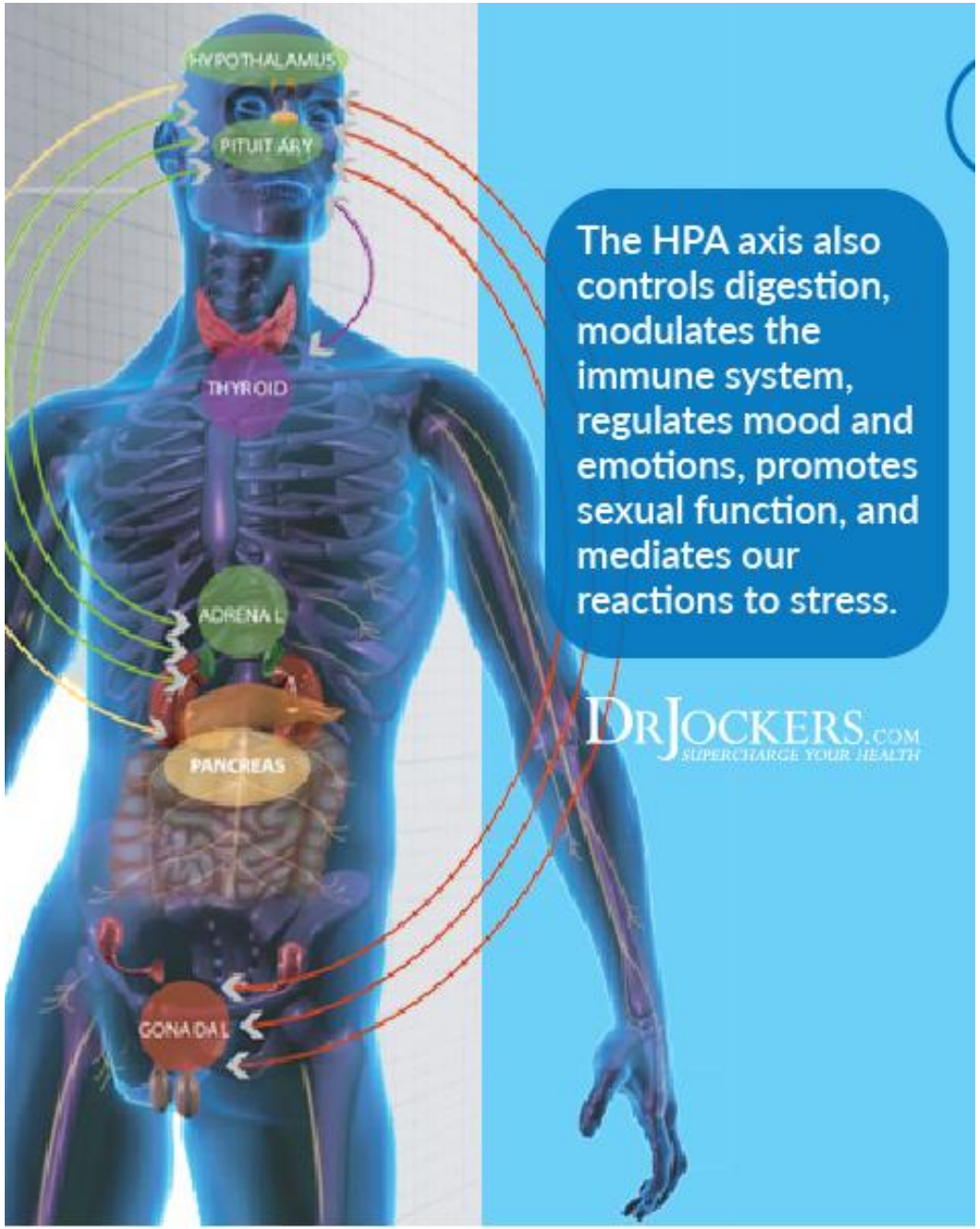
Resistance phase

Hypothalamic Pituitary Adrenocortical Axis (HPA)

