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The HPA Axis, Cortisol & Depression

Presented by: James L. Wilson ND, PhD

Sept 19th, 2018
Purpose of this Presentation

• Introduce some important facts about depression
• Help the healthcare practitioner understand the frequent but often overlooked role of the HPA axis, particularly cortisol levels, in different types of depression
• Help the healthcare practitioner become aware of differences between HPA axis patterns in major depressive disorders (MDD) and in the types of depression more commonly seen in a typical clinical practice
• Provide an organized method for treating the patient, not just the depression
• Provide treatment recommendations for patients suffering from depression related to HPA axis dysfunction
Depression Data
Depression is a common mental disorder. Globally more than 300,000,000 people of all ages suffer from depression.

http://www.who.int/news-room/fact-sheets/detail/depression (sourced Aug 30, 2018)
Depression is Common and Debilitating

• Depression is THE leading cause of disability worldwide.¹,²

• Depression will figure prominently during the extra years of life gained from improved outcomes in cardiovascular disease, cancer and other domains.¹

World Health Organization Depression Facts

• Depression can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities.

• “At its worst, depression can lead to suicide, a tragic fatality associated with the loss of about 850,000 lives every year worldwide.”

• Unfortunately, understanding the molecular biology of depression has been extremely slow.²

Depression in the US

• Incidence in Adults\(^1\)
  - Overall Frequency - 16.2 million (est) adults in the USA had at least one major depressive episode in 2016, representing 6.7% of all US adults.
  - Sex: Females (8.5%) > males (4.8%)
  - Age: Highest among 18-25 year olds (10.9%)

• Incidence in Adolescents (12-17 YO)\(^1\)
  - Overall frequency – 3.1 million representing 12.8% of the 12-17 YO population
  - Sex: Females (19.4%) > males (6.4%)
  - Age: progressively worse with increasing age (12 YO- 5% → 17 YO-17.0%)

Definition of Depression
Depression Definition

“Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration. These problems can become chronic or recurrent and lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities.”

Depression remains neither a clearly articulated nor a universally accepted category, and subtypes have shifted over time: there is no unified understanding of what the category seeks to define, agreed causes or treatment approaches.\[^1\]

Depression Definition cont.

“...depression is a heterogeneous illness that manifests a variety of symptoms sets, for a variety of reasons, at various points in life, lasts for a varying amount of time, and may or may not respond to treatment.”

Translation – *We don’t know what it is or how to treat it.*

Diagnosis of Depression

• Hamilton Rating Scale For Depression
  o Considered the gold standard test – 21 questions given (verbally) to patients suspected of suffering from depression,\(^1\) graded and then rated and interpreted.\(^2\)
  o Online automatic grading version at:
    [https://qxmd.com/calculate/calculator_146/hamilton-depression-rating-scale-ham-d-or-hdrs](https://qxmd.com/calculate/calculator_146/hamilton-depression-rating-scale-ham-d-or-hdrs) (accessed Sept. 3, 2018)

Diagnosis of Depression cont.

- The classic manual for diagnosis of depression
  - First, MB (Ed). *Epidemiology of DSM- DSM-5®* 

* First, MB (Ed). Diagnostic and Statistical Manual of Mental Disorders- 5th ed.: 2013; Amer Psychiatric Assoc Publishing
Symptoms of Depression May Include

- Difficulty concentrating, remembering details and making decisions
- Fatigue and decreased energy
- Feelings of guilt, worthlessness and/or helplessness
- Feelings of hopelessness and/or pessimism
- Insomnia, early-morning wakefulness or excessive sleeping

Symptoms of Depression May Include cont.

- Irritability, restlessness
- Loss of interest in activities or hobbies once pleasurable, including sex
- Overeating or appetite loss
- Persistent aches or pains, headaches, cramps or digestive problems that do not ease even with treatment
- Persistent sad, anxious or "empty" feelings
- Thoughts of suicide, suicide attempts

Major Classifications of Depression
Classifications of Depression

The most severe forms of depression are classified as:

Major Depressive Disorders (MDD)

- **Melancholic depression** – 25-30% of patients with MDD present with pure melancholic depression.
- **Atypical depression** – 15-30% of patients with MDD present with pure atypical depression.
- **Undifferentiated (Mixed)** – 40-60% of patients with MDD present with a mixed type of depression.

"Those with pure melancholic or atypical features show a much more severe course of illness than those with mixed neurovegetative features."

Melancholic Depression

- Anhedonia (lack of enjoyment)
  - Characterized by lack of enjoyment in doing or experiencing things that are usually enjoyable
- Lack of reactivity to pleasurable stimuli
- 3 of the following:
  - Loss of appetite or weight
  - Insomnia
  - Psychomotor retardation or agitation
  - Sense of guilt
  - Early awakening
  - Depression that is worse in the morning
  - Distinct quality of depressed mood

Melancholic Depression cont.

- Physiological hyper-arousal such as hyper-cortisol ... insomnia (most often early-morning awakening), simultaneous with loss of appetite.¹

- Another consistent feature of melancholy is a diurnal variation in the severity of depressed mood, which is greatest early in the morning.²


Atypical Depression\(^1\)

- Mood reactivity (mood brightens in response to positive stimuli)
- Increased appetite
- Increased weight gain
- Hypersomnia (excess sleeping)
- Leaden paralysis
- Hypersensitivity to perceived interpersonal rejection resulting in social or occupational impairment (emotional labile).

Atypical Depression cont.

- More common in women
- Is associated with an earlier age of onset
- Frequently includes comorbid anxiety or avoidant personality disorder

Atypical Depression cont.

- Suicidal thoughts and attempts\(^1\)
- Greater utilization of health services\(^1\)
- Physical and sexual abuse or neglect\(^1\)
- Functional disability\(^1\)

Atypical Depression cont.

• Responds better to monoamine oxidase inhibitors than to tricyclic antidepressants\(^1\)

• May have a smaller noradrenergic activation (less accurate recall of emotional memories with time) than melancholics\(^2\)


But a consensus on depression subtypes is still far from being reached.

“Though the diagnostic criteria allow the specification of different subtypes, e.g. melancholic and atypical features, a consensus still has to be reached with regard to the clinical symptoms that clearly delineate these subtypes.”

But a consensus on depression subtypes is still far from being reached. cont.

