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Professional Webinars

# The RDN's Role in Eating Disorders A Progressive Approach

Hosted by Susan Allen RDN, CCN  
Presented by Margo Gasta, DCN, RDN



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# About Margo Gasta DCN, RDN

- Registered Dietitian
- Doctorate in Clinical Nutrition from MUIH
- Private Practice in Boulder CO
- Adjunct professor at Saybrook University
- Specialize in gut health, mental health, emotional overeating and pain



**The presenter reports no conflicts of Interest**



## **Forward: This training will not qualify you an eating disorder specialist**

Consider becoming a certified eating disorder specialist through [IAEDP.com](http://IAEDP.com) - International Association of Eating Disorder Professionals certification program.

Recognize that some clients will be out of your scope of practice and skill level and you should refer them on. Don't put yourself or the client at risk.



# Objectives

Upon completion of this presentation, participants will be able to:

- Identify specific nutrients that are helpful with supporting recovery from eating disorders.
- Evaluate conventional and integrative lab findings to assess biochemical individuality as it relates to mental health.
- Recognize the appropriateness of working within your scope of practice.



# Practice Responsibly

- Research articles used regarding nutrients and mental health benefits in this presentation may be subject to publication bias in this field.
- With application in practice, clinicians may find that nutrients given in supplement form may or may not provide benefits for individual patients.
  - Sometimes supplements can affect patients negatively so educate yourself.



# Practice Responsibly

- Caution should be used when recommending the use of supplements with patients who take medications, as there may be contraindications with psychotropic medicines and possible nutrient/drug interactions may occur in general.
- More research is needed to evaluate the efficacy and safety and determine optimal doses of nutritional supplements, though in many cases, a thorough assessment of each individual patient to determine personal nutrient deficiency/inadequacy is prudent.
  - After dietary recommendations, if inadequacy persists, supplementation may be warranted.
- This supports the reason to seek supervision and practice as part of an interdisciplinary team



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# **Why I Began Working with Binge Eating (Personal Account)**



# Registered Dietitians Are The Right Professionals

“Registered dietitians (RDs) are considered to be the most uniquely qualified and trained to provide nutrition therapy across the full continuum of disordered eating and at various levels of care.”

1. Nutrition Therapy for Eating Disorders, Christina Scribner Reiter, MS, RD, CSSD1; and Leah Graves, RD, LD, FAED2

2. Nutrition in Clinical Practice, Volume 25 Number 2, April 2010 122-136 © 2010 American Society for Parenteral and Enteral Nutrition, 10.1177/0884533610361606 <http://ncp.sagepub.com>, hosted at <http://online.sagepub.com>





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# **Review of Different Types of Eating Disorders**



# Anorexia

- “Unwillingness” to maintain body weight at a minimally normal weight for age and height. (Unwillingness is more likely” inability”)
- Intense fear of gaining weight or becoming fat that does not diminish with weight loss
- Disturbance in the way in which one’s body weight or shape is experienced.
- Undue emphasis on body weight or shape on self evaluation.
- Denial of the seriousness of the low body weight Absence of at least 3 consecutive menstrual cycles (not relevant in males).
- Subtype:
  - Restricting type: lack of regular binge eating or purging behavior
  - Binge Eating/Purging Type: Regular binge eating or purging type

1. American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

2. Nutrition Therapy for Eating Disorders, Christina Scribner Reiter, MS, RD, CSSD1; and Leah Graves, RD, LD, FAED2

3, Nutrition in Clinical Practice, Volume 25 Number 2, April 2010 122-136 © 2010 American Society for Parenteral and Enteral Nutrition, 10.1177/0884533610361606 <http://ncp.sagepub.com>, hosted at <http://online.sagepub.com>



# Bulimia

- Self-evaluation unduly influenced by body shape and weight. A sense of lack of control during recurrent episodes of binge eating, which occur **at least twice a week for at least 3 months**.
- **Use of compensatory behaviors to prevent weight gain (eg, self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise) at least twice a week for at least 3 months. The disturbance does not occur exclusively during episodes of anorexia nervosa.**

## Subtypes:

- Purging type: Use of self-induced vomiting or the misuse of laxatives, diuretics, or enemas
- Non-purging type: Use of compensatory behaviors other than regular use of purging, such as fasting or excessive exercise.



## DSM-5 OSFED (Other Specified Feeding or Eating Disorder) Replaces EDNOS

- Atypical Anorexia—Significant weight loss but weight remains within normal range.
- Atypical Bulimia Nervosa-binge eating and criteria frequency occur less than once a week or fewer than 3 months.
- Binge eating disorder or low frequency or and/or limited duration.
- Purging Disorder-purging behavior to influence weight or shape is present in the absence of binge eating. In appropriate compensatory behavior after eating very little.
- Night Eating Syndrome (NES)-consumption of 25% of caloric intake after the evening meal. Includes waking up to eat at least 2x per week. Causes considerable distress to the person.



