

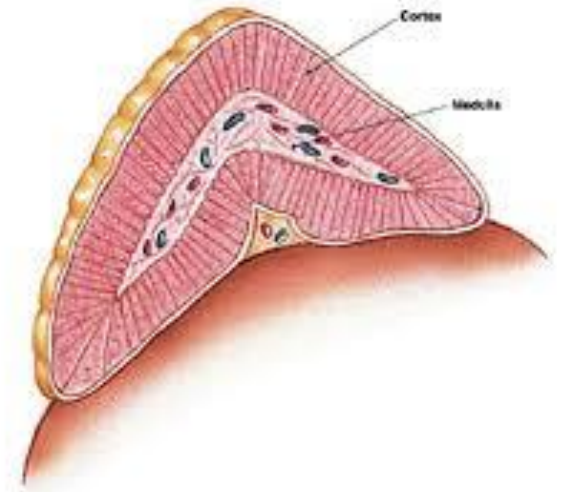
The Players Part II



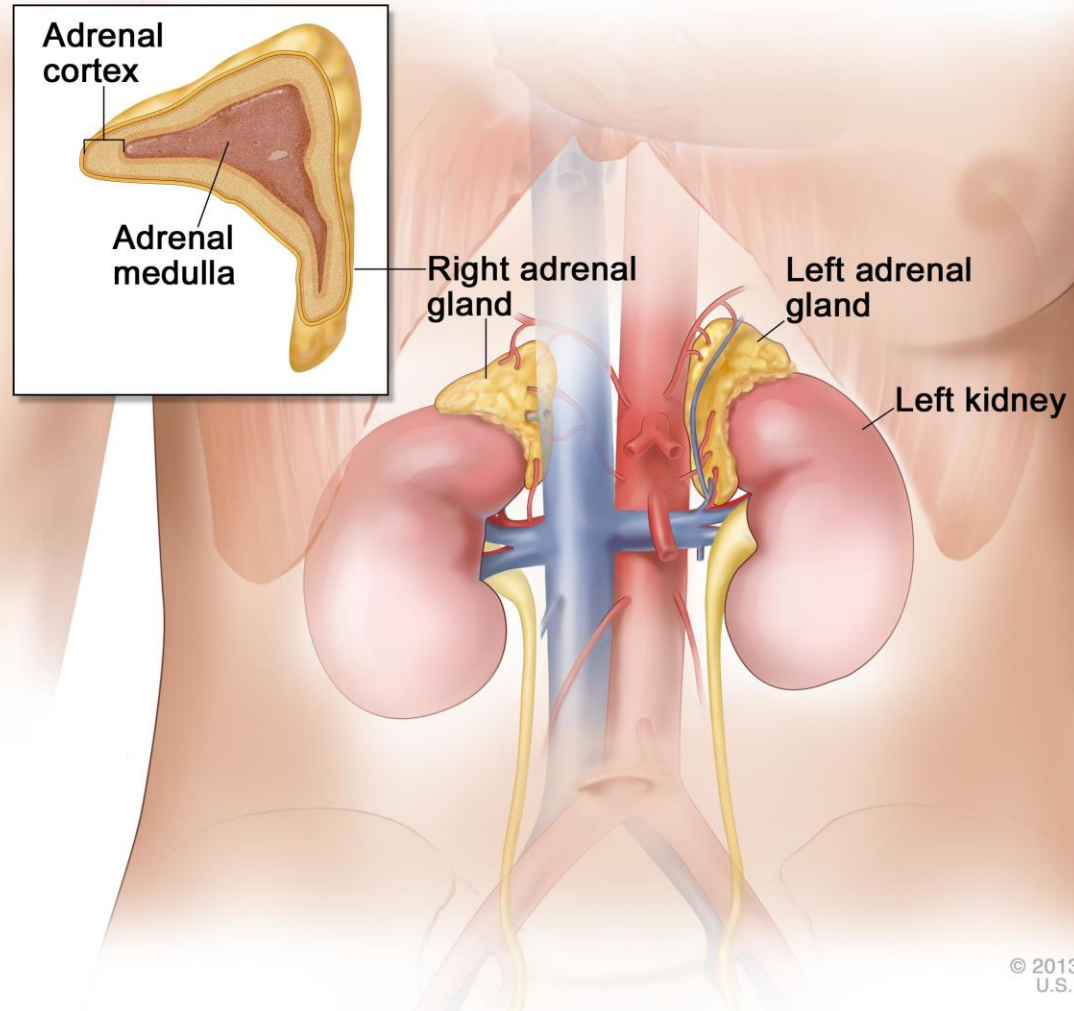
Healthy
Hormones

The Adrenals

- Are a key factor in all hormonal issues
- Because the adrenals can convert one hormone to another – they play a role like no other in the body
- Can affect all hormone systems
- They are also affected by others systems, too



Anatomy of the Adrenal Gland



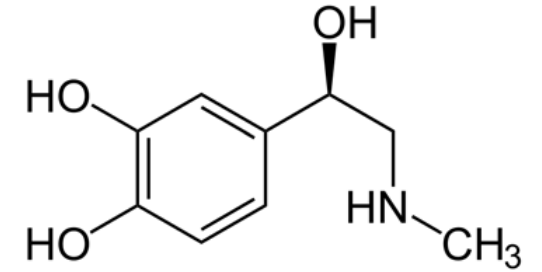
Adrenal Cortex

- Adrenal cortex – outer part- produces hormones that are essential to life such as cortisol and aldosterone
- Role of Cortisol: Essential for the maintenance of homeostasis and maintaining life, helps regulate blood sugar, immune response, anti-inflammatory response, blood pressure, heart muscles contractions, nervous system function, fat, protein and carbohydrate metabolism, keeps you awake, communicates with the GI track
- Aldosterone: Plays a central role regulating blood pressure, also helps with conservation of sodium and potassium from the kidneys



Adrenal Medulla

- Inner part of the gland – produces non-essential hormones such as adrenaline and noradrenaline
- Hormones from the adrenal medulla are released after the sympathetic nervous system is stimulated during times of stress
- Addison's Disease: failure to produce cortisol (autoimmune) – has been linked to gut health problems
- Cushing's Disease: Too much cortisol (often due to a tumor) – probiotics have been used to help this disease in horses



