

Course Title: Nutrition - The Effects of Obesity and Metabolism on Musculoskeletal Conditions in the 21<sup>st</sup> Century

Instructors: Dr. Michael Robertson, D.C. and Dr. Jeremy Webster, D.C.

Total Hours: 16 hours (includes Texas mandatory hours)

Summary:

In this course you will learn how obesity trends and metabolic changes affect the musculoskeletal system. All covered information is supported by the current scientific literature with references throughout. You will review the underlying mechanisms of obesity and metabolic disorders/abnormalities which may signal the need for nutritional therapy as an adjunct to your chiropractic and rehab protocols. You will learn appropriate examination procedures and history taking to identify possible nutritional needs as well as metabolic conditions that require referral to other medical professionals. Dr. Webster will review samples of clinical protocols using lab analysis and nutritional and lifestyle modifications which could be utilized to positively affect the outcomes of your chiropractic patients.

Learning Outcomes:

By the end of the seminar, participants will be better able to:

- Accurately evaluate nutritional status and related metabolic issues which lead to obesity and joint pain.
- Identify metabolic situations that justify a referral to another medical professional.
- Explain the impact of nutrition, diet and lifestyle as they relate to obesity, tethering those findings to their relevance to musculoskeletal conditions.
- Read and monitor lab markers and physical symptoms that indicate the patient's improvement thorough nutritional care.
- Create individualized treatment plans that help improve function and well-being of the chiropractic patients and are within the scope of practice for their state.

Teaching Methods:

Lecture, slides, Q & A, Sample Cases/Case Studies

Course Outline:

<i>Hour</i>	<i>Content</i>	<i>Format</i>	<i>Topic</i>
<i>Saturday 9:00am- 9:50am Hour #1</i>	<ul style="list-style-type: none"><li>● E/M Coding Selection Changes Effective Jan 1, 2021<ul style="list-style-type: none"><li>○ History of why these changes are being made<ul style="list-style-type: none"><li>▪ Review 2019 proposals to change by CMS and negotiations/feedback from AMA</li></ul></li><li>○ Summary of Changes<ul style="list-style-type: none"><li>▪ E/M Scoring changed to Time or MDM</li><li>▪ Deletion of 99201</li><li>▪ Retention of individual code levels</li></ul></li></ul></li></ul>	<i>Lecture, Slides</i>	<i>TBCE Mandated hours: Documentat ion/Record Keeping</i>

- Review new compensation schedule
        - Addition of new prolonged services code
  - Review of NEW CPT code Descriptions
    - o Current code descriptions for 99202-99215, & 99417
  - E/M Scoring changes – New ways to select your code level
    - o Compare and contrast new vs old methods
      - MDM vs 3 key components
      - Total time vs old Time method
  - E/M Coding according to Time
    - o Elements addressed in new time code selection
    - o Differences between new E/M timed code selection and all other CPT code time selection processes
    - o Specific criteria for time code selection
    - o Face-to-Face and Non-face-to-face
    - o Date of Service only
    - o Pre/Post/Intra-service definitions changed
    - o Portions of clinical encounter that can be counted toward time
    - o No double dipping & exclusion of separate CPT services
    - o Review correct coding for every probable time frame for E/M codes
    - o The new Prolonged services code and how to implement Compare new prolonged code to existing prolonged codes and differentiate appropriate usage of said codes

Saturday  
9:50am-  
10:40am  
Hour #2

- E/M coding in 2021 according to Medical Decision Making
  - o Compare/Contrast MDM vs 3 Key Components
  - o Highlight documentation requirement of only the history and examination they deem necessary for the encounter and maintenance of standards of Problem Oriented Medical Record as per NCQA Guidelines for Record Keeping
  - o 3 categories of MDM
    - Number and complexity of problems addressed
    - Amount and/or complexity of data to be reviewed and analyzed
    - Risk of complications and/or morbidity or mortality of patient management
- Determining level of service
  - o Selection of code level with respect to Number and complexity of Problems addressed
  - o Selection of code level with respect to Amount and/or complexity of data to be reviewed and analyzed
  - o Selection of code level with respect to Risk of complications and/or morbidity or mortality of patient management
  - o Coding based on level of medical decision making

Lecture,  
Slides

TBCE  
Mandated  
hours:

Documentat  
ion

- Clinical scenarios outlined by the AMA and CMS that qualify for 99203
    - Scenarios that qualify for 99204
  - Review of probable code selection pathways for chiropractors given the new coding rules
    - Code Selection tips for:
      - 99202/99212
      - 99203/99213
      - 99204/99214
      - 99205/99215
- Final Review of code changes and expectations for Payer policy updates

*Saturday  
10:40am  
-11:30am  
m  
Hour #3*

- Discussion of ethical pitfalls and board complaints
  - Review of previous board actions for past year
- Introduction to medical ethics
  - Defining medical ethics
    - Medical ethics vs common ethics
    - The 6 primary tenets of medical ethics
  - Looking at common medical ethical issues
    - Privacy and confidentiality
    - End-of-life issues
    - Access to care
- Ethical considerations of the provider-patient relationship
  - Fiduciary duty
  - Protecting patient privacy
  - Clear and ethical communication
  - Understanding full disclosure
  - Understanding appropriate referrals
    - Considering second opinions
    - Specialist referrals
      - Stark Regulations and anti-kickback regulations
- Running an ethical practice
  - Propriety in medical records
  - Modern managed care & today's office practice
- Ethical challenges in delivering basic healthcare
  - Ethics of healthcare distribution
  - Exploring concepts in health care rationing
  - Looking at healthcare delivery strategies in the US
    - HIPAA and the adolescent patient

*Lecture,  
Slides  
TBCE  
Mandated  
hours:  
Ethics*

*Saturday  
11:30am  
-12:20pm  
m  
Hour #4*

- Stroke
  - Review of evidence between chiropractic and stroke
  - Utilizing Informed Consent
  - Public Perception of chiropractic and stroke risk
    - Topics and research to discuss with patients
- Risk Management Tips

*Lecture,  
Slides,  
Case  
Study  
TBCE  
Mandated  
hours:  
Risk  
Management*

- o Screening patients for health risk and readiness for rehab
  - PAR-Q
  - Red Flags from history
- o Handling the upset patient
- o Insurance records requests
- o Community outreach
- o Patient reactions
- o Balancing philosophy
- o Updating patient records
- Risk Management and Social Media
  - o Is it appropriate to text my patients?
  - o The risks of expanding your practice's social media presence
    - Avoiding potential pitfalls of social media
  - o Concerns with responding to a bad online review
    - Handling a negative social media comment
- Informed consent
  - o Components
  - o Examples-Case Study

*Saturday  
12:50pm  
-1:40pm  
Hour #5*

Obesity's impact on Musculoskeletal Health and Nutritional Interventions for the Chiropractor

*Lecture,  
Slides*

*Clinical  
Sciences;  
coding;  
documentat  
ion*

- Obesity Statistics – An Ever-Growing America
  - o CDC obesity maps 1985-2010
    - Note southern states obesity rates compared to NE or West Coast
    - Mississippi consistently has among the highest obesity rates
    - Colorado tends to have the lowest obesity rates
    - Observe the trends in all states over this 25-year study period
    - In 1990, Mississippi (and all other states) <15% obesity
    - By 2002, Colorado (and all other states) >15% obesity
    - By 2010 ALL states >20% obesity (12 states >30%!)
      - Obesity is NOT a southern problem. It is an American problem
  - o New data type 2011-2016
    - Changes in obesity data collection occurred in 2011
    - Direct comparisons to data before 2011 are not accurate
    - Trends can still be observed both before and after the 2011 change
  - o Ethnicity and Obesity stats 2015-2017

- White- only DC and HI <20%, entire MW>30%, WV>35%
  - Black- ND<20%, dozens>35%
  - Hispanic- DC<20%, 8 states>35%
  - It's also NOT a Black/White/Hispanic issue
- The impact of obesity on joint longevity and subluxation
  - The alteration in biomechanics of joints due to obesity
    - BMI has been linked to back, knee and hip pain
    - Each extra pound places 4 lbs. of extra force on your patient's knees
    - BMI>35 equates to 48%-233% greater chance of back pain
    - Osteoarthritis in the hip has been linked to obesity - (Arthritis Rheumatol. Author manuscript; available in PMC 2017 Feb 1.)
  - The link between obesity and subluxation
    - Excess abdominal fat produces an increase in lumbar lordosis
    - Postural instability due to poor integration of plantar somatosensory input - (Osong Public Health Res Perspect. 2016 Dec; 7(6): 378–381.)
- Adipose tissue and inflammation
  - The role of adipose tissue in storing inflammatory chemicals
    - Sequestration of toxins into fat decreases blood concentration of toxins
    - Bio-accumulation of many toxins leads to increased body burden
    - Increased body burden leads to inflammation, oxidative stress, joint destruction and pain
- Adipose tissue can stimulate the production of inflammation - (Arch Med Sci. 2017 Jun; 13(4): 851–863)
  - Stimulates TNF-alpha, IL-6 and decreases Adiponectin
  - Increased production of CRP
  - Increased joint pain and destruction