# ARFIDS

## Avoidant and Restrictive Food Intake Disorder

- New diagnosis in the DSM-5. Was previously referred to as “Selective Eating Disorder.”
- ARFID is similar to anorexia in that both disorders involve limitations in the amount and/or types of food consumed, but unlike anorexia, ARFID does not involve any distress about body shape or size, or fears of fatness.



# Diagnostic Criteria for ARFIDS

An eating or feeding disturbance (e.g., apparent lack of interest in eating or food; avoidance based on the sensory characteristics of food; concern about aversive consequences of eating) as manifested by persistent failure to meet appropriate nutritional and/or energy needs associated with one (or more) of the following:

- Significant weight loss (or failure to achieve expected weight gain or faltering growth in children).
- Significant nutritional deficiency.
- Dependence on enteral feeding or oral nutritional supplements.
- Marked interference with psychosocial functioning.



## Diagnostic Criteria for ARFIDS Continued:

- The disturbance is not better explained by lack of available food or by an associated culturally sanctioned practice.
- The eating disturbance does not occur exclusively during the course of anorexia nervosa or bulimia nervosa, and there is no evidence of a disturbance in the way in which one's body weight or shape is experienced.
- **The eating disturbance is not attributable to a concurrent medical condition or not better explained by another mental disorder.**
- When the eating disturbance occurs in the context of another condition or disorder, the severity of the eating disturbance exceeds that routinely associated with the condition or disorder and warrants additional clinical attention.



## Is ARFIDS seen in Functional Medicine/Nutrition Clinics?

### My Observations:

- Integrative Practitioners need to be aware of ARFIDS type behaviors in people with intestinal infections such as parasites, SIBO, candida, etc.
- Due to intestinal symptoms people can become too afraid to eat. However..they need to eat to heal.
- The patients need to be educated about ARFIDS
- Both referral to GI and eating disorder treatment may be necessary.





# Is Obesity a Mental Health Issue?

“It is important to note that the *DSM-5* Eating Disorders Work Group specifically decided *not* to make obesity a psychiatric diagnosis, stating that “genetic, physiological, behavioral, and environmental factors that vary across individuals contribute to the development of obesity; thus, obesity per se is not considered a mental disorder.”

Findings of study suggest that DSM5 is unlikely to provide greater eating disorder prevalence. Needs more clarity on NES and OSFED to better capture eating pathology of those with obesity.



# Standards of Practice

2020: Academy of Nutrition and Dietetics:  
Revised Standards of Practice and Standards of  
Professional Performance for Registered  
Dietitians Nutritionists (Competent,  
Proficient, and Expert) in Eating Disorders



“Through a conscious awareness of medical, psychological, and behavioral strategies, the implementation of the SOP and SOPP supports a dynamic and holistic view of ED treatment by the RDN.”



# For Your Reference

- **Updated Practice Paper 2020:**

- Hackert, A., et al, 2020: Academy of Nutrition and Dietetics: Revised Standards of Practice and Standards of Professional Performance for Registered Dietitians Nutritionists (Competent, Proficient, and Expert) in Eating Disorders J Acad Nutr Diet. 2020;120(11):1902-1919.

- **Position Paper 2011:**

- Ozier A. and Henry B. Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders. J Acad Nutr Diet. 2011;111(8):1236-1241DOI:<https://doi.org/10.1016/j.jada.2011.06.016>.

- **Previous Practice Paper: in support of 2011 Position Paper**

- Practice Paper of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders (PDF) file:///Ozier A. and Henry B. Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders. J Acad Nutr Diet. 2011;111(8):1236-1241DOI:<https://doi.org/10.1016/j.jada.2011.06.016>.C:/Users/Susan/Next%20Level%20Functional%20Nutrition/IFMNT%20-%20Class%20Materials/Class%20Handouts/Level%203/Practice%20Paper%20Eating%20Disorders.pdf (Accessed Oct 31, 2020)



# Medical Findings

- “Anorexia Nervosa: Bradycardia, orthostasis by pulse or blood pressure, hypothermia, cardiac murmur, atrophic breasts and vaginitis (postpubertal), pitting edema of extremities, emaciated, cold extremities, slowed capillary refill time .”
- “Bulimia Nervosa: Sinus bradycardia, orthostatic by pulse or blood pressure, dry skin, parotid gland swelling, Russell’s signs, mouth sores, dental enamel erosion, cardiac arrhythmias, may be normal weight.”
- “Binge Eating Disorder: Weight-related hypertension, abnormal lipid profile, and diabetes.”



# Essential for RDs to Understand

“Eating disorders have an emotional/behavioral component and a neurophysiological/genetic component. The latter may set the stage for ED development, be triggered by weight loss, and may be the reason many ED psychological symptoms resolve with physical restoration.”

“People do not choose to have EDs.”