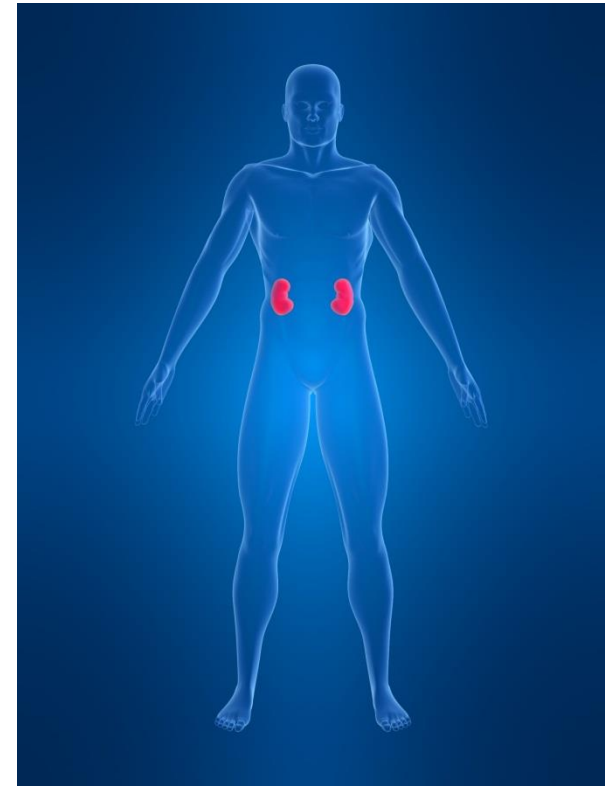
Adrenals

The Adrenal Cortex is responsible for producing over 50 different types of hormones in three major classes:

*Glucocorticoids: Cortisol, cortisone
– burn carbohydrates*

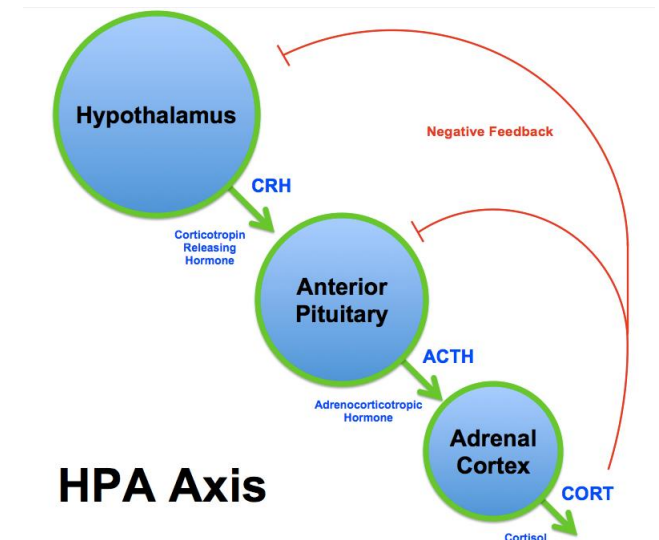
*Mineral corticoid: Aldosterone
– regulates mineral balance (electrolytes)*

Androgens: DHEA, testosterone



The HPA-Axis

- The hypothalamus releases CHR (corticotropin –releasing hormone) which signals the pituitary to release ACTH (adrenocorticotrophic hormone)
- The adrenals are stimulated by ACTH to produce glucocorticoids - cortisol and corticosterones (anti-inflammatory)
- Glucocorticoid steroids in turn suppress the function of the hypothalamus and the pituitary to suppress glucocorticoid production



Fight or Flight Response

- Our body's defense response to danger
- Designed for physical threats – to protect us from danger
- Adrenaline works with cortisol to increase the body's ability for immediate energy and strength. It causes blood vessels to contract. It increases heart rate and tells your brain to pump more cortisol
- The purpose is so you can fight or run from danger
ie if being chased by a bear.



The Problem

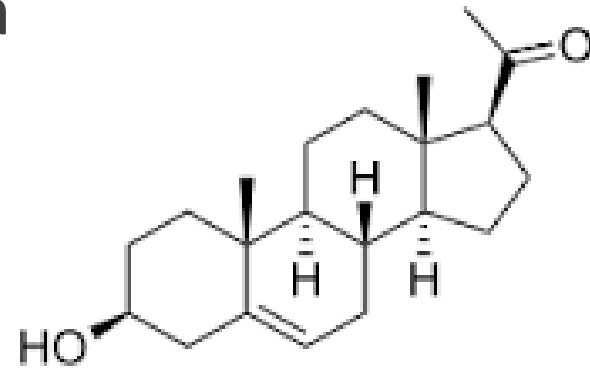
- Our bodies do not know the difference between running from a bear and or being yelled at by a boss or being stuck in traffic
- As a result we are secreting excess cortisol and adrenaline too much and our bodies were not designed for this
- Flight or flight is supposed to be short term
- Chronic use of this response, causes all kinds of problems in the body including the digestive and intestinal system issues

