

# MICRONUTRIENTS FOR THE BRAIN

OPTIONS BEYOND  
PHARMACEUTICALS

# Objectives

- 1) Increased knowledge of the importance of micronutrients in mental health
- 2) Awareness of which micronutrients have evidence based studies to support their use
- 3) Increased awareness of the concept of optimum health via the support of micronutrients for the whole body and brain
- 4) Inspire the possibility to question the current paradigm in the field of psychiatry

# ALL LIVING BEINGS FLOURISH WITH OPTIMUM MICRONUTRIENTS



A survey of CAM (complementary and alternative medicine) utilization indicated 10 % of US adults visited CAM provider with self report of diagnosis.

50 % of these individuals sought CAM provider for the psychiatric indication.

An inpatient study of psychiatric patients indicated that 63% had CAM experience in past year AND 79% did not disclose to the psychiatrist this info.

Consider asking what CAM your Patients are using!

Supplements have been in use in medicine since

Ancient times: sources have been from the plant, mineral, animal worlds.

Modern science has allowed us to break down the ingredients from these worlds:

Vitamins

Minerals

Fatty acids

Amino acids

Carbohydrates

These are the **building blocks** of the human **body/brain, ALONG WITH H<sub>2</sub>O, O<sub>2</sub>** composing cells, tissues, organs.

We

require a **minimum** of these substances to function

and possibly to **age less**

- ▣ SINCE PERFECT ADAPTATION MAY NOT BE POSSIBLE, EACH CELL/TISSUE MUST LEARN TO FUNCTION ADEQUATELY WITH LESS THAN OPTIMUM PROVISION OF NUTRIENTS.

The chief ways to assist:

- 1) Food
- 2) Micronutrients

# WHAT ARE MICRONUTRIENTS?

- ▣ AMINO ACIDS-ie TRYPTOPHAN
- ▣ VITAMINS-ie VIT b12
- ▣ MINERALS- ie MAGNESIUM
- ▣ ESSENTIAL FATTY ACIDS-OMEGA 3 FISH OIL, PHOSPHATIDYL SERINE /CHOLINE

THESE ARE THE BUILDING BLOCKS OF THE  
BRAIN AND BODY!



# Why bother to add micronutrients???

- ▣ Food as we know it today is vastly different in its composition and nutrient density than about 10 0 years ago.

Michael Pollan has addressed these concerns in an excellent book- *In Defense of Food* -true even with an organic food based diet at this point in time.

- ▣ Modern/highly processed diet AKA SAD (simple American diet)  
VERSUS
- ▣ Primitive/wholesome(close to the source- both in Composition and origin) diet
- ▣ Which DIET may best supply key nutrients in Body/brain!? **FOOD CLOSER TO THE SOURCE!**

# Food for thought

THOSE WHO THINK THEY HAVE NO TIME  
FOR HEALTHY EATING WILL SOONER OR  
LATER HAVE TIME FOR ILLNESS...

HIPPOCRATES

# Consider this simple concept

The SAD Diet creates the right conditions to limit physical and mental health.....

GREATER RISK for:

Diabetes

Obesity

Hypertension

Metabolic Syndrome

Cardiac problems

Stress syndrome

Depression, anxiety

**Every tribe/culture** that has assimilated the SAD diet has all the above challenges **within one generation** of it adapting to the processed foods that we consume daily....FOOD FOR THOUGHT

# Medical Conditions that can cause, mimic, or worsen Depression and Anxiety

## ▣ Weak Immune System

- ▣ Lyme disease
- ▣ Viral meningitis
- ▣ Hepatitis
- ▣ Pneumonia
- ▣ Flu
- ▣ TB
- ▣ HIV

## ▣ Brain Diseases

- ▣ Post stroke
- ▣ Dementia
- ▣ Traumatic Brain Injury

## ▣ Dietary Deficiencies

- ▣ Vitamin B, and B12
- Thiamine, Vitamin D
- ▣ Folic Acid
- Omega 3 fatty

## ▣ Heart Disease

## ▣ Metabolic Disease

- ▣ Kidney disease
- ▣ Mineral imbalance
  - Potassium
  - Sodium
  - Calcium

## ▣ Infection

## ▣ Lung Disease

## ▣ Cancer

## ▣ Gastrointestinal disease

- ▣ Irritable bowl syndrome, celiac disease

## ▣ Allergies to food, dyes, molds, or additives in food

## ▣ Toxicity due to heavy metals, pesticides from foods

## ▣ Chronic Pain

## Depression

Research is most robust for the following:

Omega-3 fatty acids (low in the SAD diet)

EPA (eicosapentaenoic acid)-data indicates EPA alone or in greater ratio is more supportive for MDD  
DHA ( docosahexaenoic)

Epidemiologic studies indicate:

**INCREASE** fish intake/wk lowers prevalence of Major depression, postpartum depression and bipolar disorder.

Randomized clinical trials indicate 1 gm/d minimum Omega 3 fish oil is beneficial for Major Depression.