*Saturday  
1:40pm-  
2:30pm  
Hour #6*

Dietary trends and contributions to obesity

- Macro-nutrient consumption
  - US Calories consumed daily per capita
    - 1970 caloric consumption compared to 2010 - ([http://www.pewresearch.org/fact-tank/2016/12/13/whats-on-your-table-how-americas-diet-has-changed-over-the-decades/ft\\_16-12-09\\_food\\_grains\\_fat/](http://www.pewresearch.org/fact-tank/2016/12/13/whats-on-your-table-how-americas-diet-has-changed-over-the-decades/ft_16-12-09_food_grains_fat/))
  - US Sugar consumption trends
    - Fairly steady from 1925-1975 (110-120lbs annually/person)
    - By 2000, that number had increased to over 150lbs/year

*Lecture,  
Slides,  
Case  
study*      *Clinical  
Sciences*

- A Large portion of that is HFCS
  - Gallop poll 2013- those earning <\$30k/year more than twice as likely to drink regular sodas than those earning >\$70k
- o US Wheat consumption trends
  - 1960-1981 between 16M-23M metric tons per year
  - by 1984 we consumed 31M metric tons (26M-37M ever since)
  - 1960-2012 consumption increased 136% vs 74% population growth
- o US Corn consumption trends
  - First exceeded 100MMT in 1968
  - Exceeded 150MMT in 1987
  - Exceeded 200MMT in 2001
  - Exceeded 300MT in 2014
  - 1960-2018 growth rate of 266% vs 81% population growth
- o US Soy Oil consumption trends
  - Review data on increase in soy oil consumption from 1964-2018
  - 466% increase in soy oil consumption vs only 71% population growth during this timeframe
- o US Beef consumption
  - 7MMT in 1960
  - 12MMT in 2018
  - 65% consumption growth vs 81% population growth
  - We eat LESS beef now per person - (<https://www.indexmundi.com/agriculture/?country=us&commodity=corn&graph=domestic-consumption>)
- o Micro-nutrient consumption
  - With a more refined diet, micro-nutrient content has rapidly declined
    - Review how the refining process strips vitamins and minerals from whole grains
    - Trends reveal that consumption of more grains and cooking oils results in fewer fruits and vegetables consumed
- o Research has demonstrated that soil nutrients have become less dense
  - Review changes in magnesium and iron levels in farmed soil
- o Links between low Micro-nutrient Status and Obesity
  - Building blocks of hormones and neurotransmitters
  - Cofactors for enzymes that drive Krebs cycle

Saturday  
2:30pm-  
3:20pm  
Hour #7

Dietary Modifications to Improve Musculoskeletal Health via  
Reducing the Effects of Obesity common to the 1900s

Lecture, Slides  
Clinical Sciences

- Caloric Reduction Strategies
  - Eat less calories than you burn- it works!
  - Common "diet" companies use this approach.
  - Problems with low calorie diets
    - Eating less of the same food is often difficult
    - Poor long term complains
    - Loss of lean tissue
    - Haven't solved the "cause" of the overeating/obesity
    - Patients expect better from their doctor
- Fat Reduction Strategies
  - Correlation between fat consumption and body fat percentage
  - Impacts of fat consumption on arterial health and heart disease
  - Public health impacts of fat reduction strategy in the US
  - The challenges with a low-fat approach
    - Too much sugar consumed
    - Miss out on important nutrients
- Strategies Involving Alterations in Meal Frequency, Timing, and Portion Size
  - The effects of high frequency meal consumption on metabolism
    - Times when 5-6 meals can be helpful
  - Common beliefs around breakfast timing compared to current data on the impact of this trend on weight loss
- Veganism Strategies
  - Define Vegan
  - Reasons for being vegan
    - Ethical/moral
    - Religious
    - Health
  - Positives of a vegan diet
    - Nutrient rich fruits and veggies
    - Avoid low quality meat products that include preservatives and flavor enhancers
  - Negatives of Veganism
    - Insufficient intake of certain nutrients that require supplementation
    - Many unhealthy foods are still vegan- give examples
  - Sample of a full day on a vegan diet with proper supplementation

