

# **Healing the Brain: The Powerful Impact of Nutrients on Behavior, Learning, and Mental Disorders**

**Woodridge, Illinois  
September 25, 2019**

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Walsh Research Institute**

# Walsh Research Institute

Naperville, Illinois

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- **501c3 Public Charity**
- **Expertise in behavior disorders, ADHD, autism, depression, bipolar disorder, schizophrenia, and Alzheimers.**
- **International Physician-Education Program**
- **Experimental Research**

# Biochemical Individuality

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- **Humans exhibit great diversity in blood and brain chemistry.**
- **Because of genetics and epigenetics, most people are deficient in certain nutrients and overloaded in others.**

# Massive Chemistry Database

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- **Lab testing of 30,000 mental-health patients and controls.**
- **More than 3 million lab chemistries**
- **More than 2 million medical history factors.**

# Database Findings

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Striking blood/urine  
**chemistry differences**  
between mental health populations  
and the rest of society

Walsh WJ (2002). Nutrient Power. Skyhorse Publishing, NYC.  
Crayton J, Walsh W (2007). J Trace Elem Med Biol. 21:17-21.

# The Good News

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- **Seven nutrient imbalances dominate mental disorders,**
- **Treatment of these imbalances is sufficient for 90% of patients,**
- **Testing and treatment for dozens of factors usually is unnecessary.**

# High Incidence Imbalances in Mental Disorders

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**Methylation Disorder**

**Zinc Deficiency**

**Copper Overload**

**Folate Deficiency or Overload**

**Pyrrole Disorder**

**Toxic Metal Overload**

**Essential Fatty Acid Imbalances**

***These factors have a powerful impact on NT synthesis and/or regulation of NT activity.***

# Neurotransmitter Focus

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- **Serotonin**
- **Dopamine**
- **Norepinephrine**
- **GABA**
- **NMDA**



# Individualized Nutrient Therapy

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- **Medical history and review of symptoms**
- **Special blood/urine lab tests**
- **Diagnosis of chemical imbalances**
- **Nutrient protocol aimed at normalizing brain chemistry and NT activity.**

# Frequently Asked Questions

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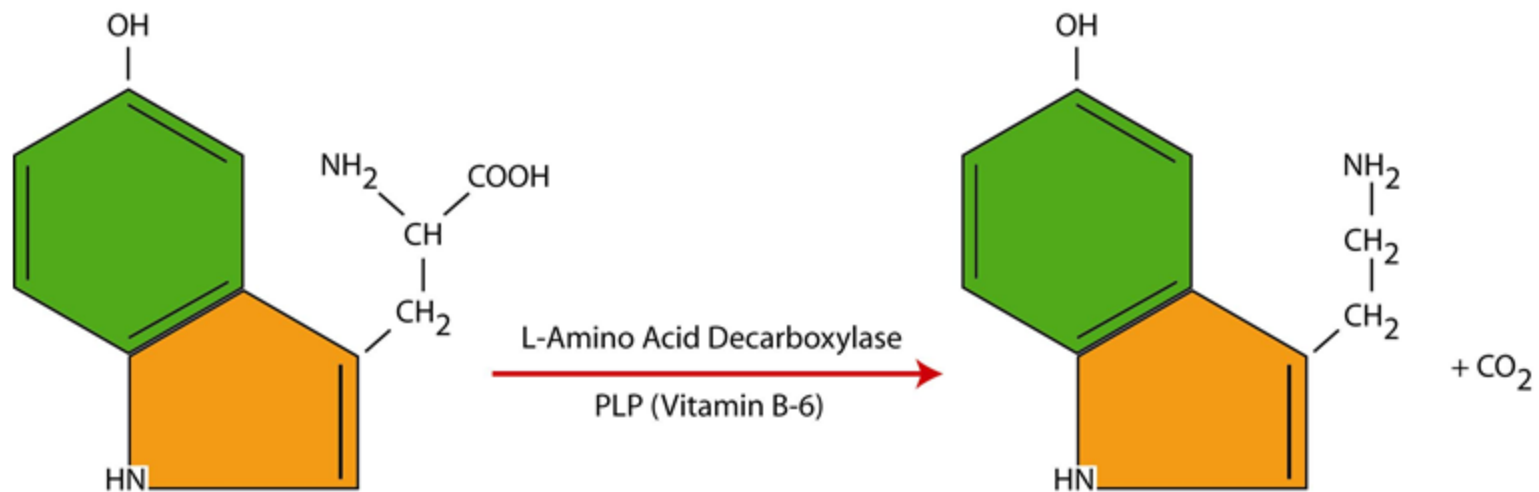
- 1. How can vitamins, minerals, or amino acids significantly help a person with a serious mental illness?**
- 2. Don't you really need a powerful drug to get the job done?**

# The Power of Nutrients

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- 1. Neurotransmitter synthesis**
- 2. Epigenetic regulation of gene expression**
- 3. Adjustment of NT reuptake**
- 4. Protection against oxidative stress**