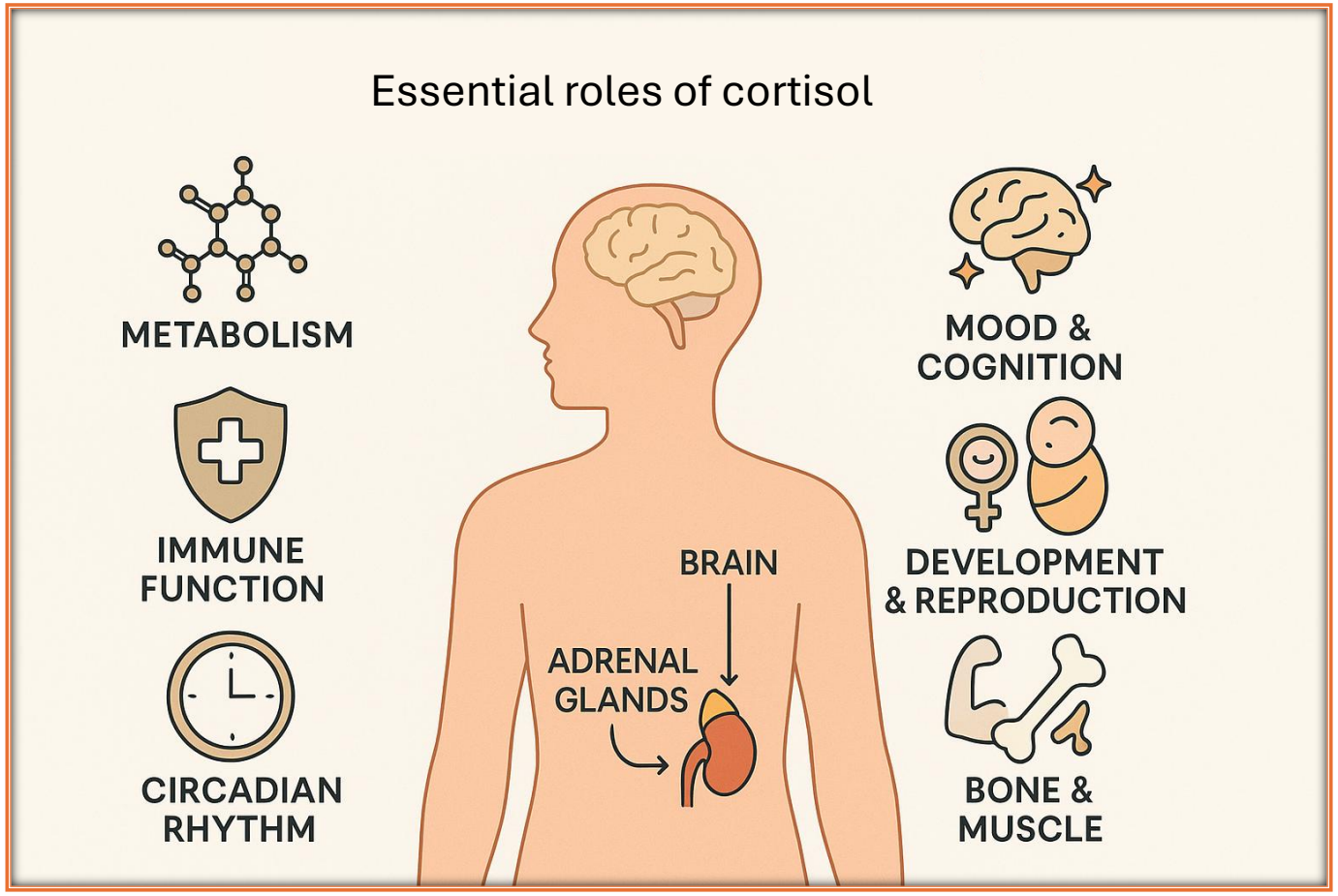
Lasts many minutes – years

Cortisol released into the blood travels up to the hippocampus which then inhibits HPA

Too much cortisol for too long can impair hippocampal function



Think Cortisol is bad for you? Think again!



Function	Role of HPA Axis / Cortisol
Metabolism	Glucose production, energy mobilization
Circadian rhythm	Morning cortisol peak promotes wakefulness
Immune function	Anti-inflammatory, immunoregulation
Mood & cognition	Affects memory, emotion, and anxiety
Development	Shapes long-term stress sensitivity
Reproduction	Suppresses gonadal hormones under stress
Bone & muscle	Reduces bone growth, increases catabolism

