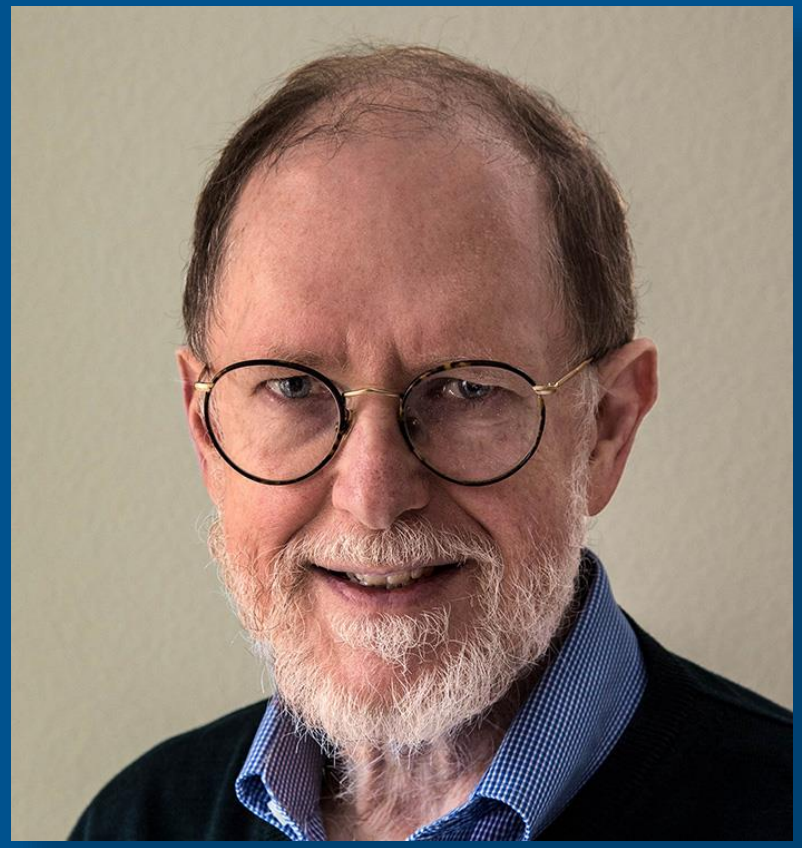
LE&RN Online Symposium:

Changing Sleep, Nutrition, and Activities to Feel Better



Presented by
Chuck Ehrlich, MS, MBA

Lymphatic Education & Research Network

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Disclosure Information

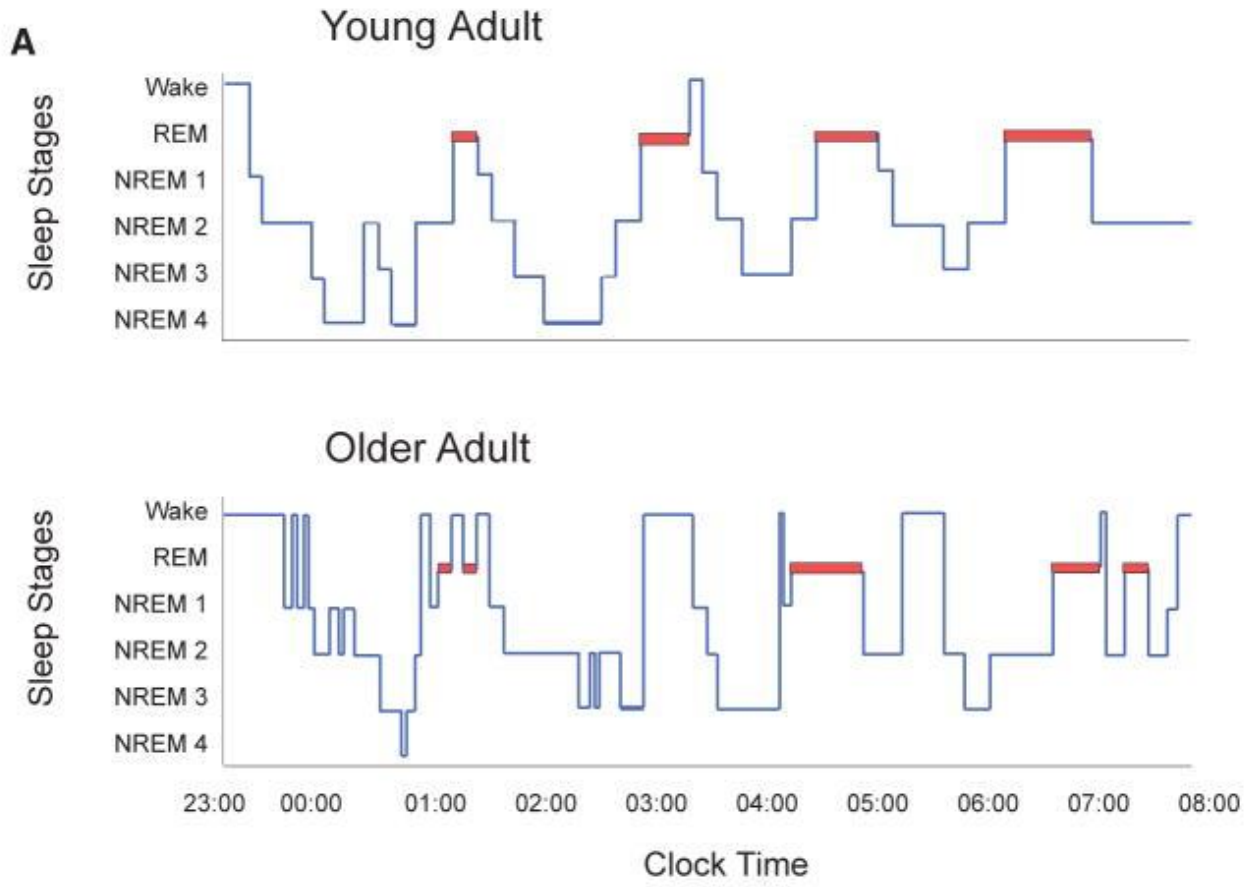
- Meeting:
  - LE&RN Symposium Series 2020
- Speaker:
  - Chuck Ehrlich:
    - Ownership interest in Lymph Notes, publisher of the **Lymphedema and Lipedema Nutrition Guide** and other books
- Not discussing off label or investigational drugs.