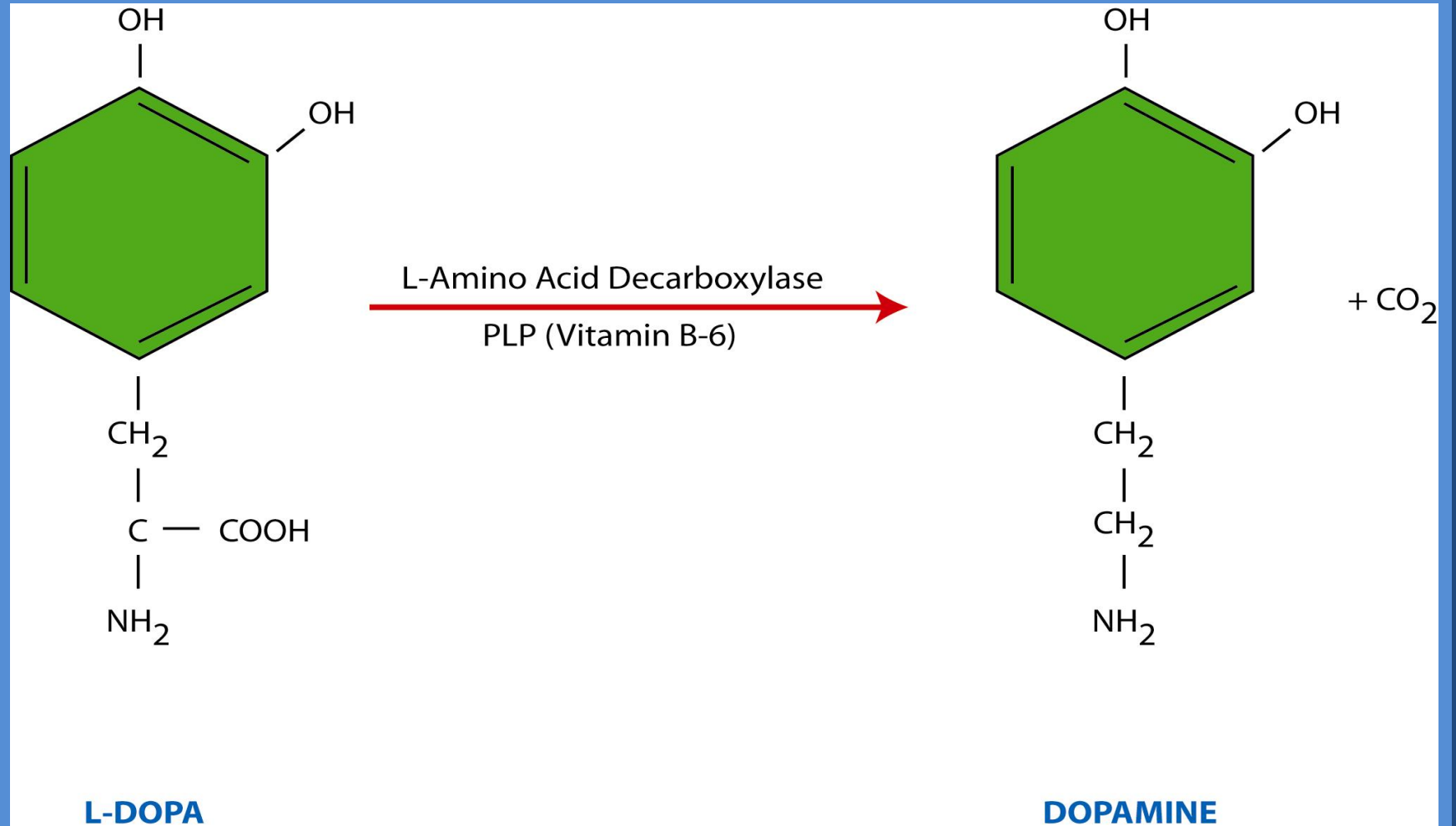
# Serotonin Synthesis



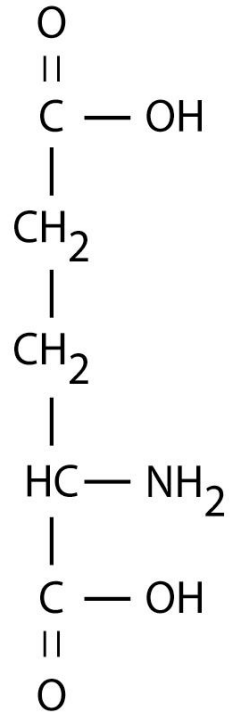
5-HYDROXYTRYPTOPHAN

SEROTONIN

# Dopamine Synthesis



# GABA Synthesis

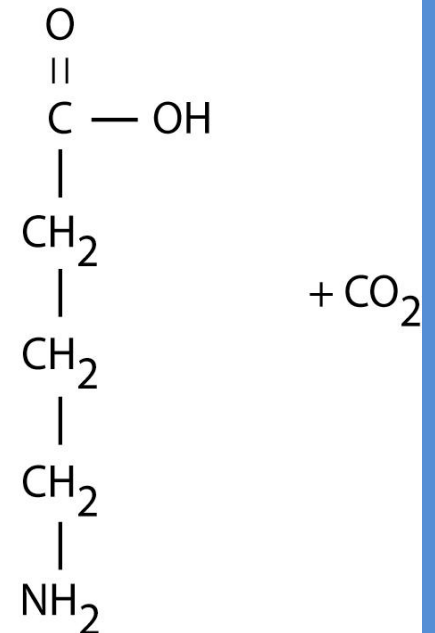


**GLUTAMIC ACID**

L-Glutamic Acid Decarboxylase



Pyridoxal Phosphate (B-6)



**GABA**

# Zinc Depletion in Brain Disorders

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Median plasma Zn for mental-health population  
(n=15,000)

**76 mcg/dL**

Zn level for optimal brain function:

**90-120 mcg/dL**

**NEARLY ALL PATIENTS NEED ZINC**

# Pyrrole Disorder

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- **Severe deficiency of B-6 and zinc.**
- **Reduced synthesis of serotonin, dopamine, GABA.**
- **Anxiety, depression, rage, reading disorder, and in severe cases, psychosis.**
- **Treatment with B-6 and zinc often eliminates symptoms and need for psychiatric medication.**

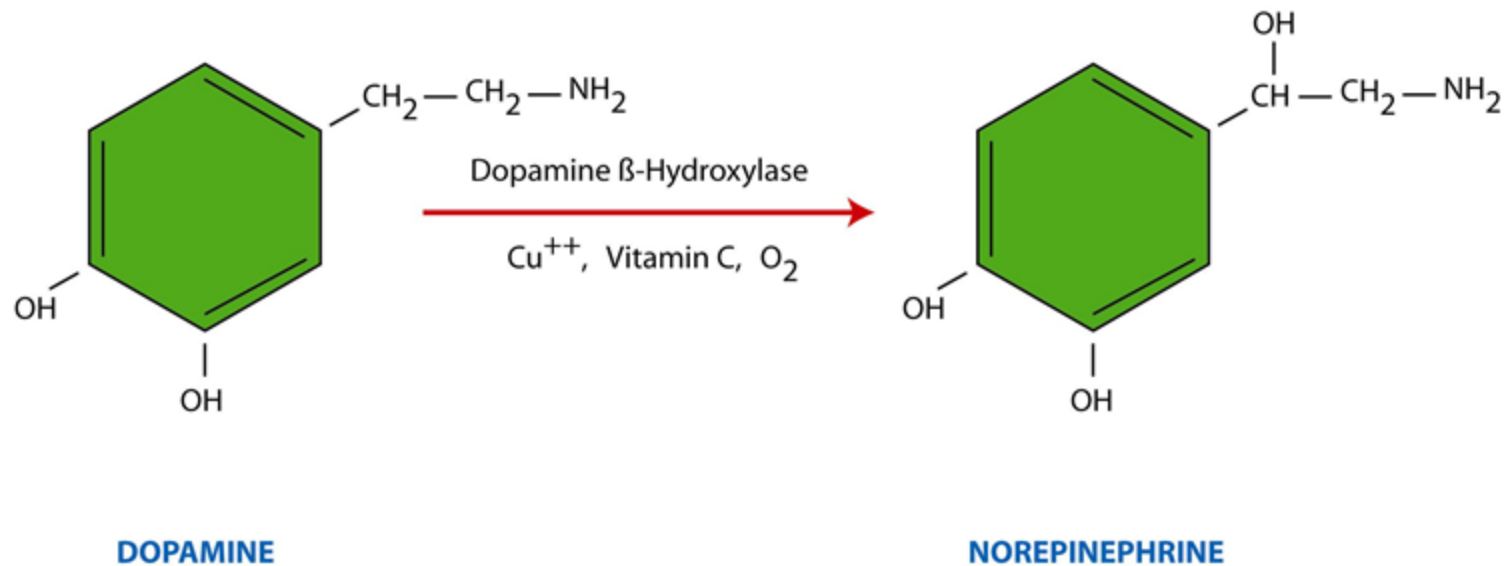


# Copper Overload

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- **Post-Partum Depression: 95%**
- **Autism: 90%**
- **ADHD : 68%**
- **Behavior Disorders: 55%**
- **Schizophrenia: 50%**

# Norepinephrine Synthesis



# Causes of Oxidative Overload

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- **Genetic weakness in antioxidant protection.**
- **Illnesses, injuries, and emotional trauma.**
- **Toxic metals, pesticides, industrial pollutants, and other environmental insults.**

**95% of patients exhibit oxidative overload!**

# The Three Musketeers of Antioxidant Protection in the Brain

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**Glutathione: First line of defense.**

**Metallothionein: Nature's back-up system.**

**Selenium: Speeds up the process.**

# Recent Advances in Understanding of Brain Disorders

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- **Methylation Processes**
- **Epigenetics**

# New Capability in Nutrient Therapy

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- Regulation of enzyme gene expression
- Adjustment of serotonin and dopamine reuptake

***“I did then what I knew how to do.  
Now that I know better, I do better.”***

***Maya Angelou***

# Methylation and Mental Illness

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- Methylation status has been determined for 30,000 patients over a 40 year period,
- 70% of patients exhibit a methylation imbalance,
- Accurate diagnosis of methylation is essential to effective treatment.



