

NUTRIENT POWER – HEAL YOUR BIOCHEMISTRY AND HEAL YOUR BRAIN

William J. Walsh, Ph.D.
Walsh Research Institute
Naperville, IL

Walsh Research Institute

- ❑ **Nonprofit public charity**
- ❑ **Expertise in autism, ADHD, depression, behavior disorders, schizophrenia, bipolar disorder, and Alzheimers**
- ❑ **International physician training**
- ❑ **Research**

Clinical Experience

William J. Walsh, Ph.D.

- **10,000 Behavior & ADHD**
- **3,500 Schizophrenia & Bipolar**
- **3,200 Depression**
- **6,500 Autism**

Massive Chemistry Database

- **Laboratory testing of 30,000 mental health patients and controls.**
- **More than 3 million chemical test results for patients diagnosed with schizophrenia, depression, ADHD, depression, autism, etc.**
- **An additional 2 million blood/urine/tissue chemistries from research experiments.**

Database Findings



Striking blood/urine chemistry differences between mental illness populations and the rest of society.

Biochemical Individuality

- Humans are genetically & epigenetically diverse.
- Because of genetics and epigenetics, most people are deficient in several nutrients and overloaded in others.

Nutrient Deficiencies that Impair Brain Function

- Zinc
- Methionine
- Folic Acid
- Vitamins B-6 and B-12
- Niacin/Niacinamide
- DHA, EPA, AA (essential fatty acids)
- Antioxidants: Se, GSH, Vitamins C, E, etc.
- Chromium

Nutrient Overloads that Impair Brain Function

- ❑ Copper
- ❑ Folic Acid
- ❑ Iron
- ❑ Methyl groups
- ❑ Toxics: Lead, Mercury, Cadmium, etc.

Individualized Nutrient Therapy

- Medical history and review of symptoms,
- Special blood/urine lab tests,
- Diagnosis of chemical imbalances,
- Prescribed nutrient program aimed at normalizing brain chemistry.

Populations With Positive Outcomes Following Biochemical Therapy

- Behavior Disorders
- ADHD
- Autism
- Anxiety
- Depression
- Bipolar Disorder
- Schizophrenia
- Alzheimer's Disorder

Frequent Questions From Mainstream Medicine

- 1. How could vitamins, minerals & other nutrients possibly help a person with a serious mental illness?**
- 2. Don't you really need a powerful drug medication to get the job done?**

The Brain Is a Chemical Factory



- Serotonin, dopamine, and other NT's are synthesized in the brain.
- The raw materials for NT synthesis are nutrients: vitamins, minerals, and amino acids.
- A genetic or epigenetic imbalance in a nutrient needed for NT synthesis can result in serious brain chemistry problems.

The Power of Nutrients

- **Neurotransmitter synthesis**
- **Reuptake processes at synapses**
- **Epigenetic regulation of gene expression**
- **Protection against oxidative stress**

Nutrient Imbalances that Alter Neurotransmitter Activity

- ❑ **Zinc Deficiency**
- ❑ **Copper Overload**
- ❑ **Methylation Disorder**
- ❑ **Folate Imbalances**
- ❑ **B-6 Deficiency**
- ❑ **Fatty Acid Imbalances**
- ❑ **Toxic metal Overload**
- ❑ **Severe Oxidative Stress**

These nutrient imbalances are present in a variety of disorders:

Example 1: Copper overload present in most cases of hyperactivity, post-partum depression, paranoid schizophrenia, and autism.

Example 2: Undermethylation observed in most cases of OCD, anorexia, seasonal depression, schizoaffective disorder, and antisocial personality disorder.

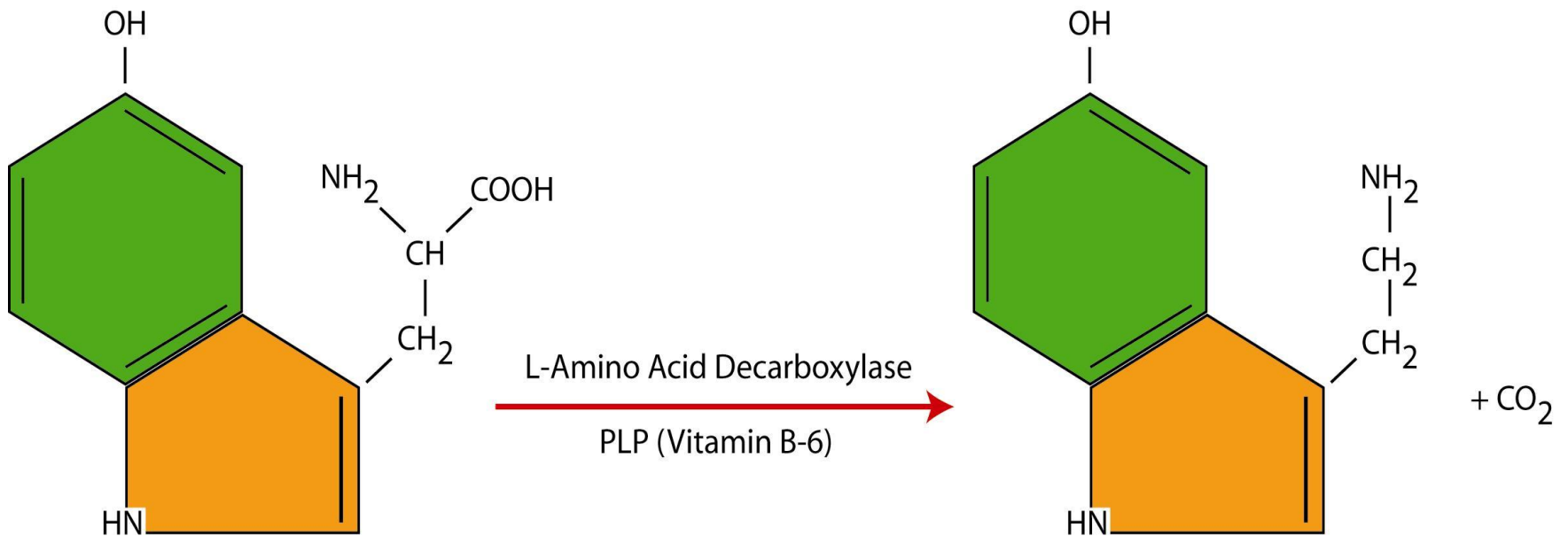
The Repeat Offenders



Question: Why are these biochemical abnormalities seen in so many mental disorders?

Answer: Each is directly involved in synthesis or regulation of a major neurotransmitter.