# Integrated Approach to stabilize mood and reduce anxiety

- ▣ Exercise
  - Research supports improved mood and lowers anxiety
  - Aerobic program most effective 20 min 3-4 times a week (outdoors, if possible)
    - Walking can be included. Yoga, Tai chi are options.
- ▣ Nutritional supplements/interventions
  - Good for *both* anxiety and depression
- ▣ Omega 3 fatty acids are building blocks for all cell membranes, esp. for brain, heart and lungs
  - Found in cold water fish, flax seed oil(GLA)

# Vitamins: cofactors in enzymatic reactions

- ▣ FOLIC ACID--well studied B vitamin and deficiency is clearly linked to depression and has been linked to other mental health problems.
- ▣ One study indicated fewer hospital days for those on Folate compared to those not on Folate.
- ▣ DOSAGE: the RDA amt is 400 mcg. For depression, consider 1000 mcg/d and eat bananas, green leafy vegetables, wheat germ

# FOLATE

- ▣ B vitamin needed for serotonin dopamine and NE production and KEY for methylation
- ▣ Folic acid Deficiency leads to
  - 1) elevated HOMOCYSTEINE assoc. with dementia
    - Cerebrovascular disease
    - Parkinson's dse
  - 2) depression
    - Those suffering from depression and LOW folate have MORE SEVERE Depression, LONGER relapses and 6x more likely to respond to ADMs

# B complex vitamins

## ▣ Vitamin B1 (THIAMINE)

- ▣ Severe lack→PELLAGRA (confusion, HTN, diarrhea, Dementia)
- ▣ Mild deficiency→ DEPRESSION, Fatigue, numbness in legs, constipation
- ▣ Dosage: 50 mg/ d or eat kale, spinach, green peas, Lettuce, cabbage.

## ▣ Vitamin B2 (RIBOFLAVIN)

- ▣ Research has shown a lack of it in diets leads to
- ▣ Greater risk of depression.
- ▣ Dosage: 50mg 2xd or eat asparagus, broccoli, Spinach

## ▣ Vitamin B3 (NIACIN)

- ▣ Needed to convert Tryptophan to Serotonin thus aids
- ▣ In treating depression.

# POWERHOUSE VITAMIN

- ▣ Vitamin C (ASCORBIC ACID)
- ▣ POWERFUL antioxidant that supports the immune System and other parts of the body PLUS if LOW, Depression may occur.
- ▣ DOSAGE: 1000 mg 2xd and found in red chilis, oranges, strawberries, broccoli, mango

# Depletions in vitamins and minerals in the body impact BRAIN

- ▣ Anxiety (Research has seen possible links)
- ▣ The typical depletions seen include:
  - 1) Niacin, Vit B6, C, E in GAD
  - 2) Mag, selenium, phosphorus in chronic anxiety
  - 3) Possible link with increase of urinary glutamate in GAD
- ▣ Insomnia (research has seen possible links)
- ▣ Typical depletions include:
- ▣ Folate, Vit B12, C, E and are associated with daytime sleepiness

# Substance Abuse

- ▣ Malnutrition often present, esp w/ alcohol abuse
- ▣ Deficiencies seen in: Zinc  
Magnesium  
Essential fatty acids
- ▣ Homocysteine is elevated in Chronic alcohol use---  
-is a possible indicator that person is sober as  
Homocysteine level returns to normal

# SAM-E (S-Adenosyl Methionine)

- ▣ Naturally occurring molecule in all human cells  
Involved in methylation cycle; methyl donor for membrane phospholipids, myelin, choline, catecholamines, and other molecules for brain function.
- ▣ Affects receptor function, membrane fluidity, and neurotransmitter production

# SAM-E (S-Adenosyl Methionine)

- ▣ **Beneficial for Fibromyalgia and arthritis via 2 other pathways in the body**
- ▣ **(Trans-sulfuration which boosts glutathione—a master anti oxidant**
  - ▣ **And Transaminopropylation)**

# SAM-E (S-Adenosyl Methionine)

- ▣ Studies do support efficacy of Sam -e in meta analysis in depression of 4 out of 5 studies
- ▣ Clinical evidence for oral SAM-e does reduce depressive symptoms in small RCTs In 4 out of 5 studies

# SAM-E (S-Adenosyl Methionine)

- ▣ Starting Dose 400mg/day SAM-E for mild-moderate depression for 2 weeks.
- ▣ May be increased to 800mg/day if only 25% improved in 2 wks
- ▣ SE: studies reveal the following-GI distress
  - ▣ Insomnia ,dry mouth, sweating, restlessness
  - ▣ Dizziness, tachycardia, headaches, vertigo, sedation, fatigue