# Methylation Disorders – Two Types

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UNDERmethylation

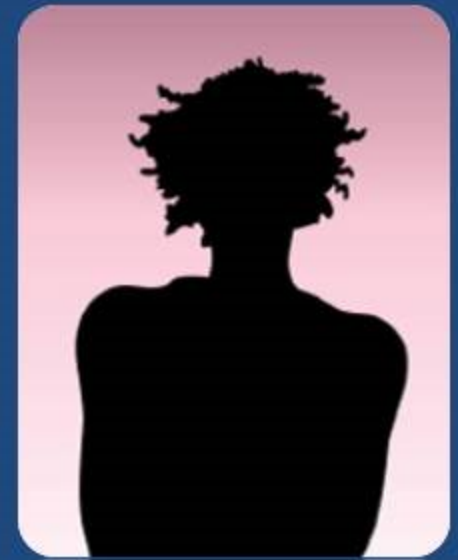
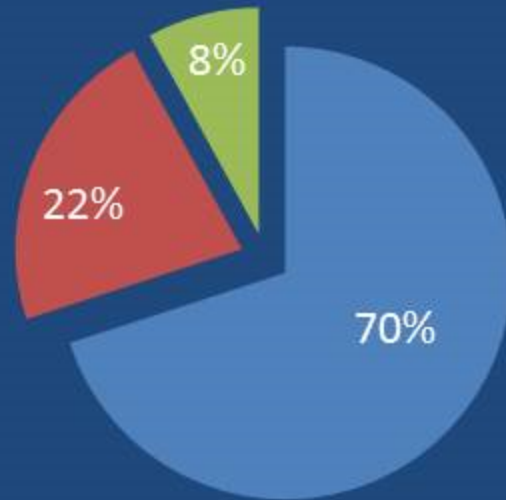


OVERmethylation



# Incidence of Methylation Disorders in the General Population

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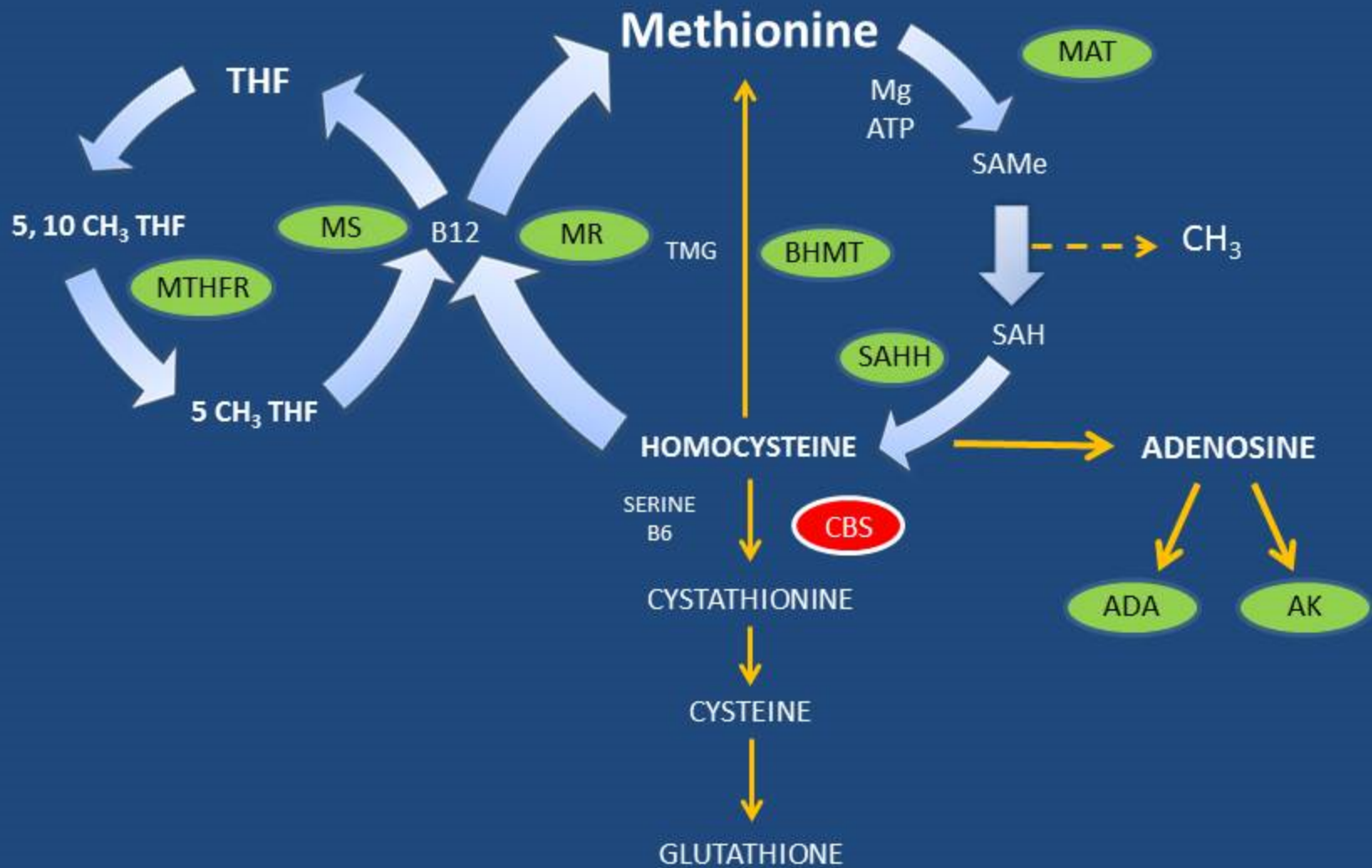


Normal Methylation = 70%

*Under* Methylation = 22%

*Over* Methylation = 8%

# Methylation Cycle Enzymes



# Primary Cause of Overmethylation

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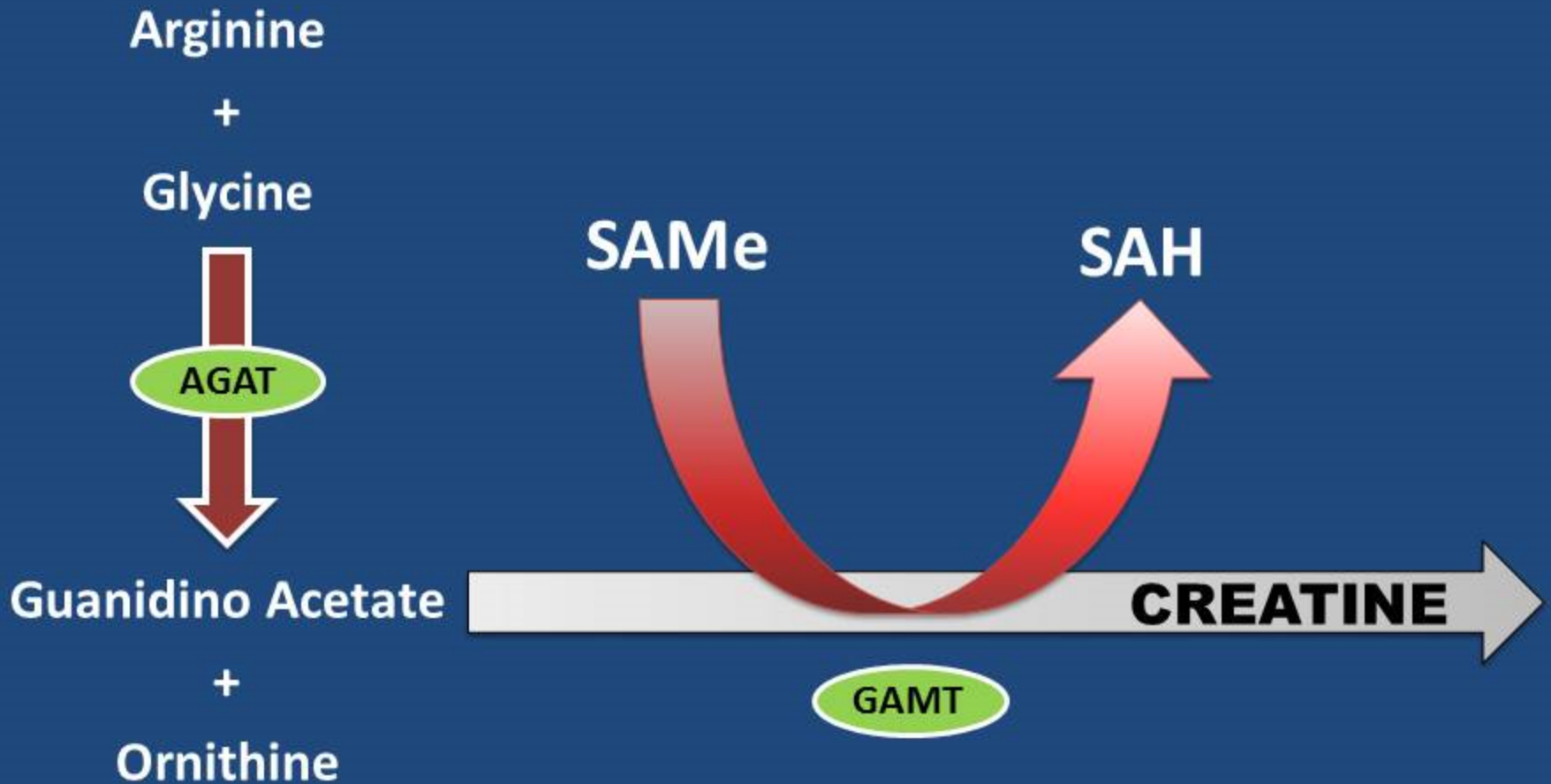
**Impaired SAMe Utilization**

