

Healing Sleep

The Art and Science of Sleep

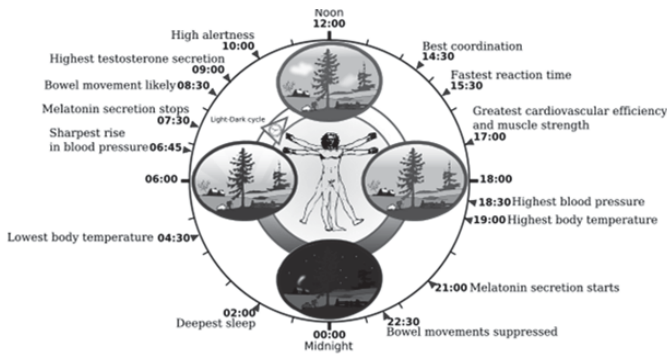
Christopher Hobbs, Ph.D., L.Ac., A.H.G.



What is sleep?

- Sleep is a behavior that follows a circadian rhythm
- Sleep is not uniform, but organized into cycles
- Sleep is defined behaviorally
 - reduced motor activity
 - decreased response to activity
 - stereotypic postures
 - reversibility

Sleep/Wake Cycle and Physical Changes



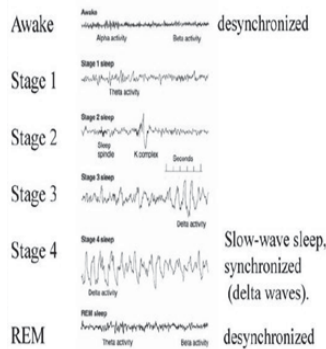
Yassine Mrabet *et al.*, 2015.

Sleep Cycle

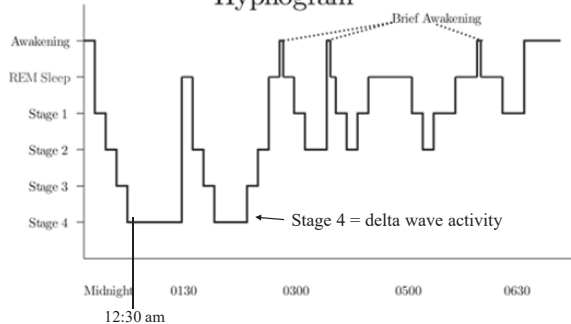
- There are five stages of sleep

- Stage 1: theta activity
 - Falling asleep
 - Increasing sleep spindles, K complexes; light sleep
- Stage 2: K complex
 - Intermediate sleep
 - suppressing cortical arousal in response to stimuli the sleeping brain evaluates not to signal danger, and second, aiding sleep-based memory consolidation
- Stage 3: Delta
 - Deeper sleep (< 50% delta)
- Stage 4: Delta
 - Deepest sleep (> 50% delta)
- REM sleep
 - Cycles of dreaming
 - Sudden loss of muscle tone (prevents harm during dreaming)

Allan & Bacon, 2004



Hypnogram

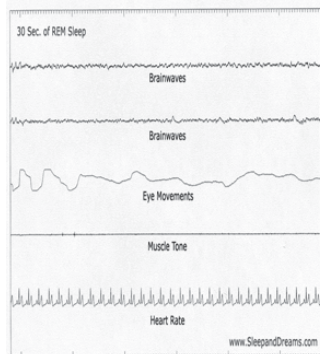


Note: loss of deep sleep can occur if bedtime is past 12:30 am or so (harmful effects)

Source: Wikipedia contributors

REM Sleep

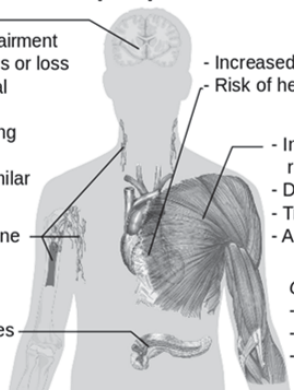
- Accounts for about 25% of sleep
- In humans, occurs once every 90 minutes
- Brain activity is high during REM
- Make “meaning” out of day’s random events
- Increased protein production



Sleep Deprivation

- Studies with humans have found that sleep deprivation takes its greatest toll on cognitive abilities, immune function
- When allowed to sleep again, all stages of sleep are not made up evenly
- Studies with animals have shown that with enough sleep deprivation the animals will become sick

