July 1997 Issue | Dr. Michael Schmidt, DC, CNS, CCN

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Welcome to *Functional Medicine Update* for July 1997. Those of us who attended the Fourth International Symposium on Functional Medicine in Aspen, Colorado in May were led to an understanding that functional medicine represents an emerging pattern and program that delivers health promotion and functional improvement, which might actually become a reality in the new millennium. There was a sense of celebration among the nearly 500 attendees at the symposium about how functional medicine connects with so many disciplines that end in "-ology." Hepatology, endocrinology, and gastroenterology, for example, are parts of a web of interconnecting organ systems that make up the human being. Functional medicine cuts across the relationship between the environment and the genes to give rise to expression of function.

Stress, activity levels, environmental quality, relationships with others, diet -- all of these impact the way genes express themselves as function. I was reminded of that when I read a recent article in the *Journal of the American Medical Association* (1997;277:1521). The authors discuss the effects of mental stress on myocardial ischemia during daily life. The editorial comment that follows on page 1558 of the same issue asserts that stress-related functions, how we perceive ourselves in the world, and the way we maintain our rhythm with the world have a distinctive impact on our cardiovascular function over the course of our lives. They impact the degree to which our tissues are oxygenated. Ischemic events -- low oxygen delivery to tissues -- are associated with increased oxidative stress reactions and potential adverse cytopathologies that can develop years later. Feelings of tension, frustration, sadness, and hostility that often result from the mental stresses of life can more than double the risk of myocardial ischemia in the subsequent hour following a stressful event. We should never discount the importance of gene-expression modifiers like stress and lifestyle in how patients feel and present with symptoms that are outside the easy definition of an ICD9 or a CPT code.

The message of that editorial was reflected in a brilliant article in a recent *Harper's Magazine*(June 1997;70) by Spencer Nadler, M.D., a pathologist in Southern California. The impact of this article is so profound that I'd like to excerpt portions of it for your review. I think it establishes the world view that functional medicine is founded upon in a compelling way. The article is titled "A Woman With Breast Cancer -- The will to live, as seen under a microscope."

"As an interpreter of human-tissue biopsies, my work is largely an art. I carefully observe changes of color, delicately feel for variations in texture and, with my microscope, peer in on the cells to study their form and tableau. The impact of disease can be very subtle."

Dr. Nadler discusses the demanding nature of his work, the need to be error-free. His work haunts him;

sometimes, phantom patterns of cells that try to trick him necessitate his developing tricks of his own to outwit them.

"After many years at my microscope, the number of different cells and patterns that I recognize, the blueprints of disease, seems infinite. I rely on this experience. And although the majority of biopsies are no longer diagnostic challenges for me, interpretation can, on occasion, be tortuous."

Dr. Nadler goes on to explain that in his practice, which is close to the surgery area in the hospital histology lab, he is frequently required to perform a biopsy during surgery, while a patient is under anesthetic, so he is constantly aware of the time-urgency of his work. He has neither time nor context to consider the human patient as he performs his highly skilled work. He is unprepared, therefore, when one day he is unexpectedly interrupted.

young woman enters his office, explains she was at a recent lecture Dr. Nadler gave, and, with shy determination, asks if she can view the slides of her breast tumor, which he had diagnosed 43 days ago.

"Her cropped, blonde hair has a uniform thinness that suggests chemotherapy; her face is gaunt and pale. Still, she seems undaunted, her self-esteem intact."

Somewhat reluctantly, as it is late in the day, Dr. Nadler retrieves her breast and lymph-node slides and sets up a two-headed microscope so he and she can view the slides together. "Resting her elbows on the desktop, she looks in on the events of her body -- cells long dead, now fixed and colored -- that have given rise to her affliction."

Dr. Nadler points out separate features of a section of healthy tissue, focusing on the lobules where milk is produced in the lactating breast. She compares them to hydrangeas, is fascinated by the beauty and variety of her interior domain.

"There is little need for pedagogy; she is finding her own truths with metaphor. I switch from the four-power objective, the scanner -- a magnification of 40 -- to the 40-power objective -- a magnification of 400 -- and individual cells take prominence over cell patterns.

"She clasps her hands together. 'It's as if all the planets in the universe have come together here.'

He allows the woman several minutes to absorb the beauty the microscope reveals and then, reluctantly, replaces the slide of normal breast tissue with a cancerous tissue slide

INTERVIEW TRANSCRIPT

Clinician of the Month:
Dr. Michael Schmidt, DC, CNS, CCN

We have the privilege of interviewing as our Clinician of the Month, Dr. Michael Schmidt, a practitioner who is at the cutting edge of functional medicine. Dr. Schmidt is a Fellow of the Functional Medicine

Research Center in Gig Harbor, Washington, working in clinical nutrition and functional medicine. He is a visiting professor of applied biochemistry and clinical nutrition at Northwestern College, Bloomington, Minnesota, where he lectures in brain biochemistry and nutritional neuroscience. Dr. Schmidt has written and lectured widely on the role of biological response modifiers in modulating immune and nervous system function. His books have been widely read and well reviewed. They include *Beyond Antibiotics*, a Health Book-of-the-Month Featured Selection. His most recent work, *Smart Fats: How Dietary Fats and Oils Affect Mental, Physical, and Emotional Intelligence*, describes the role of fatty acids in brain architecture and nervous system function. It is that topic I would like to discuss with Michael today. As a presenter at the recent Fourth International Symposium on Functional Medicine, he conducted a workshop on the role of fatty acids in neurochemistry, endocrinology, and immunology.