# SAMe Utilization

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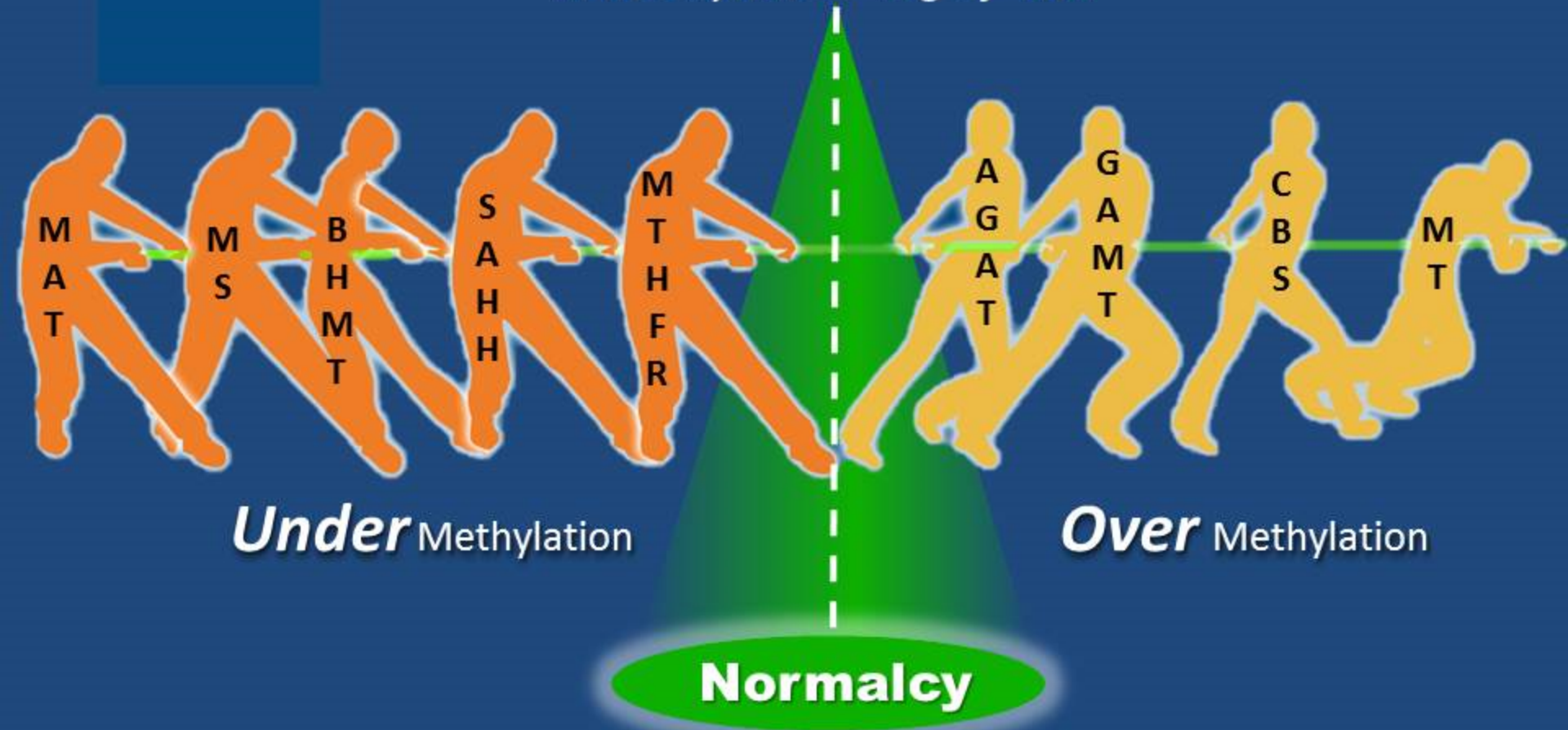
# Creatine Synthesis





# Enzyme Mutations and Methylation

*A Methylation Tug of War*



# Useful Methylation Lab Tests

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- **DDI Methylation Panel (SAM/SAH Ratio)**
- **Whole Blood Histamine (LabCorp)**
- **Genetic Testing (MTHFR, etc)**



# Importance of Medical History

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- **In-utero DNA methylation permanently affects behavior of individual genes.**
- **Humans are born with a predisposition for specific symptoms and traits that are usually permanent.**
- **Symptom & traits can assist diagnosis of innate methylation status.**