Effects of Sleep deprivation

- 
- Irritability
 - Cognitive impairment
 - Memory lapses or loss
 - Impaired moral judgement
 - Severe yawning
 - Hallucinations
 - Symptoms similar to ADHD
 - Impaired immune system
 - Risk of diabetes Type 2
 - Increased heart rate variability
 - Risk of heart disease
 - Increased reaction time
 - Decreased accuracy
 - Tremors
 - Aches
 - Other:*
 - Growth suppression
 - Risk of obesity
 - Decreased temperature

Mikael Häggström, 2014

Benefits of Sleep, Research

- Both short and long sleep durations are associated with increased risk of stroke mortality in a Chinese population, particularly among those with a history of hypertension (Pan *et al.*, 2014).
- After controlling for multiple risk factors in logistic regression models, the prevalence of hypertension was significantly higher among women in 3 groups who slept ≤ 5 hours (odds ratio = 1.19, 95% confidence interval [CI] = 1.14-1.25) per night compared with 7 hours (Gangwisch *et al.*, 2013).
- Cross-sectional and longitudinal epidemiological studies have shown associations between short sleep duration and obesity, diabetes and hypertension (Gangwisch, 2009).

Sleep and Obesity, Metabolism

- Metabolic changes resulting from sleep restriction shown to increase
 - body weight
 - insulin resistance
 - blood pressure
- Interventions designed to increase the amount and improve the quality of sleep could serve as treatments and as primary preventative measures for metabolic disorders.
- Experimental studies have shown sleep deprivation to decrease leptin, increase ghrelin, increase appetite, compromise insulin sensitivity and raise blood pressure (Gangwisch, 2009)

Evolution—Short Sleep Periods

- The circadian rhythms of our early ancestors were more closely synchronized to the rising and setting of the sun
 - Likely to have obtained more sleep
 - Today we have artificial lights to extend our active phases
 - Longer work days and commuting times
 - Increase in the use of television, personal computers and the internet, which curtail our sleep. Blue light filters! Get the app
- Short sleep durations could help trigger the expression of the *thrifty* genotype (retains caloric input more efficiently)
 - Induce metabolic changes to increase caloric intake and fat deposition
 - Today we can have year-round short sleep durations with electric lights
 - Year-round availability of highly palatable foods and simple sugars
 - Facilitate year-round fat accumulation.

Source: Gangwisch, 2009 (review)

Experimental sleep deprivation studies Hunger, Appetite

- Conducted at the University of Chicago with normal, healthy, young adults
- Sleep deprivation decrease leptin levels
- Increase ghrelin levels
- Elevate hunger and appetite (Spiegel *et al.*, 2004)
- Subjects were found to particularly crave sweets, starch and salty snacks.
- A recent study has shown that sleep curtailment is accompanied by increased intake of calories from snacks with higher carbohydrate content (Nedeltcheva *et al.*, 2009)

Sleep and Immune Function

- Reciprocal influences between sleep and immune system are well-documented.
- Likely regulated (in part) by microglia and astrocytes in CNS
- Microglia modulate NREMS and slow wave activity via production of immunomodulators.
- Astrocytic gliotransmission mediates NREMS and sleep pressure.
- ATP (via P2X₇R) and adenosine (via A₁R) may be effectors of glial sleep regulation.
- Aging is associated with poor sleep quality and chronic, low-grade inflammation.
- Primed microglia and activated astrocytes contribute to changes of the aging CNS.

Source: Ingiosi *et al.*, 2013

Sleep and Chronic Inflammation

- Many pro-inflammatory molecules, such as interleukin-1 beta (IL-1 beta) and tumor necrosis factor-alpha (TNF-alpha) are somnogenic
- Homologous genes are highly conserved for sleep and immune system functions, from animals like mice, to flies and humans
- Primary sleep disorders, such as insomnia and obstructive sleep apnea, are associated with dysregulated inflammatory mechanisms (4).
- Persistent inflammation is also associated with many diseases, such as Type 2 diabetes (5), cardiovascular disease (6), colorectal cancer (7), inflammatory bowel disease (8), and asthma (9). Interestingly, chronic short sleep duration is also associated with inflammatory diseases including cardiovascular disease (10), Type 2 diabetes, and cancer (11)

Source: Zielinski & Krueger, 2013

Sleep and URIs

- Sleep is vital to many biological activities including host responses to pathogens (Krueger, 2008)
- TNF signaling increases NREM sleep in response to exposure to influenza pathogens
- Study: n=153 healthy men
- 14 consecutive days they reported sleep duration, quality
- Average sleep scores were calculated
- Nose drops with rhinovirus was administered
- Participants with < 7 hours of sleep were about 3 x as likely to develop a cold than those with 8 hours or more!