# SAM-E (S-Adenosyl Methionine)

- ▣ *Best taken*
  - 30 minutes before lunch or breakfast
- ▣ *Possible side effects*
  - On empty stomach, heartburn (so take with food!!)
- ▣ *Consider*
  - Enteric coated tablets they are the most stable, and best absorbed
- ▣ *Storage*
  - Dry place, not refrigerator – moisture reduces effectiveness
- ▣ *Maximum dosing*
  - 3600mg      SE: N/V, diarrhea, flatulence
- ▣ *Miss a dose?*
  - Can double up on that day, otherwise just continue next day with regular dose
- ▣ *Can be taken indefinitely*
- ▣ *Caution!! If Bipolar/Manic depressive, can induce mania*

# D-Phenylalanine(DPA) or dl-phenylalanine (DLPA)

- ▣ AMINO ACID precursor to elevate ENDORPHINS, Norepinephrine. TYROSINE is formed from DLPA and is an option (esp with glutamine).
- ▣ DOSAGE: 500 mg 2xd with 2<sup>nd</sup> dose no later than 2 PM.
- ▣ It can be STIMULATING and cause INSOMNIA if taken too late. Also, DPA can be less stimulating.
- ▣ Cofactors: Vit B6, niacin, Vit C needed for maximum effect.
- ▣ CAUTION: AVOID if person has Phenylketonuria(PKU), HTN, or is on MAOI (antidepressant), HA issues, Cirrhosis, or melanoma

# Tryptophan

- ▣ Tryptophan → 5-HTP → Serotonin and melatonin
  - ▣ Need Vit B6
  - ▣ Receptors in brain and gut
  - ▣ Calms brain, promotes sleep, reduce depression
  - ▣ Dosage: Tryptophan –up to 1.5 gm  
And for 5-HTP 50-400 mg.
- SE: Nausea (more often with 5-HTP)

# Integrative approach to ADHD

- 1) Wholesome diet with limited sugar, high fat, Processed foods, sodas (esp with artificial sweeteners)
- 2) Exercise – preferably outdoors
- 3) Limit exposure to electronics
- 4) Structure and predictability with clear expectations
- 5) Supplements: Omega 3 1-2 gm  
Phosphatidylserine 300 mg for 1 mo then 200 mg in AM.
- 6) Zn and low dose Iron(Fe) can be considered after Serum Fe, ferritin levels noted.

# ADHD and research with micronutrients

- Essential Fatty acids (EFAs) research for ADHD
- is ongoing as there has been noted a DEFICIENT
- Level of EFAs in this population.
  
- NO conclusive evidence to date to be able to
- recommend EFAs though some promising data noted recently.
  
- ZINC-One study that was 12 wk RCT (N=400)
- With significant improvement in 2 areas of ADD
- (hyperactivity and impulsivity) but not for
- Inattentive symptoms
  
- IRON-one study of children (non-anemic) with
- Low serum ferritin levels treated with 80 mg/d
- Improved comparable to those on stimulants

# Phosphatidylserine

- ▣ *Phospholipid* integral to the cell membrane in the cells of the brain and body
- ▣ **BENEFIT:** cognitive improvement as well as reduction in anticipatory anxiety in college students, better recovery from exercise, improved mood and in self confidence. In addition, lowering of stress hormone noted in studies regarding recovery. In age related memory loss, controlled studies have indicate improvement in memory, learning, word recall, and concentration.

# Phosphatidylserine

- ▣ Phosphatidylserine, or PS for short, is another supplement that is an omega 3 phospholipid. PS is a special kind of phospholipid that helps in the transmission of nerve signals. One manufacturer conjugates (synthesizes) PS with bonded omega 3 DHA. The combination of PS and DHA is very powerful, because both molecules, and especially when bonded, work synergistically in brain and nerves. PS-DHA does wonders for ADHD and ADD.
- ▣ Dose : 300 mg qd in the first month then 100-200 mg daily for 3-6 mos.
- ▣ SE: occ nausea

# For Anxiety...

- ▣ L-Theanine
  - 100-400mg 2-3x/day to reduce anxiety
  - Green tea derivative/ amino acid
  - Clinical Studies indicate:
    - ▣ Reduces stress
    - ▣ Heightens mental activity
    - ▣ Reduces negative impact of caffeine
    - ▣ Reduces brain waves associated with nervousness
    - ▣ Increases brain waves usually achieved via meditation, and allows for greater mental focus
  - Synergistic with melatonin and 5-HTP
- ▣ NO evidence of tolerance or withdrawal