# Undermethylation: Symptoms & Traits

partial list

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**Strong will**

**High libido**

**Perfectionistic**

**Very competitive**

**Addictive tendencies**

**Seasonal allergies (75%)**

**High incidence of depression, anorexia, OCD, autism, oppositional defiance, alcoholism.**

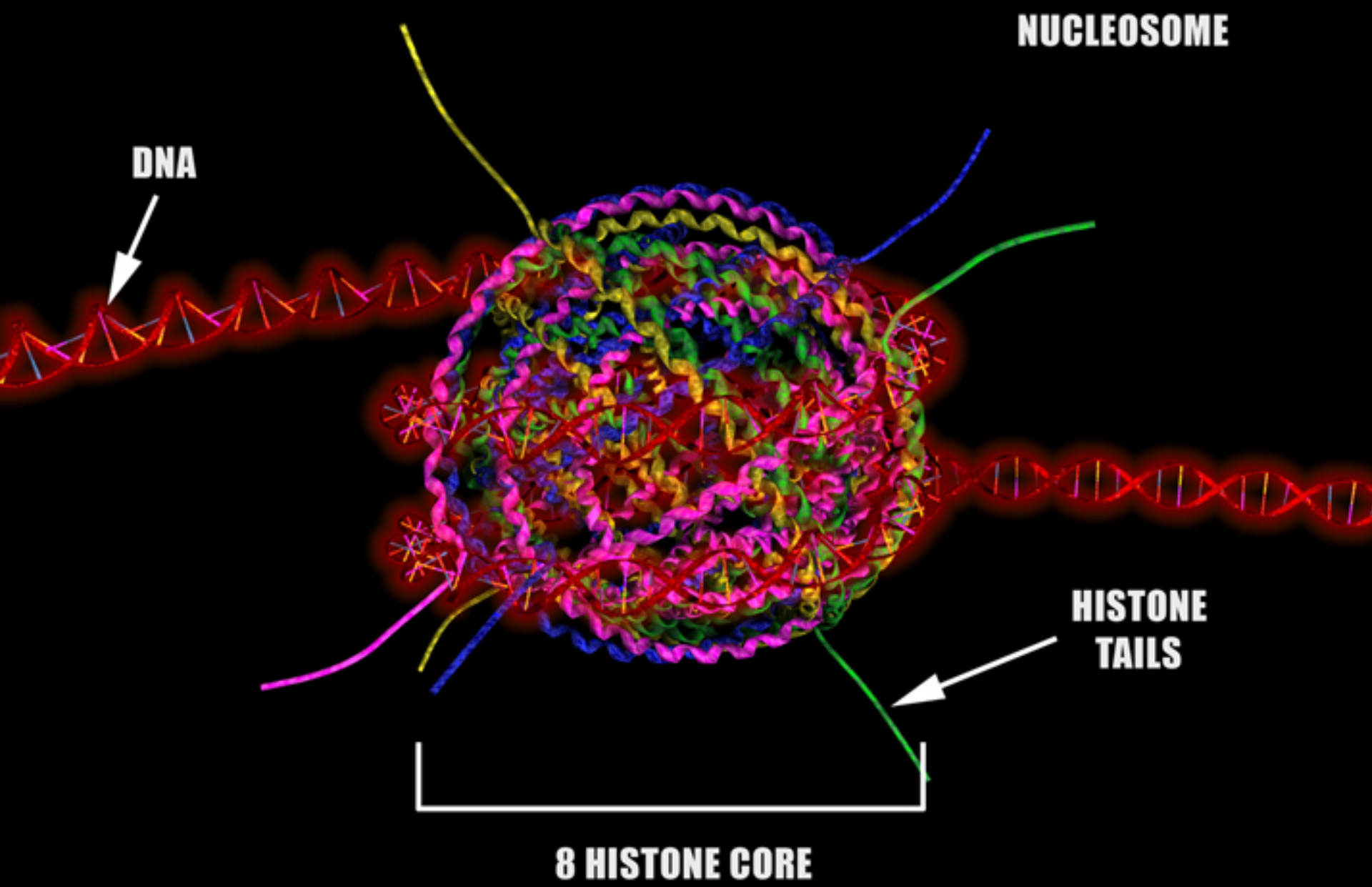
# EPIGENETIC THERAPIES

# Genetics and Epigenetics

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**DNA** -- Defines composition & physical structure of an expressed protein.

**Epigenetics** – Determines expression **rate** in each cell line and tissue.



# Gene Expression and DNA Compaction

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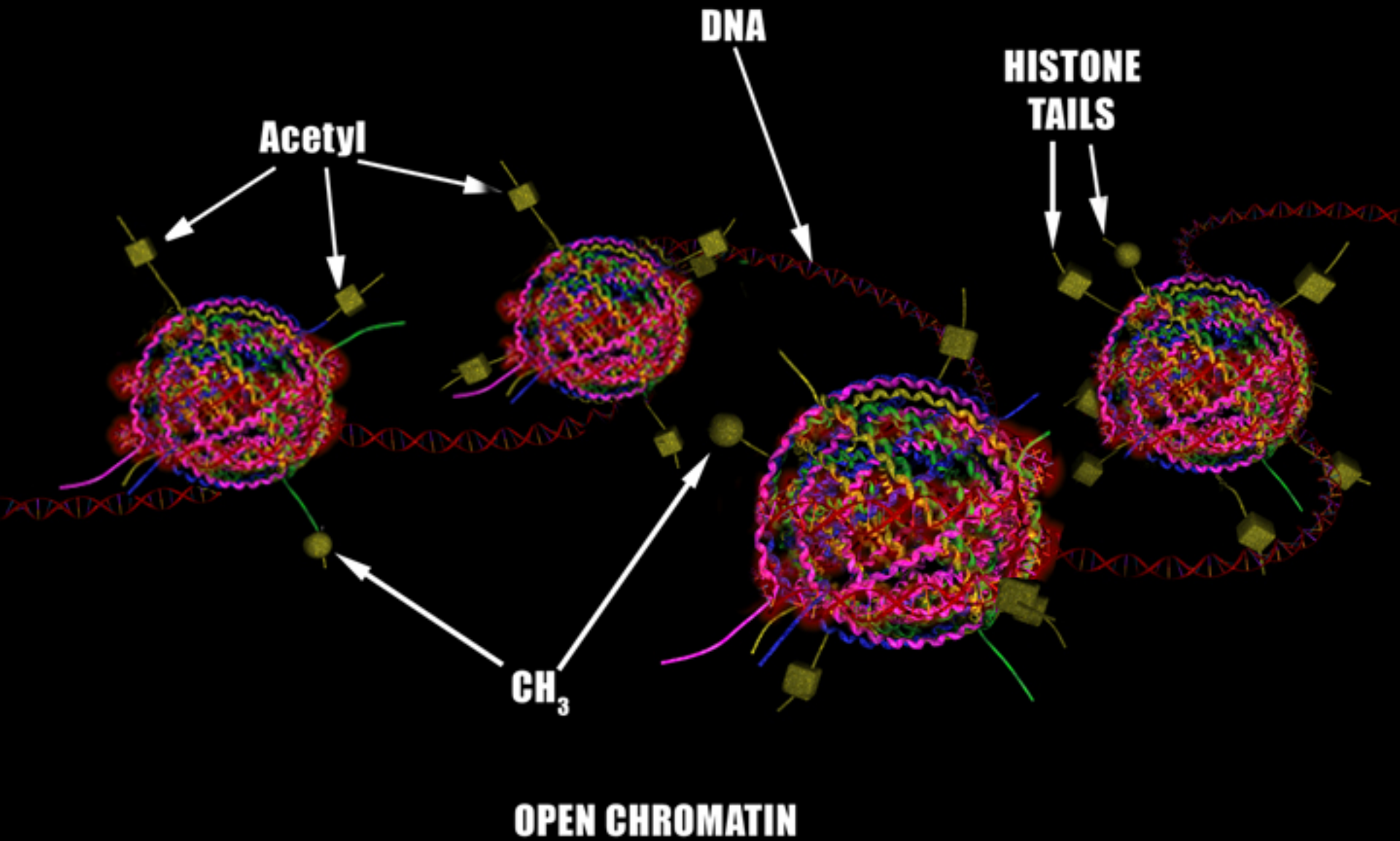
- **Gene expression requires uncoiling of DNA from histone proteins,**
- **Electrostatic attraction of DNA to histones - DNA is a weak acid and histones are mild bases (pH > 7.0).**
- **Nutrients that alter histone pH can change gene expression.**

# Methyl/Acetyl Competition

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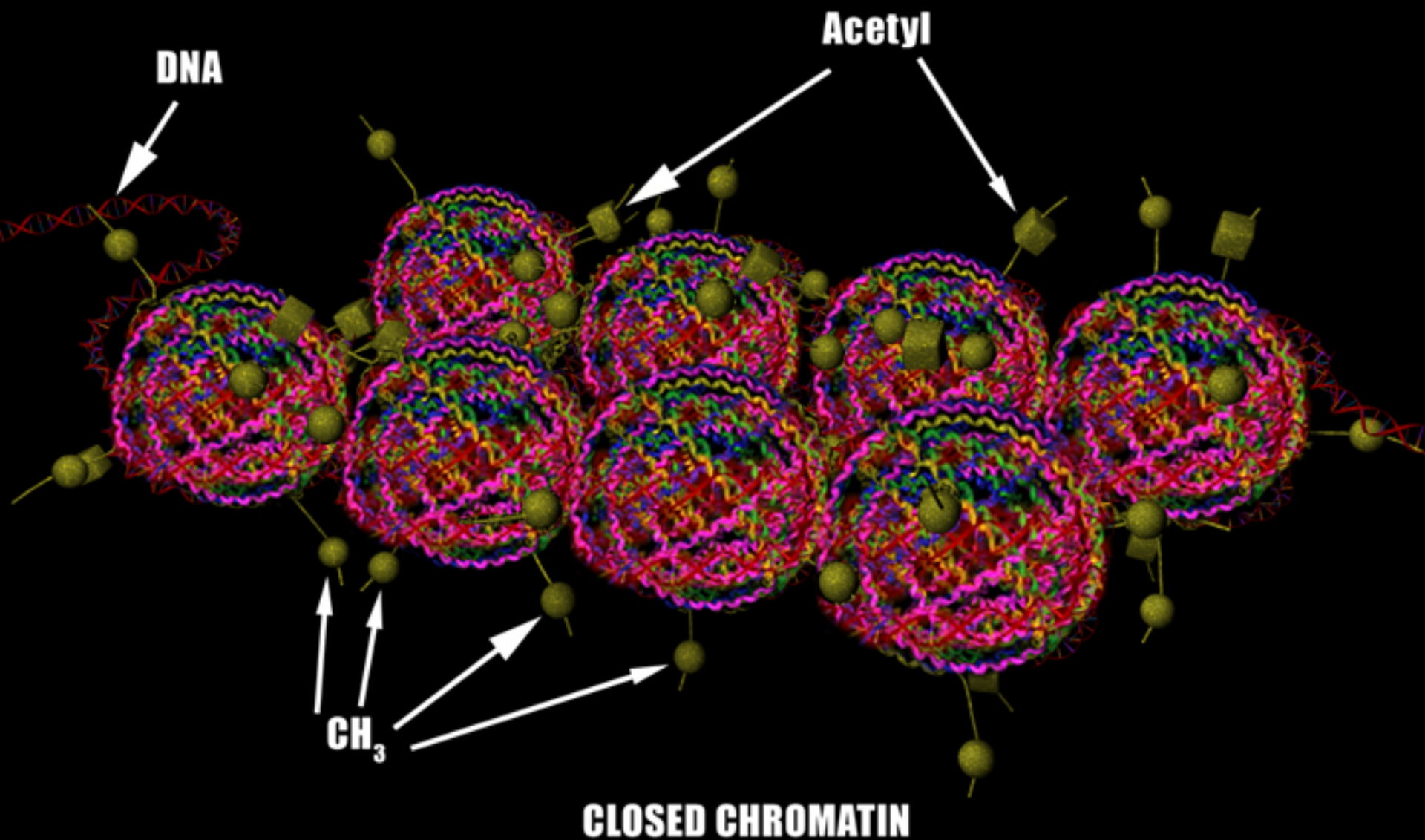
- **Methyl/acetyl competition at histone tails dominates gene expression.**
- **SAMe, methionine and other methyl donors inhibit expression.**
- **Folates and other acetylation promoters enhance expression.**