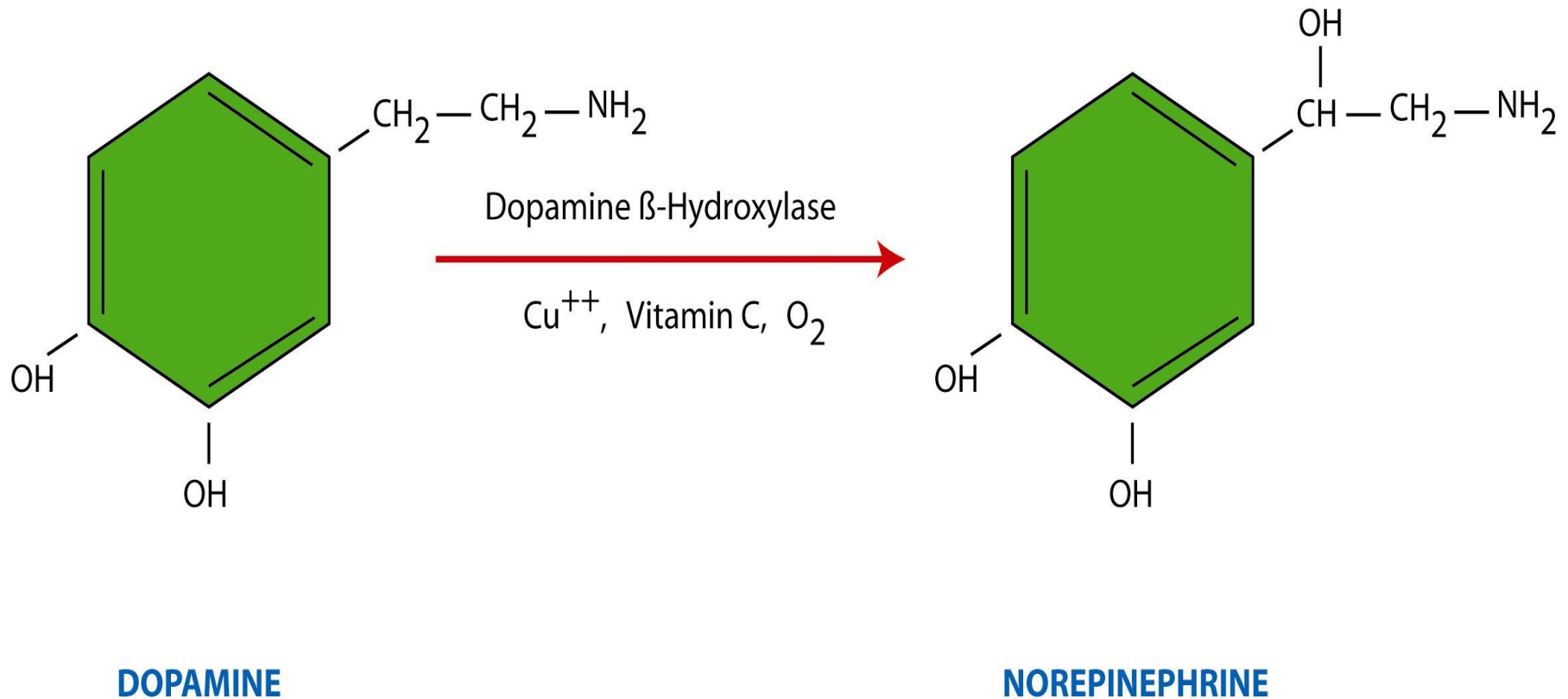
Serotonin Synthesis



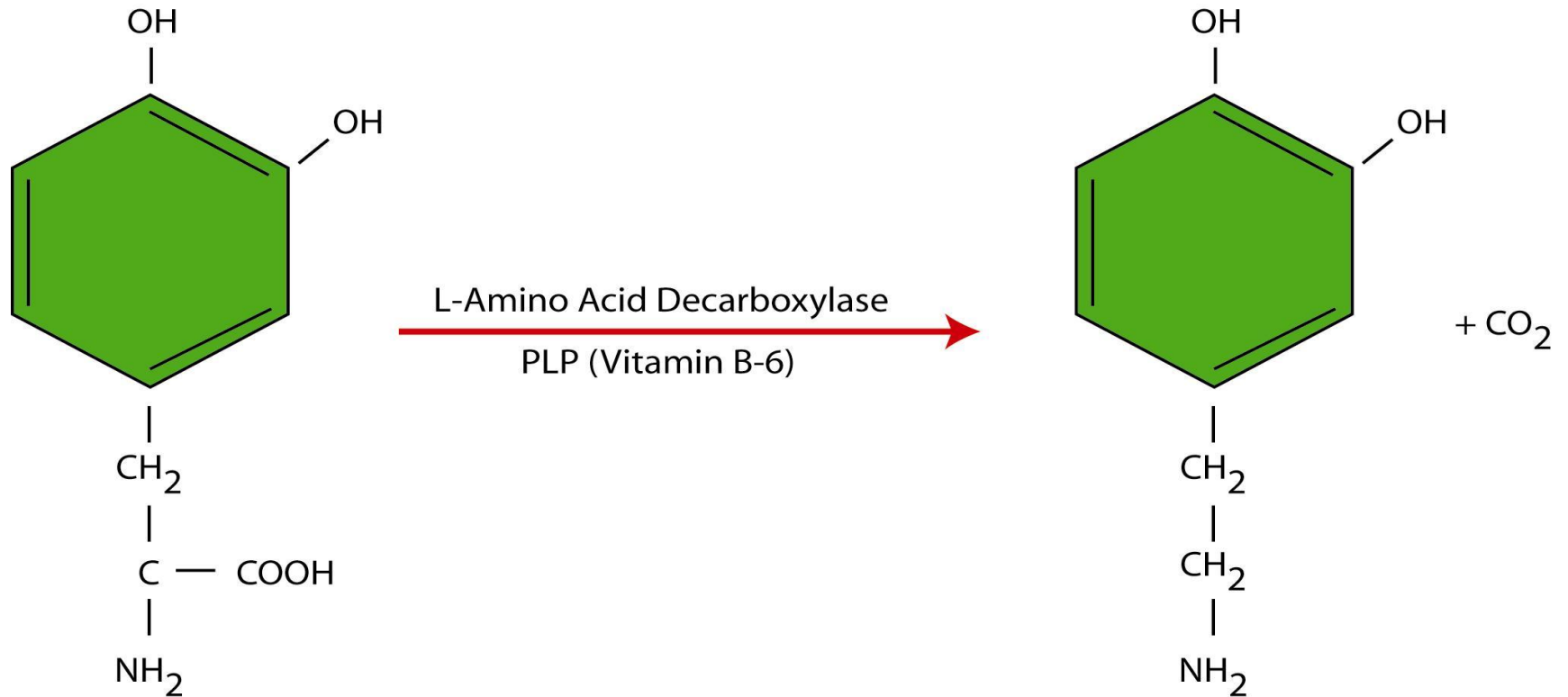
5-HYDROXYTRYPTOPHAN

SEROTONIN

Norepinephrine Synthesis



Dopamine Synthesis



L-DOPA

DOPAMINE

Nutrients and Regulation of Neurotransmitter Activity

Reuptake at synapses through transporter protein “passageways” is the dominant factor in NT activity.

Gene expression of transporters regulated by epigenetic processes.

Methyl, folate, niacin, and other nutrients have a powerful epigenetic impact on gene production of transporters and NT activity.