Saturday  
3:20pm-  
4:10pm  
Hour #8

Emerging Dietary Modifications to Improve Musculoskeletal  
Health via Reducing the Effects of Obesity

Lecture, Slides  
Clinical  
Sciences

- Paleo and “High Protein” Strategies
  - Review the history of the Paleo diet trend
  - What foods are included in a Paleo Diet and what foods are excluded
  - Theory behind Paleo Diet Strategies
  - Studies that compare outcomes of Paleo diet vs AHA diet
  - Criticisms of Paleo Diets
    - Kidney issues
    - Cardiovascular Issues
    - Lack of calcium from no dairy
    - Lack of fiber from no grains of legumes
  - Sample day of a proper Paleo diet
- Ketogenic Diet Strategies
  - History of Keto diets with epilepsy and other conditions from early 1900's.
  - What foods are included in a Keto Diet and what foods are excluded
  - “Clean” vs “Dirty” Keto
    - Samples of each
  - Theory behind Ketogenic Diet
  - Benefits of Keto Diet
    - Fat loss
    - Muscle sparing
    - Improved metabolic markers
    - Reduced hunger
    - Autophagy
  - What to expect when initiating a Keto Diet
    - Discuss exogenous ketones for first week on keto diet
    - Discuss becoming keto or fat adapted
    - Discuss keto cycling
  - Common criticisms of Keto Diets
    - Cardiovascular risks
    - Low antioxidants due to little/no fruit
    - Low fiber due to no grains/beans
    - Ketoacidosis
- Intermittent fasting Strategies
  - Benefits according to research
  - Time restricted feeding
    - 24 hr. cycle
  - Circadian feeding
    - Subset of TRF
  - 5:2 caloric cycling
    - One week cycle
  - Periodic fasting
    - One month cycle
  - Compare strengths and weaknesses of each



- o Common challenges faced by patients who are pursuing intermittent fasting strategies
  - Difficult for some
  - Dizziness/lightheaded

*Sunday  
9:00am-  
9:50am  
Hour #9*

The Metabolism and Its Impact on Obesity - Overview of Body Fat Metabolism

*Lecture, Slides      Clinical Sciences*

- Adipose Liberation
  - o Lypolysis
    - Stimulated by low insulin and high epinephrine
    - Hydrolyzes triglycerides in adipose tissue into free fatty acids (and glycerol)
  - o Fat is now in circulation in the blood with two destinations
    - Mitochondria, aka. the powerhouse of the cell, for conversion into ATP
    - Liver for conversion into ketones, if insulin is low enough
    - Ketones also enter the Mitochondria for conversion to ATP
- Fatty Acid Shuttling- Fatty acids can't cross biological membranes due to their (-) charge
  - o Pantethine 900mg QD- fundamental component of CoA
    - CoA helps fat cross the cell membrane
    - Pantethine boosts Krebs cycle activity
    - Mark Houston MD, MS, MSc, in Integrative Medicine (Fourth Edition), 2018
  - o Carnitine 2000mg QD
    - Long chain fatty Acyl-CoA requires carnitine to cross the mitochondrial membrane
    - Short chain fats can enter the mitochondria without carnitine
- Conversion of Fat into Energy (Aerobic Metabolism)
  - o Once inside the mitochondria fats undergo beta-oxidation and enter the Krebs Cycle as Acetyl- CoA to be converted to ATP
  - o Ketones, Glucose and Amino Acids can also enter the Krebs Cycle as Acetyl-CoA at this point.
  - o Review the Krebs Cycle, aka Citric Acid Cycle, aka Tricarboxylic Acid Cycle (TCA)
    - Discuss the nutrients that drive the Krebs Cycle- B's, Mg, Mn, Lipoic Acid, Fe, Cysteine
    - The goal of the TCA is to convert everything into Hydrogen containing molecules NADH and FADH2.
  - o Review Electron Transport Chain
    - Discuss the roles of Oxygen and CoQ10 in the ETC
    - How can anemia affect the ETC