# LOW METHYLATION PROMOTES GENE EXPRESSION





# HIGH METHYLATION INHIBITS GENE EXPRESSION



# Present Epigenetic Therapies

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- **Focus on histone-modification nutrients to uncoil or compact DNA strands to regulate protein production.**
- **Adjustment of gene expression rate**
- **Manipulation of neurotransmitter reuptake**

# **A Methylation Mystery for More Than 30 years**

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- A. Folates are effective methylating agents.**
- B. Most undermethylated behavior, depression, and psychosis patients are strikingly intolerant to folic acid, folinic acid, and methylfolate.**
- C. Most overmethylated depression and SZ patients thrive on folate supplements.**

**WHY?**

**Methylation Mystery  
Solved In Year 2000  
by the Science of**

**EPIGENETICS**

# Epigenetic Regulation of NT's

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- **SAMe and methionine are serotonin reuptake inhibitors (reduced expression of SERT reuptake transporters).**
- **Folates decrease dopamine activity (enhanced expression of DAT reuptake transporters).**

# **An Exception: Methylation and Autism**

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- **Nearly all correctly-diagnosed ASD patients are undermethylated,**
- **A high percentage of ASD patients thrive on folates,**
- **Methylfolate more effective than folic acid or folinic acid,**
- **Cases of methylfolate intolerance in ASD patients - Those with unusually-low serotonin or dopamine activity.**

# Examples of Epigenetic Nutrients

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- **Vitamin B-3**: dopamine reuptake promoter,
- **Methionine and SAMe**: serotonin reuptake inhibitors.
- **Folates**: serotonin, dopamine, and norepinephrine reuptake promoters,
- **Biotin**: reacts with histones to repress gene expression,
- **Zinc**: increases metallothionein (MT) expression,
- **Resveratrol**: suppresses histone acetylation,
- **Curcumin**: suppresses acetylation of certain genes,
- **Genistein**: enhances expression of certain cancer prevention genes.

# Epigenetics and Gene Expression

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- **Transitory Epigenetics:** Gene expression changes due to environment, diet, life experiences, etc. (easily-reversible).
- **Epigenetic Disorders:** Permanent changes in expression of multiple genes and onset of a complex disorder (cancer, autism, schizophrenia, PTSD, etc.).



# Onset of Epigenetic Disorders

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- **Environmental insults overwhelm DNA repair processes at multiple gene locations,**
- **Altered gene expressions that may last a lifetime,**
- **Complex disorders involving numerous malfunctioning genes.**

# Characteristics of an Epigenetic Disorder

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- **Cases of sudden onset after normalcy**
- **Persistence of condition after onset**
- **A multitude of characteristic symptoms**
- **Heritable illness that violates laws of genetics**
- **Abnormal methylation usually present**
- **Severe oxidative overload.**

# Major Epigenetic Gene-Regulation Disorders

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- Cancer
- Heart Disease
- Bipolar Disorder
- Schizophrenia
- Autism
- PTSD
- Wilson's Disease?
- Alzheimer's Disease?

# Epigenetic Disorders

## High Degree of Difficulty

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- Autism, schizophrenia, bipolar disorder, PTSD
- Numerous dysregulated genes,
- Many systems need correction: Immune function, biochemistry, G.I. Tract, oxidative stress, brain neurotransmission, etc,
- Progress usually partial in nature; complete recovery relatively rare.

# Non-Epigenetic Disorders

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- **ADHD, behavior disorders, anxiety, depression,**
- **Normalization of one to three biochemical factors is usually sufficient,**
- **Outcome studies indicate 70-90% efficacy,**
- **Medication support usually unnecessary.**

# Degree of Clinical Difficulty

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**Behavior Disorders and ADHD: Low**

**Depression and Anxiety: Intermediate**

**Schizophrenia and Autism: High**

# BEHAVIOR DISORDERS

# Massive Chemistry Database

## Behavior Disorders and ADHD -

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- More than **1.5 million** blood/urine/tissue test results for persons diagnosed with behavior disorders and/or ADHD.
- Striking chemistry differences between these populations and the rest of society.



# 10,000 Behavior-Disordered Patients

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- **Peer-reviewed studies indicate high efficacy (75-85%)**
- **Compliance greatest challenge**

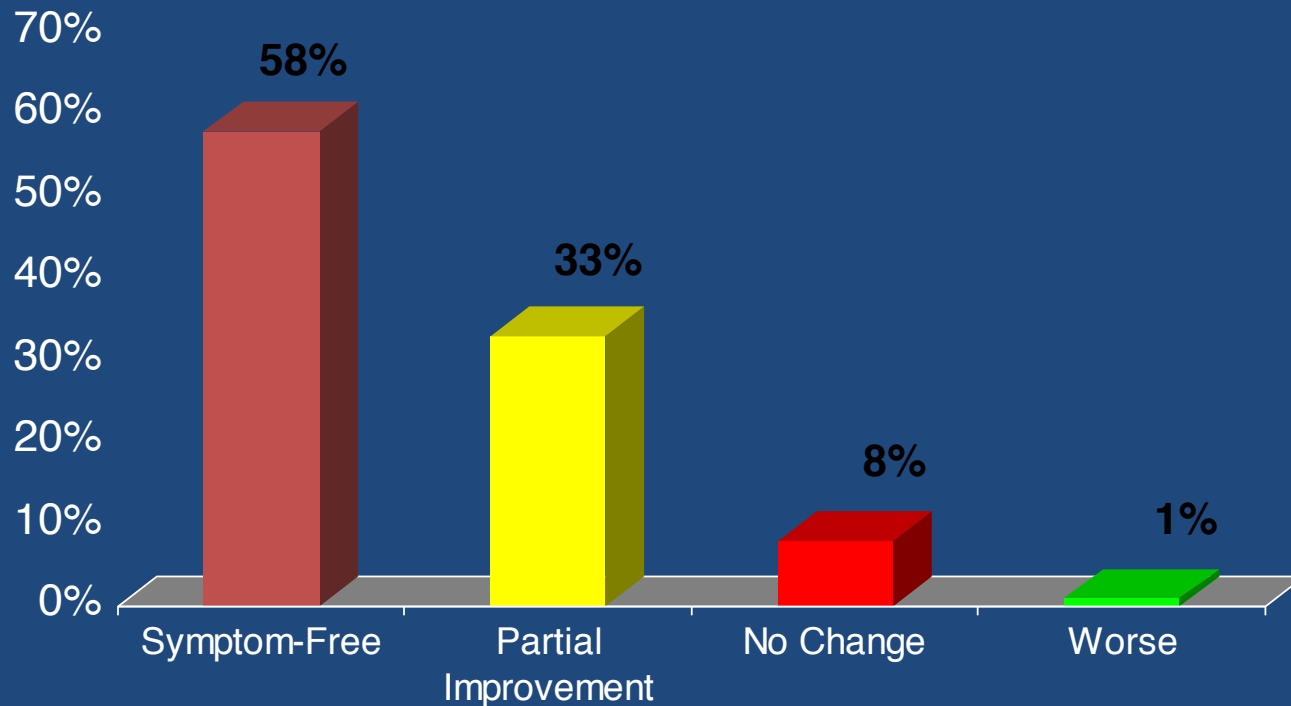
# Outcome Study

Walsh, et al. Physiology & Behavior, 82:835-839 (2004)

