**Stressors**

- Physical/Physiologic
  - Infection
  - Pain
  - Sleep disruption
  - Excessive exercise
  - Inflammation
  - Temperature extremes
  - Shock
  - Trauma/injury
  - Glucose/insulin dysregulation
  - Hormone imbalances
  - Lack of relaxation time
  - Caffeine/nicotine use
  - Drugs

- Environmental
  - Toxins
  - Poor diet/nutrition
  - Sleep or light cycle disruption
  - Food sensitivities

- Emotional
  - Socio-economic burden
  - Negative life events
  - Social isolation
  - Marital/family problems
  - Anxiety
  - Depression
  - Feeling of helplessness
  - Rejection

**Factors Affecting the Adrenals**
Stress & the HPA Axis

- Stressors → Hypothalamus ➔ CRH ➔ Pituitary ➔ ACTH ➔ Adrenal Gland ➔ Cortisol ➔ DHEA ➔ Testosterone ➔ Aldosterone ➔ Catecholamines (Epi, NE)

**Cortisol**
- The principle stress hormone
- Increases heart rate
- Increases blood pressure
- Dilates airways, increases respiratory rate
- Increases blood sugar
- Releases fatty acids into the blood
- Suppresses immune function
- Breaks down muscle

**Physical Effects of Stress**
- *Increased* blood pressure, heart rate, & heart contraction
- *Increased* blood flow to muscles (active)
- *Increased* muscle strength
- *Decreased* blood flow to areas not essential for rapid action (kidney, intestines)
- *Dilated* pupils
- *Dilated* bronchial tubes
- *Release* of glucose from liver
- *Increased* mental activity and metabolic rate
Stresses are Additive & Cumulative

Intensity of Each Stress Reaction

Number of Stressors

Length of Time the Stress Occurs

Effects of Chronic Cortisol Elevation

↑ Insulin secretion
↑ Fat deposition
↓ Immune regulation
↑ Muscle wasting
↑ Hypothyroidism
↑ Alterations in neurotransmitters
↑ Oxidative stress
↓ Cognition

↑ Bone loss
↑ Insulin resistance
↑ Sodium and water retention
↑ Blood lipids
↓ REM sleep
↓ Regulation of in sex hormones
↑ Blood pressure and heart rate

Conditions Associated & Chronic Stress

- Cancer
- Fatigue
- Cardiovascular disease
- Hypertension
- Diabetes
- Arthritis
- Depression
- Weight gain

- Insomnia
- PMS
- Hypothyroidism
- Asthma
- Digestive disorders
- Infection
- Dermatologic disorders
- Angina
- Hair loss

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Cortisol in Mother’s Milk

• Cortisol in a mother’s body can end up in her milk!
  • Infants appear to be remarkably sensitive to the hormone
    - Rapidly build receptors in their intestines for detecting cortisol
    - Receptors decrease after weaning
    - Not seen in formula fed infants
  • Shaping the HPA axis and behavioral tendencies of the infant

Cortisol in Mother’s Milk

• Reflects maternal life history

• Predicts infant temperament
Cortisol in Mother’s Milk

• Important physiologic pathway for both nutrient transfer and glucocorticoid signaling
  › Nutrients and glucocorticoids have simultaneous effects on offspring behavior phenotype
  › Influences offspring growth

Cortisol in Mother’s Milk

• Higher cortisol in mother’s milk associated with greater “negative affectivity”
  › Composite score of infant’s tendency toward fear, sadness, discomfort, anger/frustration, and reduced soothability
  › More nervous, less confident temperament
  › Increased fear behavior in infant
  › Both male and female infants but greater effect in females
• Higher cortisol concentrations in milk are associated with greater infant weight gain

Cortisol in Mother’s Milk

• Cortisol in mother’s milk reflects the mother’s environment
  › Degree of “danger” or conflict
  › Signal of her HPA axis activation

• Infants appear to rely on cortisol to detect condition of their mothers
  › Adjust growth and temperament based on mother’s condition
Cortisol in Mother’s milk

- New mothers have been shown to have higher cortisol levels in their own bodies and in their milk

Maternal Psychological Distress

- In utero exposure is a risk factor for developmental psychopathology
  - At least partially regulated via dysregulation of the maternal and fetal HPA axes.
  - High or flattened patterns of maternal cortisol blunted cortisol reactivity in infants

