POSITION STATEMENT

# The use of alternative therapies in treating children with attention deficit hyperactivity disorder

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Mental Health and Developmental Disabilities Committee
Paediatr Child Health 2002;7(10):710-8
**Posted:** Dec 1 2002

## Objectives

The objectives of the present statement are to:

- Provide an overview of alternative therapies commonly used in attention deficit hyperactivity disorder (ADHD).
- Review the pharmacology and toxicology of alternative medicines for ADHD.
- Discuss the available evidence about the efficacy of alternative therapies for ADHD.

## Introduction

ADHD is a common and complex disorder for which no specific neuroanatomical, physiological, biochemical or psychological origin has been identified. Despite the effectiveness and relative safety of stimulant medications, many parents are concerned about giving their child a psychoactive, 'mind-altering' medication for what is likely to be a long period of time. As with many chronic diseases of childhood, parents have turned to complementary and alternative medicine [1]. There is a plethora of information on alternative therapies for ADHD in the mainstream media and on the Internet. Evidence-based reports were identified from the MEDLINE database and references of review articles published in peer-reviewed literature (Table 1).

## Dietary Management

Dietary interventions are the most popular alternative therapies in ADHD [2] and primarily include the following types of diets.

### Elimination diets in ADHD

**The Feingold diet:** In his book, *Why Your Child is Hyperactive* [3], Feingold reported that when treated with the salicylate and additive-free diet, 50% of children with ADHD achieved a "full response", and showed a return to symptoms when the offending food artificial additives were reintroduced. The effects of this diet have been reviewed in controlled studies [4]-[12], showing that improvements were not consistent, occurring generally on parental report, but rarely substantiated by laboratory measures [13][14].

### Elimination of food allergens

Over the past 15 years, double-blind, placebo controlled food allergen challenge studies have shown some results on more differentiated outcomes [15]-[18]. This recent research led to the following conclusions [19].

- Appropriate elimination diets are more likely to improve behaviour in younger children with atopic histories, a family history of migraine, and a family history of food reactivity.
- Common dietary allergens are implicated (milk, nuts, fish, wheat and soy) as well as additives.
- Specific target behaviours should be considered.

### Restriction of sugar and aspartame

There is a tenacious 'myth' that sugar and aspartame intake can cause hyperactive behaviour. Although Prinz et al [20] found correlations between the amount of sugar consumed and levels of observed inappropriate behaviour, no causality could be demonstrated. Further challenge studies [21]-[24] showed no effect of dietary sucrose or aspartame on children's behaviour.

Another popular theory comes from Crook's *The Yeast Connexion* [25], which postulates that chronic candidiasis and can-

dida toxin production is responsible for hyperactivity. Treatment based on this theory includes the use of antifungal agents, and a diet free of any sugar source that could promote yeast growth, and any foods made with or contaminated by molds and yeast (eg, bread, cheese, processed foods, dried fruits). This has not been scientifically validated.

## Dietary supplements

**Megavitamin therapy:** A double-blind, placebo controlled, crossover study of megavitamin treatment (combination of $B_6$, niacinamide, ascorbic acid and panthotenate) of children with ADHD showed no improvement on behaviour [26]. One should also be concerned by reports of toxicity of megavitamin therapy [27] (Table 2).

**Iron:** Proven iron deficiency should be treated. However, an open trial of iron supplementation in noniron-deficient boys with ADHD showed no improvement in teacher behavioural ratings, although parent behavioural ratings improved [28]. Because this study was not followed by a controlled clinical trial, there is no support for an indication of routine iron supplementation of children with ADHD.

**Magnesium:** One study showed behavioural improvement in a cohort of children with ADHD and relative deficiency in magnesium [29]. However, this isolated report does not justify routine magnesium supplementation in children with ADHD.

**Pyridoxine (vitamin $B_6$):** One double-blind study showed a trend in favour of behavioural improvement in children with ADHD receiving pyridoxine compared with methylphenidate and placebo [30]. No other study confirmed this trend, and pyridoxine is not recommended unless a deficiency is documented.

**Zinc:** One study found lower serum zinc in healthy, normally nourished children with ADHD, compared with a group of children without ADHD [31]. Another study suggested that zinc nutrition may be important for the response of ADHD children to dextroamphetamine, and that the possible benefit of evening primrose oil (gamma-linolenic acid) derives from the improvement or compensation for borderline zinc nutrition [32]. There are no controlled studies, and supplementation beyond the recommended daily allowance is not indicated in the absence of documented deficiency.

