INE | INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

INSULIN RESISTANCE SOLUTION PRACTITIONER TRAINING

Sleep

With Dr. Ritamarie Loscalzo

Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

Sleep and Insulin Resistance

- ✓ The effect of sleep deprivation on hormones, mental function, blood sugar metabolism, energy, and weight
- ✓ How to adopt a bedtime ritual that encourages sound sleep, including activities, herbs, and supplements that improve sleep
- ✓ Understanding sleep cycles and how to choose a bedtime that optimizes deep sleep duration
- ✓ Understanding the hormone interactions during sleep that contribute to energy, focus, fitness, and a flat belly
- ✓ Optimizing hormones during sleep to assure balanced blood sugar, mental clarity, a fit body, and high energy

Sleep Facts

- ✓Between 1910 and 1960, “normal” average sleep duration was 9 hours
- ✓Current average is 7.5 hours
- ✓1/3 of population sleeps 6 hours or less
- ✓Shift workers sleep on average less than 5 hours per work day

Sleep Tidbits

- ✓ **70% of Americans are sleep deprived**.
- ✓ **One of the most common causes of being tired is lack of quality sleep**.
- ✓ According to Dr. Mark Hyman, the most important thing you can do for your health is have enough sleep.
- ✓ **Insufficient sleep leads to imbalance between melatonin and growth hormone,** leading to stunted growth, decreased repair, and slower healing.

Sleep Benefits

- ✓ **Fat burning:** reduces cortisol and increases leptin
- ✓ Increased lean body **growth and repair:** enhances growth hormone and DHEA
- ✓ Enhances **focus and attention**
- ✓ Detoxification and metabolic **waste removal**
- ✓ Enhances **learning**, memory, and creativity
- ✓ Improves **insulin sensitivity**
- ✓ **Decreases cancer risk** via melatonin
- ✓ Enhances serotonin and **reduces depression**
- ✓ **Reduces inflammation:** CRP higher with less than 6 hours of sleep
- ✓ **Enhances endurance** and stamina

Sleep Deprivation Effects

- ✓ Nurses and shift workers studies – higher incidences of heart disease
- ✓ Sleep deficit leads to performance loss, slowed reaction time, impaired memory, and decreased motivation
- ✓ Brain uptake of glucose drops as much as 7% with sleep deprivation
- ✓ One sleepless night can induce insulin resistance in healthy people

The 5 Stages of Sleep

Brain activity falls by only 10% during sleep

- ✓ **Stage 1: Lightest Sleep:** Transition sleep
  – very light, easily roused
- ✓ **Stage 2: Light Sleep:** Beginning of true sleep
  – muscles relaxed, loss of awareness

} 50%

- ✓ **Stage 3: Deep Sleep**
- ✓ **Stage 4: Deepest Sleep:** Restorative

} 25%

- ✓ **Stage 5: REM Stage:** Deep Sleep
  – dreaming

} 25%

Analyzing Sleep Cycles

On days you need to wake up at a certain time, pay attention to how long it takes you to fall asleep and how you feel when awakened.

Pick a day or two (i.e., a weekend when you don't need to get up at a specific time), go to bed at regular time, and sleep until you awaken naturally.

Note how long you sleep.

Calculate length of sleep cycle (see *Optimizing Sleep for Hormone and Blood Sugar Balance* document).

Hormones and Sleep

- ✓ Insulin/Glucagon
- ✓ Cortisol/DHEA
- ✓ Growth Hormone
- ✓ Leptin/Ghrelin
- ✓ Melatonin
- ✓ Estrogen/Progesterone
- ✓ Testosterone

Sleep Deprivation, Insulin Resistance, and Growth Hormone

- ✓ Sleep debt causes impairment in endocrine, cardiovascular, and immune systems.
- ✓ Glucose clearance rate depressed by 40% after 4 days of restriction of sleep to four hours a night, comparable to gestational diabetes.

  Spiegel K, Leproult R, Van Cauter, E Impact of sleep debt on metabolic and endocrine function. Lancet 1999 354: 1435-1439
- ✓ Glucose tolerance is decreased during sleep debt.