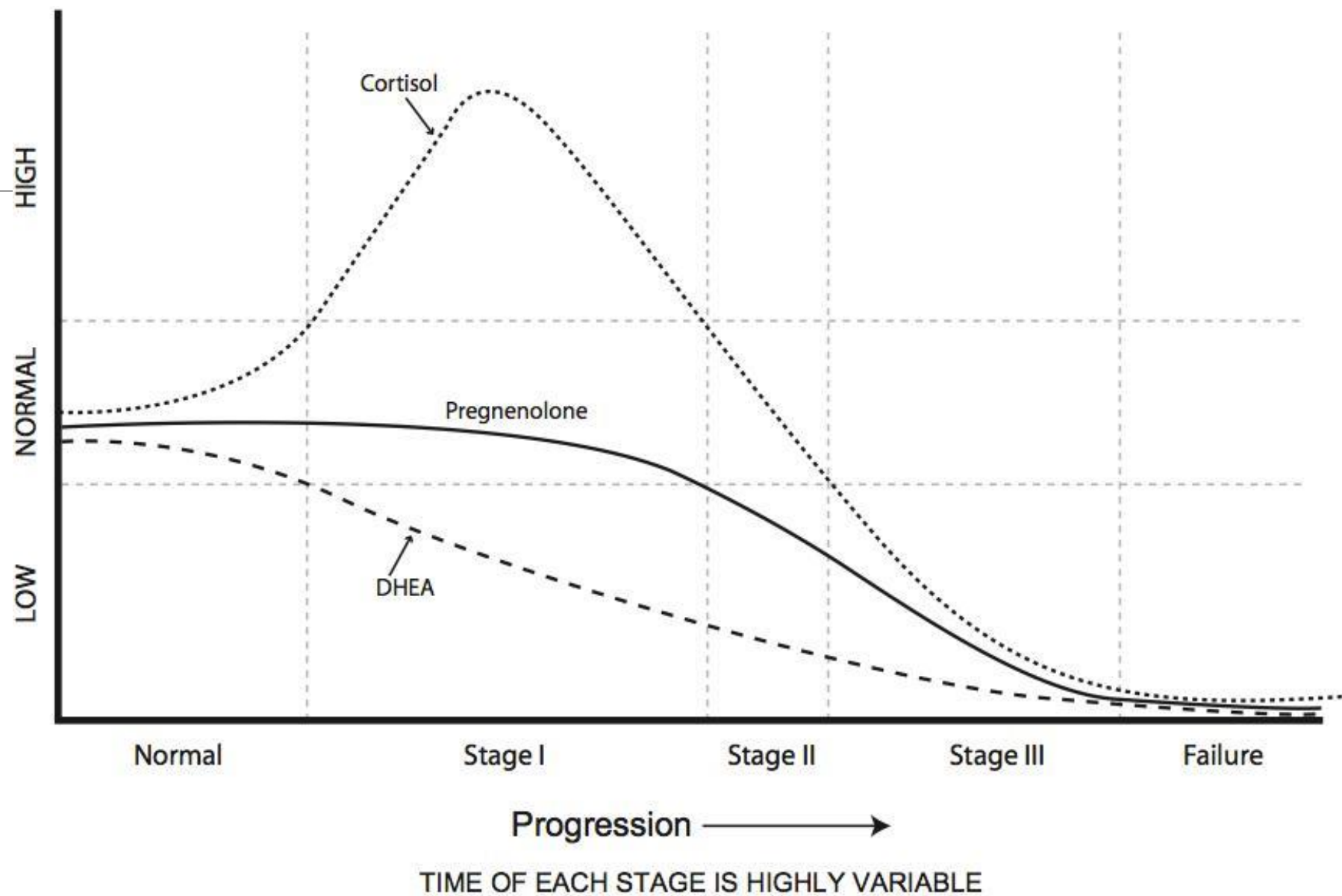


Stage of Adrenal Function

- Phase I: Alarm reaction – adrenaline and cortisol levels are high – B's and C depleted and digestion stops
- Phase II: Resistance phase – low adrenaline, cortisol high, loss of concentration, headaches, cold sweats, emotional instability
- Phase III: Exhaustion phase – low adrenaline, low cortisol, underactive adrenals – disease sets in

The Pregnenolone Steal





What is the Chronic Stress Response?

- Any stress the body is subjected to on ongoing basis (or single occasion with permanent traumatic effects).
- Stress: Compromises body systems that maintain harmony/health, while guarding against illness & disease.
- When one system breaks down, creates stress on the others, accelerating illness and disease.

This is known as the ***Chronic Stress Response***

How To Stop Chronic Stress

- Identify the source of the problem
- Resolve these sources
- Institute measures to repair or prevent



