

Nutrition and Schizophrenia

ABRAM HOFFER, MD

SUMMARY

Nutrition as a treatment component for schizophrenia is a novel concept. A brief introduction outlines the need for physicians to become nutritionally minded, since the processing of food has deteriorated its quality. The elements of good nutrition are described.

There are several etiologies for the schizophrenia syndrome. It is suggested that these include Vitamin B-3 and B-6 dependency, mineral deficiency, particularly zinc, and cerebral reactions (termed allergy). The treatment based upon these ideas includes good nutrition (junk-free diet), megadoses of some vitamins, minerals, attention to certain foods which produce psychosis in a few; all in a judicious combination with standard psychiatric therapy. Such a program will improve the recovery rate over standard therapy alone.

Dr. Hoffer, a psychiatrist, practices in Saskatoon, Sask. He is editor of the journal of Orthomolecular Medicine, and author of many papers on megavitamin therapy.

CASIMIR FUNK, who coined the word 'vitamin', first suggested that pellagra was a vitamin deficiency disease, later proved by Goldberger's classic experiments between 1915 and 1920. Between 1930 and 1940 most of the vitamins were isolated, identified, synthesized and introduced into medicine. The introduction of nicotinamide to cereal products in 1941 probably prevented more schizophrenic-like psychosis (pellagra) than any other single measure before and after. Nutritional therapy is the greatest preventer of mental disease; if we were deprived of our Vitamin B-3 we would all be psychotic before we died of pellagra.

Nutrition and Medicine

The second half of our century marked a growing disinterest in nutrition; few of us today received any courses in clinical nutrition during our undergraduate career. The reasons lie in one or a number of the following factors.

The introduction of antibiotics, tranquillizers and anti-depressants, as well as developments in allergy, medicine and surgery, led to the hope that nearly all diseases would come under control. Medical schools gradually lost interest in nutrition as a clinical subject, leaving it to the departments of biochemistry to recite the vitamins, minerals and other components of diet, until today very few medical schools provide any formalized courses in nutrition.

Nutritionists have promoted the idea that very few people need be concerned about their diet so long as it is balanced. However, very little attempt has been made to prove that a balanced diet is as healthful as its proponents

hoped and little attention has been given to each individual's requirements. Nutritionists were interested in global problems while physicians, who are primarily responsible for individuals, completely avoided the subject with the general belief that all was well.

The Change in Our National Diet

When the balanced diet concept was originated, it may have served the main function well — of providing a rough guide for people interested in nutrition. But over the past 25 years there has been an amazing change in our national diet.

The quality of our food has deteriorated. It is impossible to retain the original flavor and appearance of food which is transported, washed, processed and stored, whether frozen or canned. To restore palatability to these foods, they are salted, sugared, colored and treated with additives to prevent rancidity. The processed foods acquire a taste of their own, usually sweet and salted. Advantage has been taken of the added sugar's addictive capacity, until many equate good food with sweetness. The consumption of processed carbohydrates (white flour for example) and table sugar (sucrose) has reached 50 percent of the total caloric intake and is much higher for some. The average Canadian (including infants in the calculation) consumes 110-120 pounds of sugar per year. For all these reasons, dietary advice and guides which may have been adequate in 1950 are not adequate today.

At the same time it has become apparent to a number of nutritionists and physicians that all is not well. There has been an increase in prevalence of several degenerative

diseases. Many chronic diseases stubbornly fail to yield to our most modern treatment. It has been estimated that almost every fourth person suffers from one or more degenerative diseases.

Anyone doubting the deterioration of our diet need only read the Nutrition Canada Reports.¹ The disinterest of physicians in nutrition is easily confirmed. How many physicians take dietary histories or try to relate the illness before them to the patient's nutrition or follow up with nutritional advice?

In this paper I will discuss the interrelationship of nutrition and schizophrenia, presenting evidence gleaned from the literature or my own observations. I hope physicians will check my references, try these nutritional concepts and determine the relevance to their patients' illnesses. Family physicians see few schizophrenics per year, but the general nutritional findings described will also apply to many other conditions, such as children with learning and behavioral disorders, or adults with depression and anxiety. If family physicians became expert clinical nutritionists, which they can easily do, they would refer fewer of their patients for psychiatric treatment.