"The majority of patients with major depression present with a mixture of cognitive, affective, and physiological features that do not fully conform to the classifications of melancholic and atypical depression. Moreover, not all cases the melancholic and atypical depression resemble one another." 1

Depression and the HPA Axis
Depression and the HPA Axis

• Depressed patients often have elevated cortisol levels.¹
• But they also can have lowered cortisol levels.²
• Many antidepressants are thought to improve mood by altering HPA axis function.¹

Cortisol Levels in Typical [Melancholic] versus Atypical Depression

“Abnormalities of the hypothalamic-pituitary-adrenal (HPA) axis have long been implicated in major depression with hypercortisolemia reported in typical [melancholic] depression and hypocortisolemia in some studies of atypical depression.”¹

The Importance of Cortisol in Major Depressive Disorders (MDD)

- Studies vary widely on the percentages of patients suffering from each of the two types of major depressive disorders (MDDs).
- However, at least 70% of all MDDs involve a disruption of the HPA axis, with the primary driver of signs and symptoms being cortisol.
Stress and Depression

"Stress precipitates depression...Major depression and the stress response share similar phenomena, mediators and circuitries. Thus, many of the features of major depression potentially reflect dysregulations of the stress response."

Gold PW, Chrousos GP. Organization of the stress system and its dysregulation in melancholic and atypical depression: high vs low CRH/NE states. Mol Psychiatry. 2002 (7); 254-275.
Stress and the HPA Axis
The Role of Cortisol in Stress

“The hypothalamic-pituitary-adrenal (HPA) axis is the major endocrine stress axis of the human organism. Cortisol, the final hormone of this axis, affects metabolic, cardiovascular and central nervous systems (CNS) both acutely and chronically.”¹

A Comparison of HPA Axis Hormone Patterns in Melancholic and Atypical Depression, Cushing’s Syndrome and Addison’s Disease
HPA Axis Hormones in Melancholic Depression

- **Corticotrophin Releasing Hormone (CRH)**
  - Normal response to stress, i.e. CRH proportionately responsive to overall stress and cortisol levels

- **Adrenocorticotropic Hormone (ACTH)**
  - Blunted response, i.e. under-responds to CRH stimulation → low ACTH

- **Cortisol**
  - Hyper-responsive to ACTH despite low ACTH response to CRH. This is due to hypertrophied (swollen) adrenal cortex tissues from hypersensitivity to ACTH producing an abundance of cortisol.
  - As a result, even though CRH response to stress is normal and ACTH is low, cortisol is high.

HPA Axis Hormones in Atypical Depression

- All stress hormones of the HPA axis are low.
  - CRH
    - Under-responsive to stress, i.e. does not rise proportionately to level of stress → low CRH
  - ACTH
    - Under-responsive to CRH stimulation → low ACTH
  - Cortisol
    - Under-responsive to ACTH → low cortisol

HPA Axis Hormones in Cushing’s Syndrome

• CRH
  o Normal to ↓ Blunted response to cortisol and stress

• ACTH
  o Primary Cushings – from adrenal adenoma (adrenal tumor); ACTH ↓
  o Secondary Cushing’s – from benign pituitary adenoma; ACTH is highly ↑
    ❖ Hyper-responsive to CRH stimulation → highly ↑ ACTH
  o Exogenous Cushing’s – from corticosteroid use
    ❖ Initially ↓ ACTH
    ❖ ACTH may eventually return to normal if corticosteroid use is discontinued.

• Cortisol
  o ↑↑ If Cushing’s is caused by an adrenal adenoma (primary Cushing’s)
  o ↑↑ If Cushing’s is caused by pituitary tumor (secondary Cushing’s)
    ❖ Adrenal cortex response is normal to ACTH, → highly ↑ cortisol
  o If Cushing’s is caused by corticosteroid use (exogenous Cushing’s)
    ❖ Adrenal cortex is shut down
    ❖ Serum cortisol levels are ↑ to ↑↑ as long as corticosteroids are taken
    ❖ If corticosteroids are withdrawn, cortisol often sinks to or near zero and can be a medical emergency.
Cushing’s Syndrome

- Moon face
- Dark facial hair (in women)
- Cardiac hypertrophy
- Obesity
- Abdominal striae
- Amenorrhea (in women)
- Muscle wasting in the extremities
- Skin ulcers (poor wound healing)
- Buffalo hump
- Osteoporosis
Cushing’s Syndrome

- Thinning of hair
- Red cheeks
- Buffalo hump
- Supraclavicular fat pad
- Increased body and facial hair
- Weight gain
- Purple striae
- Pendulous abdomen
- Ecchymosis resulting from easy bruising
- Thin skin and subcutaneous tissue
- Slow wound healing

Image: Diagram illustrating physical features associated with Cushing's Syndrome.
Depression is common in Cushing’s Syndrome\(^1\)

- 50-81% of Cushing Syndrome patient’s suffer from major depression. \(^1\)

HPA Axis in Addison’s Disease

- **CRH**
  - Normal responsiveness to stress (varies as the stress varies)
  - If cortisol is ↓ CRH is ↑ (i.e. normal negative feedback response to cortisol)

- **ACTH**
  - Normal responsiveness to CRH stimulation
  - If CRH is ↑, ACTH is ↑

- **Cortisol**
  - Extremely low or non-existing levels
  - Adrenal gland does not produce cortisol due to absence of functioning adrenal gland tissue caused by:
    - Infection or autoimmunity eroding 90% or more of the gland
    - Overuse of corticosteroids causing adrenals to shut down and subsequently atrophy from disuse (now, the most common cause)
Addison's Disease

(Primary Hypoadrenalism)

1. Adrenal Gland
   - Outer Cortex
   - Produces Steroids:
     - Cortisol
     - Aldosterone
     - Androgen

2. Destruction of Entire Adrenal Cortex

3. What's causing this...
   a. 90% - destruction of entire adrenal cortex by organ specific autoantibodies
   b. Rarer causes - haemorrhage, malignant infiltration, adrenal gland tuberculosis

4. What are the clinical features:
   a. Non-Specific Symptoms:
      - Lethargy
      - Depression
      - Anorexia
      - Weight Loss
   b. What else to look out for:
      - Postural Hypotension
      - Hyperpigmentation
      - Vitiligo
      - Loss of body hair in women
   c. Addisonian Crisis:
      - Vomiting
      - Abdominal pain
      - Profound weakness
      - Hypoglycaemia
      - Hypovolaemic Shock

https://www.google.com/search?q=addison%27s+disease+(primary+hypoadrenalism)&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiRiO2o6pzdAhWPAnwKHWHbzCz5Q_AUICigB&biw=1274&bih=598#imgrc=9MNzOdZqGNZIRM: (sourced Sept 2, 2018)
Addison’s Disease

HPA Axis Hormones in Metabolic Syndrome

- **CRH**
  - Normal or elevated
  - Normal responsiveness to stress*
  - Normal responsiveness to cortisol levels

- **ACTH**
  - Somewhat elevated – may be due to CRH stimulation*

- **Cortisol**
  - Using 4-samples/day salivary cortisol test
    - Elevated during part or all of the day*
    - At least 2 of 4 test points are high-normal or high
    - Often all 4 test points are high
  - Elevated cortisol are associated with all the major signs and symptoms of metabolic syndrome.
  