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- **207 behavior-disordered subjects**
- **Identification of biochemical imbalances**
- **Individualized nutrient therapy to correct imbalances**
- **Measurement of frequency of physical assaults, property destruction before & after treatment.**

# Treatment Outcomes: Compliant Assaultive Subjects



# 2017 Australia Violence Study

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- Collaboration by Griffith University and Dr. Kelly Francis.
- 32 violent males age 4-14,
- Evaluation instruments: CAS, MOAS, HRQoL, PedsQL.
- *Hambly J, Francis K, Walsh W, Haywood A, et al. (2017). Micronutrient therapy for violent and aggressive male youths: An open-label trial. J Child and Adolescent Psychopharmacology. 1-10.*

# Griffith Study Results

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- **All scales indicated impressive efficacy**
- **Reduced violent behavior,  $p < 0.001$**
- **Low side-effect profile**
- **Replication of 2004 behavior study**

# Behavior Outcomes vs. Age

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1. Disappointing results for adults who are abusing drugs & alcohol.
2. Excellent results for violent children and teens.

Since 1990, treatment focus has been on youths.

**DEPRESSION**

# Mainstream Psychiatry Misconception

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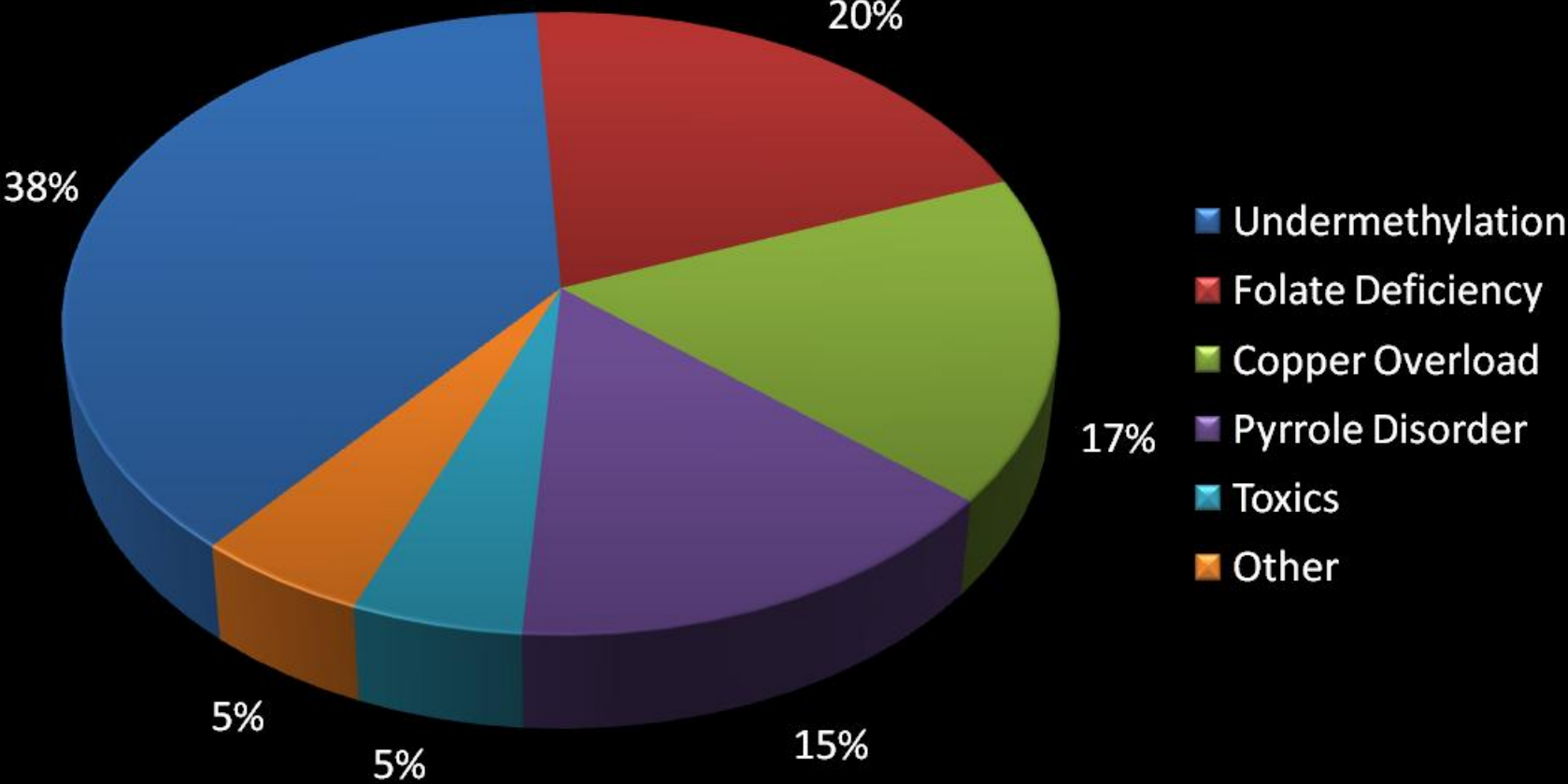
**Depression** - regarded as a single entity with variations along a central theme.

**Central Belief** - Low activity at serotonin receptors.

**Treatment of choice** - SSRI antidepressants to elevate serotonin activity at synapses.



# Depression Biotypes



# Clinical Depression Summary

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- **Therapy using vitamins, minerals, amino acids, and other chemicals that are natural to the body (drug-free)**
- **Separate treatment approach for each biotype**
- **80% of families report major improvements and ability to eliminate psychiatric drugs.**

# SCHIZOPHRENIA

# Chemical Classification of Schizophrenia

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- 1. Database studies indicate four major high-incidence schizophrenia biotypes.**
- 2. Each biotype exhibits unique neurotransmitter imbalances and symptoms.**
- 3. Separate treatment approach needed for each biotype.**