The Schizophrenic Syndrome

Perception, which includes seeing, hearing, tasting, feeling, awareness of time passing and of the relationship of our bodies to the world, deals with the information received by our senses. When perception is disturbed or distorted, the individual suffers from illusions (objects distorted in color, shape, form, texture, etc.) or from hallucinations. The experiences produced by the hallucinogenic drugs such as mescaline and LSD are typically illusionary, seldom hallucinatory. Thought disorder is classified as a content disorder if the ideas are so bizarre or unusual that even the average person would consider them delusional. However, delusional thinking is difficult to assess; ideas which are novel (such as, for example, the idea that food allergy can cause schizophrenia) may be judged delusional by some and highly creative by others. Fortunately, most delusions are concrete and can be checked against facts. Examples are ideas of being spied upon, plotted against, talked about and so on. When the thinking process is altered, one will detect gaps in thinking (blocking), increase or decrease in rate of thinking and so on. This is a thought process disorder and is more serious than a thought content disorder.

Mood may change from depression to mania with a variable cycle which may be regular or random. It may be judged as appropriate or inappropriate. Behavior may be judged quantitatively as being hyperactive or hypoactive, and qualitatively as appropriate or inappropriate.

A syndrome is a constellation of symptoms usually directing attention to an organ dysfunction or a systemic disease. However, it does not prove any particular etiology. Thus the syndrome of pain in the chest, fever and cough, will point toward an infection in the chest, but will not tell us what kind it is. More investigation will be required to establish this. The schizophrenic syndrome is present when changes in perception and thinking are present. Changes in mood indicate only an affective or mood disorder. Changes in behavior are not characteristic, since they usually result from changes in perception, thinking and mood. Therefore, any biochemical change in the brain affecting perception and thinking will produce the schizophrenic syndrome. It may of course also be produced by changes in behavior or thought produced by other means; for example, hypnosis.

The syndrome must be very heterogeneous, since there are a large number of pathological conditions which cause the schizophrenic syndrome. These have gradually been defined as more and more information became available.

At the beginning of this century, the four main differential diagnoses in mental hospitals were dementia praecox, scurvy, pellagra and general paresis of the insane. The last three have more or less vanished since etiology and treatment were discovered and these conditions were taken over by non-psychiatric branches of medicine. Dementia praecox also disappeared when Bleuler changed its name to schizophrenia. It seems that only conditions which remain etiologically obscure and for which there is no specific treatment remain in the psychiatrist's domain. Since then a number of other syndromes have been identified. These are nutritional (such as PKU which was first recognized in chronic backward schizophrenics and which still produces psychotic individuals)², infectious (chronic rheumatic fever), chemically induced (hallucinogens, amphetamines, atrophine, etc.) or endocrine (adrenal tumors).

When all the known syndromes are recognized, we are left with a large number of patients for whom there is no generally accepted etiology. I have concluded that these residual syndromes may be divided into four groups:

1. Vitamin dependencies involving Vitamin B-3 (nicotinamide, also known as niacinamide, and nicotinic acid, also called niacin), Vitamin B-6 (pyridoxine), Vitamin B-12 and folic acid. The majority of cases are Vitamin B-3 dependent, a smaller proportion are Vitamin B-6 dependent and a few have other dependencies. One of my patients was dependent on both Vitamin B-3 and B-6, relapsing if either one was discontinued.
2. Mineral metabolic abnormalities.
3. Cerebral allergies. These will be described later.
4. Syndromes of unknown etiology.

Elements of Nutrition and Schizophrenia

Foodstuff has been broken down by biochemists into constituents which have clearly defined chemical properties. However, these are artifacts which do not occur naturally in a pure form. There is little danger in thinking about protein, fat, carbohydrates, vitamins and minerals, so long as we recognize that these are artifacts. We eat *food* — meat, potatoes, bread and so on, not protein, fat and carbohydrates unless of course, we obtain the pure substances isolated from food. When I discuss these constituents I refer to foods rich in these constituents, but which also contain the other food elements.