**Essential fatty acids:** Some studies have shown that children with ADHD had a higher rate of nonspecific symptoms typical of essential fatty acids deficiency (eg, increased thirst and atopy) [33]-[35]. Evening primrose oil contains over 70% cis-linoleic acid and about 9% cis-gamma linolenic acid, and has been reputed to improve behaviour of hyperactive children [36]. Another source of essential fatty acids is fish oil, which contains docosahexaenoic acid, a long chain polyunsaturated fatty acid whose obligate precursor is alpha-linolenic acid. However, three blinded placebo controlled studies on essential fatty acid supplementation in children with ADHD showed minimal or no behavioural improvements [37]-[39].

# Role of nutritional supplementation in the treatment of ADHD

Children with ADHD may be at an increased risk for marginal deficiency of some micronutrients, because of erratic eating habits and decreased appetite secondary to treatment with stimulant medications. Although no studies support using megadoses of any micronutrient, children with ADHD may need a daily multivitamin and mineral supplement to meet the recommended daily nutritional requirements [40].

## Nootropics

Nootropics are substances reported to enhance mental competence. The most commonly used is piracetam, which acts possibly through the enhancement of dopamine and noradrenaline transmission [41]. There are no controlled studies to date of piracetam's effect on ADHD. Another nootropic frequently contained in over-the-counter ADHD remedies is deanol, considered to be an acetylcholine precursor. In one double-blind, placebo controlled study, deanol seemed to improve performance in children with learning and behavioural disorders about as much as methylphenidate [42]. However, selection criteria were very loose. Children were referred for poor school performance; the sample studied was heterogeneous, with only 49 of 74 children having a clear history of hyperactivity; and there was no measure of core symptoms of ADHD.

## Herbal remedies

These agents have been used for a long time for their sedative or anxiolytic properties as well as their possible enhancement of memory and cognition [43]. Sedative herbs are quite popular because of the frequency of sleep problems in children with ADHD [44]. The most popular sedative herbs include chamomile [45], lemon balm, valerian, passion flower and hops.

- Herbal teas, which contain chamomile, spearmint, lemon grass, and other herbs and flowers are considered to be a safe and effective way to help a child relax. However, their chronic use because of stress should be considered as a possible sign that the child has an underlying problem that needs to be addressed [43]. Some cases have been reported of diminished iron absorption, atopic dermatitis and allergies in children with hay fever [45].
- Valerian has been shown to be more effective than placebo in improving sleep in clinical randomized trials with adults [46]. However, to date there have been no controlled

trials to evaluate valerian in paediatric sleep problems or ADHD. Side effects of valerian are limited to gastrointestinal upset and headache and this product is on the United States Food and Drug Administration's "Generally Recognized As Safe" list (FDA's GRAS list). The use of valerian and lemon balm combinations has been studied in randomized controlled trials in adults with sleep disorders and insomnia with positive results and without daytime sedation or rebound phenomena [47]. Lemon balm has not been studied in children with sleep disorders or ADHD. This compound is on the FDA's GRAS list, but caution should be exercised in patients with Grave's disease because of a possible inhibition of thyroid hormones [43].

- Passion flower is used to treat insomnia in adults [48]. In combination with valerian, it has been shown in a randomized controlled trial to benefit patients with adjustment disorders and anxious mood. Hypersensitivity vasculitis and altered consciousness have been reported.
- Hops is used as a mild sedative and/or hypnotic agent, but there are no clinical studies of its use for insomnia or anxiety disorders. Allergy and disruption of menstrual cycles have been reported [48].
- Kava is reputed to have anxiolytic, sedative and muscle relaxant properties, without adverse effects on cognitive function or mental acuity. Several clinical trials suggest that kava lactones may be useful in managing anxiety and tension [49]. There are no clinical trials about the use of kava in ADHD. Kava use has been associated with side effects that include an itchy, scaly rash (kava dermopathy), muscle weakness, coordination problems and serious liver dysfunction. A safety assessment conducted by Health Canada resulted in a stop-sale order issued in August 2002 for all products containing kava [50].
- Ginkgo biloba is commonly used for peripheral vascular disease, cerebral ischemia and intermittent claudication. Mechanisms of action include vasoregulating activity, platelet activating factor antagonism, changes in neuron metabolism, and free-radical scavenging properties [51]. Because of promising effects on adult cognition, concentration and memory [52], ginkgo formulations are used for treating ADHD, but no systematic studies have been reported. Side effects include headache, dizziness, palpitations, gastrointestinal upset and allergic skin reactions [51]. Ginkgo should not be used with anticoagulants or antiplatelet agents (such as acetylsalicylic acid) and should be avoided in patients with bleeding disorders [51].
- Blue-green algae are a source of B-complex vitamins, iron, calcium, potassium, magnesium and all 22 amino acids [43]. There are no clinical trials of blue-green algae in ADHD. Algae may get contaminated by microbes, heavy metals, sewage and animal feces. Moreover, some species produce their own toxins. Main side effects include nausea, diarrhea, weakness, numbness and tingling [53].
- St John's wort is used as a herbal antidepressant, and a recent meta-analysis showed that it was as effective as standard antidepressants, with fewer side effects [54]. There are no clinical trials on the use of St John's wort in ADHD. Recent reports have suggested that there are interactions with various prescribed drugs (theophylline, warfarin, cyclosporine, indinavir, oral contraceptives), possibly by activation of the hepatic isoenzyme 3A4 of cytochrome P450 [55].