  *results are mixed with large variation
HPA Axis Hormones in Adrenal Fatigue

- **CRH**
  - Normal responsiveness to cortisol levels
  - Less responsive to stress if cortisol levels are low
- **ACTH**
  - Normal to mildly elevated during stress
- **Cortisol**
  - Generally less responsive to ACTH
  - Levels tend to be low-normal or low
  - Using 4-samples/day salivary cortisol test
    - At least 2 of 4 test points are low-normal or low
    - Often all 4 test points are low
  - Signs and symptoms generally correspond with cortisol levels.
Cortisol Levels Related to Most Depression

- Altered cortisol levels, either high or low, are seen in all of the above health conditions involving depression.
- Melancholic depression and Cushing’s syndrome have highly elevated cortisol; metabolic syndrome has mildly elevated cortisol levels.
- Atypical depression and Addison’s disease have extremely low cortisol levels; adrenal fatigue has mildly low cortisol levels.
- Either high or low cortisol levels are a consistent finding in most depression, with cortisol named as a causal and/or participating factor by most experts.
# HPA Axis Variability in Depression

<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>CRH</th>
<th>ACTH</th>
<th>Cortisol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melancholic</td>
<td>N(^1)(\downarrow)</td>
<td>(\downarrow^2)</td>
<td>(\uparrow\uparrow^3^*)</td>
</tr>
<tr>
<td>Atypical</td>
<td>(\downarrow\downarrow^*)</td>
<td>(\downarrow\downarrow)</td>
<td>(\downarrow\downarrow)</td>
</tr>
<tr>
<td>Cushing's</td>
<td>N/ (\downarrow)</td>
<td>(\uparrow\uparrow\uparrow) if pit. tumor</td>
<td>(\uparrow\uparrow^*) if adrenal adenoma</td>
</tr>
<tr>
<td>Addison's</td>
<td>N/ (\uparrow)</td>
<td>(\uparrow)</td>
<td>(\downarrow\downarrow^*)</td>
</tr>
<tr>
<td>Metabolic Syndrome</td>
<td>N/ (\uparrow)</td>
<td>N/ (\uparrow)</td>
<td>(\uparrow) all or part of day*</td>
</tr>
<tr>
<td>Adrenal Fatigue</td>
<td>N</td>
<td>N/ (\uparrow)</td>
<td>(\downarrow) all or part of day*</td>
</tr>
</tbody>
</table>

1. N= Normal response to stress – rises and falls appropriate to amount of stress and/or circulating cortisol
2. Under-responsive
3. Hyper-responsive to ACTH

* Primary source of dysregulation
** Secondary source of dysregulation
The HPA Axis & How it is Related to Adrenal Dysfunction Seen in Your Clinic
Clinical Relevance of MDD

• Healthcare practitioners, especially those in the holistic healthcare field, rarely see the classic forms of MDD (melancholic, atypical or mixed type) in their clinics. In my four decades of professional experience (approximately 100,000 patient visits), I saw only two cases of MDD.

• If you do have a patient presenting with the classic symptoms of MDD, it’s best to refer them to a specialist for treatment of the depression but work in conjunction with the specialist to address other aspects of the patient’s health that may be contributing to and/or exacerbating the depression.
Clinical Experience with Depression

- Although I seldom saw MDD, I frequently saw milder types of depression in my clinic and had excellent results using the individualized treatment approach that follows, based on a comprehensive intake interview, clinical examination and laboratory tests.
- Depression may not be the primary reason for their initial visit to the office of a holistic healthcare physician. However, if depression is present, it should be uncovered during a proper intake interview, physical examination and follow-up visits.
Treat the Patient, Not the Illness

As holistic healthcare providers, we view depression as a part of a symptom complex that gives us clues to what is out of balance in the patient. So as we re-establish balance, the depression goes away.
We treat the dog,
not the tail!
Treat the Patient, Not the Illness cont.

- We treat the person with depression (the whole dog), not the depression (the tail).
- We use the depression to get a more complete understanding of the person so we can treat the person as deeply as possible, keeping in mind what we need to do to make them as comfortable as possible on their road back to balance and health.
- We also treat the depression.
To help patients with the kind of depression most likely seen frequently in your clinic, it is important to be able to recognize, diagnose and treat the high and low cortisol conditions of metabolic syndrome and adrenal fatigue.
Depression and Cortisol

• Signs and symptoms of mild depression are commonly seen in both the low and high cortisol syndromes of adrenal fatigue and metabolic syndrome, respectively.
• Therefore, when a patient has low cortisol (adrenal fatigue) or high cortisol (metabolic syndrome) look for signs and symptoms of depression.
• Vice versa: When depression is present, be certain to check for metabolic syndrome and adrenal fatigue.
In All Cases of Depression

• If a patient is depressed, always look for physiological imbalances that could be contributing or causal factors.
  o Look for signs and symptoms of metabolic syndrome or adrenal fatigue.
  o Check cortisol levels.
  o Do other clinical and/or laboratory tests as indicated.
If Depression is Suspected

- If you suspect the patient is significantly depressed, give them the Hamilton Rating Scale for Depression. (handout)
- If their responses confirm your suspicions of MDD, discuss with them the possibility of working with you and a practitioner who specializes in depression (preferably one who can prescribe drugs, if needed).
- The professional you chose to work with must be sympathetic to and willing to work with alternative healthcare practitioners.
Diagnosing High and Low Cortisol Conditions
The Cortisol Tightrope Walk

1. Stress → Excess cortisol → ↑ Glucose → ↑ Insulin resistance → Metabolic Syndrome (Syndrome X)

2. Stress → Excess cortisol → Adrenal Fatigue (Functional Hypoadrenia)

3. Stress → Decreased cortisol → Adrenal Fatigue
The Initial Examination

• If indications of metabolic syndrome or adrenal fatigue are present, the patient should also be examined for indicators of:
  o Metabolic Syndrome
  o Adrenal Fatigue

in addition to the usual physical examination
Diagnosis of Metabolic Syndrome (Syndrome X)
Metabolic Syndrome or Syndrome X
Original (1988) Definition – Gerald M. Reaven