Relevant Body Systems

- Hormones
- Metabolism
- Gastrointestinal
- Detoxification
- Immunity

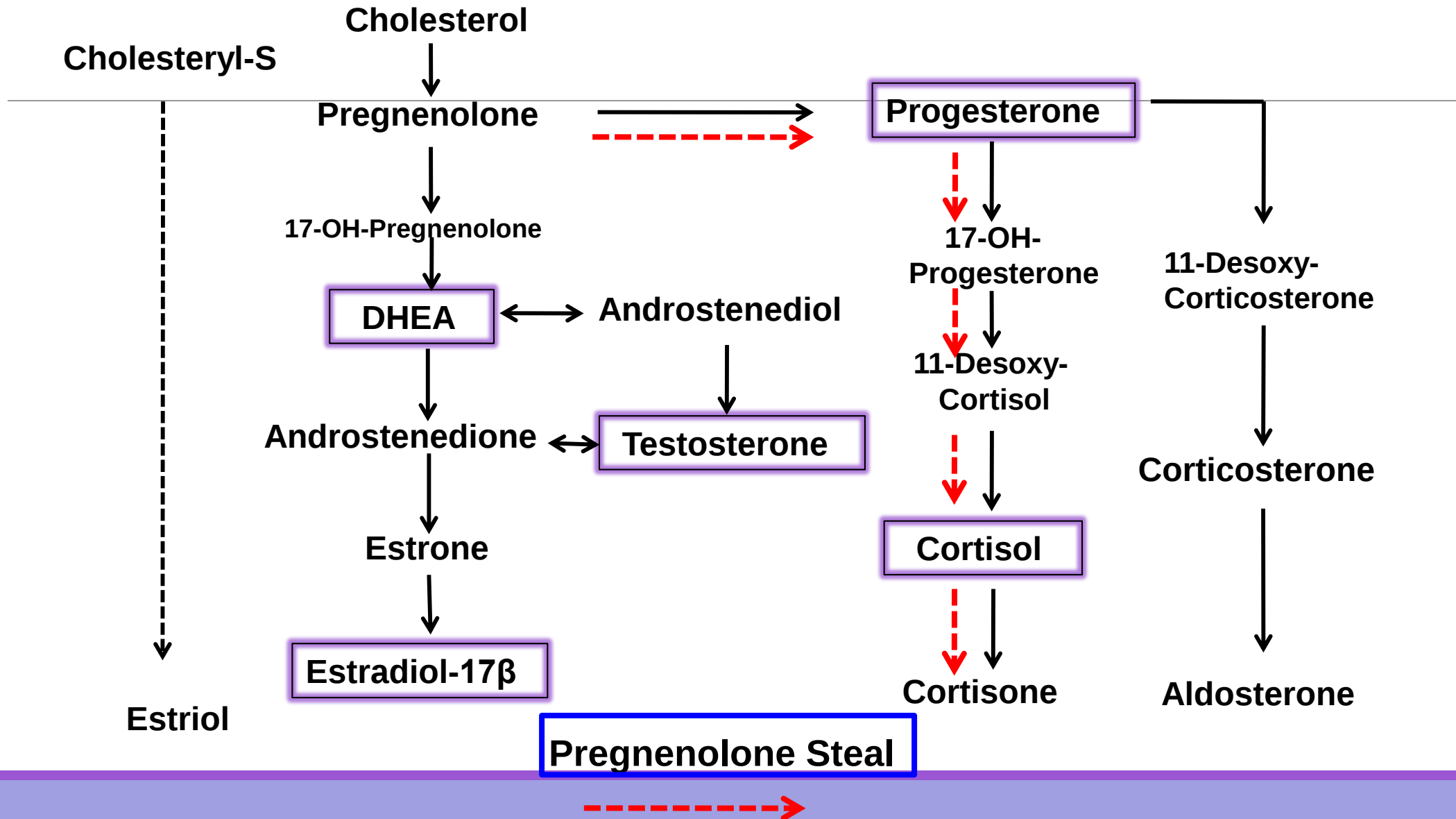


Hormones

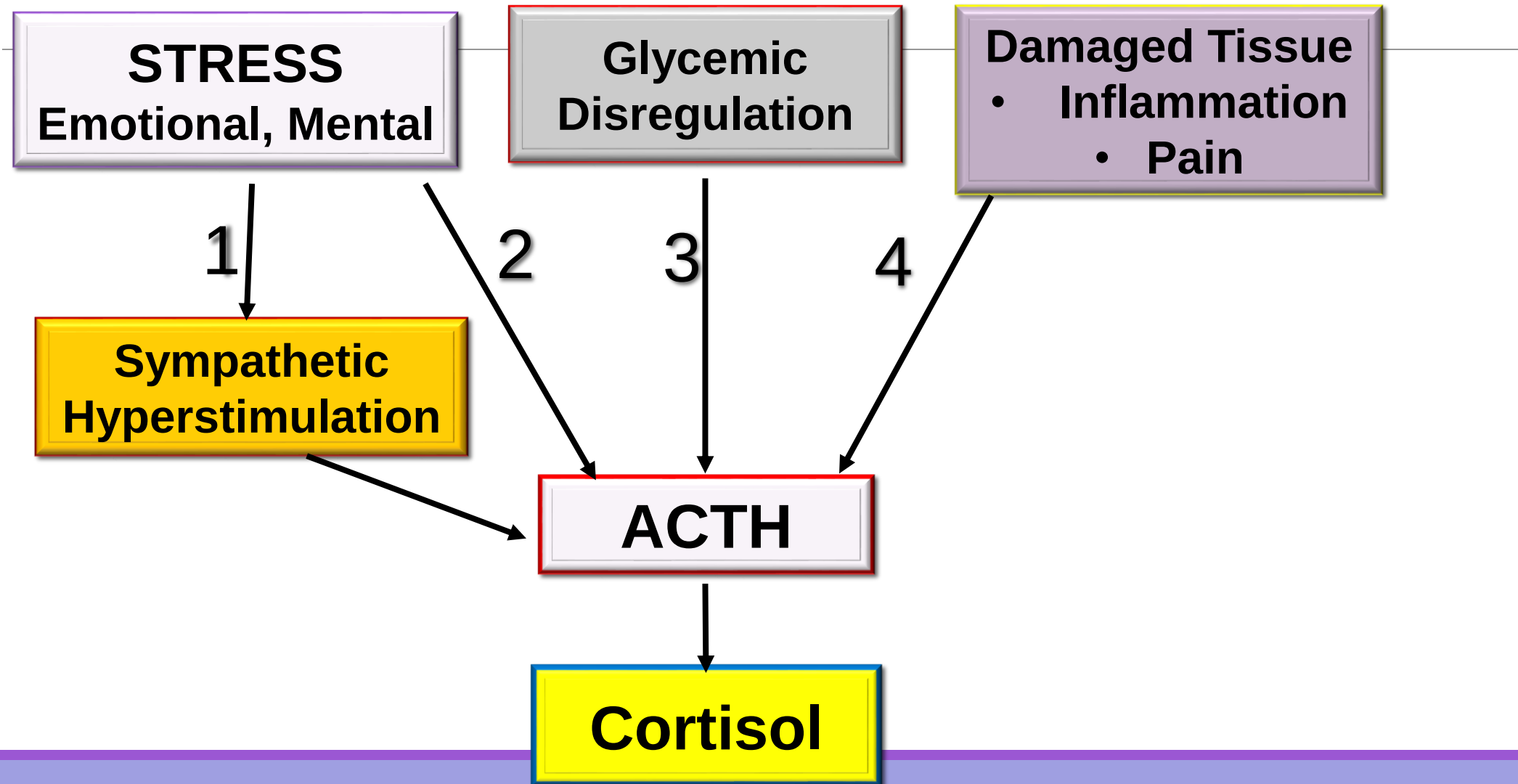
- Pregnenolone – “Mother” Hormone
- Cortisol
- DHEA-S
- Estrogens
- Testosterone
- Progesterone
- Melatonin