Postpartum Depression

- Dysregulated cortisol metabolism present
  - Symptoms of postnatal depression are related to higher cortisol metabolite production
    - Independent of breastfeeding
  - Higher cortisol levels caused by:
    - Higher conversion of cortisone to cortisol
    - Lower conversion of cortisol to its metabolites.
  - Breastfeeding has no effect on post partum depression which is related to higher cortisol metabolite production
### Clinical Indications of Adrenal Fatigue

#### Blood Pressure
- Drops by 10 mm/Hg upon rising from a lying position

#### Pupil Contraction
- Iris cannot hold contraction when light is shone into eye

#### Sergeant’s White Line
- Line drawn on the abdomen by a blunt instrument, remains white for several minutes, where it would normally turn red (present in 25%)

#### Rogoff’s Sign
- Pain or tenderness over the adrenals when pressed

#### Clinical Indications of Adrenal Fatigue

<table>
<thead>
<tr>
<th>Lymphadenitis</th>
<th>Skin</th>
<th>Perspiration</th>
<th>Thyroid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized cervical lymphadenitis frequent</td>
<td>Skin tendency towards dry &amp; thin (especially in women)</td>
<td>Perspiration may be scanty</td>
<td>Signs &amp; Symptoms of low thyroid (80% of severe cases)</td>
</tr>
</tbody>
</table>
Energy Patterns in Adrenal Fatigue

- Morning fatigue: Hard to get up & get going
- Fatigue decreases until lunch
- Mid-afternoon low energy
- Increase in energy after 6 pm
- Tired at 9-10 pm
- Second burst of energy if up at 11 pm
- Sleeps best in morning 7-9 am

Intake Patterns in Adrenal Fatigue

- Cravings for High Fat Food & Stimulants
- Cravings for Salt
- Uses caffeine, sugar, nicotine, carbs to sustain energy levels
- Intolerance to Potassium

Adrenal Function Assessment

Questionnaire in “Adrenal Fatigue” by James Wilson

Energy / Intake 3 day diary

- Rate energy level on a scale from 1 to 10 randomly, but at least 2 hrs
- Record time any food, liquid, nicotine or recreational drugs are consumed
- Watch for lower energy level followed stimulant intake
Testing for Adrenal Fatigue

24 Hour Urinary Cortisol

› Suspect Adrenal Fatigue if score is in bottom 1/3 of reference range.

Saliva

› Use 1 day collection (4 vials) as baseline
› Take on a "normal" stress day
› Test other steroid hormones
  - DHEAs, testosterone, estradiol, progesterone
› If possible, take blood sugar at same time as cortisol level

Wilson J. Adrenal Fatigue, The 21ST Century Stress Syndrome
Treatment Strategies

Lifestyle Adjustments
Nutritional Repletion
Adaptogens
Phosphatidylserine
Glandular Extracts
Hormone Balance
Cortisol

Lifestyle Changes for Adrenal Fatigue

<table>
<thead>
<tr>
<th>Identify Stressors</th>
<th>Eliminate the Stress</th>
<th>Change Your Response to the Stress</th>
</tr>
</thead>
</table>

Lifestyle Adjustments

- Minimize stress in life
- Recognize, anticipate and balance stressful events
  - Compensation techniques
  - Find personal ways to reduce stress response
- Lie down during work breaks
  - Brief (15-30 minute rest) at 10:00 AM &
  - Brief (15-30 minute rest) between 3-5:00 PM
- Exercise – not competitive
- Retire to bed at 9-9:30 PM
- Sleep in until (9 AM) whenever possible
Lifestyle Changes for Adrenal Fatigue

- Love
- Laughter
- Actively diffuse tension and stress
- Eliminate or minimize negative (energy draining) people and events
- Daily break for enjoyment
- Regular meals - chew food well
- Regular relaxation
- Breathing exercises

Diet for the Adrenals

- Eat by 10 AM and again before noon
- Eat regular meals – chew food well
- Emphasize good quality proteins.
  - Some protein at each meal
  - Any snacks should be protein

Diet for the Adrenals

- Digestive aids will be needed by most until recovery is more complete
- Allow unrefined salt to be added ad. lib. according to taste
- Adequate water intake
  - % of weight in pounds equals the number of ounces daily
**Diet for the Adrenals**