• The simultaneous occurrence of any 2 or more of the following:
  o Insulin resistance and glucose intolerance – elevated or erratic levels of glucose with insulin resistance
  o Excess body fat around the stomach or chest
  o Elevated total cholesterol (>240 mg/dl) with elevated triglycerides (>160 mg/dl) & low HDL (< 40 mg/dl)
  o High blood pressure (> 140/90)
Current Definition of Metabolic Syndrome

- **Glucose intolerance**: glucose >99 mg/dl
- **Visceral obesity**
  - Body Mass Index (BMI) \[weight \text{ (kg)} / \text{height} \text{ (m}^2\text{)}\] > 30; 23 for Asian
  - Waist circumference: > 100 cm (40") male; > 87.5 cm (35") female
  - Waist/hip ratio
- **Hypertension**
  - >140/90 mm hg as a single marker
  - >130/80 if other indications of metabolic syndrome are present
- **Dyslipidemia**
  - HDL cholesterol Men > 40 mg/dl Women > 50 mg/dl
  - LDL Cholesterol > 200 mg/dl
- **Inflammation**
  - C-reactive protein > 2.0 mg/dl

Note – The above tests must be confirmed with 2-3 repeated tests over a 3-6 month period. A single test is not diagnostic.

Houston MC. The metabolic Syndrome. JANA 2005; 8(2) 3-83.
Consequences of Metabolic Syndrome

- Diabetes (AODM, NIDDM)
- Cardiovascular disease
- Osteoporosis
- Depression
- Hormone irregularities
- Cancer
Metabolic Syndrome and Depression

“Major depression is associated with a 4-fold increased risk for premature death, largely accounted by cardiovascular disease (CVD). The relationship between depression and CVD is thought to be mediated by the so-called metabolic syndrome (MeS). Epidemiological studies have consistently demonstrated a co-occurrence of depression with MeS components, ie, visceral obesity, dyslipidemia, insulin resistance, and hypertension.”

The Central Role of Cortisol in Metabolic Syndrome

• Increased cortisol is a strong contributor to glucose intolerance, insulin resistance, visceral obesity, hypertension, dyslipidemia and microalbuminurea.

The Central Role of Cortisol in Metabolic Syndrome cont.

- “Administration of a selective, potent 11 beta-HSD1* inhibitor into diet-induced obese mice [the equivalent of a cortisol reducing activity in humans] resulted in lower body weight, insulin, fasting glucose, triglycerides, and cholesterol and lower fasting glucose, insulin, glucagon, triglycerides, and free fatty acids, as well as improved glucose tolerance…”1

- “The results show…excess glucocorticoids produce both central obesity and diabetes.”2

* 11 beta-HSD1 in mice is equivalent to 11 beta –HSD2 activity in humans.

The Central Role of Cortisol in Metabolic Syndrome cont.

- Therefore, **controlling cortisol** is often a key factor in normalizing physiology and controlling, limiting and reversing metabolic syndrome and the disorders it spawns such as depression, insulin resistance, full blown diabetes, hypertension and heart disease.
The Initial Examination

• The physical examination begins the moment your patient walks through your door.
  o What does their face tell you?
  o What does their body tell you?
  o What does their posture tell you?
  o What does their handshake tell you?
Clinical Observations

• Does his/her stomach proceed him/her?
• Does he/she have an apple body type?
• Does he/she have his/her own personal spare tire?

• But metabolic syndrome is not always obvious.
General Symptoms of Metabolic Syndrome

• Unexplained fatigue
• Brain fogginess and inability to focus
• Intestinal bloating/gas
• Sleepiness almost immediately after a high carbohydrate meal (20-30% CHOs)
• Depression independent of depressive events
• Erectile dysfunction (ED)
In-Office Diagnosis of Metabolic Syndrome

• Diagnosis of metabolic syndrome is primarily determined by in-office measurements and simple laboratory tests.
Tools for In-Office Diagnosis of Metabolic Syndrome (handout)

- Cloth tape measure
- Scales (measures in Kg; goes to 350 lbs+)
- Sphygmomanometer
- Glucose monitoring device (glucometers)
- Urinary multi-sticks or glucose strips
- Activity and dietary info sheet (use the handout “Salivary Cortisol Test Daily Information Sheet”)

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Visceral Obesity

- Instruments: cloth measuring tape and scales
- Body/mass index =
  - Weight (kg) ÷ height$^2$ (m) or [weight (lbs) × 703] ÷ height$^2$ (in.)
    - Overweight BMI >25 [>21 in Asians of either sex]
    - Obese BMI >30 [>23 in Asians of either sex]
  - Waist measurement
    - >40" (male); >35" (female)$^1$
  - Waist/hip ratio
    - >.90 (male); >.85 (female)$^2$

(1 kilogram = 2.2 lbs; 1 meter = 39.37 inches)

1. NCEP-ATP III
2. World Health Organization
Hypertension

- **Instrument**: sphygmomanometer
  - Resting blood pressure (BP)
    - >140/90 mm hg as a single marker; >130/80 if other indications of metabolic syndrome are present
    - Note that office samples of BP are notoriously inaccurate.
    - Most accurate BP is taken at home when the person is at leisure.
    - Repeated measures are needed to be diagnostic.

Note – Insulin resistance often precedes hypertension by 10-20 years.\(^1\) Therefore, if hypertension is present, metabolic syndrome is often well established.