Studies comparing herb therapy with conventional treatment are difficult to conduct, mainly because herbal preparations are not standardized, and many questions arise about the purity, reliability, safety and toxicity of these products [56].

### Antioxidants

In addition to gingko, other popular antioxidants are pycnogenol and melatonin.

- Pycnogenol has recently been advocated for the treatment of ADHD under the speculation that it is a potent antioxidant and free radical scavenger with beneficial effects on the brain because neurons are rich in docosahexanoic acid [57]. There is no scientific evidence to support that assertion [58]. Pycnogenol prevents platelet aggregation and should not be used with anticoagulants [43].
- Melatonin is a powerful antioxidant with immunological and neuroprotective effects. It has been successful in treating sleep problems in children with ADHD [59][60]. Side effects include reduced daytime alertness, increased fatigue, sleepiness, headache and irritability with high doses [43].

## Vision therapy and oculovestibular treatment

There is no support for claims that dyslexia and secondary ADHD can be alleviated by specific ocular exercises or coloured lenses [61]. A study comparing vestibular stimulation with visual stimulation and with combined vestibular and visual stimulation failed to show significant differences between treatments [62]. Children's vision should be checked regularly and any concerns should be addressed by an ophthalmologist.

## Homeopathy

Homeopathy is a therapeutic system that purports to restore 'vital energies', by using extreme dilutions of plant, animal or mineral extracts highly individualized to the patient's symptoms. One recent placebo controlled study demonstrated sig-

nificant behaviour improvement in children with ADHD receiving homeopathic treatment [63]. However:

- Patients were assigned to placebo or homeopathy alternately in the order they were referred to the investigator for testing.
- The investigator was not blind to treatment.
- Many patients presented with comorbidity (phobia, post-traumatic stress disorder, manic symptoms).
- The evaluation scale was not validated.
- Children who were not improving after 10 days on one homeopathic prescription received a second and, if needed, a third homeopathic prescription.

## Auditory stimulation: Tomatis method of sound training

There is a growing interest in the role of music in emotional and cognitive processes, and its applications in medicine and education. In a recent controlled study [64], boys with ADHD improved their arithmetic solving skills when they were listening to favourite music. However, there was a significant group order interaction, indicating that arithmetic performance was improved only in the group who received music as the first experimental condition. The Tomatis Method of Sound Training is based on the hypothesis that focus and attention can be improved with a combination of auditory stimulation and listening training, using high frequency modifications of human voice and classical music that are transmitted through an 'electronic ear'. Although there are claims of improvement in ADHD, there have been no controlled studies to date. The high intensity of the intervention (at least 75 sessions), and the inclusion of social and academic skills training in the program could be responsible for most of the improvement [40].

## Biofeedback

The goal of biofeedback is to facilitate the patient's physiological and psychological self-regulation. Electrical or electromechanical equipment is used to measure and then feedback information about physiological processes to the patient who is given instructions about modulating one of the physiological parameters in a desired direction [65].

Electromyographical biofeedback has been used in ADHD, the assumption being that teaching general relaxation will help to reduce the hyperactivity symptoms. Results have been equivocal, due to small samples, lack of control groups, and confounding independent variables such as additional treatments [66].

Quantitative electroencephalography has documented electroencephalogram (EEG) differences between children with ADHD and non-ADHD children [67]. Children with ADHD generally display over frontoparietal regions elevations of slow wave theta and/or alpha activity and diminished posterior beta activity [67][68].