Changing to Feel Better

- Goal: help you feel better and minimize pain
- Why—research showing:
  - Sleep is important
  - Factors that influence sleep
- How—recommendations for:
  - Sleeping better
  - Nutrition: what to eat and when
  - Activities: exercise and avoiding in-activity
- Plus—consistent with COVID-19 pandemic advice.

Adequate Sleep

- People do best with 7-9 hours of sleep per night
  - Including 2 AM- 4 AM
- Healthy sleep includes multiple stages:
  - Rapid eye movement (REM)
  - Non-rapid eye movement (NREM 1-4)



[Mander, BA 2018]

Inadequate Sleep

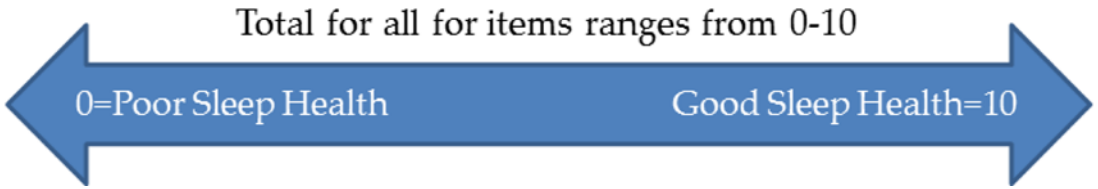
Common sleep issues include:

- Short sleep: less than 7 hours per night
- Obstructive Sleep Apnea (OSA)
  - Fat/fluid accumulation impairs breathing or triggers loud snoring
  - Repeated awakenings interrupt sleep of person and bedmates
- Interrupted sleep aka parenting
  - Or other sources of interruptions
- Medicated sleep: disrupts normal sleep stages

Sleep dimensions:

- **Satisfaction:** Are you satisfied with your sleep?
- **Alertness:** Do you stay awake all day without dozing?
- **Timing:** Are you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?
- **Efficiency:** Do you spend less than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)
- **Duration:** Do you sleep between 6 and 8 hours per day?

Are you SATED?



		Rarely/ Never rating: 0	Sometimes rating: 1	Always rating: 2
Satisfaction	Are you satisfied with your sleep?			
Alertness	Do you stay awake all day without dozing?			
Timing	Are you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?			
Efficiency	Do you spend less than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)			
Duration	Do you sleep 6 to 8 hours per day?			

Adapted from [Buysse, D 2014] www.ncbi.nlm.nih.gov/pmc/articles/PMC3902880/

Sleep Issues Affect Health Outcomes

- Accidents
- Coronary heart disease
- Depression
- Diabetes
- Hypertension
- Impaired performance
- Metabolic Syndrome
- Mortality
- Obesity

Sleep Affects Body and Mind

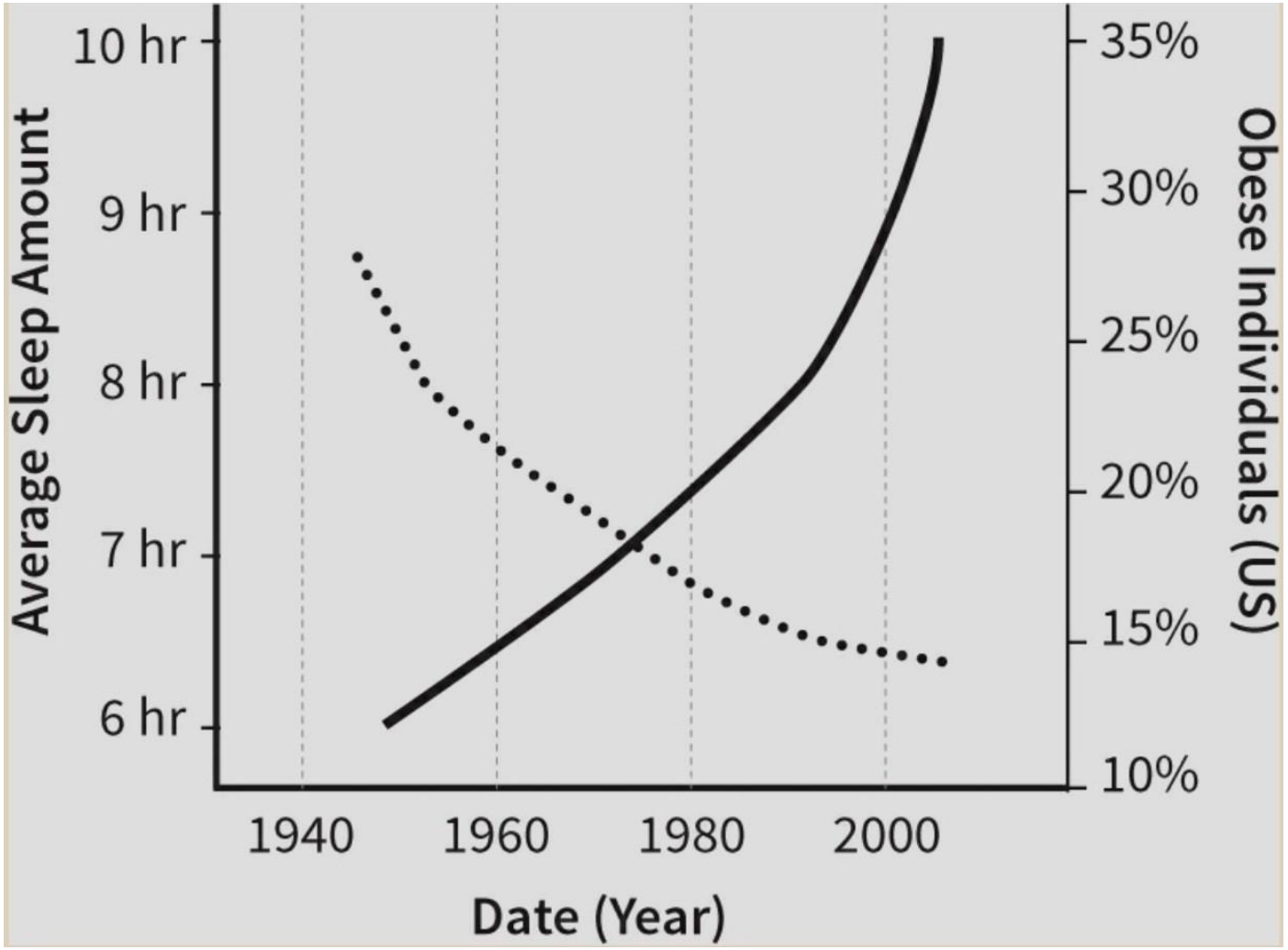
- Body: all major systems including immune, metabolic, thermoregulatory, endocrine, and cardiovascular function [Irwin, 2015]
- Mind:
  - Cognitive and affective neural processes, such as learning and memory, emotional regulation, attention, motivation, decision making, and motor control [Walker 2009]
  - Mental health issues bi-directionally linked to sleep disorders include depression, anxiety, post-traumatic stress disorder (PTSD), bipolar disorder, schizophrenia, alcoholism and other substance abuse disorders [Krystal 2012]

