



Smart Life Forum

Parris M. Kidd, Ph.D.

Recent Advances in Phospholipids and Omega-3 Fatty Acids for Brain Vitality

Cubberly Community Center
4000 Middlefield Road, Room H1, Palo Alto, California

April 21 , 2005 at 7:00 PM

- ***Future Speakers:***

- **May 19, Phillip Miller, MD**

Coronary Artery Disease, Vascular Disease and Heart Attacks

- **June 16, David Cowan, BA, CNC, CBT**

*Unlocking Wisdom of the Body via Electrophysiological Reactivity Using
the QXCI (SCIO) Biofeedback*

- **July 21, To be Announced**

- **August 18, Raymond Peat, PhD**

Protecting and Restoring the Nervous System

Opening short bio-med 101 presentation by our own board member, Stan Field.

The title is: *“One Sick Dude, A Parody on Our American Culture”*

Main Speaker - Parris M. Kidd, PhD.

Parris M. Kidd received his PhD from the University of California at Berkeley in 1976. Later he served as a lecturer at Berkeley in embryology and as a research investigator at the University of California San Francisco Medical Center, conducting research in cardiology as a Fellow of the Cardiovascular Research Institute. Dr. Kidd's research was funded by the California Heart Association and by the National Heart, Lung and Blood Institute of the National Institutes of Health. In 1983 he accepted an opportunity to write a textbook on antioxidants which later became a classic in the dietary supplement field. Since then he has pioneered in documenting, developing and publicizing products from every nutrient category.

Dr. Kidd's PhD thesis was on the cell biology of fertilization, a membrane - based phenomenon. He maintained his passion for membranes and cell biology until in 1987 a chance came to work on phospholipids as dietary supplements. He has since pioneered in educating the North American public and health professionals about the phospholipids PS (phosphatidylserine) and GPC (glycerophosphocholine). Recently he expanded his perspective to include the omega-3 fatty acids, which are functionally synergistic with the phospholipids. Today he uses his understanding of cell membranes to interpret the remarkable clinical findings on phospholipids and omega-3 fatty acids for brain vitality.

Presentation

Cells are the basic units of the living organism, and membranes are the dynamic action zones of every cell. Just about everything important to maintain life occurs on or within cell membranes. And membranes are constructed mostly from phospholipids (herein abbreviated as “PL”). The PL molecules have fatty acids integral to their structure, so that the life functions of PL and FA are linked and clinically synergistic.

The phospholipids phosphatidylcholine (PC), phosphatidylserine (PS), phosphatidylethanolamine (PE), and phosphatidylinositol (PI) are the main molecular building blocks of cell membranes. Of these, PS is a proven dietary supplement, and PC works well for the liver but not the brain. The others are not yet commercially available as

defined dietary supplements. GPC is not present in membranes but in the water phase of the cell interior. However GPC is readily converted to PC, which is the most common PL of all membranes.

Besides being a facile metabolic substitute for PC, GPC is a more effective dietary source of the essential nutrient choline than either PC or the commonly used choline salts. The choline held in GPC's molecular structure is also the body's most ready source for synthesis of the key chemical acetylcholine (ACh). Another dimension to the marked clinical utility of GPC (as well as PS) is the biochemical synergism with DHA (omega-3), the main fluidizing nutrient for cell membranes.

These phospholipids make up the bulk of lecithin, which was one of the first "health foods." As dietary supplements they are very well absorbed (generally more than 90 percent), are very well tolerated, and very safe to take even in high amounts and for extended periods. The PL are orthomolecules: they occur naturally in all human cells, and in all other known cells as well. Another dimension to the PL is that they are the "parent" molecules for the complement of fatty acids in the membrane. The membrane PL molecules hold the fatty acids in position within the membrane, for enzymes to have appropriate access to them.