“Eating disorders are spectral disorders; they exist on a continuum of severity and often become more severe the longer they are present”.

“Family dynamics might be part of the environmental influences that cause stress and stressful environments can exacerbate EDs, but families are not causative in ED etiology.”

Practice Paper of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders. PDF.

file:///C:/Users/Susan/Next%20Level%20Functional%20Nutrition/IFMNT%20-%20Class%20Materials/Class%20Handouts/Level%203/Practice%20Paper%20Eating%20Disorders.pdf (Accessed Oct 31, 2020). in support of: Ozier A. and Henry B. Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders. J Acad Nutr Diet. 2011;111(8):1236-1241DOI:<https://doi.org/10.1016/j.jada.2011.06.016>.



# Essential for RDs to Understand

“EDs often co-exist with other psychiatric illnesses especially anxiety related disorders.”

“The longer a person remains in a state of suboptimal nutrition or continues with ED behaviors, the more persistent and severe the disorder can become.”

“Both physical restoration and cognitive/emotional restoration have to occur; physical restoration alone does not constitute recovery.”

“Nutrition education alone is ineffective as is therapy/ counseling alone.”



# Essential for RDs to Understand

“With EDs, the entire treatment team has to understand that not **eating is not an option**, that food is medicine, and that **the person with an ED does not have a choice about whether to eat**, they do have a choice in where they will eat—in the hospital or residential treatment center or at home. If hospitalized, the choice for the patient is to eat orally or via nasogastric tube.”





# American Psychiatric Association Levels of Care Guidelines Inpatient Treatment:

## For adults:

Heart rate <40 bpm

- Blood pressure <90/60 mmHg
- Glucose <60 mg/dl
- Potassium <3 mEq/L
- Electrolyte imbalance
- Temperature <97.0°F
- Dehydration
- Liver, kidney, or cardiac compromise requiring acute treatment
- Poorly controlled diabetes



# American Psychiatric Association Levels of Care Guidelines Inpatient Treatment:

## For children and adolescents:

- Heart rate near 40 bpm
- Orthostatic blood pressure changes (>20 bpm increase in heart rate or >10 mmHg to 20 mmHg drop)
- Blood pressure <80/50 mmHg
- Low potassium, phosphate, or magnesium levels



# American Psychiatric Association Levels of Care Guidelines for Inpatient Treatment

- Suicidality present (Consult their therapist and doctor)
- Weight: Generally <85% healthy body weight; acute weight decline with food refusal even if not <85% of healthy body weight
- Additionally: Poor motivation to recover, co-occurring disorder such as substance abuse, other existing psychiatric disorder, needs meal supervision, family conflict, geographic distance to treatment is too far.



# Severity of Thinness

WHO categories thinness in children and adolescents and adults.

- Mild: BMI  $>17$  kg/m<sup>2</sup>
- Moderate: BMI 16-16.99 kg/m<sup>2</sup>
- Severe: BMI 15-15.99 kg/m<sup>2</sup>
- Extreme: BMI  $< 15$  kg/m<sup>2</sup>



# Ethical Considerations

- Ensure patient has a treatment team: Psychiatrist, therapist, medical doctor.
- If the patient is too sick for outpatient treatment, have them first complete inpatient therapy to become stable enough for outpatient treatment.
- Food restriction can worsen eating disorders (ARFIDS). Don't jump to food sensitivity testing right away. Try to only restrict what is absolutely necessary, i.e. Celica's disease.
- Make sure the patient is sharing all nutrition interventions with doctor and psychiatrist to minimize risk of drug/nutrient interactions.



# Where Can Functional Nutrition Help?

Addressing physiological root causes:

- Looking at the role of nutrition in neurotransmitter balance
- Assessing gut health and looking for malabsorption factors that would affect neurotransmitter balance



## Co-Morbid Conditions That May Relate To Functional Nutrition

- “There is dysregulation of dopaminergic and serotonergic systems in ED.
- These systems are essential in rewarding aspects of food, executive function, regulation of mood, satiety and impulse control.”
- Functional Nutrition intervention can help support the production of neurotransmitters.



# Resources: Questionnaires with Reliability and Validity

- The Eating Beliefs Questionnaire (EBQ-18)
- Eating Disorder Examination Questionnaire (EDE-Q)
- Depression, Anxiety, Stress Scale (DASS-21)
- Eating Disorder Thoughts Questionnaire (EDTQ)

\*These are administered by qualified mental health practitioners, not dietitians. You may want to acquaint yourself for referral purposes.





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# **Nutrition, Neurotransmitters and Eating Disorders**



# Nutrition For Mental Health

“Although the determinants of mental health are complex, the emerging and compelling evidence for nutrition as a crucial factor in the high prevalence and incidence of mental disorders suggests that **diet is as important to psychiatry as it is to cardiology, endocrinology, and gastroenterology.** Evidence is steadily growing for the relation between dietary quality (and potential nutritional deficiencies) and mental health, and for the **select use of nutrient-based supplements to address deficiencies, or as monotherapies or augmentation therapies.**”



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# Dietitians

Dietitians can help clients include food choices that supply nutrients required for neurotransmitter synthesis.