JB: Michael, could you tell us a bit about the workshop presentation you made at the Fourth International Symposium on Functional Medicine?

MS: The presentation focused on nervous system function, one of the vastly overlooked areas in which fatty acids are operative. We certainly are aware of the role of fatty acids in regulating inflammation and the eicosanoid pathways and the role of fatty acids in peripheral membranes, basically regulation of a lot of different cellular functions, but the role of fatty acids in the nervous system is just beginning to get a lot of attention. The focus of the workshop was to show precisely how fatty acids fit into this most elaborate and fascinating architecture of the human brain, which is about 60 percent lipid, and myelin is about 75 percent lipid.

We surveyed the way in which fatty acids fit into the fatty architecture of the brain, the fascinating relationships that has to protection against neurological behavioral diseases, and the potential therapeutic roles various types of fatty acids may play in a variety of different, seemingly unrelated conditions of the nervous system. One of the focuses was on the role of very specific long-chain fatty acids and also the critical nature and need for the balance of particular fatty acids.

JB: Tell us about the difference between omega-3, omega-6 and omega-9 fatty acids in relation to the nervous system. How do they relate to brain chemistry?

MS: In the brain, there is a very specific, and it seems absolute, requirement for long-chain omega-3 fatty acids, specifically in the form of DHA, or docosahexaenoic acid, and the omega-6 fatty acid, arachidonic acid. Ironically, we tend to think of arachidonic acid as a sort of Jekyll and Hyde, which it seems to be, but arachidonic acid is crucial to neuron function. It is this balance between arachidonic acid and docosahexaenoic acid in the brain membrane that seems to be critical for its architectural integrity and also for its function.

JB: When you look at the biochemical interconversions of these fats and you start talking about chain elongation desaturation potentials within the nervous system or other tissues, why is it so critically important that one be concerned about nutrition when the body can interconvert one fatty acid to another?

MS: Of course, we can convert the dietary omega-6 linoleic acid into its long-chain counterparts, and we can convert the omega-3 alpha-linolenic acid into its long-chain counterpart of DHA, which is needed in the brain. There is, however, no conversion between omega-3 and omega-6, which means both those families must be gotten from the diet. Secondarily, it seems quite clear now that the conversion of alpha-

linolenic acid to DHA is a very inefficient process, with many steps along the way that have to function properly to get to DHA.

From studies with vegans, for example, we have learned that vegetarians who ingest a fair amount of alpha-linolenic acid, in many cases, don't show the same levels of DHA in their red cells as omnivores do, which suggests that alpha-linolenic acid is not adequate to provide enough DHA to the brain. We must get certain amounts of DHA in a preformed state, and that's especially crucial in certain critical periods of life, but increasingly we are learning that it may be important throughout the lifespan.

JB: When we look at the fact that we are in the third generation of infants who have been reared on infant formula, obviously this discussion you're having suggests, or at least implies, that maybe we haven't been giving infants optimal nutrition for nervous system development. Is there any evidence of that, given that soybean oil, which is rich in linoleic acid, has been the principal oil used in infant formula?

MS: There has been a great deal of investigation into that question of whether or not breast-fed infants, as opposed to bottle-fed infants, have any differences in brain development. Formula has contained no DHA and, in fact, often no alpha-linolenic acid, so there has been this clear evidence that many infants did not get enough of these long-chain fatty acids during development. Are there consequences to that? I think the evidence suggests there are. Some of them seem to be visual. There are some data that suggest differences in intelligence between breast-fed and bottle-fed infants when measured at age 8. Some of this work has to be repeated, but the pattern suggests quite strongly that providing adequate fatty acids during gestation and in infancy is essential to developing an efficiently functioning brain.

That takes us to the question of generational changes. We are, perhaps, the third or fourth generation that has consumed inadequate fats of this particular sort. Investigators at the National Institutes of Health have recently been doing studies with animals looking at the effects of DHA inadequacy over a period of generations. In one feeding study, in the second generation, DHA levels in the brain had fallen by 50 percent, and by the third generation, brain DHA levels had fallen by 90 percent. In other similar studies, actual brain cell numbers and brain cell DNA had fallen by the third generation. So we're talking about something with fairly revolutionary implications, not only for the clinician, but also, perhaps, for society.

I wonder if these kinds of nutritional changes we have brought upon ourselves over the generations may be responsible, in part, for the widespread, seemingly unrelated neurological conditions that are popping up. Also, a most interesting phenomenon is how fatty acids affect aggression and violent behavior. This may be within that complex web of social factors that influence aggression in society.

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