Source: Cohen *et al.*, 2009

Insomnia

- Difficulty initiating and maintaining sleep; non-restorative sleep
- Clinically significant distress/impairment in social, occupational, or other important areas
- Disturbance of sleep is not due to another sleep disorder.
- Disturbance of sleep is not due to another mental disorder
- Not due to direct effects of substance use or general medical condition
- About 60 million Americans have chronic insomnia
- Most common sleep complaint
- About two percent have excessive sleepiness
- Affects 40% of women and 30 % of men
- # 1 cause is thought to be medications
 - Nearly 70 percent of Americans are on at least one prescription drug, and more than half take two (Mayo clinic)
- Acute or Chronic
- Treatment: medication or behavior modification

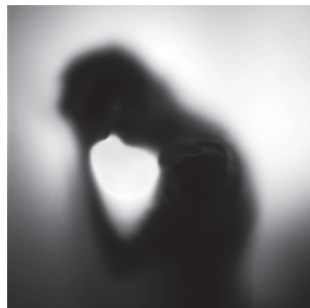
Source: Audrea Elliott

Major Identified Causes

- Medications, multiple, more as we age
 - Stress (concerns about relationships, finances, etc.)
 - Anxiety
 - Depression
 - Chronic pain or other medical conditions
 - Travel, changes in work schedules
 - Poor sleep habits, external noise
 - Stimulants, over-stimulation from media
 - Substance abuse, alcohol, other recreational drugs
 - Overeating late in the day or before bed
 - Aging
- Source: Mayo Clinic

Major Psychiatric Causes of sleep disorders

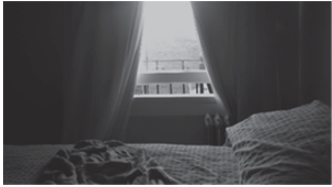
- Psychosis/schizophrenia
- Depression
- Alcoholism



Evaluation

- Determine after discussion with patient
 - List of medications or dietary supplements
 - Usual bedtime, media, food before bed
 - Stimulant or sugar intake during the day
 - Sleep latency, sleep quality, restlessness, vivid dreaming, regular time of awakening, how long to fall back asleep, number of trips to the bathroom, discomfort (mental or physical)
 - Family history of insomnia
 - Recent worries, interpersonal conflict, problems at work, etc.

Other Questions



- Nap during the day?
- Snoring, breathing problems?
- Partner who snores, is restless, gets up at night?
- Exercise routine
- External noise level, light
- Temperature in room, or sources of fresh air



Nursing home residents' self-perceived resources for good sleep

- Calmness
 - Main factor for disturbing calmness—rumination!
 - Main cause of digestive disturbance in TCM, pensiveness (worry, excessive thinking)
 - Recommend Pema Chödrön's books, mindfulness
- Daily activity
 - Walking, other exercise—studies positive, not just preceding bedtime
- Environmental
 - Light, noise, softness of bed, fresh air

Source: Herrmann & Flick, 2011

Medical Treatment of Insomnia

- Limited use of hypnotics is sometimes effective for relieving symptoms due to transient disturbances such as grief
 - People with neurological conditions like Alzheimer’s disease can develop “paradoxical reaction” to hypnotics
 - Non-prescription hypnotics like antihistamines are more hazardous than prescription hypnotics like benzodiazepine
 - In the elderly, the benzodiazepines can cause insomnia in the early morning, daytime anxiety and psychomotor impairments, and memory problems (besides addiction or dependence)
 - Benzodiazepine use in the elderly have been linked to hip fracture from falls and withdrawal seizures