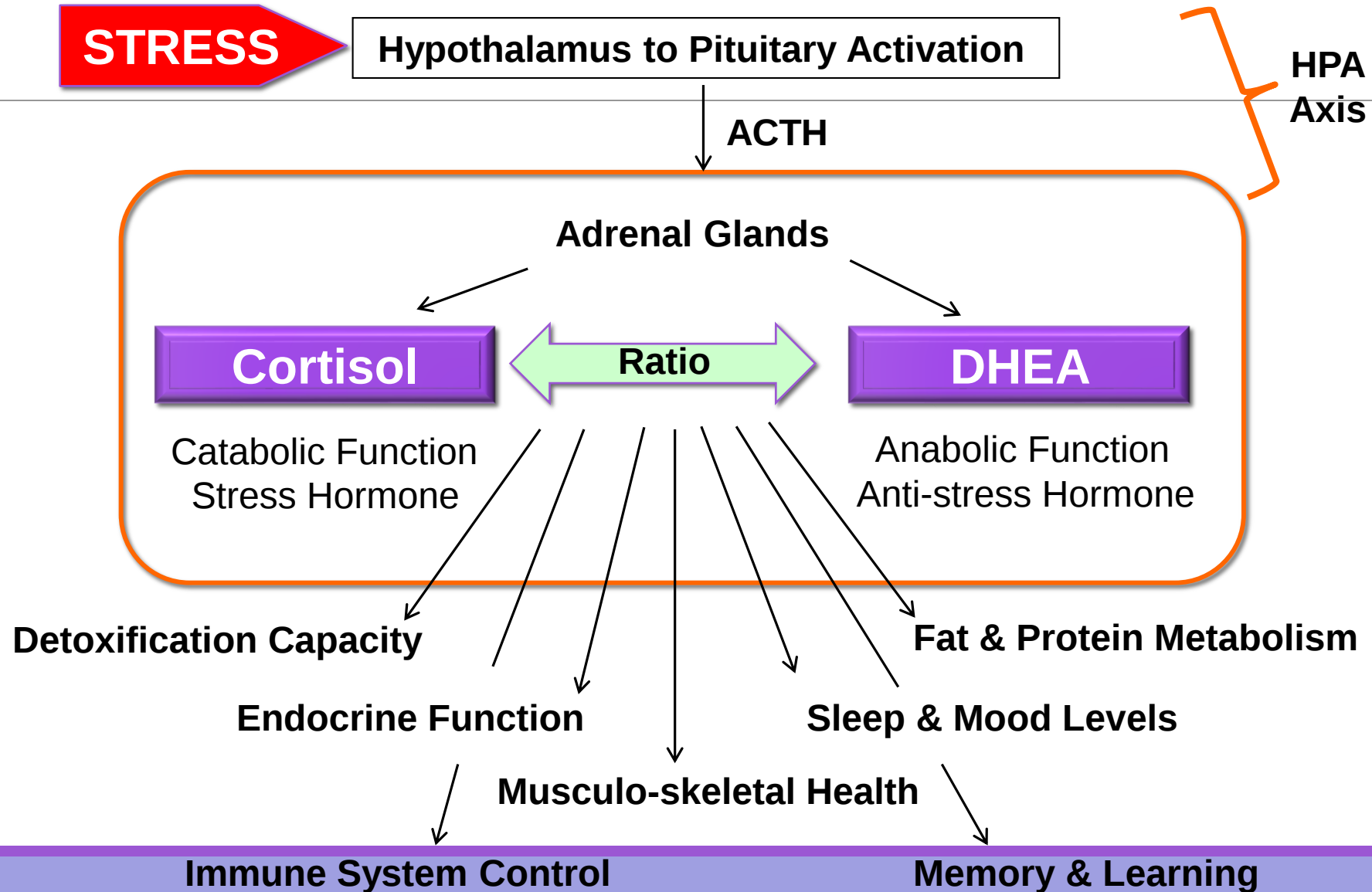
Principal Steroid Pathways



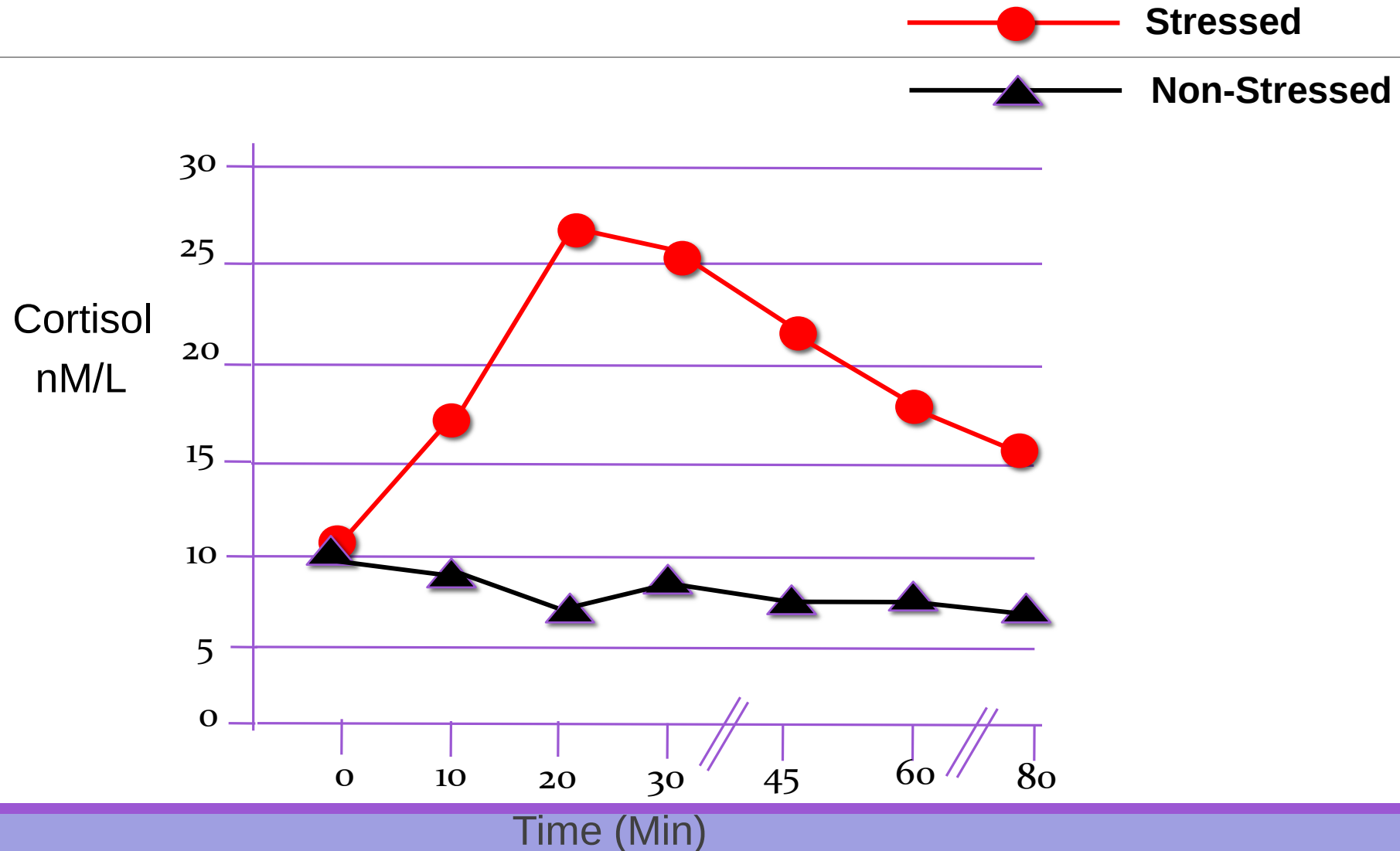
Inducers of Cortisol Release



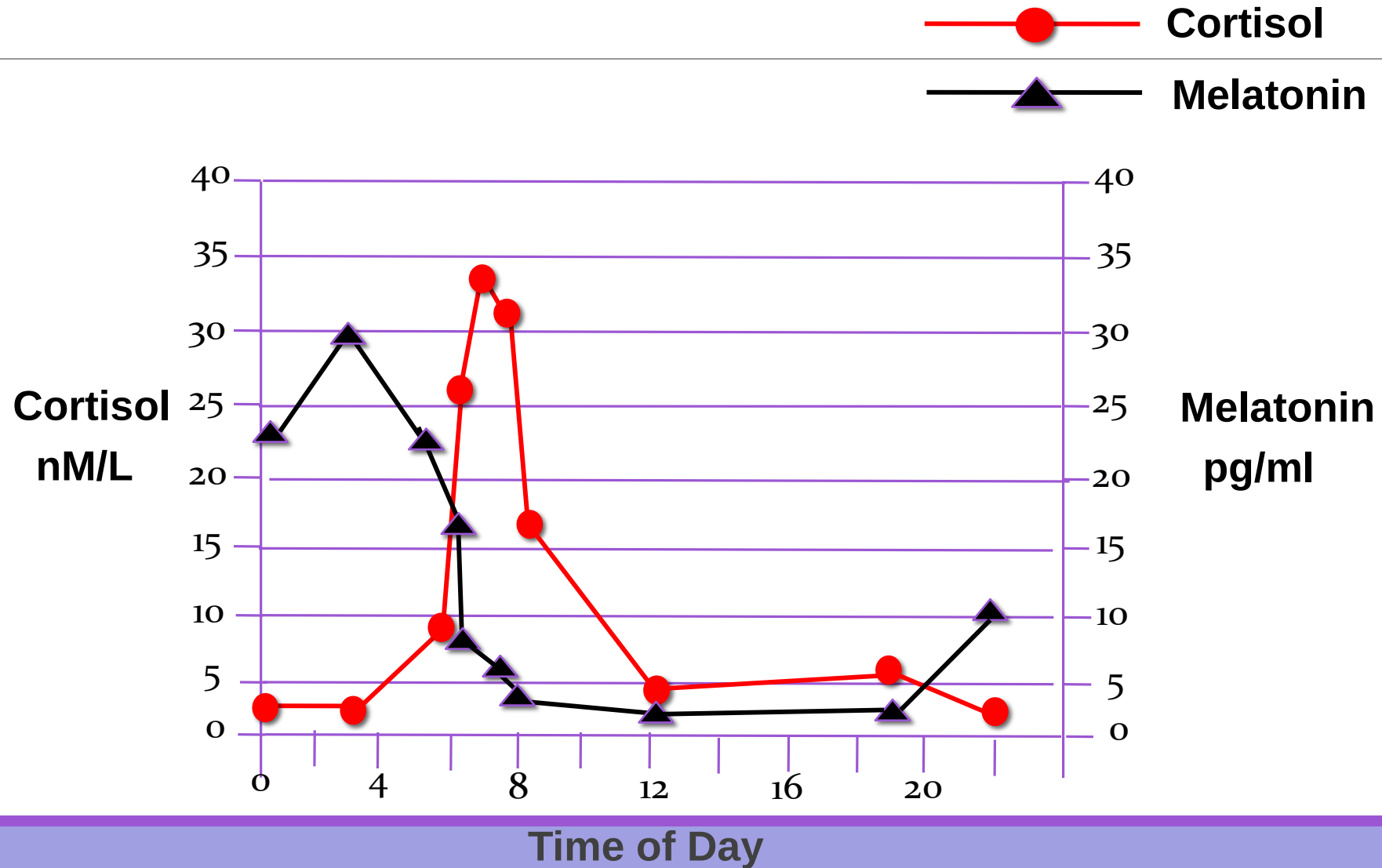
Adrenal Stress



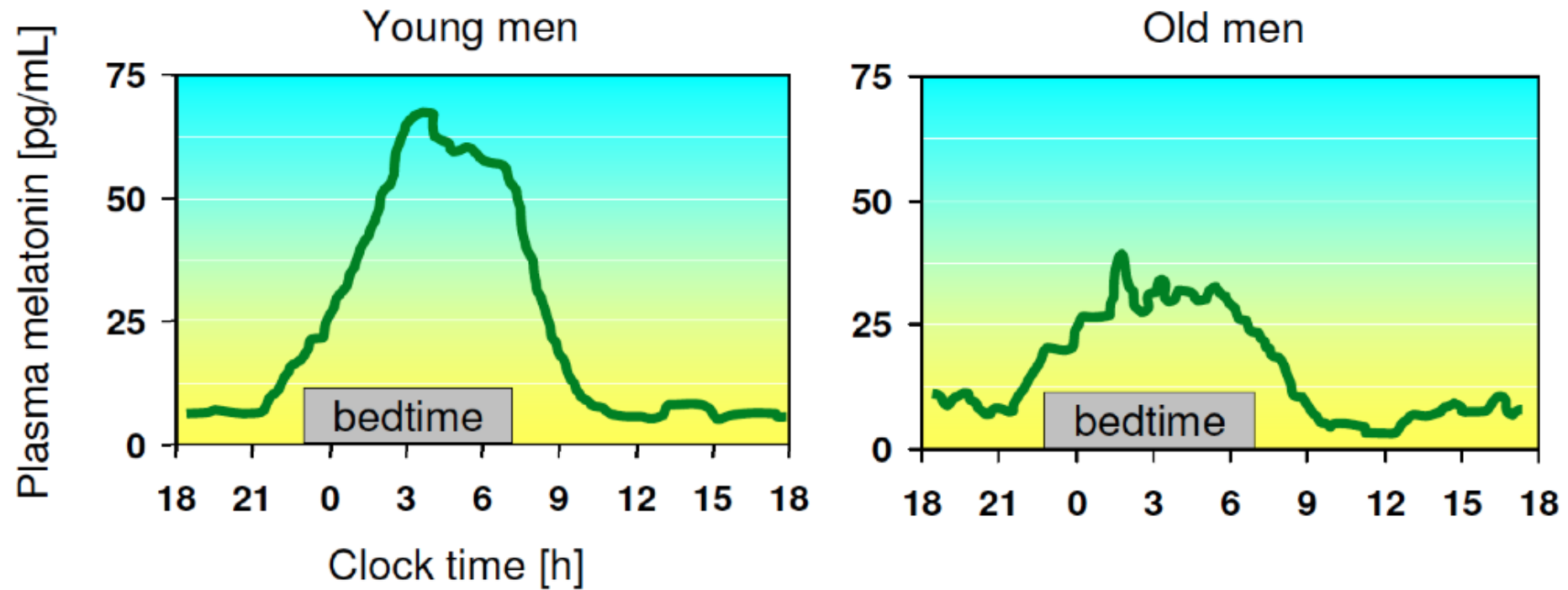
Cortisol Response to Moderate Stress



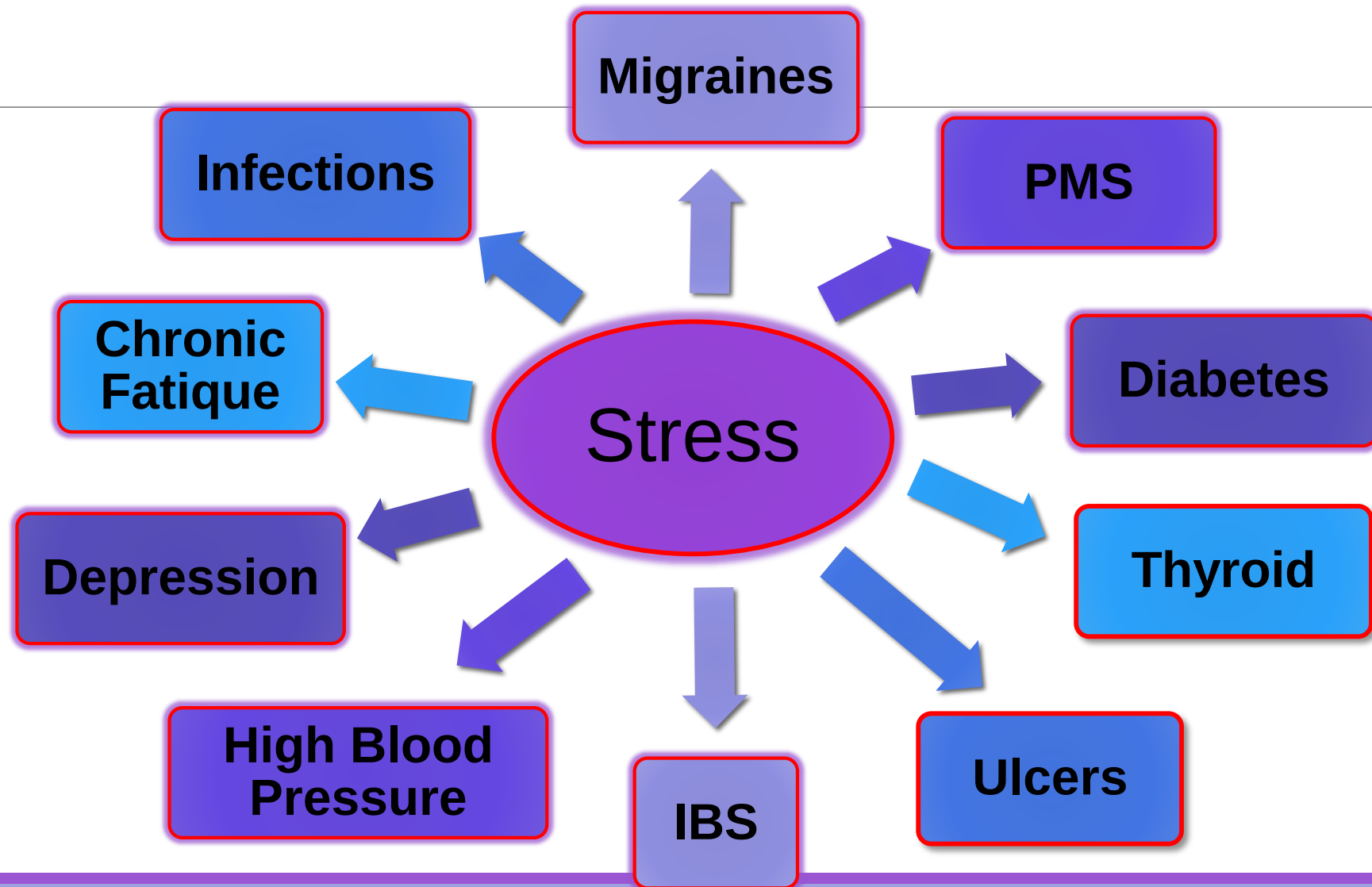
Daily Profiles for Cortisol & Melatonin



Melatonin Throughout Life



The Cost of Stress



Stress and Chronic Fatigue Syndrome

CHRONIC STRESS



HPA Axis Imbalance



Affects

Cortisol



DHEA

**Adrenal Fatigue
or Hypoadrenalism**

Chronic Fatigue Syndrome

Stress and Depression

CHRONIC STRESS

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graph TD; A[CHRONIC STRESS] --> B[Impairs Serotonin (5-HTP) Transmission]; A --> C[Prevents Neuron Generation In Hippocampus]; B --> D[Depression]; C --> D;
```