- How can statin drugs affect the ETC
  - o Organic Acids Testing
    - A simple urine test can pinpoint places where the Krebs's cycle and/or Electron Transport are weak
    - Nutritional deficiencies
- Burn
  - o ATP can be used for all cellular functions or repair
    - once burned it is expelled as CO<sub>2</sub> (literally how you lose weight)
    - If ATP is NOT burned, it will be converted back into triglyceride
    - Triglyceride be stored back into adipose tissue
    - Very wasteful use of your nutrients
  - o Adequate Exercise/activity is a must for weight loss

*Sunday  
9:50am-  
10:40am  
Hour  
#10*

Exercise and its effects on Obesity and Joint Health

*Lecture,  
Slides      Clinical  
Sciences*

- Exercise, Activity and Movement
  - o Movement is a broad term that includes both Activity and Exercise
  - o Activity levels have declined tremendously
    - By 2020, Americans will average 190 METs (metabolic equivalents of task)
    - For perspective, sleeping all day is 151METs, a desk job with 30 min vigorous activity per day is 240METs.
    - <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-789X.2011.00982.x>
  - o Activity is different than exercise
  - o Exercise is more intentional
- Intensity levels of physical movement
  - o Low Intensity- can perform for hrs. without stopping
  - o Moderate Intensity- can perform for 2-60minutes before needing to rest
  - o High Intensity- can perform 15-60 seconds before rest is required
  - o Extreme Intensity- can perform for 1-12 seconds before rest is required
- Benefits and drawbacks of each intensity level
  - o Low Intensity Benefits
  - o Low Intensity Drawbacks
  - o Moderate Intensity Benefits
  - o Moderate Intensity Drawbacks
  - o High Intensity Benefits
  - o High Intensity Drawbacks
  - o Extreme Intensity Benefits
  - o Extreme Intensity Drawbacks

Sunday  
10:40am  
-11:30a  
m  
Hour  
#11

Creating clinical treatment plans to reduce the effects of obesity on musculoskeletal conditions

Lecture,  
Slides

Clinical  
Sciences

- Goal-specific movement plans targeting the individuals needs
  - Fat Loss
    - HI training
    - Increased activity
    - Sample workout
  - Joint/spine health
    - Passive motion first, then switch to active ASAP within tolerance
    - Isometrics and then Eccentrics for tendonitis
    - Core stabilization- McGill Big Three
  - Balance/coordination
    - Core- Big Three
    - Challenge the area the individual where they are struggling
    - Constant progression- seated, seated on ball, standing, one leg, foam, wobble board
    - Eye movements
  - Endurance/Stamina
    - Long duration cardio
    - Specific to the individuals sport
    - Add HIIT for improved times
  - Increased Strength
    - Combine concentric and Isometric lifting
    - 1-5 reps per set
    - Isometric at full effort for 1-1.5 minutes per set
    - Keep volume low and effort high for best muscle stimulation and recovery
    - Sample workout week
  - Increased Muscle Mass
    - 6-12 reps per set.
    - Slow, grinding peps
    - Negatives (eccentric reps) with partner assist
    - Each muscle must be trained every second or third day
    - Compound movements work more muscle and stimulate more growth
    - Sample workout week
  - Athletic Performance
    - Build explosive strength without slowing the athlete down
    - Explosive concentric movements with little or no eccentric loading
    - Changing direction rapidly should be emphasized
    - Core strength- McGill big three with dynamic movements added

Sunday  
11:30am  
-12:20p  
m  
Hour  
#12

## Common Metabolic Abnormalities That Lead to Obesity

Lecture,  
Slides      Clinical  
Sciences

- Review TBCE rules regarding scope of practice and nutrition
  - Must be related to musculoskeletal diagnosis
    - Identifying obesity as a contributing factor to the musculoskeletal condition is allowed
    - Understanding some of the metabolic factors associated with obesity will better help the chiropractor manage the case through lifestyle modifications and proper referrals to the appropriate medical practitioner.
  - Diagnosis and treatment of a metabolic condition is not within our scope of practice
    - Helping the patient lose weight is allowed when it is aimed at improving the musculoskeletal condition of the patient.
  - Treatments allowed for weight loss
    - Diet and weight control
    - Exercise
    - Nutritional supplements
    - Advice and counseling
- Anemia
  - Define anemia
  - Why do those with anemia have difficulty losing fat?
  - Common symptoms of anemia
    - Many symptoms in common with heart attack
  - Review at risk populations for development of anemia
  - Discuss CBC plus differential blood test
  - Microcytic anemia
    - Most common cause is iron deficiency
    - Review blood tests for iron deficiency
    - Discuss normal and optimal ranges for each test
    - Other causes include other deficiencies and many diseases
  - Macrocytic anemia
    - Most common causes are B12 and B9 deficiency
    - Many other diseases, medications and alcohol abuse can also cause macrocytic anemia
    - Discuss dangers of synthetic folic acid- cancer risk
    - Warning about using folate without B12- possible neurological damage
    - Discuss MMA and FIGLU test on organic acids panel as related to B12 and B9
- Insulin Resistance
  - Define and describe the basic mechanisms behind IR
    - Sugar consumption
    - Insulin levels
    - Tissues that develop IR first
  - How does IR relate to Type 2 diabetes?