Behavioral Therapies

- Sleep hygiene classes
- Cognitive behavioral therapy (mindfulness)
- Relaxation techniques (breathing, biofeedback)
- Sleep restriction
- Passive wakefulness
- Light therapy
- Get out of bed if you wake in the night more than a short time; read or other light activity

Most common medications

- Ambien CR is an extended release version. It helps you get to sleep within 15 to 30 minutes
 - Side effects
- Belsomra (suvorexant): Belsomra is the first approved orexin receptor antagonist. Orexins are chemicals that are involved in regulating the sleep-wake cycle
- Lunesta (eszopiclone): Lunesta also helps you fall asleep quickly, and studies show people sleep an average of seven to eight hours
- Rozerem (ramelteon): targets the sleep-wake cycle, doesn’t depress the central nervous system
- Sonata (zaleplon): Of all the new sleeping pills, Sonata stays active in the body for the shortest amount of time
- Silenor (doxepine): blocks histamine receptors; people who have trouble staying asleep
- Benzodiazepines: older meds (Xanax, etc.), longer-acting
- Antidepressants: Desyrel, Remeron useful for treating sleeplessness, anxiety
- Over-the-counter (OTC) sleep aids: mostly antihistamines

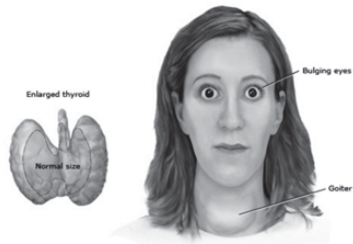
Common Side Effects

- Burning or tingling in the hands, arms, feet, or legs
- Changes in appetite
- Constipation
- Diarrhea
- Difficulty keeping balance
- Dizziness
- Daytime drowsiness
- Dry mouth or throat
- Heartburn
- Impairment the next day
- Mental slowing or problems with attention or memory
- Stomach pain or tenderness
- Unusual dreams
- Weakness

Insomnia with Hyperthyroidism

- RDBPC trial (n=50; 6 months)
- 1 or 2 g/day of L-carnitine
- Significant reduction in insomnia
- Antagonist of thyroid hormone action

Source: Benvenha *et al.*, 2001



Source:
<https://thenpmom.wordpress.com>

Western Herbal Standard of Practice

- Nervines
 - Valerian, hops, California poppy, passion flower, skullcap, albizia, wild lettuce, Jamaica dogwood (chronic—King), wild oats (King), blue cohosh (King), *Clematis virginiana* (King), kava, reishi (chronic), coptis rhizome, poria, red sage
- Body relaxants—kava

Nervines



Wild Lettuce, *Lactuca serriola*

- Calmatives
 - Calif. Poppy, kava, valerian, lemon balm, passion flower, wild lettuce, chamomile, hawthorn leaf, flower
- Antispasmodics
 - Yarrow, chamomile, wild yam, California poppy
- Anodyne
 - Jamaica dogwood, corydalis, willow
- Antitussives
 - Loquat, wild cherry, apricot kernels, flaxseed

Anxiety, Nervousness

Excess types

- Herbs to calm the liver
 - Dandelion, burdock, gentian root, yellow dock

Deficiency types

- Herbs to calm the liver
 - Dandelion, burdock, gentian root, yellow dock
- Herbs to clear Heart heat
 - Reishi, berberine (coptis), Ore. grape rt.

- Calmatives
 - California poppy*
 - Valerian*
 - Lava
 - Wild lettuce
- *Affects benzodiazepine receptors

Psychovegetative Syndrome (stress-related disorders)

• Adaptogens:

- Eleuthero
- Rhodiola
- Schisandra
- Ashwaganda

• Hormone regulators:

- Ligustrum
- Vitex
- Ginseng

• Tonic nervines:

- Gotu kola
- Nettle herb
- Wild oat spikelets in milky stage

• Calmatives:

- Cal. Poppy, kava

• Antidepressants

- St. John's wort, ginkgo

Pain Syndromes and Neuropathies



Narcotic, Semi-Narcotic

- Corydalis (yanhusuo)
- Piscidia (Jamaica dogwood)
- Cannabis
- Gelsemium
- Opium

