

Tuesday, 3:00 – 4:30, C1

Complementary and Alternative Therapies in Developmental Disabilities

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Objective:

Identify advances in clinical assessment and management of selected healthcare issues related to persons with developmental disabilities

Notes:

Complementary and Alternative Therapies Developmental Disabilities

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2016

Objectives

- Explain the steps that should be taken when counseling a patient about a dietary supplement
- Understand the general guidelines regarding dietary supplements
- Recognize dietary supplements that are considered unsafe



News Media

The hidden risks of top herbal remedies that pharmacists don't tell us about

Study finds 75 per cent of products have no warnings

By TAMARA COOPER
UPDATED 11:47 AM ET 4/24/2011

Beware of risky herb-drug combos

Last updated January 2008



The Truth Behind the Top 10 Dietary Supplements

What you need to know about the most popular dietary and nutritional supplements on the market.



Dietary Supplements

Pros

Cons



- _____
 - _____
 - _____
 - _____
- _____
 - _____
 - _____
 - _____

Advantages Regarding Dietary Supplements

- Patient autonomy
- Patient use
- Cheaper than prescription medication
- Profit to be made?

2012 National Health Interview Survey

National Institutes of Health National Center for Complementary and Alternative Medicine Report

- 33.2% adults reported using CAM in previous year
- 83 million adults spent \$33.9 billion out-of-pocket on CAM (1.5% of total)
 - Conventional out-of-pocket = \$268.6 billion
 - Total health care spending = \$2.2 trillion



\$14.8 billion on natural products vs \$47.6 billion on Rx drugs



2012 National Health Interview Survey

National Institutes of Health National Center for Complementary and Alternative Medicine Report

- No difference in gender, age
- More likely to be
 - Caucasian, Asian
 - Some college or college degree
 - Private insurance

Children with Autism Spectrum Disorder

- 30-95% of children have been provided with CAM

Limitations to Dietary Supplement

- Fear of legal liability
- Lack of reputable manufacturers
- Absence of FDA approval
- Difficulty identifying product content
- Reviewing hundreds of products and indications
- Health care provider concerns



Unsafe Dietary Supplements

Food and Drug Administration

- Carcinogens
 - Borage*
 - Calamus
 - Coltsfoot
 - Comfrey*
 - Life root
 - Sassafras



Unsafe Dietary Supplements

Food and Drug Administration

- Hepatotoxicity
 - Butterbur*
 - Chaparral
 - Germander
 - Life root
 - Pennyroyal oil → renal/ hepatic
 - Heliotrope
 - Comfrey
 - Kava*



Unsafe Dietary Supplements

Food and Drug Administration

- Miscellaneous
 - Licorice* → pseudoaldosteronism
 - Ma Huang (ephedra) → death
 - Pokeweed (Children)
 - Willow bark
 - Jin Bu Huan → paralysis
 - Stephania and Magnolia → kidney failure



Unsafe Dietary Supplements

Food and Drug Administration

- Miscellaneous
 - Germanium → acute renal failure
 - Lobelia → respiratory depression and death
 - L-tryptophan or Phenylalanine → eosinophilia-myalgia syndrome
 - Yohimbe* → seizures and death



12 Dangerous Dietary Supplements Named by Consumer Reports

<http://www.drugdanger.com/Others/4-04-01consumerreports.htm>

- Androstenedione
- Aristolochic Acid (cancer)
- Bitter orange
- Chaparral
- Comfrey
- Germander
- Kava
- Lobelia (tachycardia)
- Organ/glandular products
- Pennyroyal (liver/kidney)
- Skullcap (liver damage)
- Yohimbe

Quality of Dietary Supplement

Pediatrics 2008;121:775-781

- Brands of dietary supplement products not equivalent
- Lack of active ingredient consistency
- Difficulty in identifying reputable manufacturers



Standardization



ConsumerLab.com

Complete List of Product Reviews (alphabetical)

ES	ESL	ESL	ESL
USP 21 (Homeopathic)	Dark Chocolate and Cocoa Flavanols	Kids	Older Children (8-18 years)
Vitamin D3K2	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 1, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 2, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 3, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 4, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 5, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 6, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 7, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 8, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 9, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 10, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 11, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 12, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 13, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 14, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 15, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 16, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 17, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 18, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 19, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 20, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 21, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 22, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 23, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 24, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 25, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 26, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 27, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 28, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 29, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 30, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 31, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 32, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 33, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 34, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 35, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 36, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 37, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 38, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 39, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 40, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 41, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 42, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 43, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 44, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 45, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 46, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 47, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 48, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 49, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)
Adult 50, Curcumin	DMG	USP 21 (Dietary)	Older Youth (18-24)

USP Verification

<http://www.usp.org/USPVerified/>

The screenshot shows the USP website with a navigation bar and a main content area. The 'USP Verification Services' section is highlighted, featuring a photo of a pharmacist and text describing the verification process for pharmaceutical products.