Neurofeedback, also called EEG biofeedback training, is designed to enhance certain types of EEG activity and decrease other types of EEG activity when it occurs concurrently. Auditory and/or visual signals proportional to the relevant EEG measure are presented to the child. Because the goal in children with ADHD consists of decreasing theta wave activity and increasing sensorimotor rhythm or beta wave activity, a tone may come on when the theta amplitude drops below a preset threshold, while a second tone may come on when the sensorimotor rhythm or beta amplitudes rise above a given value. Cognitive tasks are used along with auditory neurofeedback to promote generalization [69].

Studies of neurofeedback in the 1970s and 1980s generally used a pre- and post-treatment testing design, or an ABA reversal design (experimental condition A, followed by experimental condition B, followed by experimental condition A), with the subject as his/her own control. Sample size was small, limiting generalizability of reported sustained improvements in social and academic behaviour for substantial periods of time after treatment [70].

More recent studies of the past 10 years have confirmed earlier results of post-treatment improvement [71][72]. One study comparing neurofeedback to the use of psychostimulants with well-matched experimental and control groups demonstrated significant post-treatment improvement of Test of Variables of Attention scores in both groups [73]. Another study compared the effect of neurofeedback with a waiting list control condition, and showed a significant intelligence quotient (IQ) increase in the experimental group, and reduced inattentive behaviours, but aggressive and/or defiant behaviours did not differ in both groups. However, EEG data were not available, and improvements may have occurred through behavioural methods [74].

Further research is needed with larger samples and appropriate control groups, with a thorough evaluation of confounding factors, placebo effects, and selection and information biases. One should keep in mind the ethical issue of a 'false-feedback' design in the face of the commitment required from the children and their families, and the potential for discouragement [75]. However, neurofeedback offers an alternative for patients who present significant side effects with stimulant medication, show a poor treatment response or refuse to consider medication [40].

## Hypnotherapy

Hypnotherapy allows the child to gain a sense of control, increase self-esteem and competence, and reduce stress. Children usually readily accept the suggestion, and hypnosis bridges the child's inner world of imagination and therapeutic change. Hypnotherapy is particularly helpful when integrated into a multimodal treatment context and adapted to the child's developmental age [76]. Although there are no studies showing that hypnotherapy significantly improves the core symptoms of children with ADHD, therapeutic efficacy has been reported in associated symptoms such as sleep disturbances or tics [77].

## Role of the physician

The physician is responsible for establishing a diagnosis of ADHD and other comorbidities through a standard medical evaluation, and carefully discuss the standard treatment options. The physician should be aware that parents may use alternative therapies in ADHD children, should ask about these at follow-up visits, and should be prepared to share information with families (Table 3). The physician should provide balanced advice on a range of treatment options, identify risks or potential harmful effects, and inform patients about placebo effects and the need for controlled studies. It is important to establish and maintain a trusting relationship with families [78].

## Summary

- Individualized dietary management may be effective in a small selected group of children with allergic symptoms or migraine headaches.
- Trace element supplementation may be beneficial when specific deficiencies are present.
- Nootropics have a role in neurotransmission, but that is not specific to ADHD.
- Herbs have sedative and anxiolytic properties and may play a role in memory and cognition. Side effects and interactions with other medications should be discussed with parents.
- Antioxidants have neuroprotective effects, but they are not specific to ADHD. Parents should be warned about side effects and interactions with other medications.
- Biofeedback involves a substantial commitment from the child and the family, and may be offered in cases where medication is not suitable (poor response, significant side effects, parental and/or child refusal).
- Hypnotherapy may be helpful in controlling secondary symptoms.
- There is no scientific evidence to support vision therapy, oculovestibular treatment or sound training.