Sleep Issues Increase Obesity

- Increases appetite, craving for carbohydrates, comfort foods
  - "desire for weight-gain promoting high-calorie foods" [Greer 2013]
- Slows metabolism
- Promotes fat storage, stops fat release, prevents weight loss
- Decreases energy level and the desire/ability to exercise
- Obstructive sleep apnea (OSA) is independently associated with increased glucose and triglyceride levels, inflammation, arterial stiffness, and atherosclerosis. [Drager 2013]

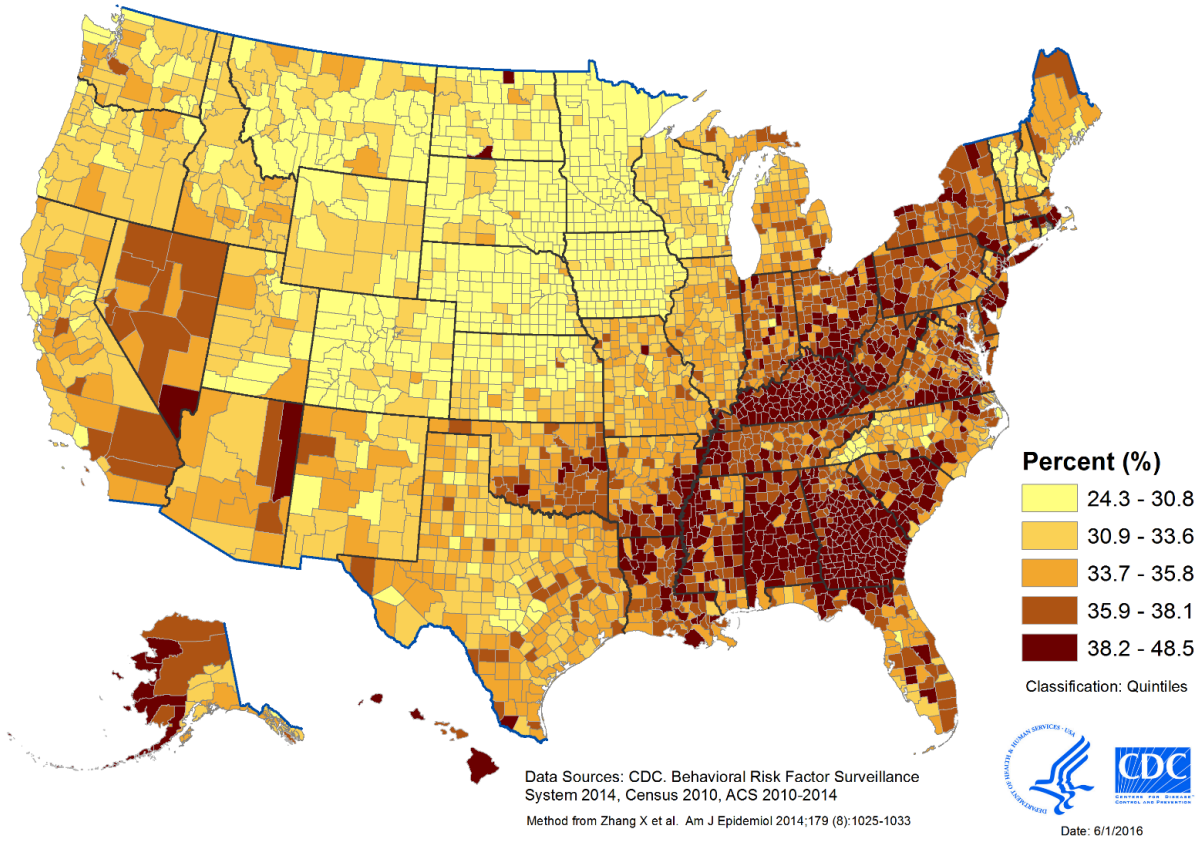
Short Sleep and Obesity

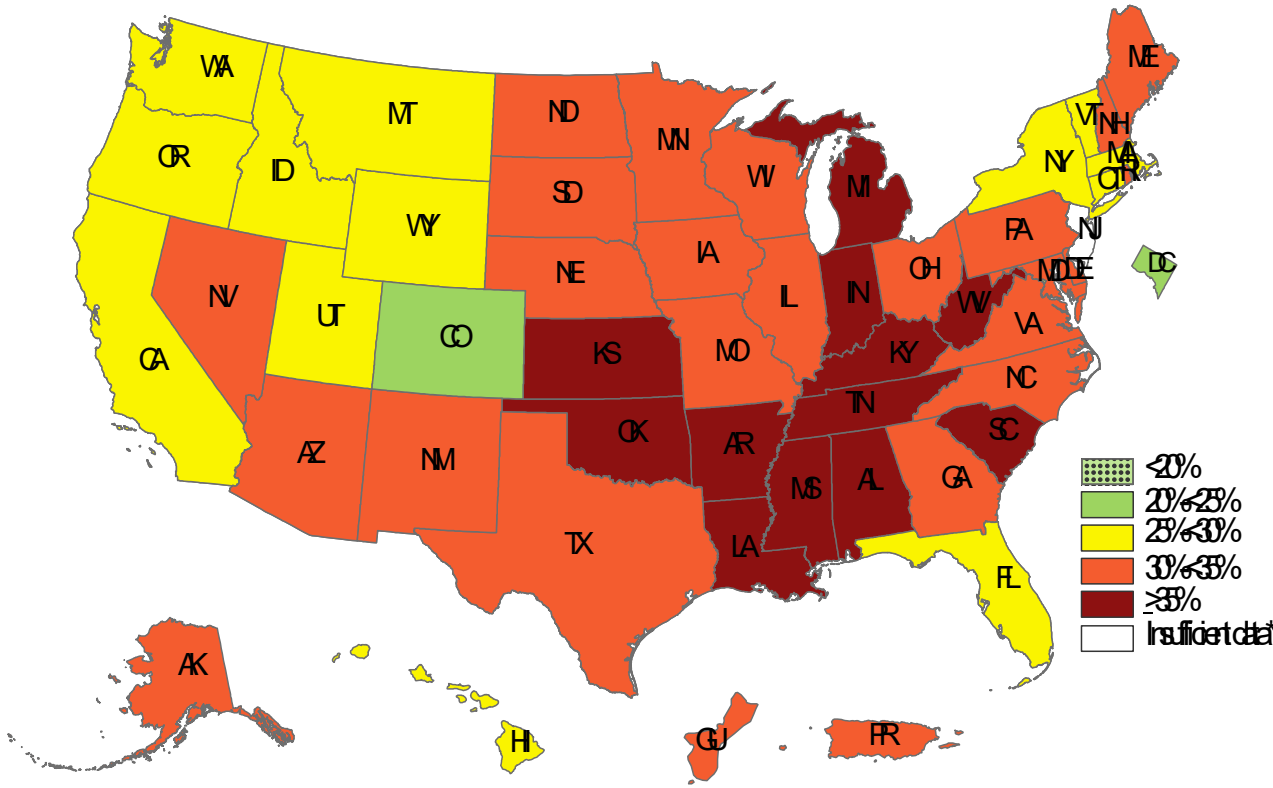
- Sleep Loss and Obesity
  - Obesity increases as Average Sleep Amount decreased



Walker, Matthew. Why We Sleep: Unlocking the Power of Sleep and Dreams (p. 177). Scribner 2018.

Short Sleep & Obesity Prevalence in US





www.cdc.gov/obesity/data/prevalence-maps.html

Obesity Increases Sleep Issues

- Many ways, for example:
  - Gut microbes and obesity-related gut dysbiosis:
    - Shapes the architecture of sleep and stress reactivity of the hypothalamic-pituitary-adrenal axis.
    - Influences memory, mood, and cognition
    - Are clinically relevant to a range of disorders, including alcoholism, chronic fatigue syndrome, fibromyalgia, and restless legs syndrome. [Galland 2014]
  - Obstructive Sleep Apnea (OSA)
    - Congestive heart failure also increases OSA [Carlisle 2017] and LE risk
  - Obesity and NAFLD reduce the desire and ability to exercise
  - Restless Leg Syndrome (RLS) may be caused by gut dysbiosis [Blum 2020]

