

Orthomolecular medicine--Optimum nutrition

Based on investigational scientific studies, single blinded and double blinded randomized controlled trials, clinical experience, and case histories, claims have been made that therapeutic nutrition can prevent, treat, or sometimes cure, acne, bee sting, burns, cancer, common cold, drug addiction, drug overdose, heart diseases, acute hepatitis, herpes, influenza, mononucleosis, mushroom poisoning, neuropathy and polyneuritis (including Multiple sclerosis), osteoporosis, polio, alcoholism, allergies, arthritis, autism, epilepsy, hypertension, hypoglycemia, migraine, clinical depression, learning disabilities, retardation, mental and metabolic disorders, skin problems, and hyperactivity, Raynaud's disease, heavy metal toxicity, radiation sickness, Pyroluria, schizophrenia, shock, snakebite, spider bite, tetanus toxin and viral pneumonia.

Orthomolecular medicine argues that it is preferable to recognize and correct any possible anomalies in metabolism at an early stage, before they cause disease. Orthomolecular medicine posits that many typical diets are insufficient for long term health; thus, orthomolecular medical diagnoses and treatment often focus on use of nutrients such as vitamins, dietary minerals, proteins, antioxidants, amino acids, ω -3 fatty acids, ω -6 fatty acids, lipotropes, prohormones, dietary fiber and short and long chain fatty acids.

Orthomolecular therapy attempts to provide what are seen as optimal amounts of these nutrients. Most often, 'optimal' has been a matter of the clinical judgment of the orthomolecular practitioner, who gives nutrients in accord with the clinical symptoms of the patient and their judgment of what is appropriate, rather than the published dietary reference intakes of these nutrients. The modern orthomolecular practitioner also uses a wide range of laboratory analyses, including those for amino acids, organic acids, vitamins and minerals, functional vitamin status, hormones, immunology, microbiology, and gastrointestinal function. However, many of these tests have not been accepted by mainstream medicine for common diagnostic use.

In the early days of orthomolecular medicine, supplementation usually meant high-dose, single-agent nutrient therapy. Most often today, the orthomolecular practitioner uses many substances: amino acids, enzymes, hormones, vitamins, minerals, or derivate substances in an effort to supply what they see as optimum levels of these substances.

Frequently supplementation with relatively large doses of vitamins is given, and the name megavitamin therapy is popularly associated with the area. Megavitamin therapy is the administration of large amounts of vitamins, often many times greater than the recommended dietary allowance (RDA). The nominal ratio of dose to RDA to qualify for the term 'megavitamin therapy' has been a matter of minor semantic debate.

Administration of short-chain fatty acids in orthomolecular practice is usually done by increasing the level of dietary fiber. The fatty acids are produced by fermentation of the fiber in the colon, and then absorbed into the body. Attempts are also made to aid this process by a combination of probiotics, prebiotics and 'glyconutrients'. Long chain fatty acids, such as the omega-3 fatty acids alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), may also be given directly, in food or in capsules.

A survey released in May 2004 by the National Center for Complementary and Alternative Medicine focused on who used complementary and alternative medicine (CAM), what was used, and why it was used in the United States by adults age 18 years and over during 2002. The survey reported uses in the previous 12 months that include orthomolecular related uses: Non-vitamin, non-mineral, natural products 18.9%, Diet-based therapies 3.5%, and mega vitamin therapy 2.8%. The survey did not include other popular related categories such as juicing, supplemental antioxidants, essential fatty acids, amino acids, enzymes and others.

Another recent CAM survey reported 12% of liver disease patients using the antioxidant Silymarin, more than 6% used megavitamins among others, and in all, 74% of patients reported using CAM in addition to the

medications prescribed by their physician, but 26% did not inform their physician of their CAM use.

Orthomolecular medicine claims an evolving nutritional pharmacology that overlaps between natural medicine and mainstream medicine. The International Society for Orthomolecular Medicine has conventionally-trained doctors among its members and authors. However, the leading orthomolecular medicine website, Orthomolecular Medicine Online, run by the Journal of Orthomolecular Medicine, discusses differences between orthomolecular medicine and mainstream medicine, which the website refers to as allopathic medicine.

Amongst the differences, mainstream medicine attaches great importance to evidence-based medicine, particularly to rigorous double-blind randomized controlled trials that test if a treatment is effective and exclude the placebo effect. Orthomolecular medicine proponents, on the other hand, believe that such studies over emphasize certainty and under emphasise patient choice. Mainstream medicine also avoids the use of new treatments whose effects are unknown, instead favoring extensively tested, clinically proven drugs. They point out that, even with extensive testing, up to 20% of drugs may subsequently have unrecognized, serious adverse reactions, were requiring the later addition of the 'black box warning', or withdrawal from market. Orthomolecular medicine holds that their approach may be useful in treating new or incurable diseases, before conventional medical treatments are available.