**TABLE 1**
**Description of studies**

| Intervention | Design | Number of patients (selection and/or measures) | Results | Comments |
|---|---|---|---|---|
| **Dietary management** | | | | |
| ***Feingold diet*** | | | | |
| Conners [4] | DBCO | 15 (DSM-II rating scales) | Improvement on teacher questionnaires only | Pronounced order effects |
| Harley [5] | DBCO | 36 (Conners P-TQ, observation-neuro, psychological tests) | No change on objective laboratory measures<br>Behavioural improvement | Pronounced order effects |
| Williams [6] | RDBCO | 26 (Conners P-TQ rating subscales) | Improved on medication<br>Slight improvement on diet plus medication | Criteria-dependent effects |
| Levy [7] | DBCOC | 22 (Psychiatric Dx Conners-WISC) | Equivocal improvement on parent questionnaire | Challenge with tartrazine only |
| Swanson [8] | Control challenge | 40 (Conners P-TQ)<br>Learning tests | No behavioural differences<br>Worse on one laboratory task after challenge | Very high dose of colour challenge |
| Weiss [9] | DBCOC | 22 (no diagnosis, parent observation) | No change in behaviour inventories | Repeated high dose challenge |
| Mattes [10] | DBCOC<br>RO | 11 (DSM-III) | No differences | Repeated high dose challenge |
| Pollock [11] | DBPCC | 19 (Food additive behaviour effects, Conners ratings) | No behavioural differences reported by parents | Adverse effect on Conners ratings |
| Rowe [12] | DBPC | 54 (Reactors or not by parent opinion, behaviour/Conners) | Behavioural changes | Dose response effect |
| ***Allergen-free diet*** | | | | |
| Egger [15] | DBCOPC | 31 (Conners scale Actometer/figures matching test) | Changes of behaviour and psychological tests | Treatment order effect |
| Kaplan [16] | WSCOPC | 24 (DSM-III, Conners ASQ and physical symptoms) | Behavioural improvement reported by parents | Preschoolers only; sleep improvement |
| Carter [17] | DBPCC<br>RO | 19 (DSM-III, Conners PQ, tests learning/matching) | Behavioural changes reported by parents<br>Changes in cognitive tests | Selection after an open trial |
| Boris [18] | DBPCC<br>RO | 16 (DSM-III-R Conners APQ) | Behavioural changes reported by parents | Higher change in atopic cases |
| ***Sugar*** | | | | |

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|---|---|---|---|---|
| Prinz [20] | Correlational study | 28 (WWP Scale behaviour video) | Aggressive behaviour is increased with sugar | Hyperactive children only |
| Wolraich [21] | PCC<br>RO | 16 (Conners PTQ Behaviour, learning and memory tasks) | No differences between challenge and placebo | Hyperactive children only |
| Milich [22] | PCC | 16 (DSM-III behaviour, reading, math tasks) | No differences in learning or behaviour | Concurrent behaviour intervention |
| Wolraich [23] | DBPCC<br>L-S Design<br>RO | 25 normal age 3-5, 23 sugar-sensitive age 6-10 (cognitive and behavioural tests) | No differences on behaviour or cognitive function | High doses<br>Sugar-sensitivity by parent opinion |
| ***Megavitamin*** | | | | |
| Haslam [26] | DBCOPC | 7/41 (open trial DSM-III-Conners) | No differences on behaviour | Potential hepatotoxicity |
| **Iron** | | | | |
| Sever [28] | Open trial | 14 (DSM-III-R Conners P-TQ) | Improvement of behaviour | Parental report<br>Not by teacher |
| **Magnesium** | | | | |
| Starobrat-Hermelin [29] | Cohort and control | 75 (DSM-IV Conners P-TQ) | Improvement of behaviour | Not blinded/ randomized comorbidity |
| **Pyridoxin** | | | | |
| Coleman [30] | DBPC<br>Randomized | 6 (DSM-II Conners P-TQ) | Improvement of behaviour | Trend with order effect |
| **Zinc** | | | | |
| Arnold [32] | DBCOPC<br>L-S design RO | 18 (DSM-III Conners P-TQ) | Linear relationship with amphetamine, Efamol benefit with borderline zinc | Post-hoc study (cf. Arnold [38]) |
| **Essential fatty acids** | | | | |
| Aman [37] | DBCOPC<br>Randomized | 31 (RBPCparent/ Conners TQ Learning/motor) | Improvement 2/42 variables of cognitive/motor tests and behaviour | Grant from Efamol Ltd<br>Parent rating |
| Arnold [38] | DBCOPC<br>L-S design<br>RO | 18 (DSM-III Conners P-TQ) | No difference between Efamol, amphetamine, or placebo on most measures | Trend with order effect<br>Efamol grant |
| Voigt [39] | DBPC Randomized | 63 (DSM-IV TOVA/Colour Trails CBCL, Conners) | No improvement despite increased plasma phospholipid DHA | Stimulants withheld 24 h pretesting |