The PL and FA profiles of our cells vary from one cell to another, vary between tissues, and even vary at the membrane microlevel from zone to zone within each cell. Dietary supplements can be designed to supply a defined PL profile AND a defined FA profile, depending on which tissues are targeted and for which conditions of dysfunction. The net effects of dietary supplementation can be quite profound. The organ about which we know most in this regard, is the brain.

Phosphatidylserine (PS)

Dr. Kidd has discussed PS with this group before, so he will briefly summarize the established findings and get to the recent advances. In some 21 double-blind clinical trials, PS proved safe and effective for the following applications:

- Improved memory, learning, word recall in middle aged and elderly adults.
- Partial restoration of function in people over 50 who have abnormally accelerated memory loss.

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- Significant benefits to memory, other cognitive functions, behavior and activities of daily living in elderly subjects with severe mental decline. Several controlled trials established that PS has marked benefits for subjects with mild to moderate Alzheimer's dementia.
- Improvement of mood and easing of anxiety in older subjects who are not demented.
- Support for mental performance while under stress, in young healthy people. Those who score high for neurosis may benefit the most.
- Support for physical performance during exercise, by improving cortisol management and reducing the risk of athletic “overtraining.”

The most recent double-blind trials on PS were conducted in the United Kingdom by Dr. David Benton and involved young, healthy, male university students. In the first, 48 students of average age 20.8 years were randomly divided into a PS test group (300 mg/day) and a placebo group (fats/triglycerides). Each student's “baseline” mood—how they felt over the previous week—was assessed by questionnaire, and a mood score developed. Their personality was also scored for “neuroticism” and “extroversion.” Blood pressure, pulse, and heart rate were recorded using a continuous monitor. Each subject was sent home with a 30-day supply of PS or placebo capsules.

After 30 days the subjects returned to the laboratory. They were given a standard acute stress test: a challenging mental arithmetic calculation to be done within 4 seconds without a calculator(!). The results showed that those students with a more “neurotic” personality experienced significantly less stress from the test if they were taking PS. Those who received the placebo reported a highly significant level of stress from the test, and experienced a highly significant worsening of mood ($p < 0.001$). Their counterparts who got PS did not deteriorate in mood. In this trial, the “neurotics” who took PS were not significantly stressed by the test.

Although young women were not included in this trial due to statistical considerations, there's no reason to expect women would not benefit from PS similarly to men. In an earlier double-blind trial, elderly women with anxiety and low mood did show benefit from

PS.

Dr. Benton's second double-blind trial further assessed PS benefits for stress management. He investigated PS for heart function under conditions of demanding exercise. Seventeen male students were randomly divided into a PS group and a group that received placebo. Baseline heart rate, blood pressure, mood were measured and the subjects sent home with PS or placebo. After 30 days they returned to the laboratory. Each was fitted with a heart rate monitor, then vigorously pedaled an ergonomic bicycle for twenty minutes and rested for forty minutes.

During the exercise period the PS subjects' heart rates did not increase as much as on placebo. It seems PS protected the heart rate against "spiking" under vigorous challenge. After the rest period these PS subjects were significantly more confident and composed than were the placebo subjects.

These two recent double-blind trials suggest PS should be useful to that considerable population of young people confronted with the stressful challenges of living in today's world. They also add to the growing list of successful trials conducted with soy-derived PS. Some skeptics have questioned whether soy PS can work as well as bovine PS (from cow brain), and to date there are 9 trials that say it does.

Among the soy PS trials are two with children. He collaborated on two preliminary, open-label studies of PS for children, first with Dr. Richard Kunin then with Dr. Carol Ann Ryser of Kansas City. Altogether, with more than 30 children we found that PS improved attention, concentration, learning, and behavior, and benefited academic performance. PS also benefited the depression and anxiety commonly seen in these children. The children required a minimum 200mg/day of PS for up to four months to achieve a stable level of benefit. For children taking Ritalin (methylphenidate), amphetamines, or Wellbutrin (bupropion), PS gave additional benefit. PS also extended the benefits of fish oil or primrose oil for these children. No adverse effects or drug interactions were noted, consistent with PS's 20-year record of clinical use.