USP Verified

Find USP Verified Dietary Supplements

Visit the links below to view USP Verified products and the locations where you can find them.

• Products
• Where to Buy

• Products
• Where to Buy

• Products
• Where to Buy

• Products
• Where to Buy

National Science Foundation

<http://www.nsf.org/consumer/>

The screenshot shows the NSF Certified Dietary Supplements search interface. It includes a search bar, a list of search filters (Certification Type, Product Search, Manufacturer, Facility Location, Product Types), and a red arrow pointing to the search button.

Top Dietary Supplements Used in Developmental Disabilities

Specific Information

Best Researched and Safest

- According to Autism Speaks
 - Vitamins
 - Melatonin
 - Omega 3 fatty acids
 - Probiotics ?
 - Casein and Gluten free diets

Vitamins/Minerals

- Autism Speaks Autism Treatment Network
 - Found that supplements and special diets for children with autism
 - Unsafe levels of Vitamin A, folic acid and Zn
 - Low levels of Calcium and Vitamin D

Melatonin

Natural Medicine Comprehensive Database



- Orphan drug status
 - Treatment of circadian rhythm sleep disorders in blind people with no light perception
- Non-approved indications
 - Jet lag, insomnia, depression, and cancer

Melatonin

Natural Medicine Comprehensive Database

- Mechanism of action
 - Hormone made from serotonin and secreted by the pineal gland
 - Melatonin controls the periods of sleepiness and wakefulness
 - May possess antioxidant properties



The use of MELatonin in children with Neurodevelopmental Disorders and Impaired Sleep: a randomised, double-blind, placebo-controlled, parallel study (MENDS).
Health Technol Assess 2012;16(40)

- 146 children with neurodevelopmental disabilities
 - aged from 3 years to 15 years 8 months
 - did not fall asleep within 1 hour of lights out or who had <6 hours of continuous sleep
 - Autism, epilepsy, developmental delays

MENDS

Health Technol Assess 2012;16(40)

Melatonin or placebo capsules in doses of 0.5mg, 2mg, 6mg and 12mg for 12 weeks

- Time to sleep onset 45.34 minutes sooner*
- Total sleep time 22.43 minutes longer*
- Total sleep time 9.5 hours*

Melatonin Dose Escalation



Melatonin

Natural Medicine Comprehensive Database

- **Contraindications/precautions**
 - Avoid in pregnancy
 - Melatonin may aggravate depressive symptoms
 - Melatonin may increase the incidence of seizures
 - Hypertension (exacerbated)
 - Diabetes (hyperglycemia)

CAUTION CAUTION CAUTION

Drug Interactions

Natural Medicine Comprehensive Database

- **Selective serotonin reuptake inhibitors**
 - May increase melatonin serum concentrations
- **Other sedatives may exacerbate the sedative effects of melatonin**
 - Alcohol
 - Benzodiazepines
- **Caffeine**
 - Theoretically, efficacy of melatonin may be decreased

Drug Interactions

Natural Medicine Comprehensive Database

- **Immunosuppressants**
 - Melatonin may interfere
- **Antidiabetic agents**
 - May be less effective
- **Anticoagulants**
 - Increased effect
- **Contraceptives**
 - Theoretically efficacy of melatonin may be increased
- **Verapamil**
 - Increased melatonin excretion

Melatonin

Natural Medicine Comprehensive Database

- **Side effects**
 - Drowsiness
 - Daytime fatigue
 - Headache
 - Dizziness
 - Transient depression
 - Alertness decreased (Caution use of machinery)
 - Long-term side effects are unknown

Melatonin

Natural Medicine Comprehensive Database

- **Dosage 0.3–5 mg at bedtime**
- **Rozerem™ (ramelteon)**
 - Selective agonist of melatonin receptors
 - FDA indication: insomnia
- **Circadin (melatonin)**
 - As a prescription drug in Canada and Europe