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|---|---|---|---|---|
| **Nootropics** | | | | |
| Lewis [42] | DBPC<br>RO | 74 (school problems, psychometric tests, WWP behaviour scale) | As effective as methylphenidate | Loose entry criteria, not all ADHD |
| **Herbs** | | | | |
| ***Kava*** | | | | |
| Volz [50] | DBPC<br>Randomized Multi-centre | 101 (DSM-III-R Anxiety Scale) | Short-term and long-term improvement of anxiety | Adults only heterogeneous patient-group |
| ***Ginkgo biloba*** | | | | |
| Hornig [52] | Descriptive | Not specified | Improvement of vigilance | Adults only |
| **Antioxidants** | | | | |
| ***Pycnogenol*** | | | | |
| Greenblatt [57] | Case studies | More than 100 | Improved school performance | No description of patients |
| ***Melatonin*** | | | | |
| Smits [60] | RPC | 25 (Conners scale actigraphy) | Improved sleep | Abstract only |
| **Oculovestibular treatment** | | | | |
| Arnold [62] | Split-sample L-S crossover Randomized | 30 (DSM-III Conners P-TQ hyperkinetic scale) | Improvement of hyperkinetic scale | Trend only |
| **Homeopathy** | | | | |
| Lamont [63] | DBCOPC<br>Not truly | 43 (Psychology tests not stated) | Improved behaviour on hyperkinetic 5-point scale | Treatment not standardized comorbidity |
| **Auditory stimulation** | | | | |
| Abikoff [64] | Controlled<br>RO | 40 (DSM-III-R arithmetic test) | Improvement of arithmetic skills in ADHD patients | Group order interaction |
| **EEG Biofeedback** | | | | |
| Lubar [71] | Open trial | 23 (DSM-III-R EEG, TOVA, Behaviour scale WISC-R) | Improvement of TOVA, behaviour, and WISC-R | Three subsets [19][13][10]<br>No EEG correlation |
| Rossiter [73] | Controlled for age, sex, IQ<br>Not blinded | 18 (DSM-III-R TOVA behaviour Scale) | Improvement of TOVA and behaviour | No differences with psychostimulants |

| | | | | |
|---|---|---|---|---|
| | Not randomized | | | |
| Linden [74] | Randomized controlled study with waiting list | 18 (DSM-III-R, IQ subtests, Conners PQ) | Improvement of attention behaviour and IQ scores | Some patients with learning disorders |

*CBCL: Child Behaviour Checklist; Conners PTQ: Conners Parent Teacher Questionnaire; DBCO: Double-blind, cross over; DBCOC: Double-blind, cross over challenge; DBCOPC: Double-blind, cross over placebo controlled; DBPC: Double-blind placebo-controlled; DBPCC: Double-blind placebo-controlled challenge; DSM: Diagnostic and Statistical Manual of Mental Disorders; L-S: Latin-Square; PCC: Placebo-controlled challenge; RBPC: Revised Behaviour Problem Checklist; RDBCO: Randomized double-blind cross-over; RO: Randomized order; RPC: Randomized placebo-controlled; TOVA: test of Variables of Attention; WISC: Wechsler Intelligence Scale for Children; WSCOPC: Within-subject cross-over placebo-controlled; WWP Scale: Werry-Weiss-Peter Scale*

**TABLE 2**
**Side-effects and drug interactions**

| Therapy | Side-effects | Drug interactions |
|---|---|---|
| **Megavitamins** | Hepatotoxicity | |
| **Essential fatty acids** | Gastrointestinal symptoms, headaches | None known |
| **Nootropics** | Unknown | None known |
| **Herbs** | | |
| Valerian | Headaches | Increases sleeping time with pentobarbital |
| Kava | Muscle weakness, rash, weight loss, increased HDL, hematuria | Potentiates benzodiazepines<br>Necrotizing hepatitis with other herbs |
| Ginkgo biloba | Headaches, dizziness, rash, gastrointestinal symptoms, palpitations | Potentiates anticoagulants |
| Blue-green algae | Gastrointestinal symptoms, weakness, numbness, tingling | None known |
| **Antioxidants** | | |
| Pycnogenol | None known | Prevents platelet aggregation<br>Not to be used with anticoagulants |
| Melatonin | Headaches, fatigue, sleepiness, irritability | Proconvulsant effects in children with neurological disabilities<br>Possible suppression of puberty |

*Adapted from reference [43]*

| TABLE 3<br>Selected web sites |
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| Independent evaluation of various products<br>www.consumerlab.com |
| A commercial site with many articles and references<br>www.lef.org |
| National Institute of Health Office of Dietary Supplements<br>http://ods.od.nih.gov/ |
| National Center for Complementary and Alternative Medicine<br>http://nccam.nih.gov/ |
| Health Canada web site on Natural Products<br>www.hc-sc.gc.ca/dhp-mps/prodnatur/index-eng.php |

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