Sleep and Brain Lymphatics

- Glymphatic system removes beta-amyloid and other waste products into the lymphatic system.
  - Glymphatic combines “glia”—a type of brain cell—and “lymphatic,” referencing this newly discovered function of the brain's glial cells.
  - Glymphatic system activity increases greatly during sleep
  - Brain shrinks, interstitial space increases, CSF fluid flows increase
    - [Nedergaard 2016]
- Sleep issues reduce glymphatic activity and increase risk of Alzheimer’s and other diseases linked to toxic plaque buildup.
    - [Bredesen 2014]
- Natural brain aging and CNS diseases including Alzheimer’s disease, traumatic brain injury, ischemic and hemorrhagic stroke, and type 2 diabetes all cause glymphatic dysfunction. [Plog 2018]

Sleep and Chronic Pain

- Self-reinforcing relationship between chronic pain and sleep:
  - Sleep can be affected by chronic pain
  - Sleep issues also increase the perception of pain
- Short sleep or REM sleep disruption increases pain sensitivity
  - Sleep loss increases the experience of pain
  - Even modest changes in sleep quality (increases or decreases) determine consequential day-to-day changes in experienced pain. [Krause 2018]
- Pain medications impact sleep and can increase sleep apnea risk:
  - Opioid-associated sleep changes may reduce analgesic effects
  - Non-steroidal anti-inflammatories are sleep neutral or sleep promoting
  - Antidepressants can change sleep patterns [Bohra 2014]
- Melatonin supplements can have analgesic benefits (see below)