Laboratory Tests for Metabolic Syndrome
Salivary Tests for Metabolic Syndrome

- **Salivary Cortisol Test**
  - 4 saliva samples done at home: upon waking, noon, late afternoon, at bedtime
  - Use with Salivary Cortisol Test Daily Information Sheet© (handout)
  - Test for cortisol (4 times in a day), DHEAS, estrogen, progesterone and testosterone
  - Indicates if elevated cortisol is contributing to metabolic syndrome
  - Results positive for metabolic syndrome if:
    - Predominantly elevated cortisol levels throughout the day
    - Spiking cortisol of any 2+ levels during the day
  - Increased cortisol is a strong contributor to glucose intolerance, visceral obesity, hypertension, dyslipidemia and microalbuminuria.
Dietary and Lifestyle Analysis

- **Salivary Cortisol Test Daily Information Sheet (handout)**
  - Indicates lifestyle, food and beverage intake, and overall stress levels
  - Provides valuable clues to causes, contributing factors and treatment of metabolic syndrome

- **Look for indicators of**
  - Lifestyle – how they spend their time*
  - Sources and types of stress*
    - Good for me/bad for me chart
    - Health timeline
  - Caffeine consumption*
  - Dietary intake*
  - Exercise program and patterns*

* affects Cortisol
Blood Tests for Metabolic Syndrome

- Fasting blood glucose (< 85 mg/dl)
- Postprandial glucose (<160 mg/dl)
- Fasting insulin [< 25 mIU/L; < 174 pmol/L (SI units)]
- Postprandial insulin: pre AM meal; 30, 60, 90, 120, 150 minutes pp
  - < 5X baseline (pre AM meal)
- Total cholesterol (<220 mg/dl)
- HDL > 40 mg/dl with sub particles A and B (A>B)
  - A = good; particles are light and fluffy, like cotton puffballs
  - B = bad; particles are small and dense, like BBs
- LDL < 160 mg/dl with sub particles A and B (A>B)
  - A = good; particles are light and fluffy, like cotton puffballs
  - B = Bad; particles are small & dense, like BBs
- Triglycerides (<100 mg/dl)
- C-reactive protein < 2.0 mg/dl
Diagnosis of Metabolic Syndrome

- Positive for metabolic syndrome if any 3+ of following:
  - Glucose intolerance
    - Elevated or erratic levels of glucose > 85 mg/dl fasting; 160 mg/dl pp
    - Insulin resistance >25 mIU/L fasting; >5X fasting baseline pp
  - Excess body fat around the stomach or chest
    - BMI >25
    - Waist >40" males; >35" females
    - Hip/waist ratio >.90 males; >.85 females
  - Elevated total cholesterol
    - Total cholesterol >220 mg/dl
    - Elevated triglycerides (>100 mg/dl) and
    - Low HDL (< 40 mg/dl); sub-particles A<B
    - High LDL (>160 mg/dl); sub-particles A<B
  - High blood pressure (>140/90 as a standalone sign or >130/85 in combination with other signs – multiple readings, out of office)
  - C-reactive protein >2.0 mg/dl = inflammation
  - Salivary cortisol – high normal or high at least 2 of 4 X/day
Depression is a Common Finding in Metabolic Syndrome
Diagnosis of Adrenal Fatigue
Adrenal Fatigue is Adrenal Depletion

• If the adrenals are destroyed by an infection or autoimmune disease, or adrenal function is totally suppressed by the overuse of corticosteroids, it is called Addison’s disease and can be a medical emergency that can even result in death.

• However, most people who have depleted, less responsive adrenal glands are not medical emergencies, but drag themselves through life not knowing what is wrong with them.

• These people are suffering from adrenal fatigue.
Definition of Adrenal Fatigue

- The sub-optimal functioning of the adrenal glands
  - At rest
  - Under stress
  - In response to constant, intermittent or sporadic demands
- When the adrenal glands cannot keep pace with the demands placed upon them by the total amount of stress – that is adrenal fatigue.
Adrenal Fatigue Prevalence

• Adrenal fatigue is very common and seen daily by healthcare practitioners in adults and children.

• Adrenal fatigue occurs both as a distinct clinical disorder and as a contributing factor to many chronic illnesses.
Diseases Involving Decreased Adrenal Function

- Fibromyalgia
- Chronic fatigue syndrome
- Rheumatoid arthritis
- Other autoimmune disorders
- Asthma
- Influenza
- Respiratory ailments – bronchitis, pneumonia
- Most diseases for which corticosteroids are prescribed in the treatment
Clinical Conditions Involving Decreased Adrenal Function

- Decreased immunity
- Lack of stamina
- Emotional paralysis
- Post Traumatic Stress Disorder (PTSD)
- Poor wound healing
- Increased susceptibility to infection
- Weak cardiac function (inotropic and chronotropic)
Clinical Conditions Involving Decreased Adrenal Function cont.

- Alcoholism and drug addiction
- Burnout (a form of adrenal fatigue)
- Hypoglycemia (low blood sugar)
- Allergies
  - Environmental sensitivities
  - Hyperallergic and universal reactors
  - Chemical intolerance
- Toxic chemical exposure
- Multiple chemical sensitivity (MCS)
Clinical Conditions Involving Decreased Adrenal Function cont.

- Unresponsive hypothyroidism
  - Persistence of hypothyroid symptoms despite treatment with thyroid hormones
- Sexual dysfunction, lack of libido
- Increased perimenopausal and menopausal signs and symptoms
- Increased premenstrual (PMS) signs and symptoms, especially depression
Adrenal Fatigue Common Symptoms

• Daily energy patterns specific to adrenal fatigue
  o Morning fatigue (doesn't really wake up until about 10 AM)
  o Usually feels much better and fully awake after noon meal
  o Afternoon low 2-4 PM
  o Typically feels best after 6 PM
  o Normally tired at 9-10 PM but resists going to bed
  o Gets a second burst of energy at approximately 11 PM that can last until 1-2 AM
  o Wants to sleep late the next morning
  o Best, most refreshing sleep often comes from 7-9 AM
  o Frequently does best work late at night (early morning)
Adrenal Fatigue Common Symptoms cont.

- Food patterns
  - Craves salt and foods high in salt
  - Usually craves foods high in fat
  - Feels better with high fat diet
  - Often uses high fat foods with caffeine to drive themselves
  - Frequently becomes hypoglycemic, especially under stress
  - Intolerance to high potassium foods (beans, veal, molasses, bananas, dried fruit), especially in the morning
    - Can be expressed as disliking these foods
  - Usually does not handle carbohydrates well without fats or protein
Tools for In-Office Diagnosis of Adrenal Fatigue

- Adrenal Fatigue Questionnaire© (handout)
- Sphygmomanometer
- Penlight and watch or timer
- Exam table on which patient can lie down
Adrenal Fatigue Questionnaire

• The questionnaire provides invaluable information about:
  o The presence of adrenal fatigue
    ❖ Total number of questions with affirmative answers >26 men, > 32 women
  o Predisposing factors, possible origin/causes of their adrenal fatigue
  o Symptomatology
    ❖ Key signs and symptoms
    ❖ Energy patterns
    ❖ Frequently observed events
    ❖ Food patterns
    ❖ Aggravating factors
    ❖ Relieving factors
Adrenal Fatigue Questionnaire cont.