  Scheen AJ, Van Cauter E. The roles of time of day and sleep quality in modulating glucose regulation: clinical implications. Horm Res 1998;49(3-4):191-201

  Scheen AJ, Byrne MM, Plat L, Leproult R, Van Cauter E. Relationships between sleep quality and glucose regulation in normal humans. Am J Physiol 1996 Aug;271(2 Pt 1):E261-70
- ✓ 3 days of 10 - 12 hours of sleep can normalize fasting glucose.
- ✓ Sleep deprivation disrupts normal pattern of growth hormone surge during first three hours of sleep.

  Spiegel K, Leproult R, Colecchia EF, L'Hermite-Baleriaux M, Nie Z, Copinschi G, Van Cauter E. Adaptation of the 24-h growth hormone profile to a state of sleep debt. Am J Physiol Regul Integr Comp Physiol 2000 Sep;279(3):R874-83

Growth Hormone

- ✓ Increases protein synthesis in every cell
- ✓ Promotes the release of fat from cells
- ✓ Shifts cell fuel from glycogen and glucose to fat
- ✓ Promotes insulin sensitivity

Secreted in response to:

- ✓ Empty or emptying stomach, via **ghrelin**
- ✓ Amino acids
- ✓ Exercise: increases with exercise intensity
- ✓ Deep sleep

Cortisol/Growth Hormone

- ✓ Cortisol reduces the rate of fat burning.
- ✓ Growth hormone added to the mix increases the rate of fat burning.
- ✓ Cortisol surge before bed inhibits growth hormone surge.

Leptin

- ✓ Secreted by the fat cells – the white adipose tissue
- ✓ Signals the hypothalamus and pancreas “we are full”
- ✓ Hypothalamus response is to turn off appetite
- ✓ Pancreas response is to stop producing insulin
- ✓ Has a 24-hour circadian rhythm and is controlled by eating
- ✓ Pancreas and hypothalamus become leptin resistant