There is no specific diet for the treatment of schizophrenia. However, a schizophrenic patient has a better recovery rate on a highly nutritious diet than on a diet lacking some of the nutrients. This is equally true for any serious physical disease. I have seen a large number of patients who had been much improved by other treatment, but who did not become well until they went onto the sugar-free diet described below. However, I have made similar observations for patients with depression, hyperactive behavior and so on.

Protein. Foods are judged by the quantity and quality of the protein. Quality depends upon the quantity of the eight

essential amino acids. The optimum quantity of proteins will provide all the amino acids required for growth and repair. Too little protein is very hazardous since growth and repair will cease, while too much is merely an inconvenience. Stefansson,³ when he lived with the Canadian Eskimos and on their diet, described how lean meat alone made him and his Eskimo companions ill, but not if it was combined with adequate amounts of fat. In other words, large amounts of protein and fat were not injurious, but protein alone would be hazardous.

Since tryptophan is the main precursor of nicotinamide-adenine dinucleotide (coenzyme, NAD) a shortage will produce pellagra. Corn is deficient in both tryptophan and niacinamide, and contains too much leucine. The last amino acid increases the loss of Vitamin B-3 into the urine.

Recently, Wurtman and Fernstrom⁴ reviewed the evidence relating diet to neurotransmitters. It has been shown that rapid and specific changes in brain composition normally occur after each meal. Increasing tryptophan in the diet increased the concentration of tryptophan in the brain and also increased the concentration of serotonin, the neurotransmitter which may have a relationship to depression. Miller and Nieburg⁵ found that 2.5 g/day of tryptophan reversed psychiatric disorders induced by levodopa in eight out of nine patients, presumably by increasing the serotonin levels. Insulin, which produced hypoglycemia in rats, also elevated brain tryptophan and serotonin. A carbohydrate rich diet also increased this hormone. The effect of food upon serotonin levels is not simple. However, a diet too low in tryptophan will cause low serotonin levels, but a diet too rich in refined sugars will increase serotonin levels.

Fats. I know of no relationship between fat levels in the diet and mental illness, except that too little fat will increase sugar intake.

Carbohydrates. Only processed carbohydrates are dangerous (syrops, sugars, alcohol, refined flour, polished rice and their derivatives). Whole grain cereals, vegetables, fruits and nuts are not dangerous. Refined carbohydrates are credited by Cleave, Campbell, and Painter⁶ as causes of diabetes, peptic ulcer, diverticulitis and so on. Yudkin⁷ recommends sugar be banned because it is so toxic. An examination of 395 dentists and 320 spouses showed that those with the lowest refined carbohydrate intake suffered the least number of complaints.

Abrahamson and Pezet⁸ described a condition they called 'relative hypoglycemia'. This is diagnosed by results on a five-hour glucose tolerance test and by a characteristic diurnal pattern of complaints. Much medical literature is now available dealing with this condition, but it is still not considered a real problem by our medical schools.

My colleagues in orthomolecular psychiatry have examined over 1,000 patients. We have seen literally hundreds of patients relieved of their anxiety, tension and depression when refined carbohydrates were eliminated from their diet. They had not responded to the usual antidepressant, anti-anxiety drugs.⁹⁻¹¹ Raichle and King¹² described a student pilot who suffered attacks of unconsciousness two hours after a meal of one chocolate bar and one bottle of Coca Cola. I hope Air Canada has seen this report.

The elimination of refined foods also takes away most of the salicylate-like additives found to be so harmful for children.¹³

Vitamins. Most of us require vitamins in small quantities, but the optimum needs vary enormously.¹⁴ Too little produces deficiency diseases. Most people who avoid refined foods probably need little vitamin supplementation. There is a growing body of information, however, which indicates that increased amounts of some of the vitamins might produce much better health. Patients on hypoglycemia-producing diets are usually depleted of vitamins and should be given multi-vitamin supplements.

The classic deficiency states are rare, so there is no point waiting for scurvy to appear before Vitamin C is considered. The symptoms of any vitamin deficiency may be vague and generalized. The intuitive clinician who is nutritionally aware will soon learn to look for clues and to test his hunches by using various vitamins.

Megadoses of vitamins are components of orthomolecular psychiatry.¹⁵ The program emphasizes good nutrition (junk-free diet), increased doses of Vitamin B-3, B-6 and sometimes other water soluble vitamins and minerals, besides all standard psychiatric treatment including ECT for non-responders.