**Impairs Serotonin (5-HTP)
Transmission**

**Prevents Neuron Generation
In Hippocampus**

Depression

Stress and High Blood Pressure

CHRONIC STRESS

Triggers Release

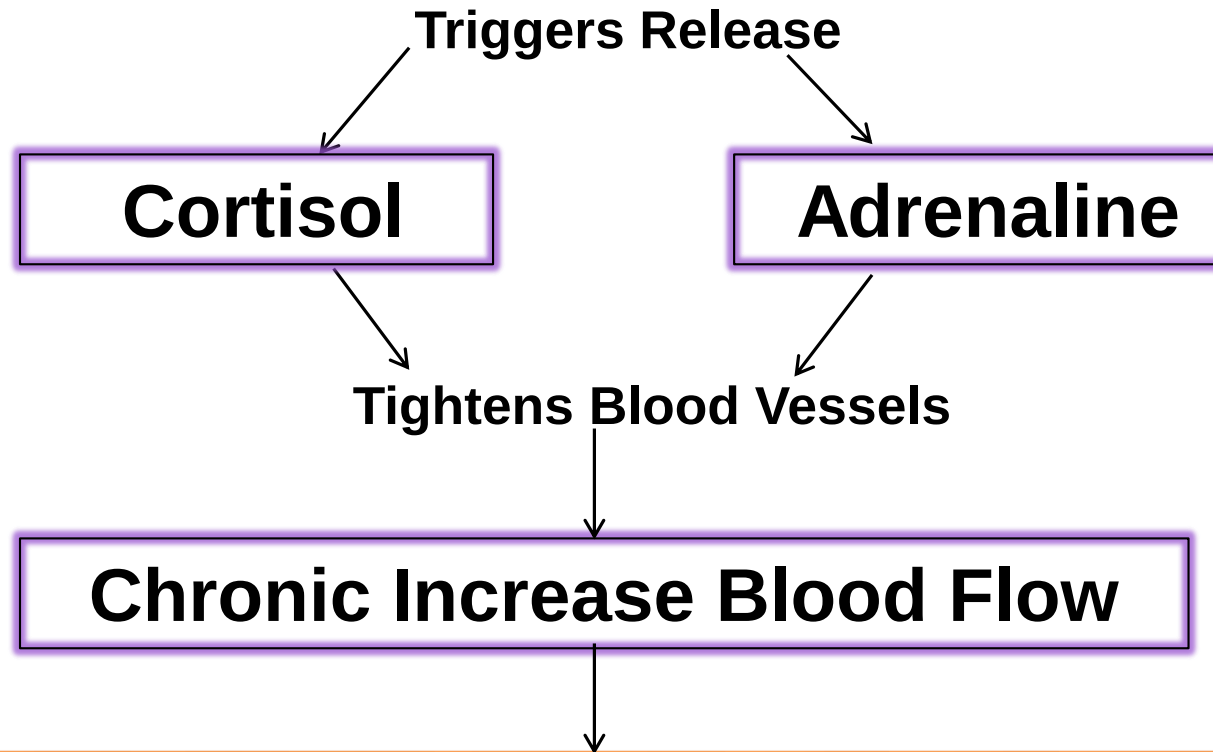
Cortisol

Adrenaline

Tightens Blood Vessels

Chronic Increase Blood Flow

Chronic Elevated Blood Pressure



Stress and IBS

CHRONIC STRESS

Brain – Gut Connection

Enteric Nervous System

Anger, Anxiety, Panic

Brain-Gut Interaction

Triggers Gut Symptoms

Irritable Bowel Syndrome

Stress and Infection

CHRONIC STRESS

↓
Adrenal Hypersecretion

↓
**Immune System
Suppression**

↓ Predisposes to
Infection & Disease Vulnerability

```
graph TD; A[CHRONIC STRESS] --> B[Adrenal Hypersecretion]; B --> C[Immune System Suppression]; C --> D[Predisposes to Infection & Disease Vulnerability];
```