<http://www.rozerem.com/en/>



<http://www.circadin.com/>

Omega-3 Fatty Acids

Natural Medicine Comprehensive Database

- **Omega 3 fatty acids**
 - Eicosapentaenoic acid (EPA)
 - Docosahexaenoic acid (DHA) important for brain development
 - Alpha linolenic acid (ALA)
 - Human body cannot produce omega-3 fatty acids
 - Nor can it convert omega-6 fatty acids



Omega-3 Fatty Acids for ADHD

- **Conflicting data on the effectiveness of omega-3 fatty acids in ADHD**
 - Necessary for proper brain development and function
 - When supplemented, results are clinically insignificant
 - No studies prove that fatty acids alone are an effective treatment for ADHD

Omega-3 Fatty Acids

- **Likely safe in children when taken orally and appropriately**
- **Dose for pediatric patients for ADHD has not been established however there are many different sources**
 - Breast milk, flaxseed oil, Docosahexanoic Acid (DHA), Alpha linolenic acid (ALA)

Omega-3 Fatty Acids

- **For Autism**
- **Small studies suggest omega-3 fatty acids**
 - reduces symptoms of repetitive behavior, hyperactivity
 - improves socialization
- **Studied dose of 1.3 grams of omega-3 fatty acids/day for 12 weeks**

Contraindications and Precautions

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- Seafood allergy
- Bipolar disorder (possible hypomania)
- Bleeding
- Cardiac disease
- Depression (possible hypomania)
- Diabetes mellitus (possible BG worsens)
- Immunodeficiency (possible suppression)
- Hypertension

CAUTION CAUTION CAUTION

Drug Interactions

Natural Medicine Comprehensive Database

- **Anticoagulants/Antiplatelets/Thrombolytics**
 - Increase bleeding
- **Antihypertensives**
 - Additive blood pressure reduction
- **Xenical, Alli, Orlistat**
 - Decreased fish oil absorption
 - » Separate by 2 hours



http://r.search.yahoo.com/_ylt=A0LEVrWH11V1ggAvcknnlQc_ylu=X3oDMTByMjB0aG5zBGVnbG8DYmYxBHBvcwMkxZlaWQDBHNIYwZyW-/RV=2-RE=1451932887/RO=10/RU=http%3a%2f%2fpharmamking.blogspot.com%2f2011%2f04%2flittle-used-drug-for-sale-gsk-says-by-c.html/RK=0/RS=1X38jvaXAmh12XBCee1wgsP.Bc-

Adverse Reactions

Natural Medicine Comprehensive Database

- Bleeding
- Ecchymosis (bruising)
- Epistaxis (nosebleeds)
- Hypervitaminosis A
- Hypervitaminosis D
- Rash
- Dyspepsia
- Eructation (burping)
- Nausea/Vomiting
- Diarrhea
- Halitosis
- Dysgeusia (taste perversion)
- Freeze capsules???
- Enteric coated capsules

Dosing

Natural Medicine Comprehensive Database

Fish oil

- 1 capsule provides daily:
 - Eicosapentaenoic acid (EPA) 300 mg
 - Docosahexaenoic acid (DHA) 200 mg

Lovaza/generics

- 1000 mg
 - Each capsule:
 - Eicosapentaenoic acid (EPA) 465 mg
 - Docosahexaenoic acid (DHA) 375 mg



Probiotics in Autism

- Only animal research
 - Improves behaviors as improves dysbiosis
- Lactobacilli and bifidobacteria most research



Probiotics

- Little or no quality control
- Low/no levels of “live” probiotics
- Recommend probiotic yogurt with billions of viable microorganisms listed on label



Consumers Health Report Top 5 Probiotics of 2016

- Based on:
 - Price
 - Potency
 - Colony Forming Units (CFU)
 - Strains
 - Strain purity

Vitamin B6

- Essential cofactor for neurotransmitter systems
 - Serotonin, GABA, dopamine, epinephrine, norepinephrine
- 1968 Bonisch reported vitamin B6 100-600 mg per day
 - Improved behavior in 12 of 16 autistic children
- Other doses studied:
 - 100-200 mg/day
 - 200mg/70 kg
 - 30mg/kg; max 1 gram/day



Vitamin B6

- **Drug Interactions:**
 - Isoniazid, cycloserine, hydralazine antagonize pyridoxine.
 - Levodopa is antagonized
- **Side effects: neuropathy**

Vitamin B6

- **Dietary Sources**
 - ****Protein rich foods---extra-lean meat, chicken, fish, soybeans, cooked dried beans and peas, wheat germ, brewer's yeast, and peanuts
 - Avocados, bananas, cabbage, cauliflower, potatoes, whole grain breads and cereals