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# **Binge and Compulsive Overeating: Serotonin and Dopamine**



# Proposed Function of Serotonin (Brain 5-HT)

- Decreased anxiety and stress
- Increased patience and coping
- Decreased aggressiveness
- Decreased impulsivity
- Decreased pessimism
- Decreased rigid thinking



# Proposed Function of Serotonin (Brain 5-HT)

- Increased flexibility and adaptation to stress
  - Better tolerance to delay
  - May improve aspects of learning and cognition
  - Engage processes necessary for change, when change is needed
  - Plasticity
  - Open-mindedness
  - Adaptability
  - Suppresses appetite in mammals
- \* Authors of study note: Function of 5-HT is elusive and puzzling due to many receptor subtypes.

1. Carhart-Harris RL and Nutt DJ. (2017) Serotonin and Brain Function: A Tale of Two Receptors. *J Psychopharmacol*. 2017 Sep; 31(9): 1091–1120. Published online 2017 Aug 31. doi: [10.1177/0269881117725915](https://doi.org/10.1177/0269881117725915)
2. Julian M Yabut, Justin D Crane, Alexander E Green, Damien J Keating, Waliul I Khan, Gregory R Steinberg, Emerging Roles for Serotonin in Regulating Metabolism: New Implications for an Ancient Molecule, *Endocrine Reviews*, Volume 40, Issue 4, August 2019, Pages 1092–1107, <https://doi.org/10.1210/er.2018-00283>



# Affects of Reduced 5-HT

- Increased Aggressiveness
- Increased Impulsivity
- Impair cognitive flexibility
- Suicidal Behavior
- Tryptophan depleted diets enhance impulsivity and aggression
- Tryptophan supplementation reduces impulsivity and aggressiveness (as well as SSRI's and MDMA).



# Depressive States

Commonly described as:

- Excessively rigid
- Emotional withdrawal
- Anhedonia
- Impaired and pessimistically based cognition





# Brain 5 HT

“It is reasonable to suppose that brain 5-HT functions to alleviate psychological distress under adverse conditions – thereby improving coping and resilience.”



# Synthesis of Serotonin

- Synthesized from tryptophan in mammals.
- Serotonin synthesis is tightly linked to availability of tryptophan, Kynurenine synthesis and rate limiting enzyme Tph.
- Produced in periphery or in brain. Serotonin does not cross blood –brain barrier.



# Synthesis of Serotonin Continued

- Peripheral serotonin is primarily synthesized from Enterochromaffin cells of GI Tract
- Serotonin can be metabolized to 5 HIAA or N-acetyl serotonin and then melatonin.
- Alternatively tryptophan may not be converted into serotonin and instead can be converted to kynurenine. This can be driven by inflammation.



# Synthesis of Serotonin Continued

- Tryptophan is converted to serotonin in Central Nervous System (CNS) or in EnteroChromafin (EC) cells in GI tract.
- In rodents this serotonin synthesis response to nutrients is modulated by gut microbiota and SCFA
- Serotonin in Enteric NS promotes motility. Degraded by MAO into 5HIAA (measured in urine).



# Inflammation Affects Serotonin Synthesis

- In addition to serotonin, dietary tryptophan can be converted to kynurenine by enzyme IDO (ubiquitous) or TDO (liver)
- Pro-inflammatory cytokines reduce serotonin synthesis and increases kynurenine in depression.



# Implications

Think about inflammation in the gut or brain decreasing serotonin synthesis and converting tryptophan to kynurenine instead of serotonin.

If a client has gut inflammation, they may experience symptoms of decreased serotonin such as depression and insomnia

1. Dantzer R. (2017). Role of the Kynurenine Metabolism Pathway in Inflammation-Induced Depression: Preclinical Approaches. *Current topics in behavioral neurosciences*, 31, 117–138. [https://doi.org/10.1007/7854\\_2016\\_6](https://doi.org/10.1007/7854_2016_6)
2. Jeon SW, Kim Y-K. Inflammation-induced depression: Its pathophysiology and therapeutic implications. *J Neuroimmunol*. 2017;313:92-98. <https://www.ncbi.nlm.nih.gov/pubmed/29153615>



# Assessment of Serotonin

“Given the challenges of assessing platelet-free serotonin in blood, assessment of more stable downstream metabolites such as 5-hydroxyindoleacetic acid (5-HIAA) in urine is frequently used as a more reliable proxy of circulating serotonin levels.”