The diagram is a vertical flowchart illustrating the physiological and immunological consequences of chronic stress. It begins with 'CHRONIC STRESS' in a purple-bordered box. An arrow points down to 'Adrenal Hypersecretion'. Another arrow points down to 'Immune System Suppression', which is also in a purple-bordered box. A final arrow points down to 'Infection & Disease Vulnerability', which is in a purple-bordered box and preceded by the text 'Predisposes to'. The entire diagram is set against a white background with a horizontal line above the first box and a purple bar at the bottom.

Stress and Diabetes

CHRONIC STRESS

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graph TD; A[CHRONIC STRESS] --> B[Increased Cortisol Production]; B --> C[Increased Glucose into blood]; C --> D[Energy for muscles "fight or flight"]; C --> E[Cells become Insulin Resistant]; D --> F[Higher Blood Sugar Levels]; E --> F;
```

Increased Cortisol Production

Increased Glucose into blood

Energy for muscles
“fight or flight”

Cells become
Insulin Resistant

End Result

Higher Blood Sugar Levels

Adrenal Stress Index

<http://www.diagnostechs.com/Pages/StressEvaluationTest.aspx>



Reasons for Adrenal Stress Testing

- Stress
- Fatigue / Low Energy
- Evaluate levels of thyroid & iron
- Abdominal weight gain
- Sleep disturbances / Insomnia
- Anxiety, depression
- Blood sugar imbalances



Adrenals

- It is unlikely that any protocol where hormones are concerned, will not include adrenal support
- Supplements can be helpful but understanding how other systems, in turn, affect adrenals is helpful
- Supplements may not work or stop working
- Lifestyle strategies are often necessary
- But it extremely worthwhile