It is based on four double blind experiments beginning in 1952, plus the clinical experience of more than 20 psychiatrists on over 30,000 schizophrenic patients. It works best for acute and subacute cases. We concluded that Vitamin B-3 alone did not help most chronic patients, confirmed by Ban¹⁶ and that Vitamin B-3 did double recovery rates of acute and subacute cases when added to standard treatment. Ban¹⁶ and Ananth¹⁷ found that in chronics nicotinic acid alone was as good as tranquilizers alone, a finding not subsequently emphasized. These supported our acute studies.

Williams,^{14, 18, 19} demonstrated man's biochemical and nutritional uniqueness. We are all different. A number of people may require 100 to 1,000 times as much of a vitamin as do the majority. These people will suffer relative deficiencies on diets which are adequate for most people. This is termed a dependency.¹⁵ A prolonged deficiency may become a dependency. This happened to Canadian veterans who spent 44 months in Japanese prison camps; apparently Dieppe veterans have similar problems. The addition of three g/day of nicotinic acid allowed about a dozen Hong Kong veterans to become normal. I have also suggested that Vitamin B-3 dependency will produce a schizophrenic syndrome.

Minerals. Diets low in vitamins also tend to be low in minerals, since refined foods waste both groups of nutrients.²⁰ A junk-free diet tends to restore the trace elements.

The junk-free diet. If we had to plan our diet from its components, we would require a computer, since the variety of possibilities is infinite. Luckily this is not necessary. All we have to do is to restore our dietary pattern to a diet which is nearly free of processed foods. This is a junk-free diet. It excludes all processed (refined) carbohydrates, sharply reduces intake of processed oils and fats and ensures availability of sufficient protein. Such a diet increases the intake of vitamins and minerals. The junk-free diet will be adequate for most people, but will not be sufficient for those with certain illnesses or special nutritional requirements. The virtue of this term is that most people are aware that excessive sugar is harmful, but need to be reminded of this. Also, by attaching a derogatory term to sugar, one can, to a degree, begin to

change the delusion that table sugar and sugared foods provide a source of good energy.

Cerebral Idiosyncracies (Allergies?)

Over the years I have accumulated a number of chronic patients who responded only partially or not at all to orthomolecular therapy. Most of them had already failed to respond to tranquilizer therapy, either under my care or that of other psychiatrists before they were referred to me. It became clear that a large number of these patients were non-responsive to orthomolecular therapy, while a smaller number required very large doses — 12-30 g/day — to achieve control either with or without tranquilizers.

Since March 2, 1974, I have treated 60 patients with the four-day fast. They were all either orthomolecular treatment failures or were only partial responders. Most of them were treated at home. Of this group, 40 were well at the termination of the fast — 30 of them having dairy products as their primary food allergy. However, not all have remained well. Most of them remain well with no chemotherapy required. A smaller number required much smaller doses of megavitamin therapy. A number are in various stages of the food allergy desensitization process and a very small number were so addicted to milk or dairy products that they refused to continue on a dairy-free program. They are still chronic schizophrenics on heavy tranquilizer therapy. Like heroine addicts, they preferred the pleasures of milk with their psychoses rather than go through the withdrawal phase and the rigors of special diet with freedom from psychoses.

A Possible Explanation

It is now clear to me why orthomolecular therapy, which ignored cerebral allergy, had failed to recover these patients. They were examples of a chronic schizophrenic syndrome due to cerebral allergy and no treatment which ignored this could be more than palliative. Perhaps the tranquilizers were helpful because of their antihistaminic properties.

It appears that a substantial proportion of chronic schizophrenics are cerebral allergies. Patients with these food idiosyncracies become chronic because they are not as responsive as the non-allergic schizophrenics and gradually begin to accumulate chronicity. Unfortunately, most institutional diets tend to promote these allergic reactions by their high starch and sugar content.

I have suggested that some schizophrenics are Vitamin B-3 dependent. Since then it has become evident a smaller proportion (those with too much kryptopyrrole in their urine) are Vitamin B-6 dependent. In my opinion, the Vitamin B dependent patients, plus the cerebral allergies comprise the majority of schizophrenic cases.