Non-narcotic; antiinflammatory

- Willow bark, devil's claw, wintergreen, meadowsweet

Toxic

- Gelsemium

Headaches



- Vinca
- Wood betony
- Feverfew

- Liver excess, stagnation
- Herbs: boldo, fringe tree bark, bupleurum

Neuropathies



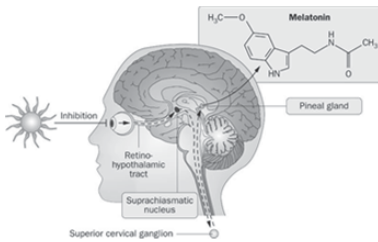
- St. John's wort oil (internally, externally)
- Essential oils:
 - Lavender
 - Rosemary
 - wintergreen oil (externally only)

Most-Supported Herbs, Supplement Ingredients

- Melatonin
- Serotonin
- Valerian
- Chamomile
- Kava
- Lavender oil (linalool)
- L-Theanine

- Passion flower
- California poppy
- Catnip
- Scullcap
- Lemon balm
- Hops
- Magnesium
- Albizzia
- Withania—anxiolytic

Melatonin



Source: Koch *et al.*, 2009

- 165 clinical trials
- Sleep efficacy (SE) was marginally improved ($P = .07$). This effect was stronger under a longer intervention period lasting more than 4 weeks ($P = .02$; 2-10 mg) [meta-analysis, $n=520$, 7 controlled trials; Xu *et al.*, 2015]

- Light inhibits melatonin secretion by the pineal gland
- New research strongly supports the idea that melatonin is largely responsible for falling asleep and to stay asleep (Prober *et al.*, 2015)
- Adenosine stimulation

Tryptophan

- Tryptophan to 5-HTP to serotonin to melatonin
 - Abundant evidence suggests that allelic variation in the serotonin transporter-linked polymorphic region (5-HTTLPR) influences susceptibility to stress and its affective consequences due to brain serotonergic vulnerability
 - By way of reducing depressive symptomatology, tryptophan augmentation may particularly improve sleep quality in stress-vulnerable individuals carrying the 5-HTTLPR S-all
 - Serotonin depletion involved with depression, sleep changes (Bhatti *et al.*, 1998)
- Source: Dalsen & Markus, 2015

Tryptophan 2

- Night-time 'sleep facilitating cereal' product containing 225 mg tryptophan, 5.3 mg adenosine-5'-P, and 6.3 mg uridine-5'-P per 100 g of product was given to infants with sleep disorders
- Infants receiving the enriched cereal during the time of darkness showed improvements in their sleep parameters
- Confirms the sleep-wake rhythm can be influenced by diet
- N=30; at least 3 nocturnal wakings; aged 8-16 months; all wore acti-meter to measure movement in the night

Source: Cubero *et al.*, 2009

Tryptophan 3



Egg in a smoothie?

- Egg, spirulina highest sources; cod, soybean, cheese
- Supplementation, but not usually foods can increase brain serotonin levels
- Linked to white blood cell disorder called eosinophilia, but thought to be contamination
- Contras: eosinophilia; caution during pregnancy
- Usual recommended dose: 2-3 grams, 2-3 x daily

Valerian



- *Valeriana officinalis* and other species (*V. californica*, *V. sitchensis*)
- Has to be fresh, make tinctures (actives unstable)
- Dried is more likely to have opposite effect (stimulation)
- Meta-analysis (n=1093 patients, 16 controlled studies, Bent *et al.*, 2006)
- Suggests valerian is effective
- Helps induce sleep, improve sleep quality

Chamomile



- Mostly *in vivo* studies only
- No high-quality clinical trials for sleep
- Small trial (Zick *et al.*, 2011), modest benefits
- Recommend tea infusion before bedtime to relieve digestive problems, calm and relax

Kava



Source: www.kava.com

- Blended fresh root, filtered most effective, then carefully dried rhizome powder, “milked” in warm water
- Tinctures, extracts in capsules and tablets less effective in my experience and others (Chris Killham)
- Kava bars
- German ban, hepatotoxicity

Lavender (high linalool)



Source: www.headachehammoch.com

- Relaxing baths (add essential oil)
- Aromatherapy
- Some products list amount of linalool, with some research for sleep, anxiety, relaxation (Silexan)
- Mostly *in vivo* studies
- Systematic review (Fismer, 2012)—8 small studies, some RDBPC, moderate benefits