Magnesium

- **Essential macromineral for enzyme-catalyzed metabolic reactions**
- **When combined with vitamin B6, increased B6 efficacy**
- **Doses studied:**
 - 100 mg/70 kg
 - 10 mg/kg; max 350 mg/day



Magnesium

- **Side Effects**
 - Diarrhea
 - Abdominal cramping
- **Toxicity increases with kidney impairment**

Magnesium

- **Contraindications**
 - Heart block
 - Kidney failure
- **Safety**
 - Large doses unsafe
 - Irregular heart beat, low BP, confusion, coma, and death

Drug Interactions

- **Decrease effectiveness**
 - Quinolones and tetracyclines
 - » Separate by 2 hrs before or 6 hrs after the antibiotic
 - Levothyroxine
 - » Separate by 4 hrs.

Selected Food Sources of Magnesium

http://ods.od.nih.gov/factsheets/Magnesium_pf.asp

FOOD	Milligrams (mg)	%DV*
Halibut, cooked, 3 ounces	90	20
Almonds, dry roasted, 1 ounce	80	20
Cashews, dry roasted, 1 ounce	75	20
Soybeans, mature, cooked, ½ cup	75	20
Spinach, frozen, cooked, ½ cup	75	20
Nuts, mixed, dry roasted, 1 ounce	65	15
Cereal, shredded wheat, 2 rectangular biscuits	55	15
Oatmeal, instant, fortified, prepared w/ water, 1 cup	55	15
Potato, baked w/ skin, 1 medium	50	15
Peanuts, dry roasted, 1 ounce	50	15
Peanut butter, smooth, 2 Tablespoons	50	15

Carnitine

- Helps intracellular transport of long chain fatty acids and energy generation
- Improves expressive and receptive vocabulary
- Improves Gilliam Autism Rating Scale
- Dose 800 mg/day for 8 weeks



Carnitine

- Side Effects: nausea, vomiting, diarrhea
 - Breath, urine may have a fishy odor
- Drug interactions: warfarin, levothyroxine
- Disease interactions: seizure disorder, hypothyroidism worsens

Down Syndrome

- American College of Medical Genetics states no scientific evidence that supplements can improve mental functioning

Cerebral Palsy

- WebMD
 - GABA (Insufficient evidence)
 - » Might improve mental development, learning, vocabulary, and physical function
 - Magnesium (Possibly effective)
 - » Given in utero may decrease risk of cerebral palsy in infant



Valerian (*Valeriana officinalis*)

- Indications
 - Restlessness
 - Nervous disturbance of sleep
- Pharmacology
 - Central depressant action
 - Inhibition of GABA enzyme
 - Spasmolytic effect

Valerian (*Valeriana officinalis*)

- **Contraindications/Precautions**
 - Similar: benzodiazepines, barbiturates, opiates
- **Drug Interactions**
 - Sedatives
 - Anxiolytics
 - Monoamine oxidase inhibitors
 - Alcohol
 - Antidepressants

Valerian (*Valeriana officinalis*)

- **Side effects**
 - Headache, hangover, insomnia, cardiac disturbances
 - Toxicity: Ataxia, hypothermia, hallucinations, increase muscle relaxation
 - No effect on reaction time, alertness, concentration in the morning
 - » (*Pharmacopsychiatry* 1999;32(6):235-41.)
- **Dosage: 2-3 grams QD-TID**

General Guidelines Regarding Dietary Supplements

- “First do no harm.”
- Pregnancy, lactation
- Children
- Medications
 - Warfarin
 - Cytochrome P450
- Immunocompromised states
 - Cancer, HIV, transplant patients
- Anti-obesity herbs
 - Laxatives, diuretics, ma huang, thyroid herbs

Patient Counseling

- “What remedies are you using in addition to your medications?”
- Any OTC medications, any herbs, vitamins, or other dietary supplements?”
- Nonjudgmental

Patient Counseling

- **Inform patients**
 - FDA does not regulate
 - » Standardization
 - » Efficacy
 - » Safety
 - » Drug interactions
 - What is actually known of the product
 - » Textbooks
 - » Literature searches
 - » Internet

Patient Counseling

- **Document !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**
 - Potential liability
- **Patient follow-up**
 - Report Adverse Drug Reactions
 - » FDA's MedWatch hotline at 1-800-FDA-1088
 - » Fax a report to 1-800-FDA-0178
 - » <http://www.fda.gov/medwatch/report/hcp.htm>
 - Drug Interactions