Normal Leptin Function

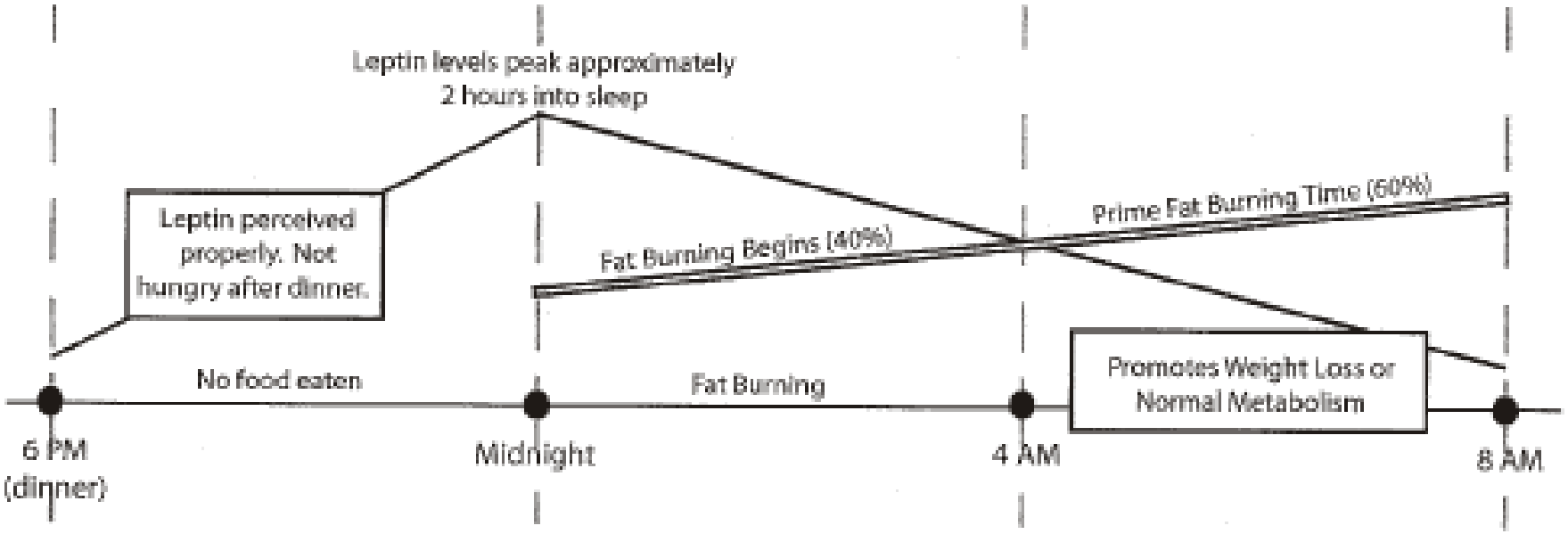


Chart from: Richards BJ. *Mastering Leptin.* Minneapolis: Wellness Resources Books, 2004

Leptin Resistance

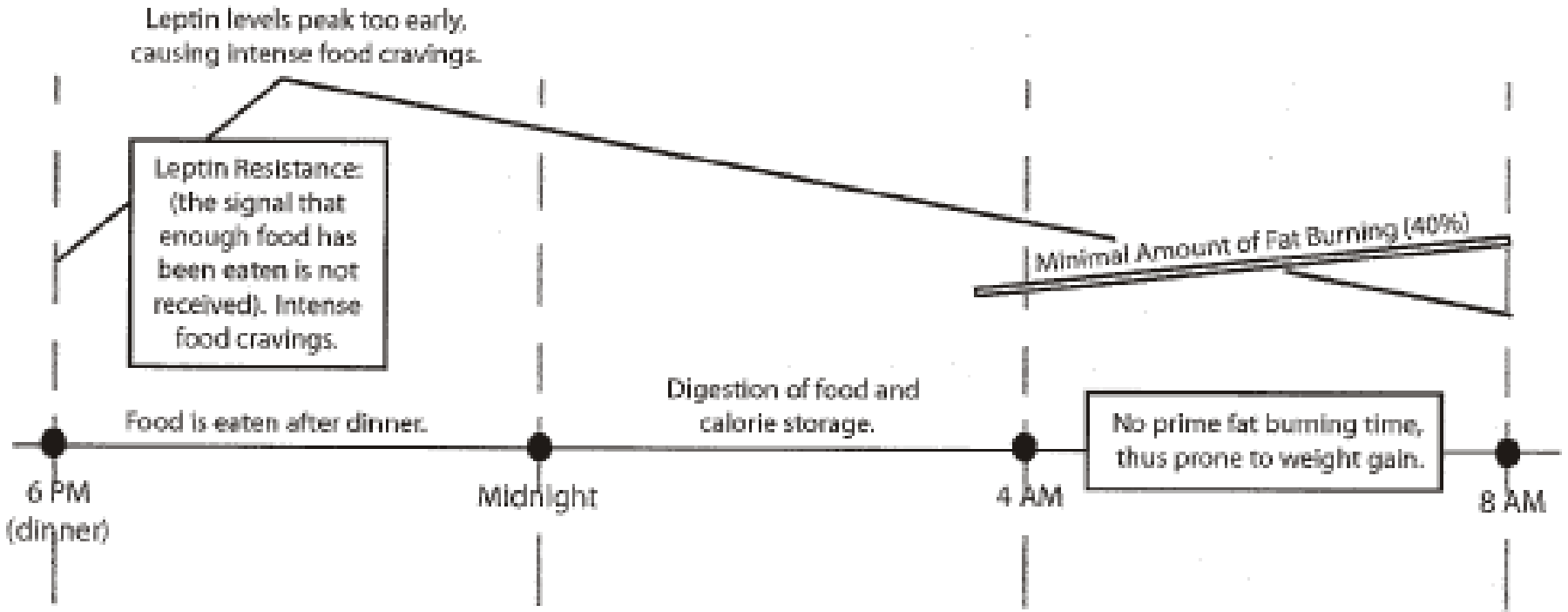
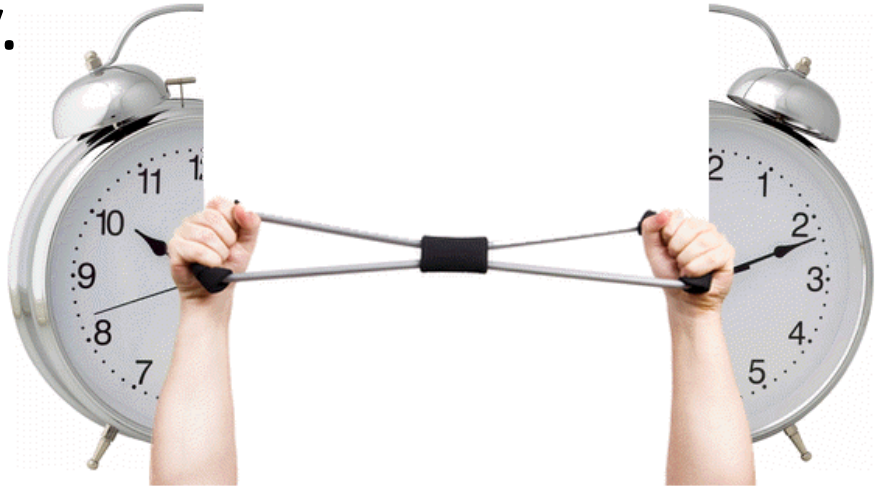