The skepticism about orthomolecular medicine comes in part because some of its proponents make claims more broad than those supported by scientific research, particularly claims that contradict clinical trials and instead consider observational studies, clinical and anecdotal experience, single blinded controlled tests, and case histories. Proponents of orthomolecular medicine argue that, despite the extensive testing of pharmaceuticals, some medications are withdrawn after approval, due to serious adverse events, and the FDA regulatory methodology and relationship with the pharmaceutical industry has been criticized.

The conventional view amongst mainstream medical physicians is that most orthomolecular therapies are insufficiently proven for clinical use, that the scientific foundations are weak, and that the studies that have been performed are too few and too open to disputed interpretation. Some mainstream medical practitioners dismiss orthomolecular medicine. For example, an adviser on alternative medicine to the National Institutes of Health, once stated that “Scientific research has found no benefit from orthomolecular therapy for any disease”. Proponents of orthomolecular medicine counter that vitamins are used in conventional medicine as treatments for a few diseases, such niacin for dyslipidemias.

Nutritional supplements, such as those used in orthomolecular medicine, are less regulated than pharmaceuticals in the United States. Furthermore, a recent meta-analysis in JAMA has suggested that supplementation with combinations of beta carotene, vitamin A, and vitamin E may increase mortality, and this risk may be particularly high in smokers.

An essential regulatory difference is that pharmaceuticals must be proven safe and effective to the satisfaction of the FDA before they can be marketed, whereas supplements must be proven *unsafe* before regulatory action can be taken. A number of orthomolecular US supplements are available in pharmaceutical versions that are sometimes quite similar in strength and general content, or in other countries are pharmaceuticals. The US regulations also have provisions to recognize a general level of safety for established nutrients that can forgo new drug safety tests. Proponents of nutritional supplement use have argued that the lower level of regulation results in cost savings for American consumers, pointing to higher supplement prices in Europe, where some supplements are more tightly regulated or even unavailable.

Supporters claim that some aspects of orthomolecular medicine, and in particular the optimal nutrition subset, have support in mainstream scientific research in a variety of areas:

- Greater than the RDA of selenium may reduce the overall incidence of cancers; this effect is strongest in people who had low selenium levels before treatment.
- Greater than the RDA of vitamin D may reduce the risk of cancer in post-menopausal women. It may also increase the immune response to a wide range of viruses, fungi and bacteria.
- Greater than the RDA of vitamin A, B₆, C and E plus zinc, folic acid and selenium reduce the incidence of specific cancers.
- Studies find that supplementation of long-chain omega-3 essential fatty acids reduced the incidence of cardiac mortality in secondary prevention trials.
- Early studies finding that vitamin E alone and vitamin C and E together reduce coronary disease mortality.
- Studies finding that niacin, selenium, zinc¹, vitamin C alone and vitamin E alone and vitamin C and E together reduce overall mortality rates
- Bruce Ames's studies on the effects of vitamins on genetic diseases and biochemical aging processes very beneficial.
- The advocacy of daily multivitamins in cancer prevention by Bruce Ames and by others in a JAMA review article for "chronic disease prevention in adults.

Modern orthomolecular medicine has different specific nutrient recommendations for CHF patients. Reconciling and confirming the conclusions of individual nutritional studies is a subject of ongoing research. These studies all come from mainstream medical sources that do not claim to support orthomolecular doctrine, and in at least some cases, explicitly reject claims of orthomolecular proponents that nutritional supplements are desirable. Ames supports daily US RDA multivitamin supplements as a public-policy solution to the lack of vegetables in United

States diets, but has not endorsed global use of megavitamin therapy propounded by orthomolecular medicine.

Orthomolecular proponents, such as Robert Cathcart, who predicts that 120+ grams per day intravenous vitamin C should cure SARS and has used up to 250 grams IV vitamin C per day, have been criticized for not having any conventional medical trials of such intravenous vitamin C treatments.

Megavitamin proponents point to an almost zero level of deaths caused by vitamins, even with large overdoses, compared to the significant numbers from pharmaceuticals, including a number of over-the-counter items.

Orthomolecular recommendations for the full vitamin E complex typically include an additional 25% to 200% w/w of beta-, gamma-, and delta-tocopherols. Recent scientific and medical research shows gamma-tocopherol, the most common vitamer of natural vitamin E, has unique beneficial functions and “gamma tocopherol is considered an integral component of the nutrient-based recommendations in many EU member countries.”