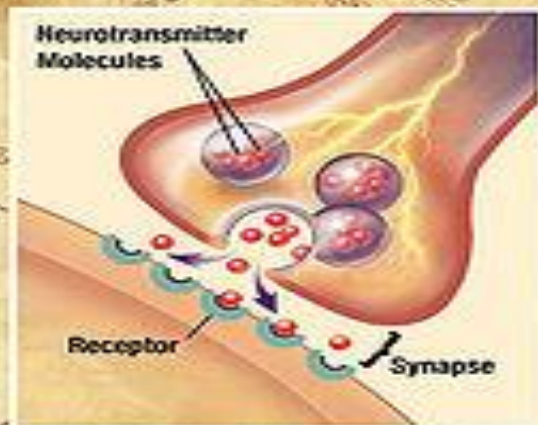
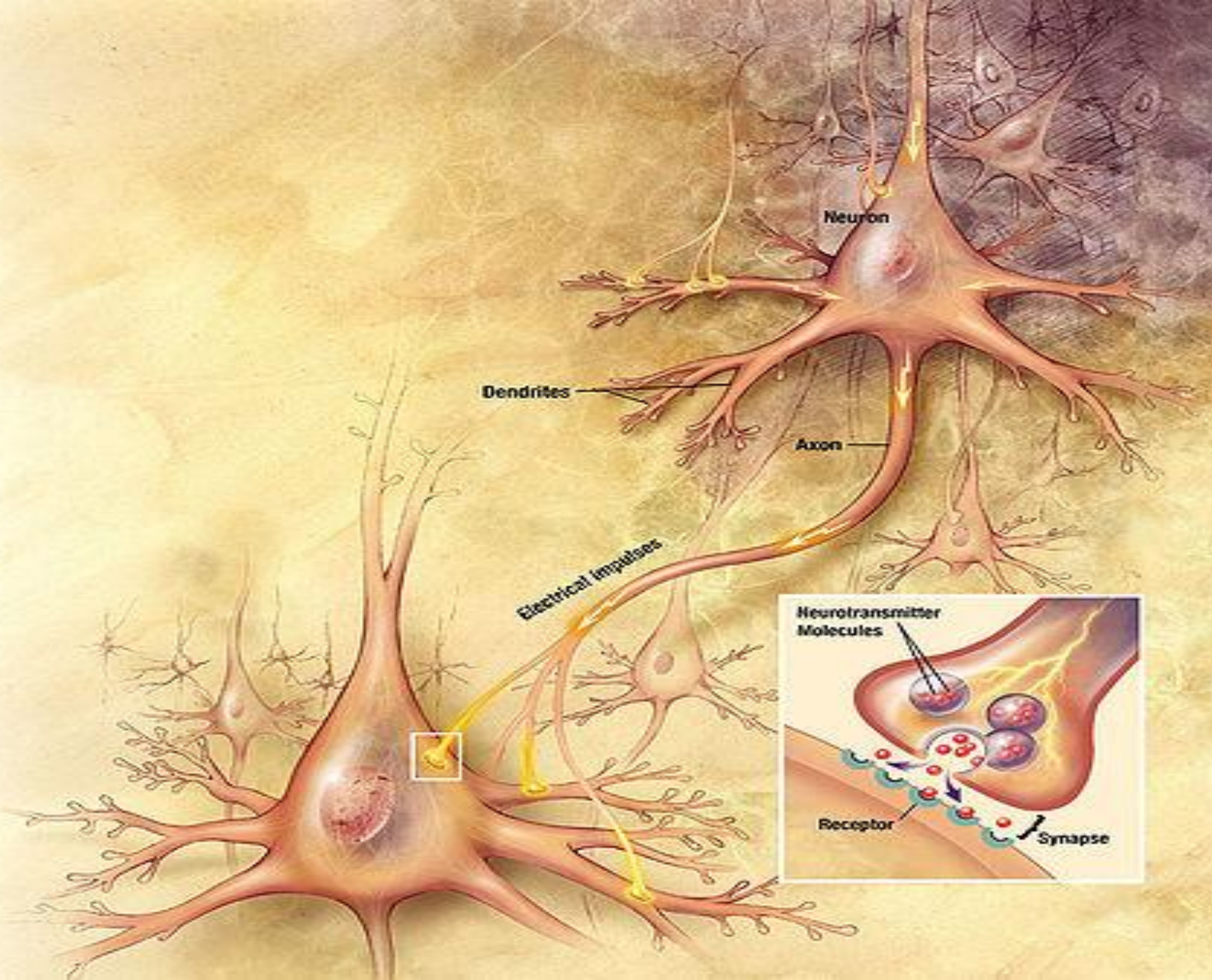
Neurotransmitter Activity

Important Factors:

Availability of nutrients, enzymes, vesicles,
Amount of NT produced,

Dominant Factor:

Population of transport proteins, the
passageways for returning NTs (reuptake).



Epigenetics

- **>20,000 genes in every cell's DNA, each capable of producing a specific protein,**
- **Liver, skin, brain, and other tissues require a unique combination of proteins,**
- **For each tissue, a natural “bookmarking” process during fetal development establishes which genes will be expressed or silenced throughout life,**
- **Environmental insults can alter gene marks and produce mental disorders and disease conditions.**

Characteristics of an Epigenetic Disorder



- ❑ Abnormal methylation,
- ❑ Cases of sudden onset after normalcy,
- ❑ Persistence of condition after onset,
- ❑ A multitude of characteristic symptoms,
- ❑ Heritable condition that violates laws of genetics.

Epigenetics & Mental Health

Many heritable mental disorders appear to be **epigenetic**, rather than **genetic**:

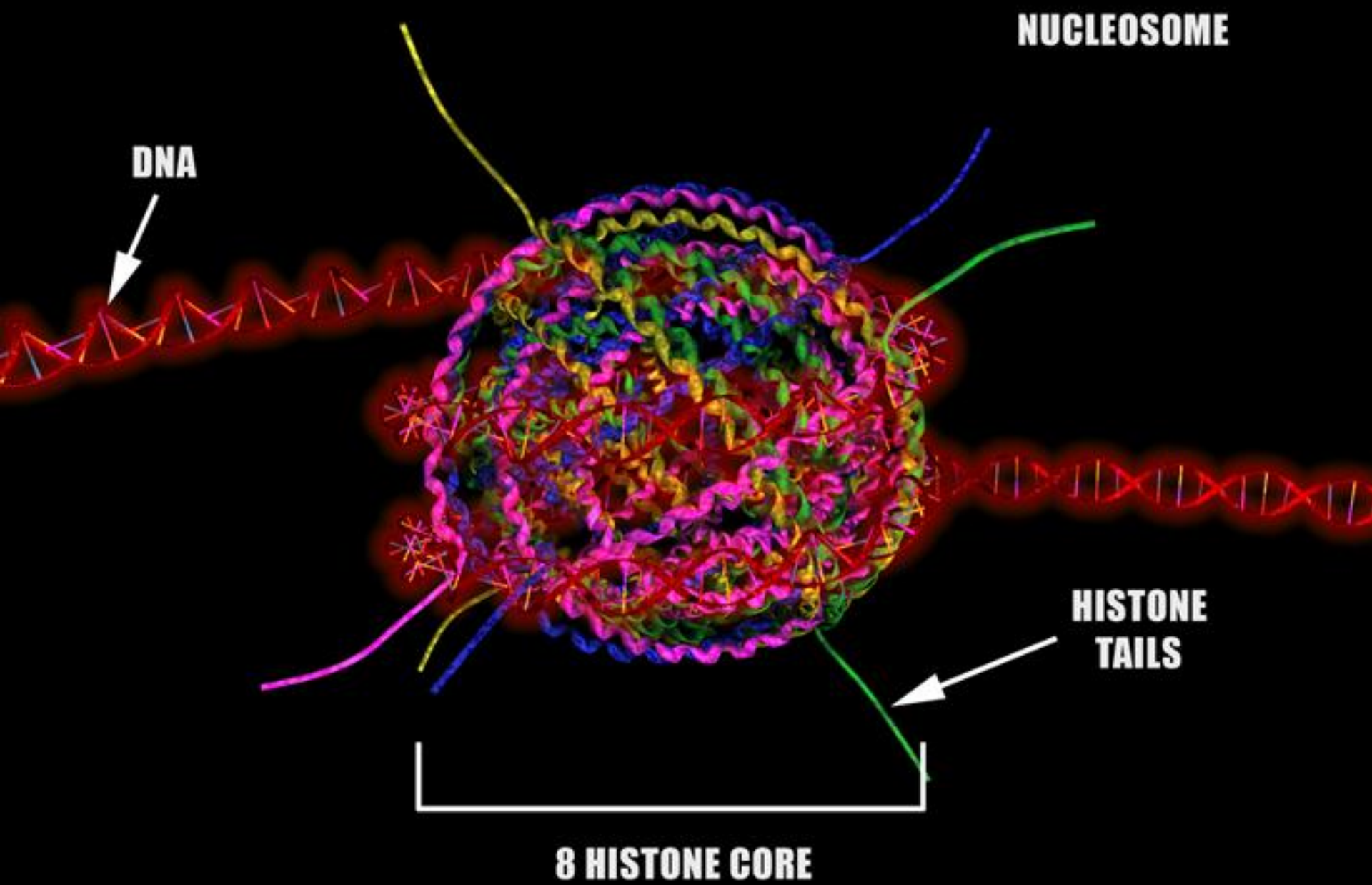
- Schizoaffective disorder
- Antisocial personality disorder
- Paranoid schizophrenia
- Obsessive compulsive disorder
- Autism
- Anorexia
- Paraphilias