# Functional Nutrition GI Assessment

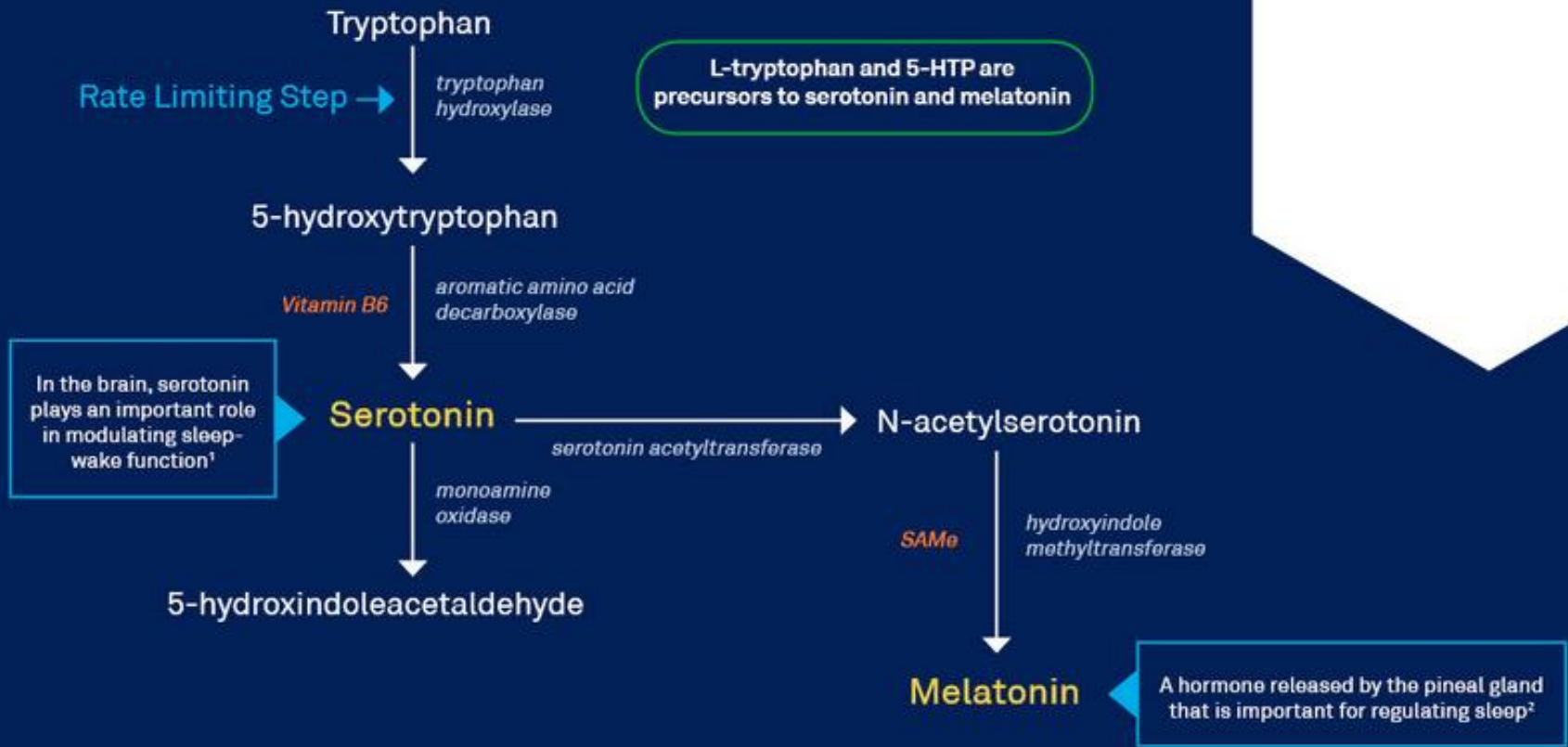
- We can see urinary metabolites in tests such as organic acids.
- We can see gut inflammation in Digestive Stool Analyses
  - Inflammation-Associated Dysbiosis (IAD) Score
  - Fecal Calprotectin
- They may have IBD diagnosed by GI doc

1. Tsoukalas, D., Alegakis, A., Fragkiadaki, P., Papakonstantinou, E., Nikitovic, D., Karataraki, A., Nosyrev, A. E., Papadakis, E. G., Spandidos, D. A., Drakoulis, N., & Tsatsakis, A. M. (2017). Application of metabolomics: Focus on the quantification of organic acids in healthy adults. *International journal of molecular medicine*, 40(1), 112–120. <https://doi.org/10.3892/ijmm.2017.2983>
2. Chen, L., Reynolds, C., David, R. et al. Development of an Index Score for Intestinal Inflammation-Associated Dysbiosis Using Real-World Stool Test Results. *Dig Dis Sci* 65, 1111–1124 (2020). <https://doi.org/10.1007/s10620-019-05828-8>
3. Manceau H, Chicha-Cattoir V, Puy H, Peoc'h K. Fecal calprotectin in inflammatory bowel diseases: update and perspectives. *Clin Chem Lab Med*. 2017;55(4):474-483.