Sleep and Melatonin

- Melatonin is a hormone and neurotransmitter
  - Produced in the pineal gland and absorbed from plant-based foods
  - Darkness increases melatonin levels, initiating the sleep cycle
- Melatonin is also:
  - Analgesic effective in reducing chronic pain [Zhu 2017]
  - Anti-inflammatory affecting multiple aspects of the inflammatory cascade
  - An activator of brown-fat that improves lipid levels [Halpern 2020]
- Low melatonin levels can cause sleep issues. Also,weight gain in postmenopausal women [Walecka-Kapica E 2015]
  - Levels change with age and decrease around 41-60 years old
  - Decrease from light exposure at night or the use of beta-blocker drugs

Food Choices that Influence Sleep

- Eating vegetables is associated with higher melatonin levels
  - Highest quartile of vegetable intake had 16% higher urinary melatonin levels relative to the lowest quartile. [Nagata C, 2005]
- Sugar-sweetened beverages should be avoided
  - Associated with short sleep [Prather AA, 2016]
- Caffeine should be limited in quantity and timing (morning)
- Alcohol interferes with healthy sleep and should be avoided

Minerals that Influence Sleep

- **Iron** deficiency and non-iron-deficient anemia can contribute to sleep issues [Chen-Edinboro 2017].
- **Magnesium** supplementation may help with insomnia [Abbasi 2012]
- **Zinc** acts as a sleep modulator. Supplements or food sources (oysters, seafood, yeast extract) can increase sleep duration and quality, especially in the elderly [Cherasse 2017]
- Monitor levels and increase foods or supplements, if needed
  - Iron and other mineral deficiencies can indicate celiac disease or other types of gluten sensitivity.
  - Gluten-free diet *and* supplements may be needed to correct.

Activities and Sleep

Data from 10,086 Women's Health Study participants showed bidirectional linkages:

- Short sleep was associated with less health promoting moderate physical activity the following day and increased resting time (being sedentary) or light intensity activity.
- Moderate physical activity during the day (20 minutes or more) was associated with a reduced likelihood of short or long sleep that night. [Pettee Gabriel, 2017]

Sleep Issues and Lymphedema Risks

- Sleep issues are associated with many lymphedema risk factors. For example:
  - Obesity, metabolic syndrome, diabetes
  - Chronic venous insufficiency, congestive heart failure
  - Breast cancer: 58.9% of women reported poor sleep quality prior to treatment
    - Depression and symptoms of menopause were independent predictors of poor sleep quality. [Mansano-Schlosser 2017]

Sleep and Lymphedema

- More research on sleep and lymphedema is needed.
- One French study of 43 lymphedema patients found that most also had obstructive sleep apnea (OSA):
  - 85% of lower limb patients, OSA severity increased with limb size
  - 56% of upper limb patients [Roux 2019]
- Overweight and obese lymphedema patients should be screened systematically for OSA.

How Sleep Issues Affect Lymphedema

- Obesity, metabolic syndrome, and diabetes are all linked to sleep issues
  - Increase risk of lymphedema and lymphedema complications
  - Promote gut dysbiosis and overgrowth of gram-negative bacteria
  - The bacteria produce endotoxins or lipopolysaccharides (LPS) that stop the pumping action of the lymphatics and make vessels leaky
- Non-Alcoholic Fatty Liver Disease risk is increased by sleep issues [Marin-Alejandre 2020]
  - Liver disease greatly increases lymph output from the liver, overloading the central lymphatics and increasing swelling