DNA PACKAGING

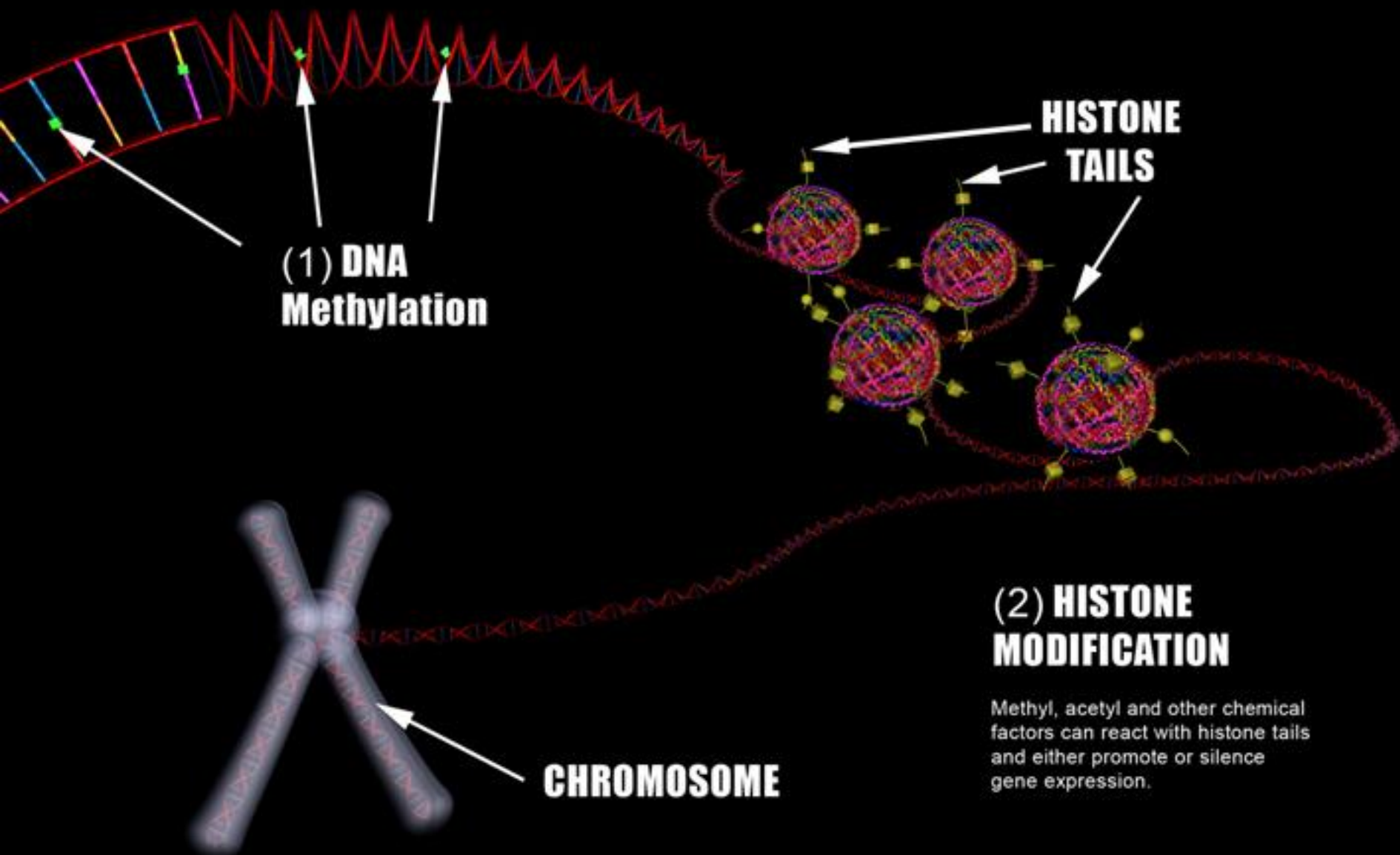
- Each DNA double helix is nearly two meters long, and amazingly packaged into a tiny cell nucleus 10,000 times smaller in diameter.
- The fragile DNA is wrapped around a multitude of tiny proteins called “histones” to form chromatin.
- The chromatin is efficiently compressed into highly compacted chromosomes.

Histones

- ❑ Composed of 8 linear proteins twisted together like a ball of yarn,
- ❑ Originally believed to serve only as structural support for DNA packaging,
- ❑ Later found to inhibit/promote gene expression depending on chemical reactions at histone tails.



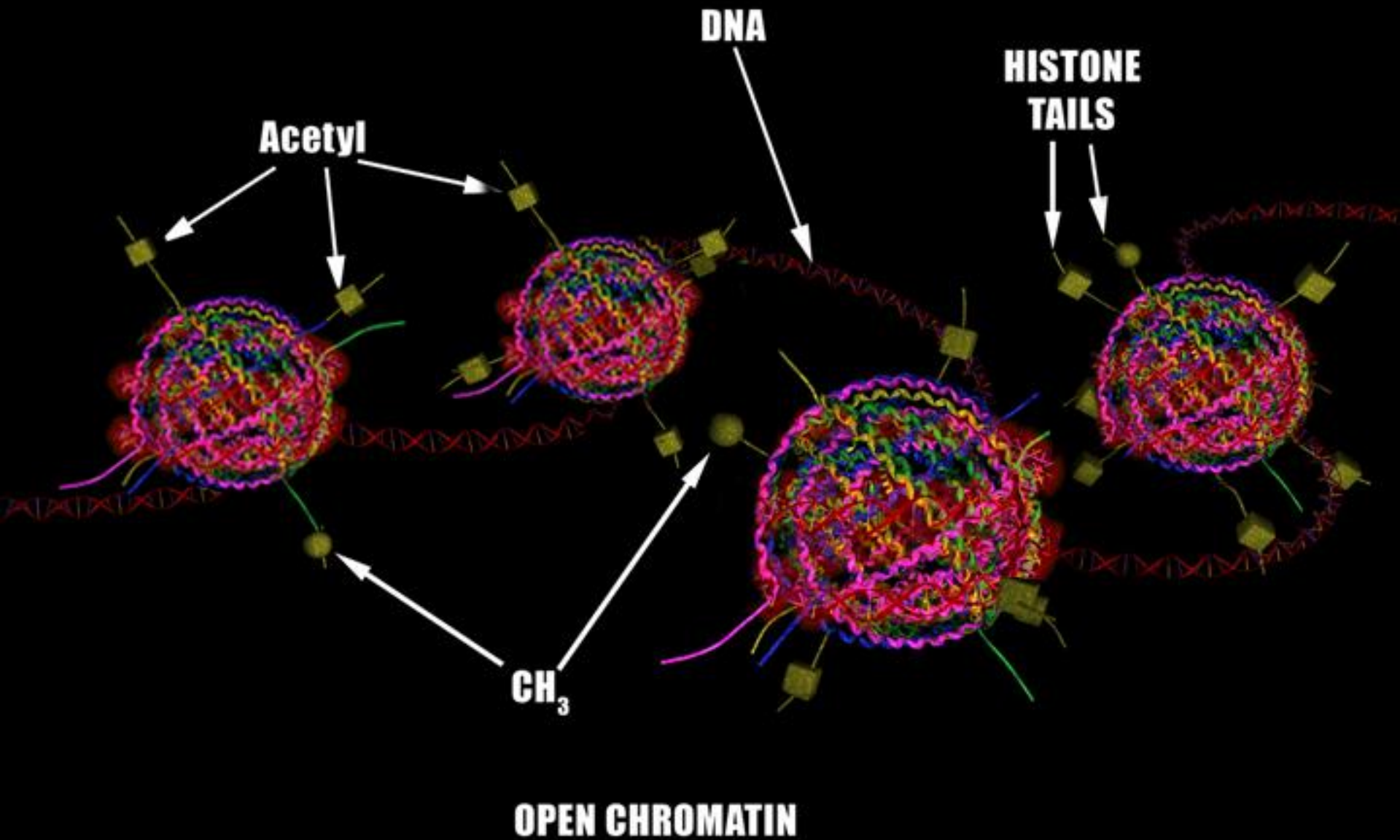
The Two Main Components of the Epigenetic Code