- Severity of adrenal fatigue – Total Points
  - Mild: 44-87 (men), 45-88 (women)
  - Moderate: 88-130 (men), 89-132 (women)
  - Severe: above 130 (men), 132 (women)

- Progression/Recovery – Past vs Present
  - It can be used, along with salivary cortisol, for initial diagnosis and for monitoring progress in therapy.
Include the Adrenal Fatigue Questionnaire© in Your Patient Intake Forms

- Include the Adrenal Fatigue Questionnaire© (handout) in your initial patient intake information packet and have the patient complete them as part of their initial paperwork.
- This provides the advantage of knowing if someone is suffering from adrenal fatigue and is often a helpful guide in your initial patient interview and subsequent examination.
Clinical Tests

Indicates adrenal fatigue if at least 2 of the 4 clinical tests are positive.

- Iris contraction (penlight, watch/timer)
  - With patient seated in darkened room for 2 minutes, shine penlight across each eye. Positive if pupil cannot hold contraction and dilates while light is shining across iris.

- Postural low blood pressure (sphygmomanometer, exam table)
  - With patient prone, take BP. Stand patient up and retake BP (caution, patient may be dizzy). Positive if BP drops by 10 mm/Hg or more upon rising from prone position.

- Sergent's white line (blunt instrument, exam table, watch/timer)
  - With patient prone, draw blunt end of neurological hammer or other blunt instrument across abdomen with about 5 kg pressure. Positive if line stays white and lasts approximately 2 minutes or more.

- Rogoff's sign (exam table)
  - With patient supine, press firmly with thumbs with about 5 kg pressure on dorsal area approximately 1" lateral to spine between the 11th and 12th ribs (location of the adrenals). Positive if pain or discomfort is produced.
Laboratory Tests for Adrenal Fatigue

- **Salivary Cortisol Test**
  - Have patient do 4 saliva samples at home on a typical day:
    - Upon waking, noon, late afternoon, at bedtime
  - Use with Salivary Cortisol Test Daily Information Sheet© (handout).
  - Test for cortisol (4 times in a day); and DHEAS, estrogen, progesterone and testosterone (from 1st sample in morning)
  - Important indicator but not a prerequisite for beginning the remedial program.
  - It can be used, along with the questionnaire and clinical tests, for adrenal fatigue diagnosis and for monitoring progress in therapy.
  - Salivary cortisol test results should roughly correlate with adrenal fatigue questionnaire results to indicate adrenal fatigue.
Depression is a Common Finding in Adrenal Fatigue
Other Endocrine Imbalances that Involve Depression

- Low estrogen
- Low testosterone
- Low progesterone
- Low dehydroepiandrosterone (DHEA) and DHEAS
- Low Thyroid

Treating Metabolic Syndrome and Adrenal Fatigue
Metabolic Syndrome
Standard Medical Treatment

• Purpose – control the symptoms
• Dyslipidemia → statins
• Hypertension → anti-hypertensives
• Elevated blood glucose → Metformin or other blood glucose regulators
• Overweight → appetite suppressants, amphetamines, referred to dietitian, 900 calorie diet, gastric bands, gastric resection
Adrenal Fatigue
Standard Medical Treatment

- None
- Corticosteroids
- Anti-depressants
- Hypnotics
- Anti-anxiety medications
- Amphetamines
- Referral to a psychiatrist
Holistic Treatment for Metabolic Syndrome and Adrenal Fatigue
Holistic Treatment Goals for Metabolic Syndrome and Adrenal Fatigue

• Help patient to:
  o Decrease and manage stress load
  o Create a healthy lifestyle

• Use dietary supplements to:
  o Replenish stress-depleted nutrients
  o Normalize blood glucose, blood pressure,
  o Normalize HPA axis function, especially adrenal function

• Restore body to optimal health so dietary supplements are no longer needed
Metabolic Syndrome Specific Treatment Goals

- **Decrease** cortisol levels to normal
- Normalize adrenal function
- Rebalance HPA axis
- Decrease blood glucose levels to normal
- Reverse pre-diabetes/diabetes
- Decrease blood pressure to normal
- Increase insulin sensitivity
- Decrease inflammation and increase antioxidant status
- Normalize lipid levels
- Normalize weight to within ideal range
- Improve cardiovascular health
- Improve immune function
Adrenal Fatigue
Specific Treatment Goals

- Increase cortisol levels to normal
- Normalize adrenal function and increase capacity to respond appropriately to stress
- Rebalance HPA axis
- Normalize blood glucose levels
- Raise blood pressure to normal
- Improve immune function
- Improve digestion
Requirements of Successful Treatment

- Successful treatment of metabolic syndrome and adrenal fatigue requires:
  - Lifestyle changes
  - Regular exercise
  - Dietary changes
  - The correct dietary supplements
  - Commitment
Lifestyle Changes for Adrenal Fatigue and Metabolic Syndrome
Metabolic syndrome and adrenal fatigue are often primarily lifestyle disorders.

- Stress overload
- Lack of exercise
- Lack of quality sleep
- Excess refined carbohydrates or high glycemic/low nutrition food consumption
- Caffeine ingestion
Lifestyle Changes for Metabolic Syndrome and Adrenal Fatigue

• Minimize stress
• Actively diffuse tension and stress*
• Relax regularly*
• Do breathing exercises*
• Get 8+ hours of sleep nightly
• Laugh often – very important to healing*

 *= Parasympathetic enhancers (The adrenals have very limited parasympathetic nerve control)
Lifestyle Changes for Metabolic Syndrome and Adrenal Fatigue cont.

- Do not get out of bed in the morning until you think of something pleasant.*
- Take a daily break(s) for enjoyment*
- Exercise moderately daily.
- Do relaxation response exercises regularly.*
- Expect something good to happen daily.

*= Parasympathetic enhancers (The adrenals have limited parasympathetic nerve control.)
Lifestyle Change for Metabolic Syndrome & Adrenal Fatigue cont.