No toxic core → no problem

Type A personality

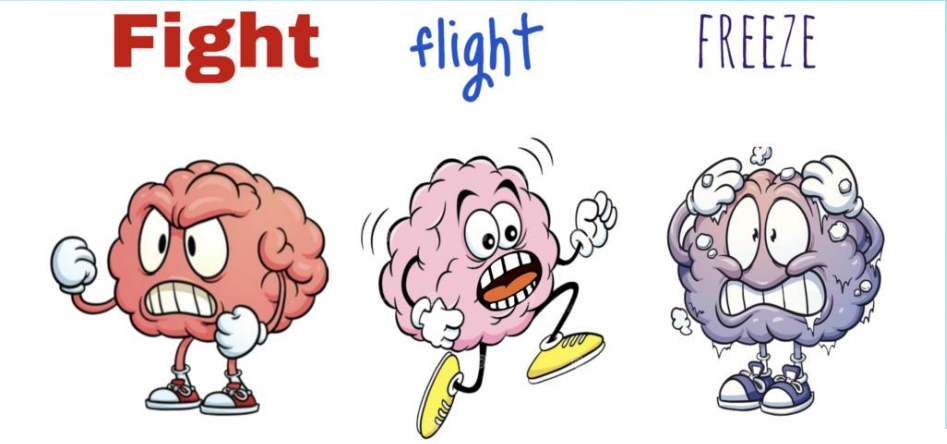
Toxic core: Anger, Hostility, Cynicism

Electrophysiology: Galvanic Skin Response (GSR)

Electrodermal Activity or Skin Conductance

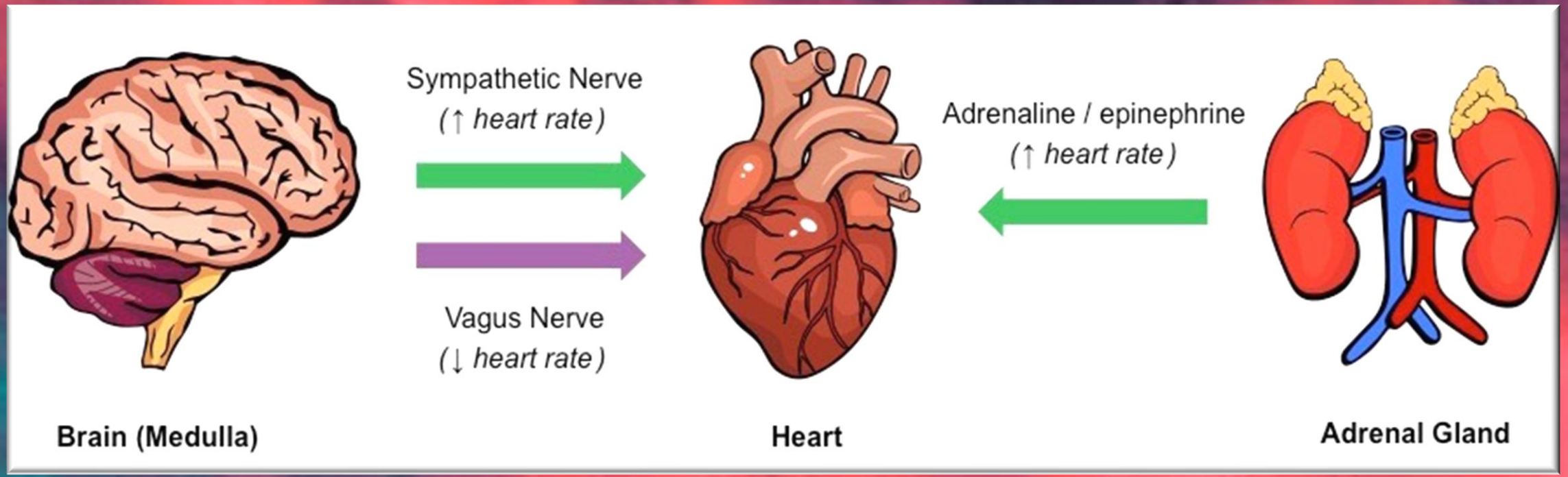
1. Attach two electrodes to the fingers
2. Deliver a micro amount of electric current to the electrodes
3. Amplify the amount of current passed between the two fingers
4. Measure the conductance in microsiemens

How is skin conductance affected by sympathetic activity?