- o Is IR of concern in those with Type 1 diabetes?
- o Symptoms of IR
- o Testing for IR
  - Insulin, glucose, HbA1c
  - Fasting and post-prandial
- o Nutrients that encourage normal insulin sensitivity
  - Lipoic Acid
  - EGCG
  - Magnesium
  - Zinc
  - Vitamin D
  - Chromium
  - Berberine
- o High Intensity Exercise and its effects on insulin sensitivity
  - How does a Ketogenic Diet affect Insulin Resistance

*Sunday*  
*12:50pm*  
*-1:40pm*  
*Hour*  
*#13*

#### Thyroid Abnormalities That Lead to Obesity

- Hypothyroid
  - o Review of thyroid system
    - Gland
    - Hormone
    - Binding and stimulating the cell
  - o Explain the series of events that take place for optimal thyroid function
    - Hypothalamus send TRH
    - Pituitary send TSH
    - Gland produces T4
    - Liver activates T4 into T3
    - Free T3 binds and activates cell to increase metabolism
  - o Describe the testing involved to analyze each step
    - TRH
    - TSH
    - Total T4
    - Total T3
    - Reverse T3
    - Free T3
    - Thyroid Binding Globulin
    - T3 Uptake
    - Thyroid Peroxidase Antibody and Anti-Thyroglobulin Antibody
  - o List and discuss the possible causes for any abnormalities in each lab marker
    - Autoimmunity
    - Deficiency

- Cancer
- Trauma
- Cortisol Excess
- Estrogen Excess
- o Review the nutrients that make up thyroid hormone and the co-factors required in each step
  - Iodine
  - Tyrosine
  - Selenium
  - Zinc
  - Vitamin D
- o Discuss the positives and negatives of iodine supplementation
  - Iodine and Hashimoto's
  - Iodine and Selenium combination

*Sunday*  
*1:40pm-*  
*2:30pm*  
*Hour*  
*#14*

#### Environmental Factors That Negatively Affect Metabolism

- Stress
  - o Review sympathetic response
    - Elevated glucose, triglycerides, heart rate, BP, cholesterol
  - o Look at studies of stress and weight gain
  - o Why do some people gain weight while under stress where others lose weight?
  - o Does "adrenal fatigue" exist?
  - o Discuss testing for 24hr. cortisol rhythm
  - o Stress relief techniques
  - o Supplements to help relaxation and encourage adrenal rejuvenation
- Nutrient Deficiency
  - o Nutrient co-factors for the Krebs's cycle
    - B-complex
    - Mn, Mg, Fe
    - Lipoic Acid
    - Cysteine
    - Carnitine
    - Pantethine
  - o Nutrients that drive ETC
    - CoQ10
- Toxicity
  - o Discuss toxicity factors - Solution to pollution is dilution
  - o Diabetogens- are toxins responsible for diabetes?
  - o <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4991654/>
  - o Endocrine disruptors
  - o Explain our inborn detoxification systems
    - Cyp450 and liver conjugation

- o List and discuss the compounds the liver uses in toxin conjugation
  - Glutathione, cysteine, methionine, taurine, glycine, Calcium-D Glucarate
- o Other important factors in detoxification
  - Bowel function, sweating, water intake
- o Detoxification markers on organic acids panel