Just about everyone can benefit from taking PS, including young and healthy people. It's best to start with 300mg/day for the first month, taken with meals. After this loading period, 100mg/day is a good maintenance intake but people with major problems should probably stick to the higher intake. PS is the safest nutrient he knows of, and there's no problem to stay on it for years.

Glycerophosphocholine (GPC)

This is a low molecular-weight, uniquely water-phase phospholipid. Its pivotal importance to human life is underscored by its abundance in mother's milk. He started working on GPC in 1997 and continued to find clinical and basic science studies on it from all over the world. GPC has had clinical trials for many different applications. It has many different modes of action, and is linked to many profound biological phenomena.

To date he has found some 23 clinical trials on GPC for mental performance in the healthy young, for dementia in the elderly, for postsurgical recovery, and for stroke and craniocerebral injury. GPC may invigorate the capacity for growth hormone release in response to physiological stimulation. GPC is uniquely effective for all these applications. Further, in head-to-head comparisons GPC's benefits surpassed those of pharmaceuticals (oxiracetam, aniracetam, idebenone) and nutraceuticals (acetylcarnitine, and CDP-choline also called citicoline).

From the available evidence, dietary GPC supplementation benefits:

- Choline and acetylcholine availability to the brain and other organs
- Development and maintenance of attention, concentration, recall
- Speed and overall sharpness of mental processing
- Mood, including positive attitude and sociability
- Recovery of brain function following circulatory deprivation
- Recovery of brain function following craniocerebral injury
- Revitalization of declining mental function • Skeletal muscle integrity, including growth and regeneration
- Kidney and liver functions, including renewal and detoxification
- Fertility, supporting both sperm motility and the fertilization process.

As he first noticed for PS, GPC also has a biochemical synergy with DHA. He will review the nature of this relationship for both these nutrients, and its profound implications for systemic health and wellbeing. Healthy individuals can supplement with GPC at 1200mg/day for the first 1-2 weeks (taken on an empty stomach, earlier in the day), then 600mg/day thereafter. The elderly and others with clinical difficulties can safely benefit from GPC at 1200mg/day over 6 months or more.

Besides providing multiple means of support for the brain and mind, GPC also supports all the body's other organs. GPC appears to be the body's major reservoir for the biosynthesis of acetylcholine (ACh). This transmitter is the major chemical tool by which the brain and mind (central nervous system) maintain communication with the other organs via the autonomic nervous system. In particular, physical performance via the skeletal muscles is coordinated via the nerve-muscle endplates which must have ACh to function. GPC is a unique nutrient for functionally linking mind with body.

GPC is also profoundly involved in muscle function and in reproduction. Among the variety of skeletal muscle fibers, the faster contracting a fiber the more GPC it normally carries. GPC seems necessary for making PC-DHA that maintains the fluidity of the fiber's cell membrane. It has been suggested that the potentially fatal Duchenne Muscular Dystrophy involves a GPC abnormality. Spermatozoa also need highly fluid cell membranes to generate their swimming motion, and here also GPC is integral to making PC-DHA. Men with poor sperm motility have low semen GPC.

In addition to all the above, GPC is a rare osmotic protectant. It provides crucial antitoxic and osmotic protection functions for the kidney and probably also for the liver. All in all, GPC is a truly unique Mind-Body Nutrient for Active Living and Healthy Ageing.

Omega 3s, Long-Chain (EPA, DHA)

These are the hottest topic in nutrition, if not in all of medicine. The clinical and basic science findings continue to pour out of the best research centers in North America and the rest of the world. When he was a young researcher investigating cardiomyopathy and atherosclerosis and culturing heart cells, neither he nor the Chief of Cardiology could get funding for omega-3s. They had to settle for working with pharmaceuticals. Now it's clear that these membrane nutrients have salutary benefits for the heart and circulation, the brain, the gastrointestinal system, the joints, and literally every other organ in the body. They know they are front-line, systemic anti-inflammatories with innocuous adverse

effects.