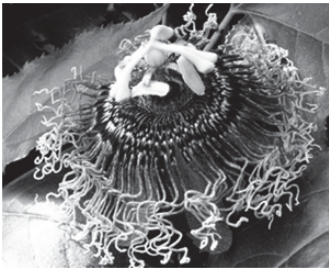
L-Theanine



Source: www.foodfitnesswellness.com

- Unusual amino acid from green tea
- RDBPC study with boys diagnosed with ADHD
- n=98, 400 mg daily (2 tablets, b.i.d.)
- higher sleep percentage and sleep efficiency scores vs. placebo (Lyon *et al.*, 2011)

Passion Flower



- Flowers and leaves of *Passiflora edulis* and *P. incarnata*
- Mild relaxant
- DBPC study (n=41; consumed tea, dairies) [Ngan & Conduit, 2011]
- Short-term subjective sleep benefits (sleep quality)
- *In vivo* studies showing sedative effects

California poppy



- Antianxiety effect
- Calming and relaxing
- No human studies
- *In vivo* studies—anxiolytic
- Binding affinity for GABA receptors
- Increasingly used clinically for anxiety, addictions
- Dried tea (6:1), tincture
- Root, fruits best parts
- Traditionally used in Native American Indian medicine

Persian Silk Tree



• Calms the spirit and relieves constraint: for bad temper, depression, insomnia, irritability, and poor memory due to constrained emotions (Bensky *et al.*, 2004)

- *Albizia julibrissin* (He Huan pi)
- Common street tree in California, invasive in the tropics
- Flowers, bark used
- 5-HT receptor-binding (flavonoids—quercitrin, isoquercitrin)
- Immunomodulating saponins
- Antidepressant, anxiolytic; significantly decreased sleep latency
- All *in vivo*
- Dose, 6-15 grams

Magnesium

- Compared to placebo, dietary magnesium supplementation (800 mg) brought about statistically significant increases in
 - sleep time ($P = 0.002$)
 - sleep efficiency ($P = 0.03$)
 - concentration of serum renin ($P < 0.001$)
 - melatonin ($P = 0.007$)
 - also resulted in significant decrease of sleep onset latency ($P = 0.02$) and serum cortisol concentration ($P = 0.008$)
 - supplementation also resulted in marginally between-group significant reduction in early morning awakening ($P = 0.08$) and serum magnesium concentration ($P = 0.06$)
 - Total sleep time ($P = 0.37$) did not show any significant between-group differences (Abbasi *et al.*, 2012)

Magnesium, Melatonin, Zinc

- DBPC study ($n=43$) with primary insomnia in long-term care facility
- 5 mg melatonin, 225 mg magnesium, and 11.25 mg zinc
- Significant improvements in all four domains of the LSEQ
 - ease of getting to sleep, $P < .001$
 - quality of sleep, $P < .001$
 - hangover on awakening from sleep, $P = .005$
 - alertness and behavioral integrity the following morning, $P = .001$
 - total sleep time ($P < .001$)
 - suggest that treatment had a beneficial effect on the restorative value of sleep (Rondanelli *et al.*, 2011)
- May be of value for restless leg syndrome (Hornyak *et al.*, 1998)

Catnip, Scullcap, Lemon balm, Hops



- Catnip, mild tea for children
 - In vitro, in vivo tests
- Scullcap
 - 1 small trial, effective for mood, but equivocal for sedative
- Lemon balm (essential oil)
 - Some clinical trials, especially with valerian
 - 80.9% of the patients who suffered from dyssomnia experienced an improvement (Muller & Klement, 2006)
- Hops
 - Two small human studies (n=42, 30; compared with valerian alone)
 - Effective for improving sleep
 - (Koetter *et al.*, 2007)



Ashwagandha, Magnolia bark



- Ashwagandha, in vitro, in vivo studies—GABAergic activity (Candelario *et al.*, 2015)
 - little else for sleep, calming
- Magnolol, a major bioactive constituent of the bark of *Magnolia officinalis*, induces sleep--benzodiazepine receptor agonist
- Magnolol is also a CB2 cannabinoid receptor agonist

Bensky-bitter, acrid, warm
-regulates Qi, removes stagnation,
directs downward, calms (especially
with abdominal fullness)

Traditional Chinese Medicine



Nervous System Imbalances According to Chinese Medicine

TCM Organs and N.S.