- Combine unrefined carbohydrates (whole grains) with good quality protein and oils (nuts and seeds) at most meals.
- Use cold pressed oils - olive, walnut, filbert, flax
- Emphasize vegetables (alkaline foods)

**Diet for the Adrenals**

- Avoid
  - Hydrogenated fats
  - Caffeine containing foods and beverages
  - Chocolate
  - White carbohydrates (white sugar, white flour)
  - Junk foods
  - Allergenic or sensitive foods

**Nutritional Repletion**

- Multivitamin/Mineral formulation designed specifically for the adrenals
  - When cortisol is dropping nutritional repletion helps with fatigue

- Unrefined salt
  - ½ to 1 teaspoonful daily on food or in water
Adaptogens
- Ashwagandha
- Holy Basil
- Siberian Ginseng
- Licorice
- Maca
- Rhodiola
- Eleuthero
- Magnolia & Phellodendron
- Cordyceps
- Bacopa
- Astragalus

Used to control high or fluctuating cortisol levels without dropping normal or low levels

Glandular Extracts
- Multi-glandular extracts designed for adrenals
  - Contain adrenal, hypothalamus, pituitary, thyroid, and gonadal extracts
- Raw Adrenal Extract
- Use in conjunction with adrenal nutritional support and adaptogens

Adrenal Steroid Therapy
- Get baseline levels
- Monitor levels
  - Doses may need lowering as adrenals resume normal production
  - Excess exogenous hormone may prevent normal endogenous production
**Hydrocortisone (Cortisol)**

In severe cases of adrenal fatigue
- Dose up to 30 mg daily in split doses
  - Start at 10-15 mg daily, increase only prn
  - Slow release capsule may improve compliance and response
- Taper dose gradually over 3-6 months
  - Goal is to have adrenals resume normal production

Giving Cortisol is cheap…
affect on adrenal function is priceless

**Steroid Therapy**

**HPA Axis/Cortisol/Sleep**

- Sleep deprivation is associated with HPA axis activation
- Chronic insomnia is associated with increased cortisol levels
- Pharmacologic intervention to normalize HPA axis abnormalities would address underlying physiologic disturbance in disordered sleep and subsequent increased risk of metabolic syndrome, hypertension, and other CVD


**Natural Supplements**

**Adrenal Suppression & Insomnia**

- Phosphatidylserine or phosphorylated serine
- L-Theanine
- 5-Hydroxytryptophan (5-HTP) or Tryptophan
- GABA
- Magnesium
- Melatonin
- Inositol
- Valerian root

Giving Cortisol is cheap…
affect on adrenal function is priceless
Adrenal Protocols

For any stage of high or low cortisol:
› Adrenals are being stressed & will eventually fatigue
› Lifestyle changes
  - Stress response adaptation
  - Diet
  - Nutrition
  - Adaptogens and/or PS
  - Sleep support
› Determine thyroid function status

Adrenal Protocols

For Low Cortisol:
› Lifestyle changes
› Determine thyroid function status
› MVM for adrenal repletion
› Adrenal extract

Adrenal Protocols

• If cortisol is high throughout day:
  › “Tired but wired”
  › Water
    - Weight in pounds /2 in ounces
  › Unrefined salt: ½ teaspoonful bid
  › Adaptogens
  › PS at 4 pm and 2 hrs before bedtime
    - Additional insomnia agents pm
  › Theanine 100-200mg 2-4 times a day
  › Magnesium
  › Adrenal vitamin support: Super Adrenal Stress Form. 1-5 tablets daily
• Cortisol elevated AM and at night but low throughout day
  ○ On way to fatigued adrenal
  ○ “Wired, then tired, then restless”
  ○ Water
  ‒ Weight in pounds / 2 in ounces
  ○ Unrefined salt: ½ teaspoonful bid
  ○ Adaptogens
  ‒ PS at 9 pm
  ‒ Additional insomnia agents pm
  ‒ Theanine 100-200mg 1 hr before bedtime and in evening pm
  ○ Magnesium
  ○ Adrenal vitamin support: Super Adrenal Stress Form. 3-5 tablets daily
  ○ Adrenal Rebuilder 5-6 tablets daily
  ○ Replace DHEA and testosterone if low
  ○ Check Progesterone levels – converting to cortisol?

LOOK INSIDE!™
Adrenal Fatigue
The 21st Century Stress Syndrome
James L. Wilson, ND, DS, PhD
Foreword by Mark Hyman, MD

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