Sleep and Lipedema

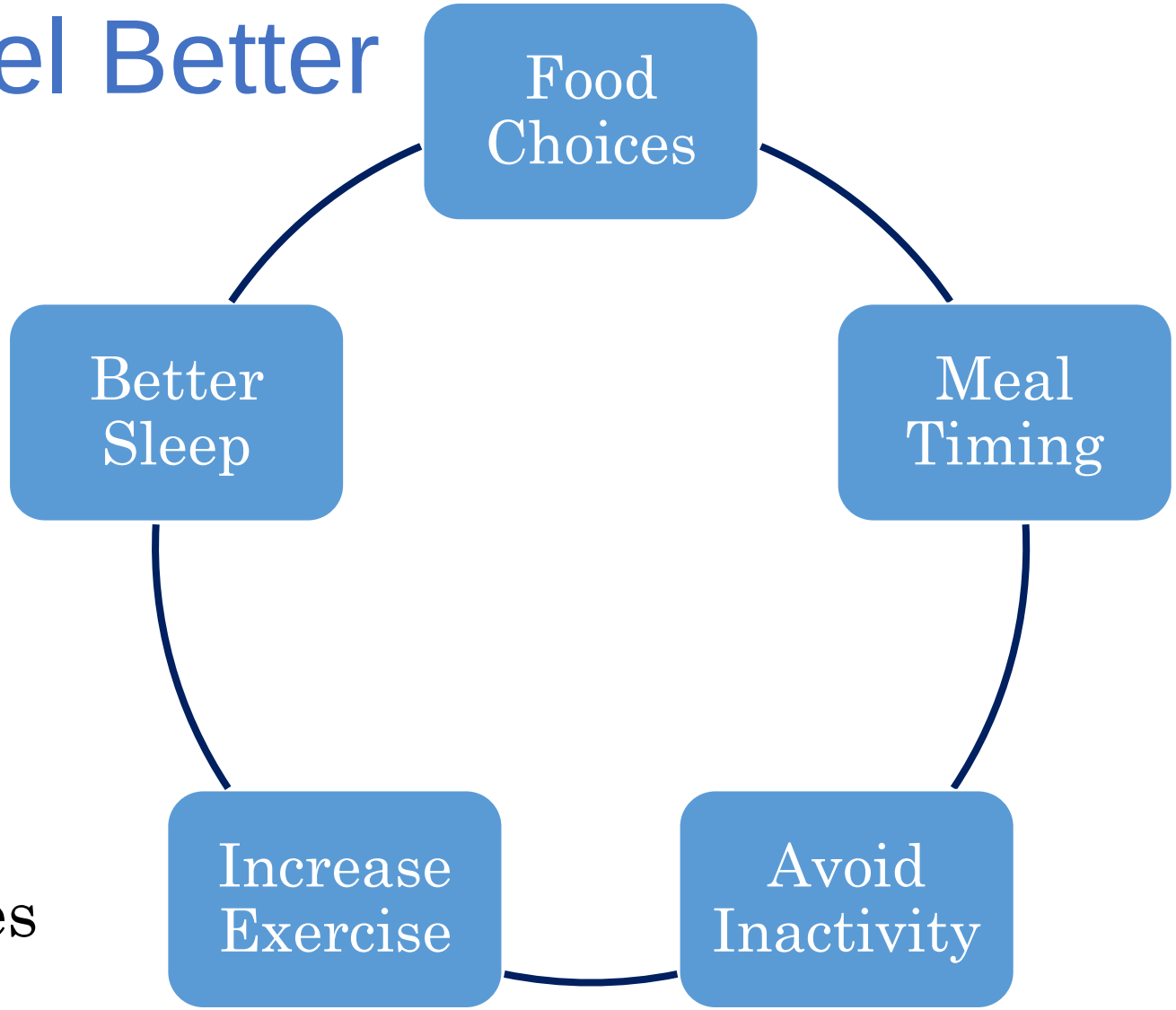
- Sleep issues are common in lipedema and other fat disorders.
- Chart analysis of 51 patients [Herbst 2015]
  - Difficulty sleeping Stage 1: 80%, Stage 2: 64.3%, Stage 3: 45.5%
  - Nocturia Stage 1 : 75%, Stage 2: 55%, Stage 3: 66.7%
  - Obstructive Sleep Apnea in later stages: Stage 2: 14.8%, Stage 3: 40%
- Convenience sample of Dr. Iker's patients:
  - N= 11, all female with lipedema, one post-liposuction
  - Average SATED score: 3.5 on 0-10 scale
  - Do you sleep between 6 and 8 hours per day?
    - 7 Rarely/Never
    - 4 Sometimes

Sleep Issues and Lipedema

- Sleep may be impaired by pain from multiple sources:
  - Lipedema pain (painful fat)
  - Abdominal pain from GI issues
  - Headaches
  - Joint and muscle pain from orthopedic issues/hypermobility
- Joint hypermobility or Ehlers-Danlos Syndrome (EDS):
  - OSA risk 6 times greater than in the general population.
  - High rates of excessive daytime sleepiness due to disrupted sleep cycles and autonomic issues. [Sedky 2019]

Changing to Feel Better

- Change is a process
- One step at a time
  - Food Choices
  - Meal Timing
  - Better Sleep
  - Reducing Inactivity
  - Increase Exercise
- Build self-efficacy
- Learn from experiences



Recommended Eating Pattern

- Eat primarily:
  - Whole foods, mostly plants, many varieties/colors of vegetables and fruits
  - Fermented foods, especially kefir and yogurt, daily
  - Use herbs and spices to provide your favorite flavors.
- Starve lymphedema and lipedema by:
  - Minimizing sugars (especially fructose), refined carbohydrates (especially grains containing gluten), and chemically modified fats.
  - Limiting animal products and high-salt foods.
  - Avoiding dairy (other than kefir and yogurt) appears to help lipedema.
- Whole foods are best
  - Prepared foods contain added sugar, salt, soy, unhealthy fats, undesirable food additives and preservatives

Food Choices

- Foods as described above to reduce gut dysbiosis and NAFLD
- Meal Timing:
  - Minimizes blood sugar swings and food cravings
- Avoid Inactivity/ Increase Exercise:
  - Reducing NAFLD increases exercise capacity
- Better Sleep:
  - Plant based diet increases melatonin for better sleep and less pain
  - Sugar sweetened beverages linked to sleep issues

Ketogenic Diets

- Our eating plan: low and slow carbohydrates
- For those interested in a ketogenic diet (under 130 grams of carb/day is considered keto, often much lower):
  - Research favors vegetable-based low-carbohydrate diets correlated with decreased all-cause mortality over animal-based diets. [Kosinski 2017]
  - Look for an eating plan you can follow for life, not a 'diet'.
  - Monitor patients for blood ketones, lipids, and liver enzymes as well as cognitive function and energy levels. [Anekwe 2020]
  - May need supplemental magnesium, potassium and sodium.