## Serotonin Synthesis



Yellow = Biomarker

Light blue = Enzyme

Orange = Cofactor

Serotonin Synthesis Retrieved from Neuroscience, Inc  
<https://www.neuroscienceinc.com/healthcare-providers/> (accessed Oct 31, 2020)



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# **Dopamine, Eating Disorders and Nutrition**



# Comorbidities of Binge Eating

“Known comorbidities of binge eating include **anxiety, depression, substance abuse**, chronic pain, diabetes, and obesity.”



# Dopamine and Binge Eating Behavior

- “Dopamine is a neurotransmitter critically involved in the motivational aspects of feeding”
- Rather than overeating bingeing is associated with a “sense of loss of control” over what or how much an individual has eaten
- “Central dopaminergic mechanisms are involved in the motivational aspects of eating and food choices.”
- Genetic Studies: “Increased dopamine transporter and associated D2 receptor polymorphisms with binge pathology.”
- “Bulimic individuals may have increased dopamine turnover during the active phase of the illness”



# Dopamine and Binge Behavior Continued

- Homovanillic acid (HVA) is the major metabolite of dopamine in humans
- HVA was found to be lower in the lumbar CSF of those with bulimia compared to healthy controls.
- Those bingeing 1-2 x per day had lower HVA than those who bingeed less frequently
- After treatment for bulimia, recovered bulimics showed similar HVA levels as controls. Suggesting that low HVA levels were state dependent.
- Evidence suggests that peripheral and central HVA levels are lower during BN.



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# Relevance to Functional Nutrition

Urinary HVA is measured on organic acids testing.



# Reduced HVA and Dopamine

- Reduced HVA is typically considered an index of reduced dopamine function and turnover.
- Polymorphisms of Catechol-methyl-transferase (COMT) gene is associated with bulimia.
- Along with MAO, COMT is an enzyme involved in metabolizing dopamine to HVA



# Sample of Neurotransmitter Metabolites

## Neurotransmitter Metabolites

			Reference Range
Vanilmandelic Acid		1.5	0.4-3.6
Homovanillic Acid		2.5	1.2-5.3
5-OH-indoleacetic Acid		11.4	3.8-12.1
3-Methyl-4-OH-phenylglycol		0.08	0.02-0.22
Kynurenic Acid		2.4	$\leq 7.1$
Quinolinic Acid		3.3	$\leq 9.1$
Kynurenic / Quinolinic Ratio		0.73	$\geq 0.44$

1. Hagenbeek, F. A., Roetman, P. J., Pool, R., et al. (2020). Urinary Amine and Organic Acid Metabolites Evaluated as Markers for Childhood Aggression: The ACTION Biomarker Study. *Frontiers in psychiatry*, 11, 165. <https://doi.org/10.3389/fpsy.2020.00165>
2. Image source: Genova Diagnostics. <https://www.gdx.net/core/sample-reports/Metabolic-Analysis-Sample-Report.pdf>





# Binge Behavior and Dopamine Continued

- Reduced COMT activity and reduced dopamine metabolism to HVA could provide genetic protection against BN
- Dopamine transporter (DAT) polymorphisms may also support alterations in dopamine turnover in BN
- PET imaging showed lower striatal D2 receptor availability in morbidly obese individuals. Higher body weights were correlated lower with lower D2 availability
- Study on 5 females: Increased D2 availability in obese subjects after gastric bypass surgery. Increase in D2 availability was proportional with amount of weight loss suggesting central dopaminergic dysfunction may be related in some degree to obese phenotype



# Important for Dietitians

- In animal models of **dietary induced binge eating (DIBE)**, **calorie restriction** produces a robust refeeding response.
- BED patients tend to **undereat during the mornings** and overeat during the evening hours.
- In DIBE models, chronic calorie restriction is likely to support repetitive bouts of binge eating.



# Important for Dietitians

- Weight suppression and desire to lose weight has been directly related to binge frequency.
- Bulimics with the highest degree of weight suppression had the worst treatment outcomes.
- Bulimics tend to fall into normal BMI ranges, but they may be underweight compared to their pre-morbid body weight.
- **Normalizing eating patterns in bingeing pathology is likely to promote normalization of dopaminergic functions** including responses to food related cues and stimuli.



# Bottom-line Message

“Binge eating behavior in BED could be driven by food palatability and altered daily eating patterns.

All of these effects then could be exacerbated in a select population with polymorphisms in dopamine-related genes further increasing the susceptibility to developing BED.”

**Genes + environment**



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# Is ADHD Common in Eating Disorders?