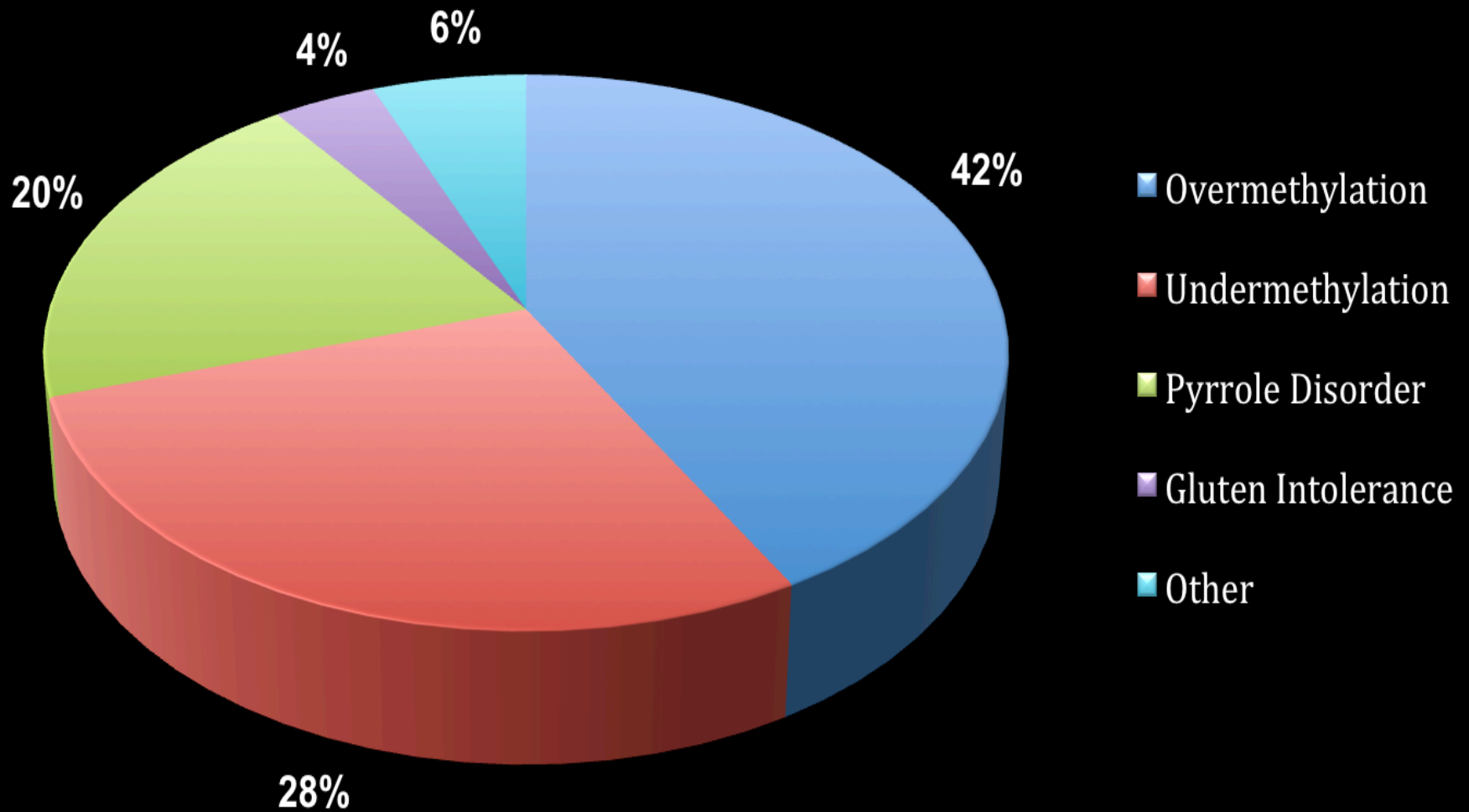
# Shift in Schizophrenia Population Since 1980

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- **Overmethylated: 8% (from 42%)**
- **Undermethylated: 70% (from 28%)**
- **Pyrroles: 15% (from 20%)**

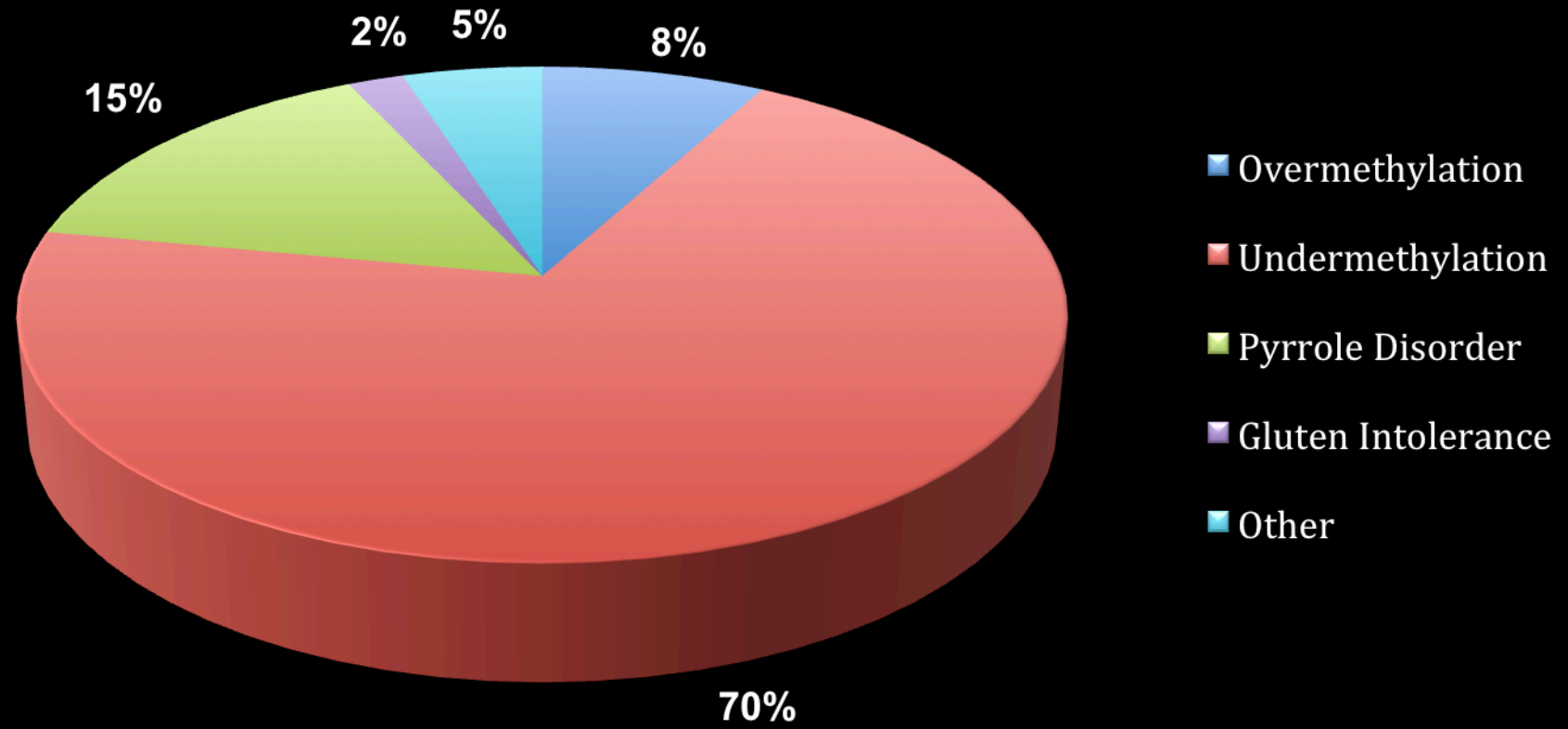
**Note: Cause not definitively known.**

# Original Schizophrenia Biotypes



# Schizophrenia Biotypes

## Schizophrenia Biotypes (2019)



# Nutrient Therapy and Schizophrenia

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- **Correction of biochemical imbalances.**
- **Treatments in harmony with medication and counseling.**
- **Separate treatment for each biotype.**
- **85% of families report improvement, reduced dependence on medication, and lessened side effects.**



# DNA Methylation Study of Schizophrenia Phenotypes

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- **Hilton Family Foundation Grant**
- **Collaboration between WRI and Queensland University of Technology**
- **First schizophrenia study examining epigenetics of individual SZ phenotypes.**

**American Psychiatric Association  
Annual Meeting -- May 8, 2018**

**A Neuroscience Theory of Bipolar Disorder**  
by  
**William Walsh, PhD and Robert de Vito, MD**

# Nutrient Therapy

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- Normalization of brain and body chemistry
- Focus on high-incidence nutrient imbalances,
- Adjustment of neurotransmission rates,
- Relatively low cost & minimal side effects,
- Harmony with medication and counseling.

**Positive outcomes for behavior, ADHD, autism, anxiety, depression, bipolar, schizophrenia.**

# A Look at the Future

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- Remarkable neuroscience advances will lead to vastly improved treatments.
- Cancer, autism, schizophrenia, PTSD, and other epigenetic disorders may be preventable.
- Psychiatric medications may fade away from society as science advances.

# Walsh Research Institute Medical Practitioner Training Program

633 Medical Practitioners from 24 Countries



Over his impressive career, Dr. Walsh has worked with 30,000 patients with conditions ranging from autism to schizophrenia to Alzheimer's. His book is an essential tool for anyone who would prefer to heal the brain with nutrients rather than drugs.

—Teri Arranga, editor-in-chief, Autism Science Digest

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AND HEAL YOUR BRAIN



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AND  
UPDATED

WILLIAM J. WALSH, PhD

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# THANK YOU!

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