• These organ systems are involved with the western concept of nervous system:

- Heart system
 - More involved with neurotransmitters, movement of the nerve impulse via mineral ions, neurotransmitters
- Kidney system
 - How the hormonal system affects the nervous system
- Liver system
 - Skeletal muscle control by the nervous system; tics, spasms.

Differential diagnosis

Heart System

- Heart Yin Deficiency
- Heart Fire
- Shen Disturbance

Kidney System

- Kidney Yin Deficiency
- Kidney Yang Deficiency

Liver System

- Liver Stagnation
- Liver Hyperactivity

Sleep Disorders

- Falls asleep easily, wakes up in the night
 - Heart fire, Heart and Kidney yin *deficiency* (wakes frequently)
- Can't fall asleep
 - Spleen and blood *deficiency*
- With intense dreams, nightmares
 - Heart fire (*excess condition*) [hyperactive liver also possible]
- As part of depression (neurotransmitter/binding site imbal.)
- Pain syndromes in the elderly
- Drug and alcohol use

Sleep Disorders Treatment Principles

- Heart and/or Kidney yin deficiency
 - Tonify Heart and Kidneys with:
 - American ginseng, figwort rt, rz, rehmannia, poria
- Spleen and Blood deficiency
 - Tonify Spleen and Blood with:
 - Ginseng (red), astragalus, ginger, nettle herb
- Heart fire
 - Cool heart fire, calm the spirit with:
 - Berberine-containing herbs (Coptis, Oregon grape root); reishi, nettle herb, calcium-magnesium supplement

Common TCM Syndromes Associated with Insomnia

- Liver qi stagnation
 - Produces fire over time →disturbs the mind
- Spleen qi deficiency
 - Leads to deficiency of qi and blood
 - Malnourishment of the heart, can't house the spirit
- Heart yin deficiency
 - Heart fire; empty fire flaring upward; disturbing the mind

TCM Syndromes for Insomnia

- ETIOLOGY & PATHOLOGY
- 1. Emotional-Mental Stress (Liver Qi Stagnation → Over time turns into fire →Disturbing the Mind
- 2. Improper Diet [Impairs Spleen T/T (transformation/transportation) → Accumulation of Dampness → Phlegm + Fire → Disturbing the Mind → Impairs Spleen T/T → Insufficient production of Qi & Blood → Malnourishment of Heart → Can't House the Shen (Spirit)]
- 3. Weak Constitution, Chronic stress, illness → Injure Yin → Empty Fire flaring upward → Disturbing the Mind
- 4. Heart and Gallbladder Deficient → Leading to a timid character → Disturbance of the Mind

Clinical Manifestations

- **Liver Fire flaring upward:**
Dream-disturbed sleep, irritability, thirst, desire to drink, headache, red eyes, bitter taste of the mouth, distending pain of the hypochondrium, scanty dark urine, constipation.
Tongue: Red with yellow coating
Pulse: wiry and rapid
- **Phlegm Fire disturbing the Mind:**
Restless sleep, tossing and turning, irritability, dizziness, a feeling of heavy head, a feeling of oppression of the chest, fullness of epigastrium, nausea and no appetite.
Tongue: Sticky yellow coating
Pulse: Slippery and rapid

Source: Sharon Zhao; Giovanni Maciocia

Clinical Manifestation 2

- **Kidney and Heart Disharmony (Yin Deficiency empty fire flaring upward):**

Restlessness, waking up frequently during the night, difficulty in falling back to sleep, palpitations, irritability, dizziness, tinnitus, poor memory, soreness of back, seminal emission, 5-palm heat, dry mouth and throat.

Tongue: Red without coating or less coating

- **Heart and Spleen Disharmony**

Difficulty falling asleep, waking up easily during the night, a lot of dreams, palpitation, poor memory, dizziness, fatigue and lassitude, poor appetite, and pale complexion.

Tongue: Pale with thin white coating

Pulse: Weak and Thready

Source: Sharon Zhao; Giovanni Maciocia

End of Sleep Presentation

Thanks for participating!

Sleep Well