It is now clear why investigators using only chronic cases obtained negative results. Their patients were unresponsive to megavitamin B therapy and judging from my series of chronic cases, were mostly cases of cerebral allergy. Had they followed the first rule of science, i.e., repeat an investigator's work by duplicating his technique and variables, they could have obtained similar positive results, as has every physician using orthomolecular therapy.

The Adrenochrome Hypothesis

The relationship between schizophrenia and allergies has always been fascinating. It has been generally accepted that patients who are mentally normal, but suffer from serious

allergies often lose all signs and symptoms of their allergy when they become schizophrenic. When the psychosis comes under control the allergy often reappears.

Adrenaline is well known for its antiallergy properties and is used to save the lives of subjects in anaphylactic shock. In patients able to convert more than average quantities of adrenaline into adrenochrome (or dopa to dopachrome, noradrenaline to noradrenochrome) there is an additional protection against histamine and the allergic reaction. Adrenochrome is an antihistamine.

Assume that when allergies develop in any system, skin, sinuses, bronchi, etc., the body develops biochemical defence mechanisms. The sympathomimetic amines would neutralize the histamine released by the allergic response. Subjects able to make adrenochrome would therefore have a back-up antihistamine in addition to the adrenaline. Adrenochrome is not a strong antihistamine, but a constantly available weak antihistamine can be as effective as strong antihistamines given intermittantly. Possibly this adrenaline adrenochrome system effectively controls the peripheral allergies, but since adrenochrome is an hallucinogen, the price a patient pays for his peripheral relief from asthma, eczema etc., is the schizophrenic syndrome arising from the adrenochrome. This mechanism provides an explanation for the alternation between, for example, asthma and schizophrenia.

This hypothesis does not suggest that allergies will necessarily produce schizophrenia, but it does suggest that subjects with a genetic potential for schizophrenia may have this activated by allergies. It also suggests that a treatment program neglecting either the adrenochrome hypothesis or the allergy hypothesis will be inferior and will fail to help many patients. The adrenochrome hypothesis is related to the Vitamin B-3 dependency hypothesis.

Conclusion

On the basis of my own experience in treating over 2,500 schizophrenic patients using the first double blind therapeutic trials ever completed in psychiatry, and on the usual clinical observations extending over 20 years, I have concluded:

1. That the orthomolecular treatment approach which I have briefly described is the treatment of choice for the majority of schizophrenics.

2. That the two main reasons for the schizophrenic syndrome of doubtful origin are vitamin dependencies and cerebral allergies.

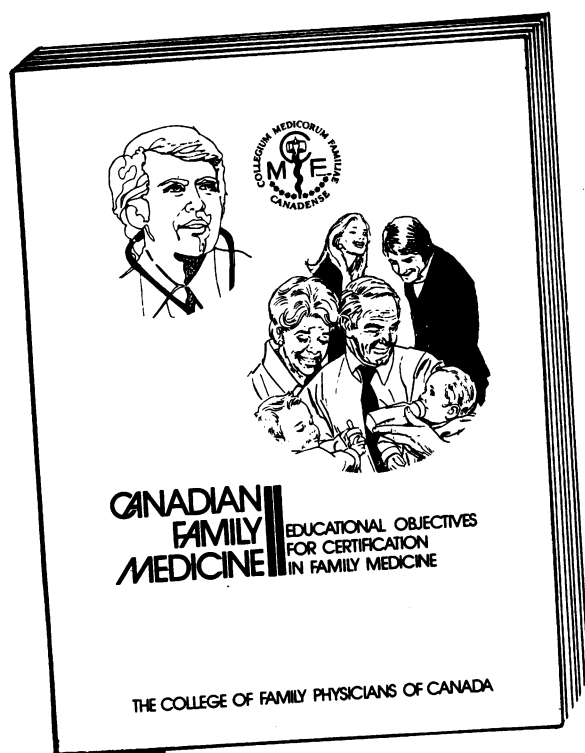
Until these conclusions are taken seriously by psychiatrists interested in research and treatment using orthomolecular methods, there will be a slow expansion of the treatment and many patients will be doomed to a lifetime of tranquilized chronicity either in hospital, in special care institutions or at home.