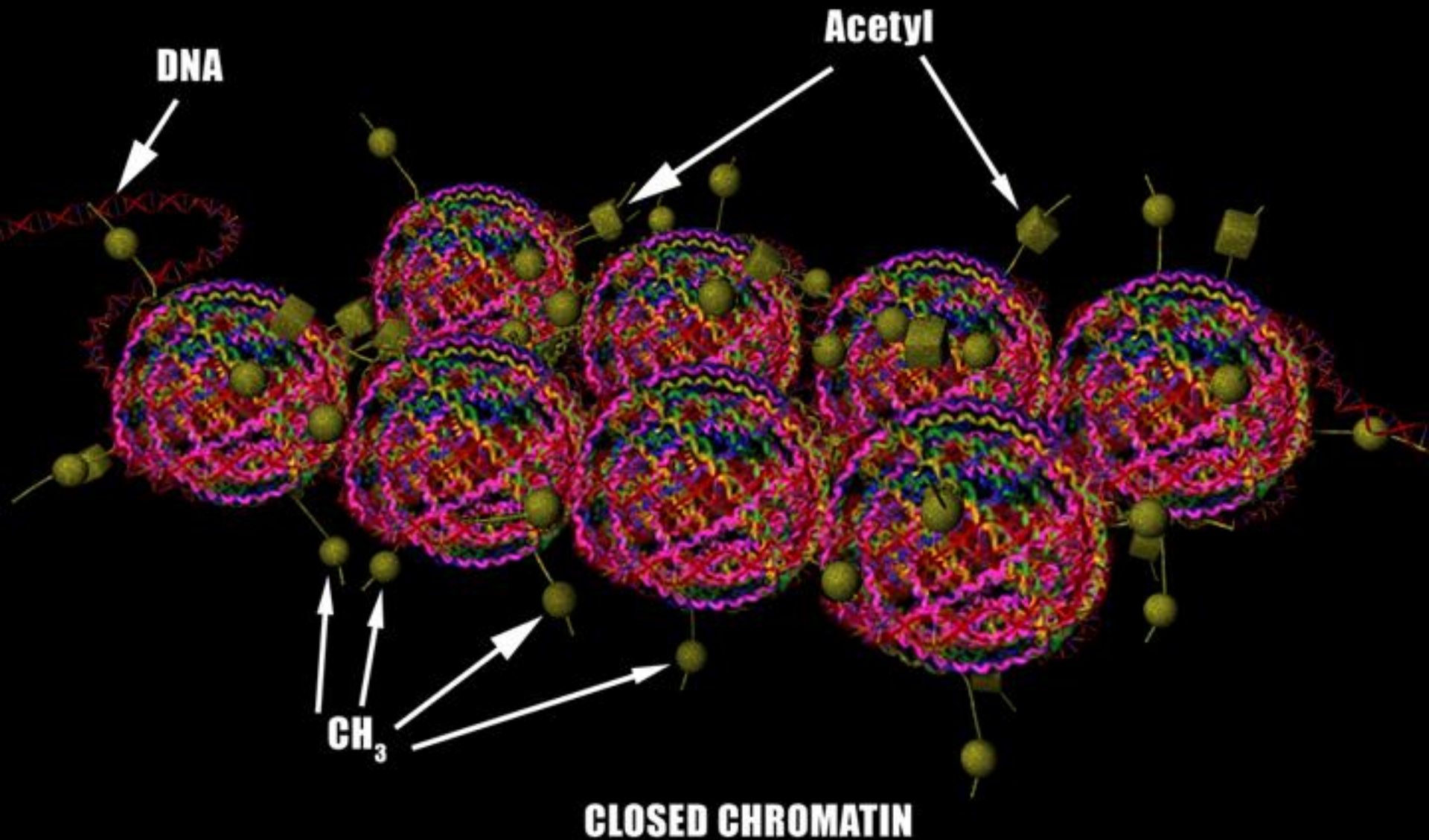
Methyl-Acetyl Competition

- Competition between acetyl and methyl groups often determines whether genes are expressed or silenced,
- Acetylation tends to promote gene expression; Methylation generally inhibits expression,
- Nutrient therapy can change methyl/acetyl ratios and adjust neurotransmitter activity.

LOW METHYLATION PROMOTES GENE EXPRESSION



HIGH METHYLATION INHIBITS GENE EXPRESSION



Reuptake Transport Proteins

- Transmembrane proteins that remove neurotransmitters from the synapse like a vacuum cleaner inhaling dust particles,
- Formed by gene expression: amount present depends on methyl/acetyl competition at DNA CpG islands or at histones,
- Dominant effect on neurotransmitter activity!

Epigenetic Insights Into Nutrient Therapy

- Niacin & niacinamide act as dopamine reuptake promoters,
- SAmE is a serotonin reuptake inhibitor,
- Folates reduce synaptic activity at serotonin, dopamine, and norepinephrine receptors,
- Undermethylated mental illness patients are intolerant to folic acid,
- Many nutrients influence neurotransmitter activity and brain function.

Antioxidants and Mental Health



1. Excessive oxidative stress is a distinctive feature of most mental disorders.
2. Functioning of NMDA and other NT systems is impaired by severe oxidative stresses.
3. Cumulative oxidative stresses can produce deviant epigenetic marks, and a lifetime of illness.

Causes of Excess Oxidative Stress

- Exposure to Pb, Hg, Cd, and other toxic metals,
- Depletion of GSH, MT, Se, Zn, cysteine, catalase and other natural antioxidant protectors,
- Illness or injury,
- Pyrrole disorder.