In recent years he has published in-depth, peer-reviewed papers on the integrative management of a number of brain diseases. To be found on his website (www.dockidd.com) are pdf files of my reviews on Parkinson's, multiple sclerosis, ADHD, autism (in two parts, so much to cover), and bipolar disorder. Omega-3s play beneficial roles in all these conditions, probably helping to counteract inflammatory processes linked to mercury and other pollutants implicated in their causation. In this presentation he will concentrate on the clinical trials conducted with EPA and DHA for these and for allied brain disorders.

Both the anti-inflammatory actions of EPA/DHA and their other mechanisms of action are based in cell membranes. Cell membranes are the exclusive sites of action for these and other long-chain fatty acids. The fluid state of cell membranes is generated by their complement of fatty acids. The membrane has a matrix built from two continuous molecular layers of PL, along with an occasional molecule of cholesterol. Cell membrane homeostasis manages the types and quantities of each phospholipid class in the membrane, as well as the fatty acid (FA) content. The functioning membrane is an array of several hundred molecular "species" of phospholipids, varying with the "heads" (headgroup configurations) and the types of "tails" (tail groups) on each molecule.

Each PL molecule in the membrane carries at least one and usually two fatty acids as an integral feature of its structure. While the PL headgroup and midpiece have one set of functions, the collective carbon-carbon bond unsaturation of the FA tails confers a degree of fluidity on the membrane as a whole. As a rule, the more fluid a cell membrane the more dynamic its metabolic activity and the more efficient its performance overall.

Fluidity is also maintained locally. The mostly liquid-like membrane PL matrix has islands or "rafts" of large proteins (or glycoproteins) distributed throughout. Each such complex has a closely associated, localized PL complement with a specified headgroup and FA profile. The membrane proteins require both such features of the PL, in order to maintain physico-chemical stability and retain optimal catalytic activity.

The polyunsaturated fatty acids of cell membranes, held in position by the PL, are the molecular sources of eicosanoids, including a variety of prostaglandins, thromboxanes and leukotrienes. These lipid-derived messenger substances in turn influence the production of cytokines, the protein-type messengers. The net balance of cytokines, together with the eicosanoids and the antioxidant status of the tissue, predicts the

presence or absence of inflammation in a tissue or organ. The cumulative fatty acid profiles of our tissues are permuted with the cumulative antioxidant profiles to determine a form of anti- or pro-inflammatory “poise” for the body. Interestingly, both these orthomolecular categories are successfully manageable by appropriate dietary supplementation over the long term.

The late Dr. David Horrobin had a brilliant career that eventually centered on the roles of essential fatty acids in health and disease. During his last years he developed a membrane signal transduction hypothesis to rationalize mood disorders. These apparently range across a symptomatic continuum, from unipolar depression through bipolar depression into schizoaffective disorder and frank schizophrenia. Horrobin built a persuasive case for a pan-phenotypic expression of multiple overlapping genes for these disorders. I will explore this hypothesis during the presentation.

As Healthy as Our Membranes

As he continues to monitor the extensive basic and clinical literature on these cell membrane nutrients, collaborate on studies, and develop supplement products, he has been amazed by their evident profound importance to human life. The exciting developments around current hot topics such as gene control by nutrients, and prospects for stem cell therapy of degenerative diseases, all devolve to cell membranes. The PL and omega-3s are in the middle of all this futuristic research. He is convinced that the functional competence of our cell membranes is amplified into the wellbeing of the entire cell collective that is the whole body. Yet our membranes depend on membrane nutrients to maintain their metabolic fitness, as they measurably respond to such nutrients coming from the diet. This suggests we may be only as powerful, fit and metabolically efficient as the cell membrane nutrients we consume. We are only as healthy as our membranes.

Note to Members and Non-paid Attendees

All non-members who have attended once must pay \$10.00 for each meeting or \$40 for the remainder of the year, with full membership benefits.



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