Svedlund NE, Norring C, Ginsberg Y, von Hausswolff-Juhlin Y. Behandling av ätstörningar vid samtidiga ADHD-symtom - Observerat samband kan ge nya möjligheter till medicinering, främst av bulimia nervosa – men ännu finns kunskapsluckor [Treatment of eating disorders with concurrent ADHD symptoms: knowledge, knowledge gaps and clinical implications]. *Lakartidningen*. 2019;116:FMUT. Published 2019 Sep 17.



# Symptoms of ADHD Among Adults with Eating Disorders

Out of 1165 adults, the prevalence of ADHD was:

- 31.3% in all eating disorders,
- 35-37% in bulimia nervosa and anorexia nervosa bingeing/purging subtype,
- EDNOS 1-4 and bulimia 26-31%,
- Anorexia nervosa 18%.



# Symptoms of ADHD in Eating Disorders

- There is a high prevalence of ADHD symptoms in binge/purge type of eating disorders
- Females with ADHD have a higher prevalence of developing ED
- ED and ADHD share similar symptoms of: Impulsivity, depression, anxiety and low self-esteem



# Hypothesis for Why Stimulants May Help Binge Eating

- Dysregulated dopamine systems lead to risky behavior as in gambling, substance abuse or binge eating to enhance the reward system.
- Appetite suppression side effects from stimulants decreases the urge to binge.





# Binge Eating Disorder (BED) and Brain

BED Subjects compared to those without BED:

- Greater cognitive attentional biases toward food
- Decreased reward sensitivities
- Altered brain activation in regions associated with impulsivity and compulsivity
- BED aggregated in families regardless of obesity status with 57% estimated heritability



# BED and Cognition

BED Subjects compared to those without BED:  
Obese BED exhibit broad cognitive dysfunction compared with obese non-BED on tasks assessing problem solving, plan formulation and implementation, task scheduling, performance monitoring, cognitive flexibility, and working memory.



# Neurobiology of Obese BED Subjects compared to those without BED

- Performed worse on apathy, disinhibition, executive dysfunction
- Exhibited impaired inhibitory control, attention, and rates of learning
- Both obese BED subjects and obese non-BED subjects performed worse on the above, than normal weight subjects suggesting obesity may be due to impaired functioning
- Those with BED make riskier decisions
- Both obese BED and non-BED exhibited similar cognitive impairments in **memory, attention, executive function and language.**



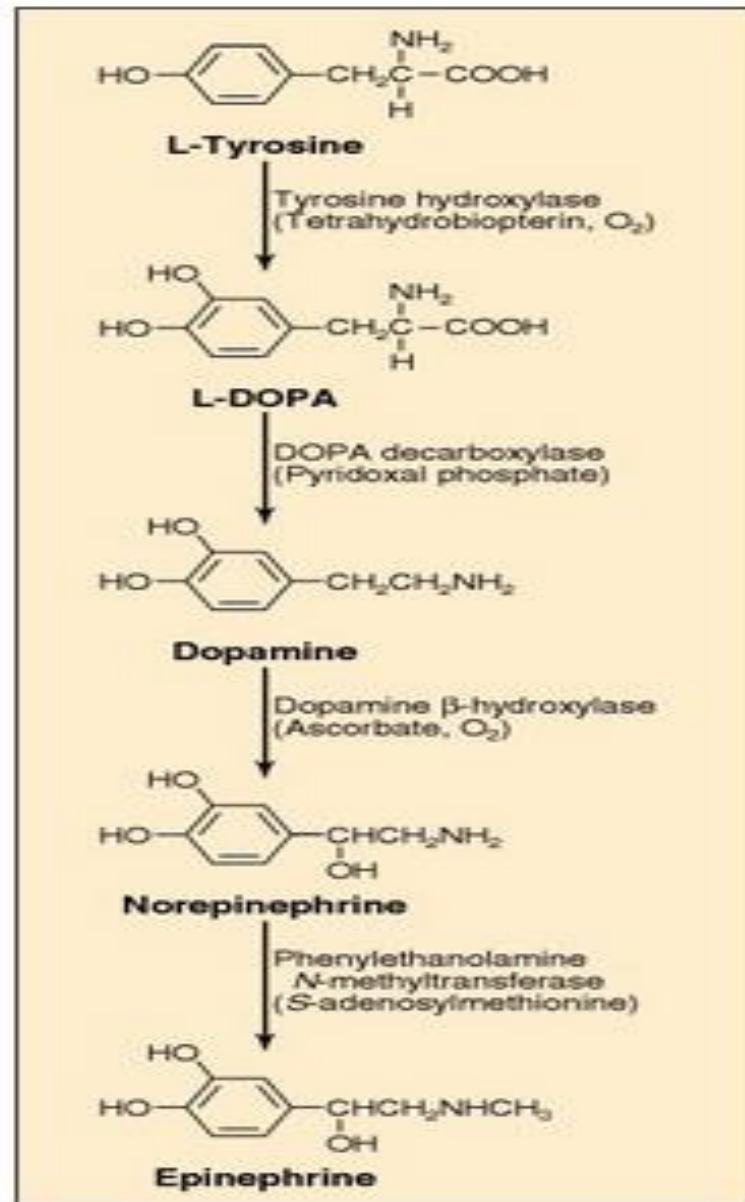
# BED and Dopamine

- Evidence to date supports that BED individuals have altered **dopaminergic systems** that may contribute to impulsivity, compulsivity and reward/reinforcement.