Mainstream Psychiatry

Misconceptions

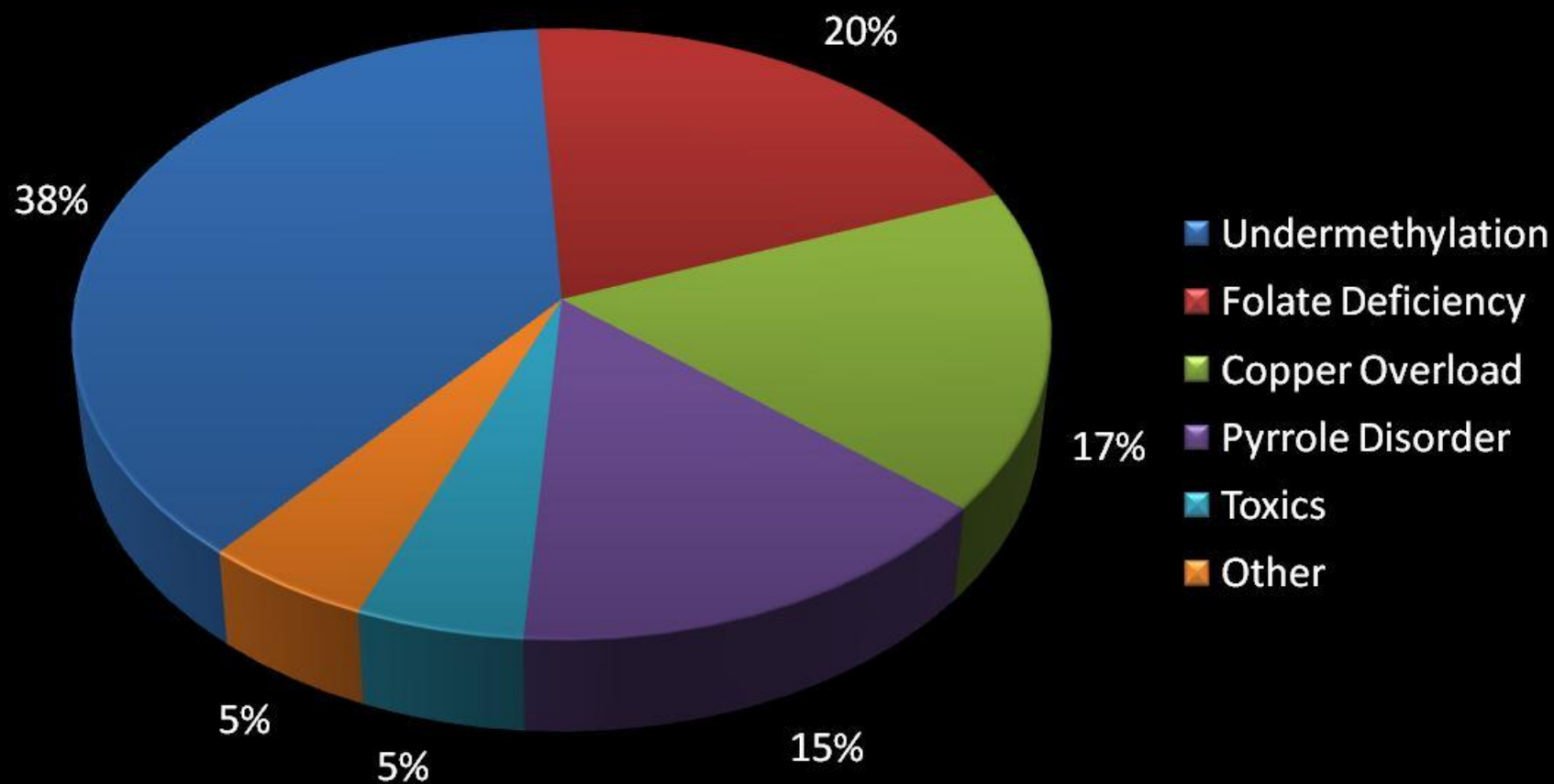
- **Depression** regarded as a single entity with variations along a central theme. Treatment of choice -- SSRI antidepressants to elevate serotonin activity at synapses.
- **Schizophrenia** also regarded as a single entity, with variations along a central theme. Treatment of choice-
- Atypical antipsychotic medications.

Chemical Classification of Depression



- My database studies have identified five high-incidence depression biotypes,
- The biotypes represent completely different disorders, each with unique neurotransmitter imbalances and symptoms,
- Separate treatment approach needed for each biotype.

Depression Biotypes



Depression Biotypes

Undermethylation: Low serotonin activity; Good response to SSRI antidepressants.

Pyrrole Disorder: Low activities of serotonin, GABA, and NMDA glutamate. Fair response to SSRIs.

Copper Overload: Elevated norepinephrine activity; SSRIs ineffective.

Toxic Metal Depression: Depressed GABA, low glutamate activity at NMDA receptors, and zinc deficiency. SSRIs ineffective.

Folate deficiency: Excessive activity of serotonin due to an epigenetic mechanism; Adverse reaction to SSRIs.

Phenotype #1

Undermethylated Depression

- Elevated Blood Histamine
- Low S_AMe/S_AH Ratio
- Low Basophils
- Low Serotonin Activity

Symptoms & Traits

Undermethylated Depression

- ❑ OCD tendencies
- ❑ Seasonal affective disorder
- ❑ Competitive & perfectionistic
- ❑ SSRI medications usually effective
- ❑ Calm exterior, but inner tension
- ❑ Strong willed
- ❑ High libido
- ❑ Seasonal allergies

Phenotype #2

Low-Folate Depression

- ❑ Tendency for high anxiety, panic
- ❑ Non-competitive in sports or games
- ❑ Absence of inhalent allergies
- ❑ Food/chemical sensitivities
- ❑ Adverse reaction to SSRI medications
- ❑ High musical or artistic ability
- ❑ Underachievement
- ❑ Sleep disorder
- ❑ Low libido

Phenotype #3

High-Copper Depression

- More than 95% are female
- Inability to eliminate excess copper
- High anxiety
- Tendency for post-partum depression
- Onset during hormonal event
- Estrogen intolerance
- Tinnitus (ringing in the ears)
- Sensitive skin, intolerance to cheap metals.

Phenotype #4

Pyrrole Depression

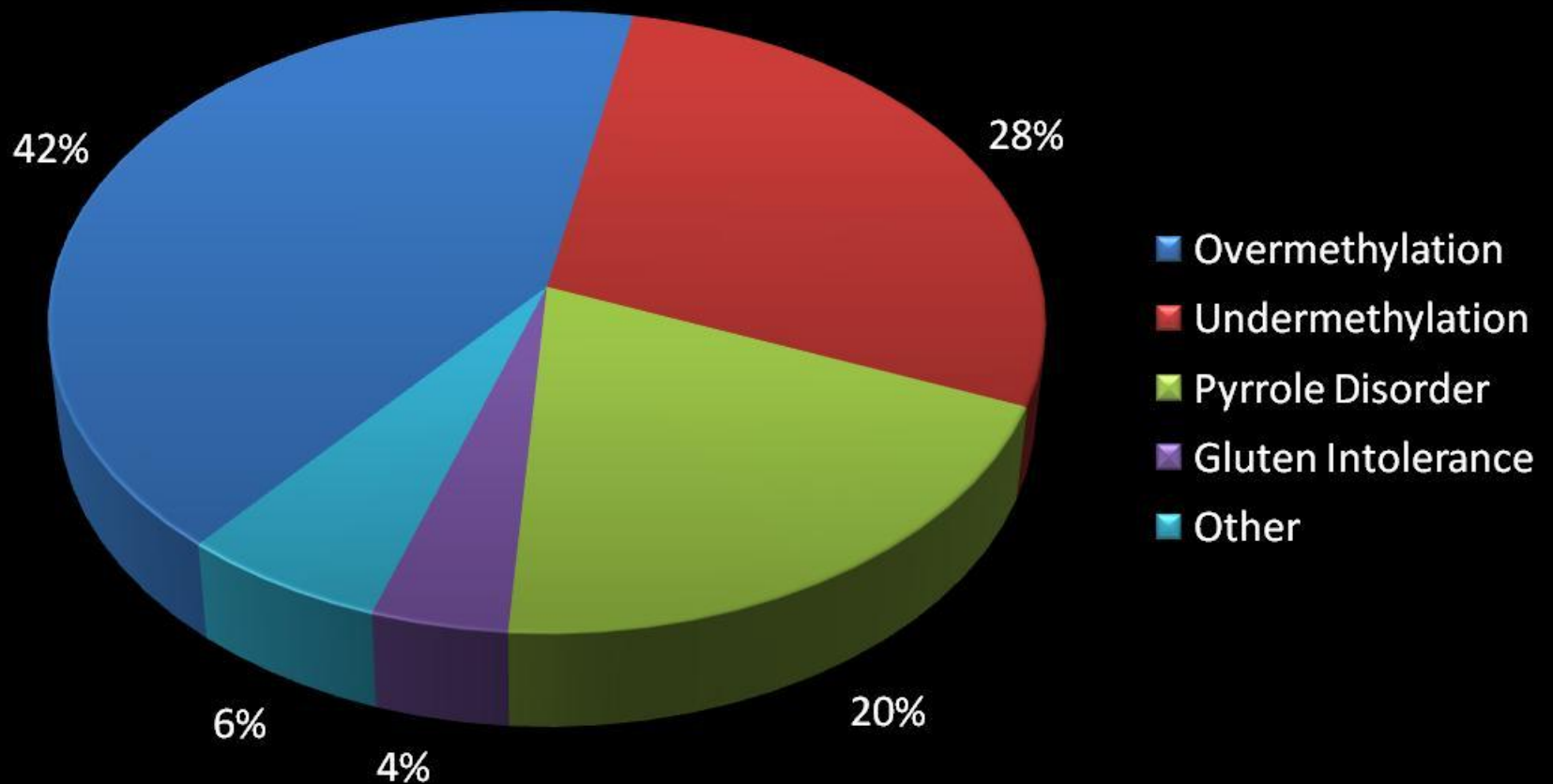
- ❑ Severe mood swings
- ❑ Poor stress control
- ❑ Extreme anxiety
- ❑ Poor short-term memory, reading disorder, little or no dream recall
- ❑ Sensitivity to light, noise
- ❑ Poor immune function
- ❑ Very poor morning appetite
- ❑ Abnormal fat distribution,
- ❑ Inability to tan.