Take a sheet of paper and divide it as below

<table>
<thead>
<tr>
<th>Good for Me</th>
<th>Bad for Me</th>
</tr>
</thead>
<tbody>
<tr>
<td>(makes me feel more alive, healthy, happy)</td>
<td>(drains me, takes away my energy, health)</td>
</tr>
</tbody>
</table>

1. 
2. 
3. 
4. ...1028

1. 
2. 
3. 
4. ...6820

P. 101
Lifestyle Changes for Metabolic Syndrome and Adrenal Fatigue cont.

• Locate and eliminate the “energy robbers” in your life (p. 103).
• Use reframing techniques to shift mental framework (see p.112).
• Make a road map for the kind of life you want: 2 or 3 obtainable personal goals that would significantly add to the quality of your life.
Metabolic Syndrome: Lifestyle Changes

- Slow down
- Balance life
  - Work/home balance
  - Relaxing free time/work
  - Mental reframing – eliminate the “oughtas, gottas and shoulds”
  - Replace with “wantas” – Songs of your heart – doing things that bring enjoyment and happiness into your life
Adrenal Fatigue: Lifestyle Changes

- Quit pushing self
- Rest when tired whenever possible
- Balance life
- Lie down during work breaks
  - Brief (15-30 minute rest) at 10 AM
  - Brief (15-30 minute rest) between 3-5 PM
- Early to bed (9-9:30 PM)
- Sleep 8-10 hours per day
- Sleep-in (until 9AM) whenever possible
Exercise Protocols for Metabolic Syndrome and Adrenal Fatigue
Exercise for Metabolic Syndrome

• Caution!
  o Most people with metabolic syndrome are more than 20% above ideal body weight.
  o They may need to begin with a simple exercise program and progress to interval training.
  o It may take a year or more before their body is ready for HIIT or other training, if ever.
  o The object is for them to move in the right direction – towards optimal health.
Exercise for Metabolic Syndrome cont.

• Purpose- Decrease excess cortisol, blood glucose, insulin & BP levels
• Step 1: Get them moving!
  - Have them do exercise of any sort
  - At the same time each day
  - 15-30 minutes per session
  - 4 to 5 days per week
• Step 2: Gradually increase their energy output and toning efforts.
• Step 3: High energy workouts – e.g. High Intensity Interval Training (HIIT)
Exercise for Metabolic Syndrome: Advanced

• Emphasize aerobic exercise, leading to:
  o Greater performance of short duration
    ❖ Short duration – Each exercise lasts from a few seconds to a maximum of 2 minutes (e.g., Tobata Training).
    ❖ Total workout time – 9-18 minutes/day
  o High intensity activities
Exercise for Metabolic Syndrome: Advanced cont.

• High Intensity Interval Training (HIIT)
  o High intensity periods or bursts of exercise designed to elevate heart rate to near maximum (220 bpm – age).
  o Workout usually includes 6-8 different exercises often focused on a particular area of the body with each one performed at maximum effort.
Exercise for Adrenal Fatigue

• Purpose – elevate adrenal activity (increase cortisol and blood glucose levels)

• Include a variety of exercises
  o Flexibility – yoga, tai chi, stretching
  o Anaerobic – weight lifting, strength building, pilates
  o Aerobics – walking, slow runs, rowing, cycling

• Exercise according to the individual’s capacity
  o Any exercise, any length, any level as long as
    ❖ The patient is not more tired within 60 minutes after doing exercises
    ❖ Or is not more tired the next morning

• Avoid highly competitive events
Dietary Protocols for Metabolic Syndrome and Adrenal Fatigue
Diet for Metabolic Syndrome and Adrenal Fatigue

• Eliminate:
  o White flour foods – e.g. pasta, pizza, bagels, pretzels, most breads and baked goods
  o Sugar and concentrated sweeteners – barley malt, beet sugar, cane sugar, corn syrup, corn syrup solids, date sugar, dextrose, fructose, high-fructose corn syrup, pasteurized honey, maltodextrin, turbinado sugar
  o Trans-fatty acids, hydrogenated and partially hydrogenated oils
  o Caffeine
3 to 5 servings daily of each food group and, believe it or not, you'll start feeling the results immediately.
Diet for Metabolic Syndrome and Adrenal Fatigue cont.

• Include:
  o Organically grown foods
  o Foods that are as natural and fresh as possible
  o Low glycemic index foods (keep carbohydrate-dense foods low)
  o Foods that favor omega 3 fatty acids over omega 6 fatty acids*
    ❖ Wild game
    ❖ Norwegian sardines
    ❖ Dark green vegetables
    ❖ Ocean fish (low mercury), shell fish

* Especially important in metabolic syndrome
Eat what grows into, out of or runs around on the ground or is taken from the water.
## Diet for Metabolic Syndrome and Adrenal Fatigue cont.

### Metabolic Syndrome
- High protein – white meat and vegetable protein
- Low sodium/high potassium diet
- Abundant vegetables
- Low glycemic index foods
- Low fat and oil content
- Low calorie diet

### Adrenal Fatigue
- High protein – some meat at most meals.
- High sodium/low potassium diet
- Abundant vegetables
- Low glycemic index foods
- High fat and oil content
- No caloric restrictions unless overweight
# Dietary Tips for Metabolic Syndrome and Adrenal Fatigue

## Metabolic Syndrome
- Avoid overeating
- Eat less
  - Quit eating before full
  - Eat only when hungry
  - Eat small regular meals
  - Chew foods well
- Avoid food that stimulates insulin or blood sugar

## Adrenal Fatigue
- Eat before 10 AM and again before noon
- Eat before hungry
- Avoid fruit in the morning
- Add salt ad lib
- Avoid missing meals
- Meals should emphasize protein, fat and unrefined carbohydrates together
Dr. Lam’s Modified Mediterranean Diet
Dietary Supplements for Metabolic Syndrome and Adrenal Fatigue
Super Adrenal Stress Formula®

- Vitamin/mineral combination specifically designed to support adrenal hormone production and stressed bodies
  - B complex in sufficient quantities with balanced ratios
    - Niacin (125-150 mg/day) as inositol hexaniacinate
    - B-6 (150 mg/day) – P5’P often better utilized
    - Pantothenic acid (1200-1500 mg/day)
    - Other B vitamins in well-balanced ratios
  - Trace minerals in the proportion they are needed for the adrenal cascade
  - Sustained release for slow release of nutrients
Super Adrenal Stress Formula® cont.
Super Adrenal Stress Formula® cont.