Chart from: Richards BJ. *Mastering Leptin.* Minneapolis: Wellness Resources Books, 2004

Rules for Managing Leptin and Insulin

- ✓ Never eat after dinner.
- ✓ Eat only three meals a day.
- ✓ Allow five to six hours between meals.
- ✓ Do not eat large meals.
- ✓ Eat slowly.
- ✓ Eat a breakfast containing protein.
- ✓ Reduce the intake of starchy carbohydrates.



Meal Timing and Leptin

- ✓ **No snacking:** Prolonged insulin curves or more frequent insulin spikes plus decreased leptin promote obesity
- ✓ **Maintain ideal body weight:** Obesity increases insulin resistance
- ✓ **No eating at night:** Late eating increases insulin and decreases growth hormone and leptin
- ✓ **Avoid high-carbohydrate breakfasts:** Morning carb overdoses cause a premature spike in leptin and food cravings
- ✓ **Eat protein within an hour of waking:** Morning protein consumption promotes growth hormone and regulates insulin

Ghrelin

- ✓ Ghrelin is secreted by cells in the stomach wall
- ✓ Eating suppresses ghrelin
- ✓ An empty stomach secretes ghrelin freely
- ✓ Ghrelin stimulates appetite
- ✓ Ghrelin is a potent stimulator of growth hormone

- ✓ Therefore, waiting to eat until you are very hungry and your stomach is empty stimulates fat burning and muscle sparing

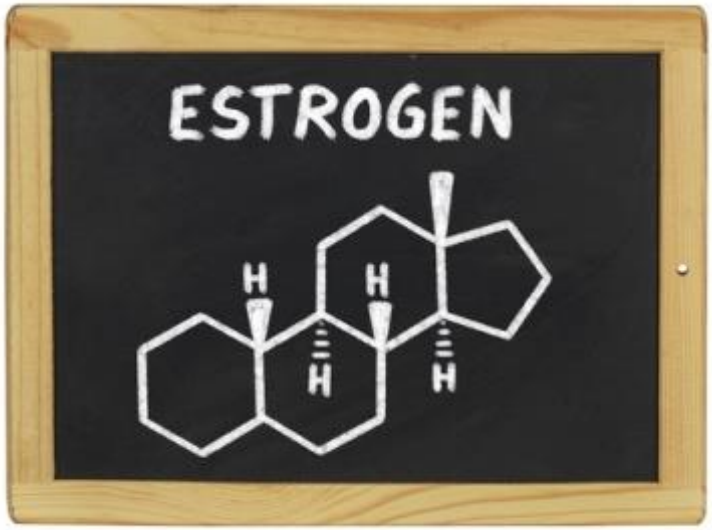
Melatonin

- ✓ Produced by pineal gland
- ✓ Turned on by low light conditions
- ✓ Turned off by bright light
- ✓ Promotes deep sleep
- ✓ Protects from tumor growth
- ✓ Reduced by computer and TV at night
- ✓ Inhibited by eating too close to bedtime
- ✓ Produced from the amino acid tryptophan and requires vitamin B6 for synthesis