References

1. SABRY, Z. I.: *Nutrition Canada. National Survey, Information Canada, Ottawa, 1973.*
2. KEEGAN, D. L., PETTIGREW, A., and PARKER, Z.: *Psychosis in Downs Syndrome Treated with Amitriptyline. Canad. Med. Ass. J. 110:1128-1131, 1974.*
3. STEFANSSON, U.: *My Life With the Eskimos. New York, The MacMillan Company, 1913.*
4. WURTMAN, R. J., and FERNSTROM, J. D.: *Effects of Diet on the Brain Neurotransmitters. Nutr. Rev. 32:193-199, 1974.*
5. MILLER, E. M., and NIEBURG, H. A.: *L-Tryptophan in the Treatment of Levodopa Induced Psychiatric Disorders. Dis. nerv. Syst. 35:20-23, 1974.*

6. CLEAVE, T. L., CAMPBELL, G. O., and PAINTER, N. S.: *Diabetes, Coronary Thromboses and the Saccharine Disease*. Bristol, John Wright & Sons, Ltd., 1966.
7. YUDKIN, J.: *Sweet and Dangerous*. New York, Peter H. Wyden, 1972.
8. ABRAHAMSON, E. M. and PEZET, A. W.: *Body, Mind and Sugar*. New York, Holt, Rinehart and Winston, 1951.
9. MEIERS, R. L.: *Relative Hypoglycemia in Schizophrenia (in orthomolecular psychiatry)* Ed. D. Hawkins and L. Pauling. San Francisco, W. H. Freeman & Company, 1973.
10. WARD, J.: *Glucose Tolerance in Schizophrenia*. *Orthomolecular Psychiatry*. 1:137-140, 1972.
11. BEEBE, W. E., and WENDEL, O. W.: *Preliminary Observations of Altered Carbohydrate Metabolism in Psychiatric Patients*. *Orthomolecular Psychiatry*, Ed. D. Hawkins and L. Pauling. San Francisco, W. H. Freeman & Company, 1973.
12. RAICHEL, M. E. and KING, W. H.: *Functional Hypoglycemia: A potential cause of unconsciousness in flight*. *Clin. Aviation and Aerospace Medicine*. 43: 76-78, 1972.
13. FEINGOLD, B.: *Introduction to Clinical Allergy*. Springfield, C. C. Thomas, 1973.
14. WILLIAMS, R. J.: *Biochemical Individuality*. New York, John Wiley & Sons, 1956.
15. HOFFER, A.: *Megavitamin B-3 Therapy for Schizophrenia*. *Canad. Psychiat. Ass. J.* 16:405-499, 1971.
16. BAN, T. A.: *Nicotinic Acid in the Treatment of Schizophrenia*. *Canadian Mental Health Coll. Study*, Toronto, C.M.H.A. 1971.
17. ANATH, J. V., BAN, T. A., LEHMANN, H. E. et al: *Nicotine Acid in the Prevention and Treatment of Methionine-induced Exacerbations of Psychopathology in Schizophrenics*. *Canad. Psychiat. Ass. J.* 15:15-20, Feb., 1970.
18. WILLIAMS, R. J.: *You are Extraordinary*. New York, Random House, 1967.
19. WILLIAMS, R. J.: *Nutrition Against Disease*. New York, Pitman Publishing Corporation, 1971.
20. SCHROEDER, H. A.: *Trace Elements and Man*. Old Greenwich, The Devin-Adair Company, 1973.

INTRODUCING . . .



CANADIAN FAMILY MEDICINE

- This book, representing four years of research, has been specially prepared for students, teachers and practicing family physicians. It brings together the basic elements of family practice – what it is, how it is applied and how it might be learned. The accompanying references reflect the general literature and general concepts but, wherever possible, specific Canadian information has been used.
- The content of this manual represents the body of knowledge that comprises the latest academic discipline – family medicine.

College of Family Physicians of Canada

4000 Leslie St., Willowdale, Ont., M2K 2R9

Please send me _____ copy/ies of CANADIAN FAMILY MEDICINE at \$5.00 per copy.

NAME: _____

ADDRESS: _____