Phenotype #5

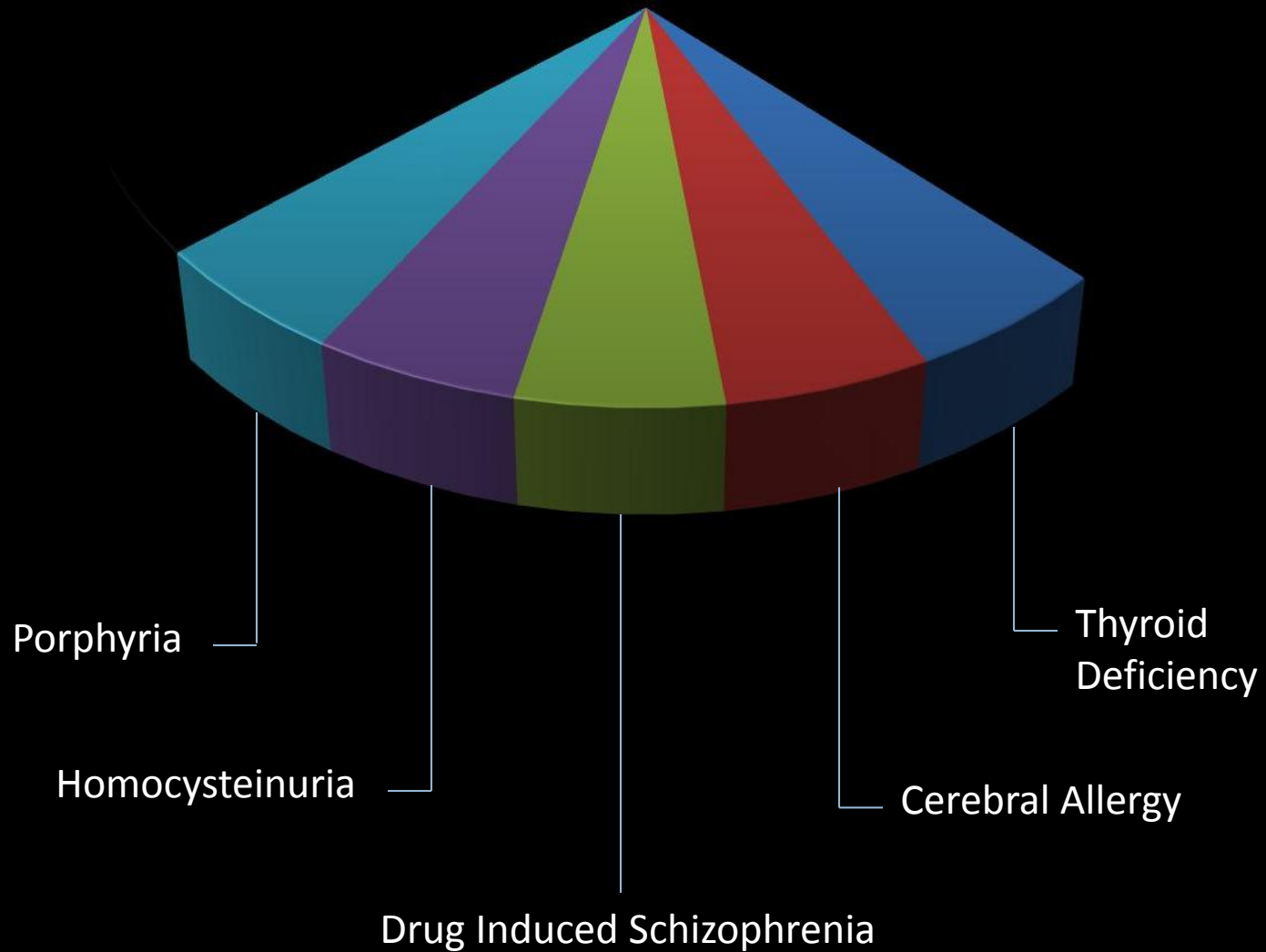
Toxic Metal Depression

- ❑ Absence of trauma or emotional triggers
- ❑ Abdominal distress
- ❑ Unrelenting depression
- ❑ Cognitive deficits (children only)
- ❑ Metallic taste in mouth, bad breath
- ❑ Irritability, anger
- ❑ Food sensitivities
- ❑ High oxidative stress

Schizophrenia Biotypes



Other Forms of Schizophrenia



Schizophrenia Biotypes

- **Overmethylation:** Classic paranoid schizophrenia; Auditory hallucinations, paranoia, high anxiety.
- **Undermethylation:** Delusional beliefs, catatonic tendencies, OCD behaviors.
- **Pyrrole Disorder:** Combination of hallucinations and delusions; severe anxiety and mood swings.

NOTE: All Sz biotypes involve severe oxidative stress.

Schizophrenia Treatment

- Separate nutrient therapies developed for each schizophrenia biotype,
- Outcome studies reveal 80% of patients report significant improvement & ability to reduce or eliminate medication.

Useful Nutrients for Mental Patients

Undermethylation

SAMe, methionine, zinc, calcium, inositol, serine, magnesium, Vitamins A, B-6, C, D, and E.

Overmethylation

Folic acid, B-12, niacinamide, zinc, manganese, DMAE, Vitamins A, C, and E.