Progesterone

- ✓ Promotes deep sleep
- ✓ Progesterone prevents lipid peroxidation
- ✓ Blocks the atherogenic effects of cortisol
- ✓ Anti-inflammatory and anti-oxidant effects
  - ➢ Reduces NK cells, TNF-alpha, and Th1 cytokines
  - ➢ Stimulates the production of IL-4 and IL-10 and increases levels of reduced glutathione and superoxide dismutase
- ✓ Suppresses excess estrogen
- ✓ Activates the GABA receptor sites - calming
- ✓ Involved in regulation of hypoglycemia

Estrogen



- ✓ May have an effect on promoting deeper sleep beyond hot flash control
- ✓ Excess estrogen in males can induce insulin resistance
- ✓ Oral contraceptives with estrogen increase insulin resistance
- ✓ Estrogen significantly increased the amount of time patients had REM sleep and reduced the time spent awake from 20 to 12 minutes during the first two sleep cycles of the night

Testosterone

- ✓ Diminished testosterone is linked with snoring and sleep apnea
- ✓ Excess testosterone in women associated with insulin resistance

- ✓ Sleep can increase testosterone
- ✓ Sleep deprivation decreases testosterone
- ✓ Diabetics have lower levels of testosterone
- ✓ Low testosterone associated with belly fat in males

Sleep Resources

- ✓ *Herbs and Supplements to Assist With Sleep*
- ✓ *Understanding Sleep Cycles*
- ✓ *Hormones That Dance in Your Sleep*
- ✓ *References for Sleep and Hormone Research*

Optimizing Sleep Part 1

- ✓ Stop eating within 3 hours of bedtime
- ✓ Dim the lights in the evening to simulate natural environment and stimulate melatonin
- ✓ Stop using a computer within 2 hours of bedtime
- ✓ Turn off the TV at least an hour before bedtime
- ✓ Avoid intense exercise close to bedtime
- ✓ For some, hot baths interfere with sleep
- ✓ Meditation, visualization, or “mini vacations” before bed to turn down the cortisol

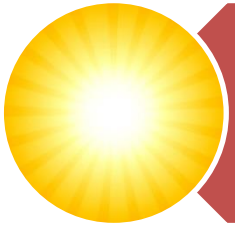
Optimizing Sleep Part 2

- ✓ No intense mental activity within 2 hours of bedtime
- ✓ Outdoor activity early in the day (before 1:00 pm)
- ✓ Turn off bright lights as soon as possible after sunset
- ✓ Neutral bath (not hot) before bed: 15 – 60 minutes can help insomnia (lavender oil)
- ✓ Keep the room at a cool to moderate temperature
- ✓ Herbs 30 – 60 minutes before bed, then again at bedtime
- ✓ Horizontal for 30 minutes to an hour before sleep

Herbs And Supplements to Help With Sleep

- ✓ Passionflower – mind chatter
- ✓ Lemon balm – relaxing
- ✓ Chamomile – soothing
- ✓ Hops – stronger
- ✓ Valerian – heavy hitter
- ✓ Wild lettuce – mild sedative
- ✓ Phosphatidylserine – decreases cortisol
- ✓ Magnolia – for stress induced sleeplessness
- ✓ Adrenal adaptogens

Additional Sleep Activities



Get Outside in the Morning Sun

Use Relaxing Herbs Before Bed

Schedule a 3-Day Sleep Vacation

Sleep in as Dark an Environment as Possible