*Sunday*  
*2:30pm-*  
*3:20pm*  
*Hour*  
*#15*

#### Patient Specific Factors That Can Affect Clinical Management and Considerations for Obesity and Metabolism

- Poor Digestion
  - o Nutrients must be broken down and absorbed in order to drive the metabolism
  - o Stomach acid
  - o Mechanisms that stimulate stomach acid and digestive enzymes secretion in the stomach
  - o Digestive enzymes
  - o Insufficiency in protein digestion can be detected in urinary organic acids testing
  - o Gut Flora
- Food Sensitivity
  - o IgE- true allergy
    - peanuts, shellfish, penicillin, etc.
    - triggers anaphylaxis
  - o IgG- delayed reaction/sensitivity
    - Studies show connection between food sensitivities and obesity
    - <https://www.ncbi.nlm.nih.gov/pubmed/18072008>
    - other evidence links IgG increases to food exposure rather than intolerance
    - good indicator of leaky gut
  - o Elimination/re-introduction diet
    - Good way to determine food sensitivities
    - Very low compliance
- Sleep
  - o Define proper sleep
    - Sleep timing
    - Sleep duration
    - Sleep quality
    - Signs of proper sleep
  - o Review the stages of sleep
    - Define stages 1-4 and REM
    - Discuss substances and actions known to disrupt certain stages of sleep
    - The ramifications of missing certain stages of sleep

- o Discuss the risks associated with poor sleep
  - Going to bed too late and reduced HGH release
  - Interrupted sleep and muscle aches
  - Too little sleep and hunger hormone imbalance
  - Sleep Apnea and cardiovascular risk and fatigue
  - Sleep variability and risk of obesity and metabolic syndromes
- o Natural solutions to common sleep issues
  - Nutritional Supplements including herbs, amino acids and minerals
  - Calming exercises to help relax the brain
  - Proper exercise intensity and timing to encourage sleep
  - Dietary modifications to promote longer sleep cycles
  - Avoidance of alcohol and OTC sleeping pills
  - Counseling for nightmares
  - Weight loss, sleep studies and CPAP for apnea and snoring

*Sunday  
3:20pm-  
4:10pm  
Hour  
#16*

#### Testosterone's Effects on Metabolism

- Low Testosterone and the Male patient
  - o Review the functions of testosterone
    - Sexual maturation
    - Protein synthesis
    - Energy, drive, stamina, aggression
    - Sex drive and potency, sperm production
    - Body hair, deep voice
  - o Signs and symptoms of low T
    - Infertility
    - Low sex drive, Impotence
    - Loss of muscle mass and strength
    - Osteoporosis
    - Mood swings, depression
    - Elevated blood sugar
    - Increased body fat
  - o Nutritional and lifestyle causes of low T
    - High Na/K ratio
    - Insulin resistance, type 2 diabetes
    - Obesity
    - High estrogen
    - Excess aromatization
  - o Pathological causes of low T
    - Pituitary tumors
    - High prolactin
    - Testicular injury or cancer



- Infection
  - Opiates
  - Klinefelter, Prader-Willi, kidney/liver disease, HIV/AIDS
  - Statins
  - <https://www.webmd.com/erectile-dysfunction/news/20100416/statins-may-lower-testosterone-libido#1>
- o Review the feedback loops involved in normal testosterone production
    - Pituitary releases LH
    - Testes release T
    - 2-3% conversion (aromatization) of T into Estrogen
    - Hypothalamus and pituitary detect T and E levels via central signaling
  - o Discuss common abnormalities in the testosterone production and labs that help identify them
    - Serum Testosterone
    - Estradiol
    - LH
    - Prolactin
    - Insulin, HbA1C, glucose, (fasting and postprandial)
  - o Review normal ranges for labs and the possible causes of any abnormal result
  - o Discuss interventions that can be indicated
    - Dietary changes
    - Exercise to stimulate T production
    - Herbal and mineral supplementation
    - Avoid exogenous estrogen
    - Weight loss to reduce insulin resistance and reduce estrogen production
    - Alcohol avoidance to improve aromatization rates
  - o Encourage proper referral to the appropriate medical provider when indicated

### Recommended/Background Readings

- Laboratory Evaluations for Integrative and Functional Medicine 2nd Edition: Richard S., Ed. Lord
- Functional Medicine Clinical Protocols for Inflammatory Disorders: Functional Inflammation, Volume 2 (Functional Inflammation & Inflammation Mastery): Alex Vasquez

- A Review of Articular Cartilage Pathology and the use of Glucosamine Sulfate. Journal of Athletic Training 2001 Oct-Dec.;36(4) 413-419: James and Uh
- NF-kB Signaling in Inflammation; Signal Transduction and Targeted Therapy July 14, 2017: Liu, Zhang, Joo, Sun
- Metabolic effects of HIIT. IDEA Fitness Journal, 2014 Vol. 11, No. 5, 16-18: Kravitz, L.