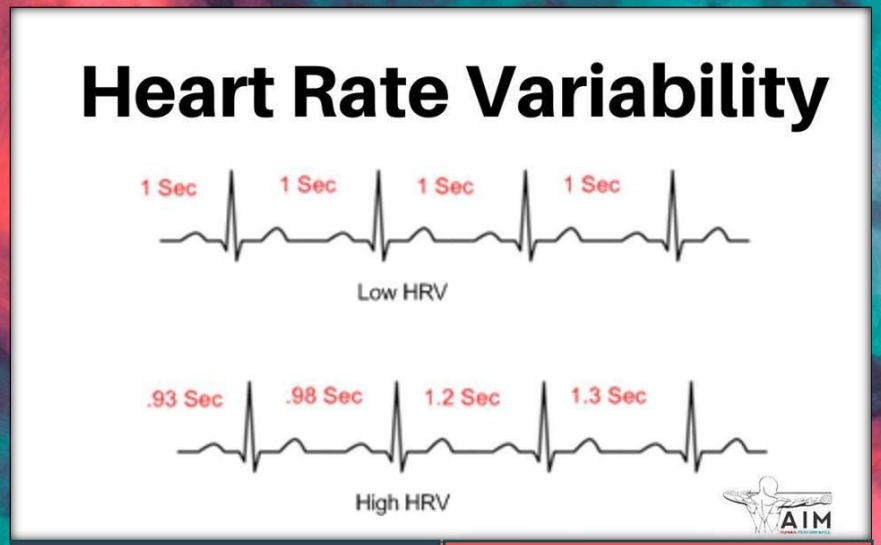
Applications?

Electrophysiology: Heart Rate 101



Also: the parasympathetic nervous system (PNS) releases the hormone acetylcholine to slow the heart rate

Electrophysiology: Heart Rate Variability 101



LOW HRV
"Flight or Fight"
Low Adaptability
Poor health

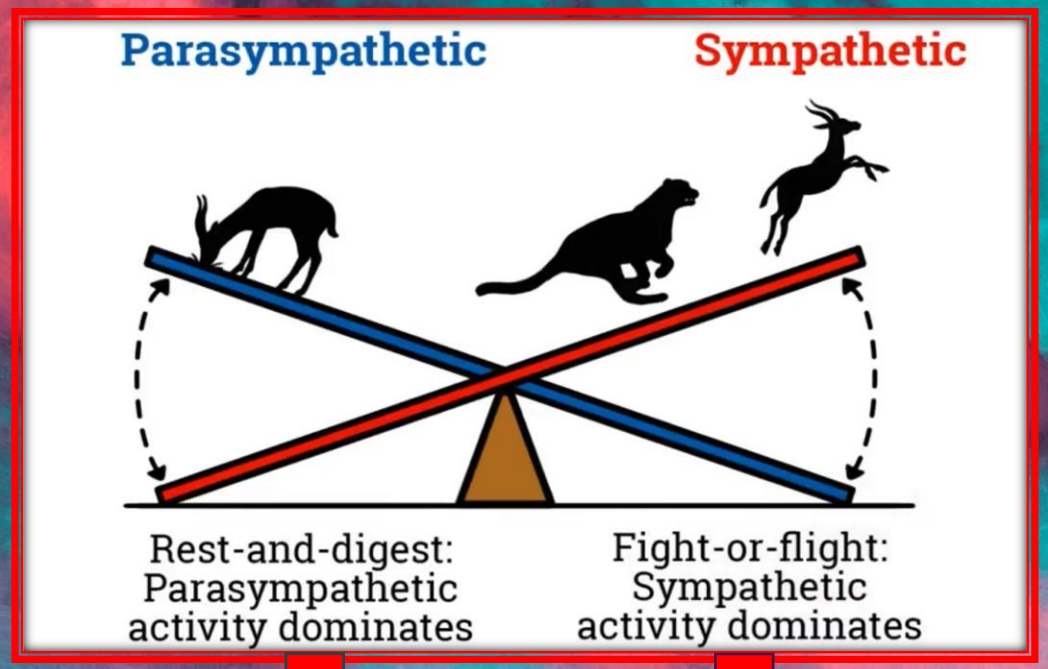
HIGH HRV
"Rest & Restore"
High Adaptability
Better health

Higher HRV is not always better
Pathological conditions can produce HRV e.g. atrial fibrillation

HRV reflects regulation of autonomic balance

- Blood pressure
- Gut and Heart Health
- Vascular Tone
- Systemic inflammation

Electrophysiology: Heart Rate Variability 101



vagus on

vagus off