# For Anxiety...GABA

## ▣ GABA

- ▣ Major inhibitory neurotransmitter that decreases constant firing of anxiety and panic related messages to cortex.
- ▣ Receptors exist in limbic system (the emotion area of the brain), stomach, and almost everywhere in the brain and organs

### ■ **Dosing**

- ▣ 750mg-4000mg (pharmaceutical grade)
- ▣ Capsules are better than tablets. Powder form is quicker.
- ▣ Start with 1/2 capsule of 750mg under tongue or dissolve in water

### ■ **Side effects**

- ▣ Nausea
- ▣ Fatigue (esp. if inositol present in product)

### ■ **Co-factors-help GABA do its job**

- ▣ Vitamin B6
- ▣ Magnesium

# Case study

- ▣ 10 yo WM presents with anger, oppositionality, mood instability, temper outbursts that lead to aggression towards different family members, socially challenged with peers, impulsive and easily injured during play, poor sleep pattern and appetite variable. Hosp 1x
- ▣ Previous med trials have included: Depakote , Seroquel, Concerta, Ativan, Prozac,
- ▣ He has been in individual therapy but no family therapy though parents in therapy.

# Case study

- ▣ Irritable 'since birth' according to mom. Difficult to feed and soothe.
- ▣ H/O head injury with LOC ; no EEG as yet though requested
- ▣ Meds: Abilify 12.5 mg March 2010  
LiCo3 300 mg bid Dec 2010  
Trileptal 300 mg bid Sept 2009

Labs WNL

Parents voiced frustration with limited impact of medications and were willing to consider micronutrients

# Case study

- ▣ Micronutrient started at 2 cap/d ; goal is up to 8-12/d in divided doses for maximum efficacy and at 8 caps/d, mood stabilization has been seen in case reports and specific cases in my practice
- ▣ Omega-3 1 gm
- ▣ Abilify reduced to 10 mg initially but proceeded cautiously for first 2 months due to volatility that was reported
- ▣ Parents then requested to wean off meds in the summer when he would have less stress and family could monitor him

# Case study

- ▣ Micronutrient increased to 4/4
- ▣ Abilify cont to reduce to 7.5 mg, then 5 mg 2 wks later
- ▣ LiCO<sub>3</sub> reduced 2 wks later over 6 days then stopped
- ▣ Trileptal reduced at the same time over same time period then stopped.
- ▣ Once off all meds, except Abilify, micronutrient increased to 4/4/4. It was well tolerated after first phase of nausea. Did better with food.

# Case study

- ▣ Parents and grandparents reported that he appeared more positive and even happy at times, though irritability and oppositionality could be present at certain times of the day but duration shorter.
- ▣ Wider range of affect and emotion, including crying when witnessing an emotional scene noted – new experience for him. Typically only angry. GM reported that a ‘softer side’ present
- ▣ Abilify had been stopped but now restarted at 2.5 mg, but prn of 2.5 not needed. More agitated at 5 mg of Abilify. Omega- 3 inc to 2 gm/d

# Case study

- ▣ 6 mos into micronutrient treatment, depression present and variable attention at school. Wellbutrin SR 100 mg. Improved mood noted but unable to tolerate higher dose
- ▣ Nutrition reviewed repeatedly: often given junk food for snacks after school or nothing at all. Rages often would happen then. Worked on improving snack options. Behavior improved.
- ▣ Self abuse issues resurfaced in the last month as well as reduced performance at school. Trial of SAM-e 100 mg started to support mood and possibly improve attention. Mood currently stable.

▣ Mom seen with son in past 2 months and stated:

‘My son is actually happy and smiles more easily..for the first time in his life...’

# IN CONCLUSION.....

- ▣ Supplements for children:
  - ▣ 1) Omega 3 fish oil with focus on DHA
  - ▣ 2) MVI/B complex
  - ▣ 3) For attention issues, check Serum Ferritin levels, Zinc, then consider supplementing:
    - ▣ FeSO<sub>4</sub> 80 mg/d
    - ▣ Zn 10-20- mg
  
- ▣ And Adult regimen:
  - 1) B complex 50-100 mcg each
  - 2) VIT C (polyascorbate or Ester C) 1-2 gm 2-3x/d
  - 3) Selenium 100-200 mcg
  - 4) Zn picolinate 15-40 mg
  - 5) Ca citrate 1 gm Magnesium 500 mg
  - 6) Copper 1-2 mg Iron 10-18 mg
  - 7) Omega 3 1-2 gm/d; higher EPA dose for depression

# REMEMBER!

- ▣ Adding MICRONUTRIENTS that are building Blocks for our BRAIN→OPTIMAL MENTAL HEALTH  
→REGAIN MENTAL HEALTH
- ▣ And is an option to add to current medication regimen leading to more efficacious impact OR may be an appropriate alternative.

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