# Synthesis of Catecholamines

Tyrosine, Oxygen  
(iron), copper,  
Vitamin C, SAME



Kuhar MJ, Couceyro PR, Lambert PD. Biosynthesis of Catecholamines. In: Siegel GJ, Agranoff BW, Albers RW, et al., editors. Basic Neurochemistry: Molecular, Cellular and Medical Aspects. 6th edition. Philadelphia: Lippincott-Raven; 1999. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK27988/>



# Neuropharmacology of Compulsive Eating

Three elements of Compulsive Overeating:

1. Habitual overeating
2. Overeating to relieve a negative emotional state
3. Overeating despite adverse consequences.



# Compulsive Eating and the Dopaminergic System

The mesocorticolimbic **dopaminergic** pathway dysfunction is hypothesized to contribute to all three elements of compulsive eating: **habitual overeating, overeating to relieve a negative emotional state** and overeating despite adverse consequences.



# Compulsive Eating and Dopaminergic System

- “Over time, overstimulation of the mesocorticolimbic dopaminergic system from **chronic exposure** to highly rewarding, palatable food is hypothesized to result in **desensitization/downregulation**, contributing to the emergence of anhedonia and motivational deficits.”
- “Compulsive eating would therefore emerge as a form of paradoxical self-medication to relieve these symptoms. “





# Compulsive Eating and The Opioid System

- The mu- and the **kappa-opioid receptor** subtypes have been implicated in compulsive eating behavior in varying degrees.
- The mu-opioid system plays a role in **hedonic feeding**, regulator of incentive motivation for food rewards and associated cues.
- In humans selective mu-opioid receptor antagonist GSK1521498 decreased consumption of palatable food as well as attentional bias to palatable food cues.
- Naltrexone, a mixed opioid receptor **antagonist**, **decreased neural responses** to food cues in healthy subjects.



# Compulsive Eating- Opioid System

- **Lifestyle** activation of opioid system-possibly **exercise?**
- “In fact, it seems that exercise accounts for a simple, effective, and low-cost treatment of dependence, which is capable of affecting some of the neural pathways and brain mechanisms activated by morphine and other opiates.”



## Compulsive Eating- Corticotropin Releasing Factor (CRF-1)

- Corticotropin releasing factor (CRF-1)—binge eating precipitated by stress.
- There is compelling evidence that the extra-hypothalamic corticotropin-releasing factor (CRF)—CRF1 receptor system is a driving factor of compulsive overeating to relieve a negative emotional state.”
- “The CRF—CRF1 system in the bed nucleus of the stria terminals (BNST) may also **underlie binge eating that is precipitated by stress** in a binge model with a history of food restriction.”



# Neuropharmacology of Compulsive Eating- Cannabinoid receptor system

Cannabinoid receptor system—Lies within the amygdala and modulates the negative emotional state associated with compulsive overeating. Withdrawal from palatable food recruits endocannabinoid receptors **similar with drug addiction during intoxication and withdrawal.**



# Integrative options for Cannabinoid receptor system:

## Diet Modulation of Gut Microbiota

“The intestinal **microbiota** and the expanded **endocannabinoid** (eCB) system, or endocannabinoidome (eCBome), have both been implicated in diet-induced obesity and dysmetabolism. These systems were recently suggested to **interact during the development of obesity.**”

This paper suggests **prebiotic foods** and a diet **low in sugar and animal fats** may have a beneficial affect on the endocannabinoid system.



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# **Anxiety and Eating Disorders**



# Anxiety

- “Pathophysiology of anxiety and related disorders is multifactorial, involving oxidative stress, neuroinflammation, and glutamatergic dysfunction.”
- Since glutamatergic hyperactivity is characteristic of anxiety, oxidative stress and neuroinflammation are relevant.



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# Anxiety and Glutamate Neurotransmission

Abnormalities in glutamate neurotransmission are among the biological mechanisms underlying stress response and anxiety disorders





# Neuropharmacology of Compulsive Eating Glutamatergic System

- Glutamatergic system-two major classes of glutamate receptors NMDA and AMPA have been found to be involved in compulsive eating including overeating despite adverse consequences.
- Memantine a medication that works as NMDARs receptor antagonists reduced binge eating in humans, also reduced impulsivity and enhanced cognitive control in compulsive shoppers.
- Are they nutritional and lifestyle antagonists to NMDAR receptors?



# Coming next...

- Functional Nutrition Connection
- Assessment Parameters
- Nutritional and Lifestyle Intervention