Recommendations for Meal Timing

- Meal timing affects health in many ways:
  - Fasting overnight for 12+ hours helps reduce the risk of diabetes, cardiovascular disease, and breast cancer [Marinac 2015]
- Eat 2-3 meals/day on a routine schedule
  - Not snacking, grazing, sugar sweetened beverages, candies, etc.
  - Avoid eating within the 2-3 hours before bed, if possible
  - Avoid eating during the night

Meal Timing

- Meal timing:
  - Eat 2-3 meals/day, not snacking/grazing or sweetened beverages
  - Eat during daylight, fast 12+ hours/night,
  - Eliminates post dinner eating that can be problematic
  - Intermittent fasting can be beneficial
- Meal timing influences:
  - Food choices: eat meals, not snack foods
  - Avoid Inactivity/Increase Exercise: coordinate timing
  - Sleep: eliminates eating close to bedtime or during the night which disrupts sleep

Better Sleep

- Sleep: adequate sleep is 6-8 hours/night including 2-4 am
  - Treat sleep apnea, if present
  - Best for insomnia: Cognitive Behavioral Therapy for Insomnia
- Inadequate sleep influences:
  - Food Choices: increases appetite and carb craving, impairs fat mobilization and prevents weight loss
  - Meal Timing: increases food cravings, caffeine, alcohol
  - Avoid Inactivity/Exercise: reduces desire and capacity to exercise
- Deficient sleep also affects pain perception, anxiety, depression and other mental health issues

Recommendations for Better Sleep

- Make sleep a priority, schedule 7-9 hours/day in bed
- Practice good sleep hygiene,
  - See **Your Guide to Healthy Sleep** from NIH: www.nhlbi.nih.gov/health-topics/all-publications-and-resources/your-guide-healthy-sleep
  - Bedroom cool, dark, quiet
  - Avoid bright lights, screen time, eating, vigorous activity before bed
- If insomnia is an issue:
  - Cognitive behavioral therapy for insomnia (CBT-I) is recommended
  - See **Insomnia Coach** app from the VA: www.ptsd.va.gov/appvid/mobile/insomnia_coach.asp
  - 'Sleeping pills' or alcohol do not provide beneficial sleep

Recommendations for Better Sleep

Ask your healthcare provider about factors that could interfere with sleep duration or quality. For example:

- Conditions such as Alzheimer's, asthma, cancer, chronic pain, diabetes, heart disease, GERD, Lyme disease, overactive thyroid, Parkinson's disease, etc.
- Medication and OTC drug side effects or dosing schedule:
  - Antidepressants, antihistamines, alpha blockers, beta blockers, etc.
- Obstructive sleep apnea
- Frequent urination (nocturia)
- Restless leg syndrome

Recommendations for Better Sleep

- Improve nutrition
  - Recommended eating pattern in **Lymphedema and Lipedema Nutrition Guide**
  - Sleep specific nutrition and meal timing recommendations below
- Consider melatonin supplements
  - Jet lag or insomnia: 3 mg time release, take 30 minutes before bed
  - Lipedema: some doctors use higher doses for anti-inflammatory effects
- Avoid long periods of immobility/inactivity
- Increase activity and exercise within safe limits
  - Affects sleep, gut microbiome, energy level, etc.

Avoid Inactivity

- Avoid prolonged inactivity: 'sitting the new smoking'
  - Non-movement changes metabolism to compensate for injury, paralysis, or hibernation
  - Movement increases lymph flow via muscle pumps and gut motility
  - Even standing up and sitting down again can help
- Inactivity influences:
  - Food choices: inactivity can be accompanied by automatic eating
  - Meal timing: eat anything within reach?
  - Exercise: deconditioning reduces exercise capacity/desire
  - Sleep: promotes napping, reduces desire to sleep at night

Increasing Exercise

- If you have not been exercising, start under the supervision of a professional, progress gradually, stay within your safe capacity:
  - Balance for fall prevention
  - Flexibility for range of motion
  - Strength to maintain or build muscle mass
  - Endurance to increase aerobic capacity
- Exercise influences:
  - Food choices: builds honest appetite, not eating as distraction
  - Meal timing: coordinate timing
  - Inactivity: counters trend, improves mobility
  - Sleep: increases desire to sleep, improves sleep efficiency

COVID-19 Risk Reduction

- BMI above 25 is a modifiable COVID-19 risk factor:
  - More likely to get COVID-19, more likely to be serious or even fatal.
- Obesity impairs immune function and increases infection susceptibility by changing the mix of gut microorganisms
  - Microbiota or microbiome: trillions of bacteria, fungi, viruses, etc.
  - Gut dysbiosis: unhealthy mix of gut microbes, gut permeability
- Gut dysbiosis can be repaired and immune function restored by consistently following our recommended eating pattern.
    - [Bold 2020] [Ehrlich 2016]

Other Pandemic Recommendations

Address common deficiencies that increase COVID-19 risk:

- Vitamin D, especially people w/darker skin, older, or housebound
- Vitamin C
  - Supplements help prevent/treat upper respiratory infections, pneumonia
- Vitamin A
- Vitamin E
- Zinc
- Selenium
- Iron

[McAuliffe 2020] [Bold 2020]

Other Pandemic Recommendations

Melatonin helps fight COVID-19 and other viruses because it:

- Helps regulate and prevent viral infections
  - Most viruses actively inhibit melatonin production and disrupt sleep
- Fights infection, cytokine storm, inflammation, and oxidation
- Minimizes virus-induced gut permeability and dysbiosis
  - [Anderson G 2020]

Melatonin may be a "Silver Bullet" adjuvant for COVID-19, but more research is required. See [Cardinali, 2020] for example.

Meanwhile, maintain melatonin levels (as discussed above):

- Plant based diet, consider supplementation

Similar Pandemic Recommendations

Uma Naidoo, nutritional psychiatrist at Massachusetts General Hospital, recommends foods that battle stress during the pandemic including a Mediterranean eating pattern with whole foods and healthy fats:

- Fiber-rich foods feed the good bacteria in the gut.
  - *Sources:* Beans, legumes, fruit and vegetables. Kefir, miso and kimchi.
- Vitamins B9 and B12 help protect brain cells.
  - *Sources:* Legumes, leafy green vegetables, fish and shellfish.
- Prebiotics feed the good bacteria in the gut.
  - *Sources*: Beans and legumes. Oats. Bananas. Berries. Garlic. Onions. Asparagus. Artichokes. Leeks.
- Probiotics live bacteria and yeast replenish good bacteria in the gut.
  - *Sources:* Yogurt with active cultures (skip fruit-sweetened versions); fermented foods, such as sauerkraut, kimchi and kombucha.