Pyrrole Disorder

Vitamin B-6, zinc, biotin

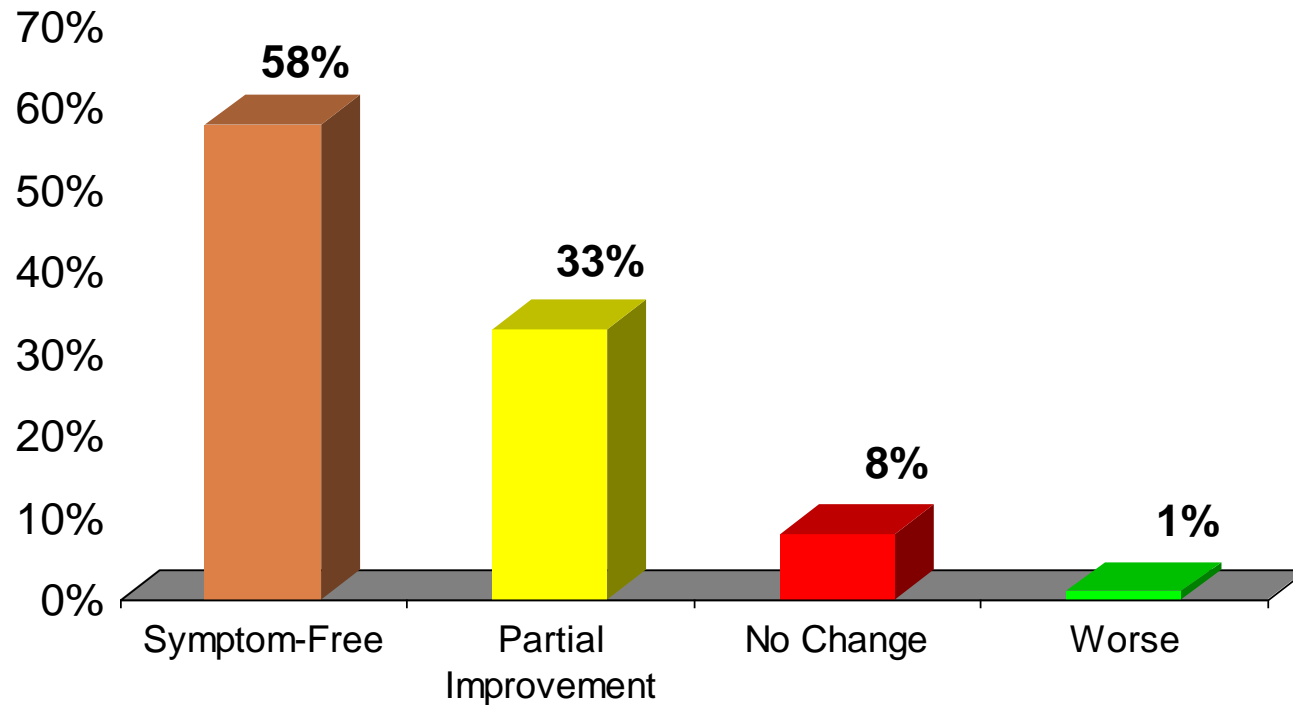
Schizophrenia: Evidence of an Epigenetic Disorder

- Abnormal methylation and severe oxidative stress are major causes of epigenetic errors.
- Greater than 95% of schizophrenics exhibit abnormal methylation or oxidative overload.
- Epigenetic disorders violate classical laws of Mendelian genetics.

Behavior Chemistry

- Antisocial-Personality Disorder: Depressed Zn, Cu, methyl, elevated pyrroles, hypoglycemia, toxic metal overload
- Intermittent Explosive Disorder: High Cu/Zn ratio
- Conduct Disorder: Severely-elevated pyrroles
- Oppositional/Defiant Disorder: Undermethylation, low-normal Cu, low Ca & Mg

Treatment Outcomes: Compliant Assaultive Subjects



Massive Autism Database



- **More than 1.5 million chemical assays of blood, urine and tissues.**
- **Striking biochemical differences between ASD children and non-affected children.**

Pervasive Biochemical Abnormalities in Autism

- Depressed Glutathione & Cysteine
- Elevated toxic metals
- Hypomethylation
- Copper/Ceruloplasmin dysregulation
- Depleted Zinc & Metallothionein
- Elevated Pyrroles
- Low B-6, C, and Selenium
- Elevated Urine Isoprostanes

*Note: Each of these imbalances is associated with elevated **OXIDATIVE STRESS**.*

Some Consequences of Excess Oxidative Stress

- 1. Hypersensitivity to Hg & other toxic metals,**
- 2. Hypersensitivity to casein, and gluten,**
- 3. “Leaky” intestinal and brain barriers,**
- 4. Increased candida/yeast levels,**
- 5. Depletion of glutathione & metallothionein.**

Oxidative Stress Can Impair Brain Development

- **High oxidative stress depletes glutathione and metallothionein levels,**
- **Ample glutathione and metallothionein essential for proper brain development,**
- **Oxidative insults can alter epigenetics of gene expression.**

Autism Brains Are Different

- ❑ Narrowed minicolumns in brain cortex,
- ❑ Incomplete maturation in cerebellum, amygdala, pineal gland and hippocampus,
- ❑ Poverty of brain dendrites and synapses,
- ❑ Brain inflammation and increased head size,
- ❑ Damaged fats in autism brains,
- ❑ Abnormal levels of calcium and iron,
- ❑ Reduced structural connectivity between brain regions.

The Three Musketeers of Antioxidant Protection

Glutathione: First line of defense,

Metallothionein: Nature's back-up system,

Selenium: Speeds up the process.

Increasing Autism Rates

A Continuing Medical Mystery

- Clear inborn predisposition: Greater than 60% concordance in identical twins; Less than 10% concordance in fraternal twins,
- Dramatic increase in autism cases over the past 50 years.
- Autism rates continue to escalate

How can there be an epidemic of a genetic condition?

The Role of Environment

- Concordance of only 60-80% in identical twins indicates that environment plays a significant role.
- Since DNA mutations can take centuries to develop, the autism epidemic has been attributed to changes in environment.

Environmental Insults: A Multitude of Possibilities

- Attention has focused on direct insults to the child from conception to age three.
- More than 30 environmental insults have been proposed, including mercury exposures, vaccines, changes in diet, viruses, increased Cu in the water supply, etc, etc.

A New Explanation - Epigenetics

- **Undermethylation can alter gene programming during pregnancy,**
- **Cumulative oxidative stress can produce deviant epigenetics “bookmarks” after birth,**
- **Epigenetic errors can be transferred to future generations and contribute to the autism epidemic.**

Epigenetic Model of Autism

- Undermethylated in-utero environment results in life-long vulnerability to oxidative stresses,
- Sometime after conception, cumulative oxidative insults reach a threshold that produces deviant epigenetic marks and the autism condition,
- Since deviant marks survive cell divisions, the autism condition can persist a lifetime,
- Epigenetic etiology explains violation of genetics laws, in a condition that “runs in families”.

The Promise of Epigenetic Therapies



- **Deviant epigenetic marks appear to be reversible.**
- **Future epigenetic therapies may represent the best therapies for schizophrenia, depression, autism, behavior disorders, and ADHD**
- **Early epigenetic testing and treatment may enable prevention of these disorders.**

The Next Revolution in Psychiatry



Drug medications will not stand the test of time. A fundamental limitation is that psychiatric drugs are foreign molecules that produce an abnormal condition rather than producing normalcy.

Epigenetic and other therapies in the new era will normalize the brain without introducing side effects.

The need for drug therapies will fade away as brain science advances.

Pfeiffer's Law

“For every drug that benefits a patient, there are natural substances that can produce the same effect”.

Carl C. Pfeiffer, MD, PhD

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*

NUTRIENT POWER

HEAL YOUR BIOCHEMISTRY
AND HEAL YOUR BRAIN



WILLIAM J. WALSH, PhD

THANK YOU!



Bill Walsh, PhD
Walsh Research Institute
www.walshinstitute.org