Metabolic Syndrome

- Purpose – Replace nutrients burned in high amounts during stress at rates food cannot replace
  - Prevents burn-out
  - Increases stress resilience

- Dosage – 2 to 3 caplets per day

Adrenal Fatigue

- Purpose – Replenish nutrients required for adrenal cascade function depleted by stress
  - Increases adrenal cascade function
  - Speeds recovery
  - Increases stress resilience
  - Decreases signs and symptoms of adrenal fatigue

- Dosage – 3 to 5 caplets per day
Adrenal C Formula®

- Vitamin C source for stress
- 1:2 ratio of bioflavonoids to vitamin C
- pH balanced
- Contains trace minerals used in the adrenal cascade to sequester free-radicals
- Does not upset stomach
- Sustained release for slow release of nutrients
Adrenal C Formula® cont.
**Metabolic Syndrome**

- **Purpose** – Replaces vitamin C, bioflavonoids and minerals used in high amounts during stress at rates food cannot replace.
  - Increases anti-oxidant activity
  - Decreases accelerated oxidative damage of stress
  - Prevents cross fiber scarring in injuries
  - Provides constant source of vitamin C to adrenals
  - Helps prevent adrenal fatigue and burn-out
- **Dosage** - 2 to 3 caplets/day

**Adrenal Fatigue**

- **Purpose** – Provides vitamin C and related nutrients required for proper adrenal cascade function depleted by stress.
  - Increases adrenal cascade function
  - Speeds adrenal repair and recovery
  - Provides antioxidants and free-radical sequestration for adrenal cell mitochondria and cytosol SOD
  - Provides a vitamin C complex used by all tissues to recover from stress and adrenal fatigue
- **Dosage** - 3 to 5 caplets/day
Herbs to Balance the HPA Axis

• Herbal HPA® – Metabolic Syndrome
  o Withania somnifera (Ashwagandha)
  o Eleutherococcus senticosus (Eleuthero; aka Siberian Ginseng)
  o Lepidium meyenii (Maca)

• Herbal Adrenal Support Formula® – Adrenal Fatigue
  o Withania somnifera (Ashwagandha)
  o Eleutherococcus senticosus (Eleuthero; aka Siberian Ginseng)
  o Lepidium meyenii (Maca)
  o Glycyrrhiza glabra (Licorice)
Herbs to Balance the HPA Axis cont.

Metabolic Syndrome  Adrenal Fatigue
Herbs to Balance the HPA Axis cont.

**Metabolic Syndrome**

Herbal HPA

- **Purpose**
  - Balances HPA axis function to keep it from going into overdrive
  - Helps patients stay more calm and balanced during the day.
  - Often lessens mild depression
  - Helps patients relax and sleep more soundly when taken before bedtime

- **Dosage**
  - 15-30 drops 2 to 3 times/day, including bedtime

**Adrenal Fatigue**

Herbal Adrenal Support Formula

- **Purpose**
  - Promotes HPA axis balance
  - Increases sensitivity to ACTH in adrenal cortex
  - Increases sensitivity to cortisol in hypothalamus
  - Makes patients feel more balanced, steady and calm during the day
  - Often lessens mild depression
  - Increases ability to sleep at night
  - Helps in recovery from adrenal fatigue

- **Dosage**
  - 20-40 drops 3 to 4 times/day, including bedtime
Good Sugar® – Metabolic Syndrome

A combination of metabolically active herbs and nutrients that increase insulin sensitivity, promote normal blood glucose levels and provide antioxidant support

• Adaptogenic herbs
  o Bilberry (Vaccinium myrtillus)
  o Bitter melon (Momordica charantia)
  o Cinnamon (Cinnamomum verum)
  o Fenugreek (Trigonella foenum-graecum)
  o Gulvel (Tinospora cordifolia)
  o Gymnema (Gymnema sylvestre)
  o Jambolan (Syzgium cumini)
  o Pterocarpus marsupium
Good Sugar® cont.

• Trace minerals
  o Magnesium citrate (40 mg/day)
  o Zinc citrate (15 mg/day)
  o Manganese gluconate (9 mg/day)
  o Chromium picolinate (240 µg/day)
  o Vanadium [vanadyl sulfate] (50 mg/day)
Good Sugar®
Good Sugar® cont.

• Purpose
  o Helps lower elevated blood glucose
  o Increases insulin sensitivity
  o Helps balance erratic or low blood glucose levels
  o Limits postprandial elevation of blood glucose and insulin when taken with meals
  o Helps stabilize insulin blood levels
  o Provides strong antioxidant activity (quenches many kinds of free radicals)

• Dosage – 1 to 3 per day taken with meals; can be taken before bedtime if needed
The Metabolic Syndrome Quartet
Adrenal Rebuilder® – Adrenal Fatigue

• The key for recovery from adrenal fatigue
• Multi-glandular extracts designed to fortify the adrenals and other glands of the HPA axis
  o Adrenal cortex
  o Hypothalamus
  o Anterior pituitary
  o Orchic tissue
  o Processed to remove hormones
Adrenal Rebuilder®
Adrenal Rebuilder®

• Purpose
  o Helps the adrenals and other glands of the HPA axis to repair themselves if damaged from stress and/or adrenal fatigue
  o Provides all the building blocks, cellular constituents, amino acids, peptides and proteins needed by the glands of the HPA axis to fully rebuild their structure
  o Works deeply to provide what no other supplement can: the actual complete gland tissue components, the glands can use to repair themselves more quickly and efficiently than otherwise possible.

• Dosage – 5-8 caplets per day
The Adrenal Fatigue Protocol®
Adrenal Fatigue Protocol Now in a Box!
Adrenal Fatigue Protocol Shelf Display
Summary
The HPA Axis, Cortisol and Depression

• There are 2 main classifications of classic major depressive disorders: Melancholic and Atypical.
• Melancholic depressives typically show high cortisol levels.
• Atypical depressives typically show low cortisol levels.
• Each have their own distinct HPA axis patterns.
Summary
The HPA Axis, Cortisol and Depression cont.

- There are also other types of depression that involve HPA axis dysregulation.
- The most common are associated with metabolic syndrome or adrenal fatigue.
- Although the practicing physician seldom sees the classic major types of depression, they often see the depression accompanying metabolic syndrome and adrenal fatigue.
Summary
The HPA Axis, Cortisol and Depression cont.

- Both adrenal fatigue and metabolic syndrome can be successfully treated by a combination of lifestyle changes, proper nutrition, the correct dietary supplements and exercise.
- Both take time (1-2 years) and consistent treatment for a successful outcome.
- Both can be dramatically affected and even reversed by proper treatment.
- The correct dietary supplements play an important role in recovery from both metabolic syndrome and adrenal fatigue.
- As adrenal fatigue and metabolic syndrome improve, the depression typically lessens.
Thank you for your attention and to Power2Practice for sponsoring this presentation. This entire presentation along with handouts will be available on the P2P website.

James L. Wilson ND, PhD