[WSJ 2020-07-28 https://www.wsj.com/articles/foods-that-battle-stress-during-the-coronavirus-pandemic-11595898000]

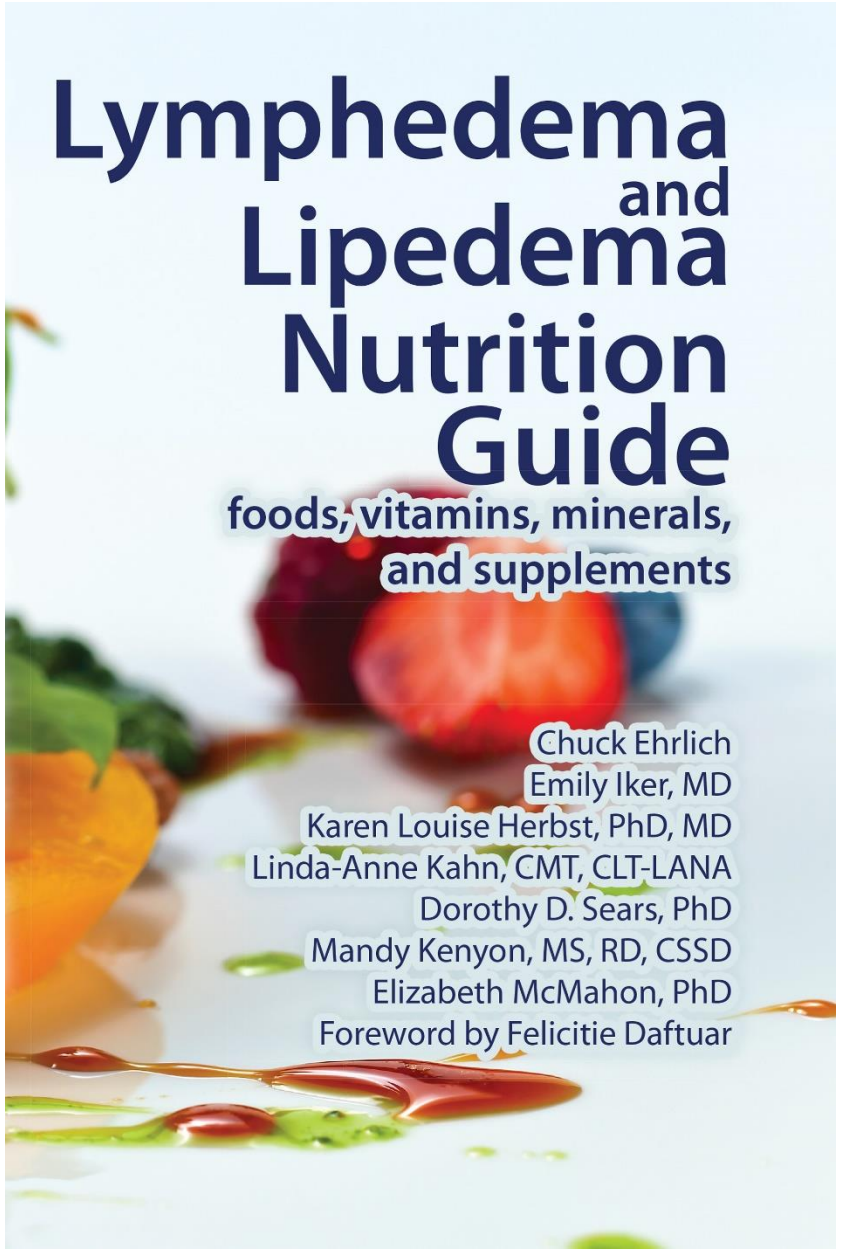
Resources

- **Your Guide to Healthy Sleep** from NIH
  - https://www.nhlbi.nih.gov/health-topics/all-publications-and-resources/your-guide-healthy-sleep
- **Why We Sleep: Unlocking the Power of Sleep and Dreams** by Matthew Walker. Scribner 2018.
- **Lymphedema and Lipedema Nutrition Guide** by Ehrlich, Iker, et al. Lymph Notes 2016.

Questions?

- Contact Chuck Ehrlich: Chuck@LymphNotes.com

- Lymphedema and Lipedema Nutrition Guide
  - Paper ISBN: 978-0-9764806-8-6
  - E-book ISBN: 978-0-9764806-9-3
  - www.LymphNotes.com/nutrition.php



Food Sources of Melatonin

Good sources of melatonin include:

- Tomato at 3–114 ng/g
- Walnuts at 3-4ng/g
- Cereal (barley, rye) at 300–1,000 pg/g
- Strawberries at 1–11 ng/g
- Olive oil at 53–119 pg/ml
- Unprocessed cow milk at 3–25 pg/ml
- Night-time milk (functional food product) at 10–40 ng/ml
  - From cows milked after dark when melatonin levels are higher, not widely available
- Wine (from grapes) at 50–230 pg/ml
- Cherries at 2.06-13.46ng/g

Adapted from https://examine.com/supplements/melatonin/

Sleep Dimensions and Health Outcomes

Sleep impacts ALL of these heath outcomes (and more)

X indicates published research studies cited in [Buysse, D 2014]

	Accidents	Coronary heart disease	Depression	Diabetes	Hypertension	Impaired performance	Metabolic Syndrome	Mortality	Obesity
Satisfaction		X	X	X	X		X	X	
Alertness		X				X		X	
Timing	X	X		X			X	X	
Efficiency		X	X	X	X		X	X	
Duration		X		X	X	X	X	X	X

Adapted from [Buysse, D 2014] www.ncbi.nlm.nih.gov/pmc/articles/PMC3902880/