

**A Technical Syllabus Provided for Use by Health Care
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Fisher Institute Professional Education Syllabus

3RD NATIONAL CONFERENCE New Initiatives in the Prevention and Intervention of FAS/FAE for Aboriginal Peoples of Canada

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FASAT

Fetal Alcohol Syndrome/Effects Assistance and Training, Ontario, Canada

Title:

**LEARNING AND BEHAVIOR PROBLEMS IN CHILDREN WITH
MATERNAL ALCOHOL DAMAGE (FAS) LED TO BENEFITS
REPORTED IN INFANTS AND YOUTH RESPONSIVE TO MICRONUTRIENTS**

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Introduction:

It should not be assumed that the information, data, and representations made herein are provided to foster immediate action for use in children or youth who suffer from maternal alcohol damage. The anecdotal observations shared are factual, but do not represent evidence-based science. The February 23, 2000 issue of the Journal of the American Medical Association contains an interview with Steven Strauss, M.D., Ph.D., Director of the Center for Complementary and Alternative Medicine (CAM) at the National Institutes of Health. In this article, CAM is described as "Frontier Medicine". Dr. Strauss states that no volume of anecdotal medical case reports is acceptable as a basis for a national policy or professional recommendations. However, anecdotal cases serve to guide one in choosing how limited resources should be directed. First, one conducts small open-label pilot studies. If results warrant further research, larger studies having increased rigor in their design should be conducted. As results continue to warrant further research, these informal studies are to be used as a guide to conduct progressively more formal studies. Finally, a random assigned double-blind placebo study should be conducted that establishes those modalities and agents that evidence indicates should be recognized as acceptable for use. Recommendations for the population of a nation should be established by such a progressive plan of action.

The anecdotal cases of fetal alcohol damage presented in this syllabus that have responded to micronutrition are believed by the author to constitute a basis to proceed to small pilot studies conducted in a prospective manner in proper clinical settings by qualified specialists with experience in evaluating the problems and progress of FAS children.

Background

In 1995 a national newspaper published a short story on the fact that the American Health Foundation had conducted a nutrition study in 3,112 children. It was found that despite the fact that a child needs five or more servings of fruits and vegetables each day, the average American child gets two, and half of those are fried potatoes. The article went on to say that due to this deficiency, the children of America pay a lifelong price in compromised health.

A dietary supplement marketing company located in the state of Texas, Mannatech Inc., took this pronouncement to heart. It developed a colorful bear-shaped, gelatin, bite-sized product that contains 12 fruits and vegetables mixed as dehydrated powders with sugars known to be required for cellular synthesis. This was designed with the general idea to improve nutrition, and to make it simple for children to have the necessary nutrients needed for good health, development, and performance, from foods which they would not otherwise readily choose to eat. Within weeks of this product being introduced to the marketplace, reports began to be received from all over North America from families with children on psychotropic drugs and in special education classes for Attention Deficit Disorder/Hyperactive Syndrome (ADD/ADHD). They reported that within two to four weeks of adding the fruit and vegetable bears to their children's diet, they were out of special education classes, no longer needed prescription drugs, and were greatly improved in regard to their academic performance and deportment at home and in school. This was not an anticipated response to nutrition. It was known that the ingredients contained potentially several hundred, if not thousands, of phytochemicals synthesized in plant matured fruits and vegetables. It was a surprise to hear of the academic and behavior improvements. Such stories continued until a case series of 19 ADD children was published (K Dykman 1997). This led to a small prospective pilot study in 17 ADD/ADHD children that was conducted using professional evaluation criteria applied at periodic intervals while subjects consumed micronutrients. Scorings supported the growing number of parent reports of significant benefits for behavior in young individuals given this diagnosis (K Dykman 1998).

Parent desperation and initiatives have led to the formation of many groups of families forming Results Projects across the United States and Canada. These groups invite a former severe, but now adult ADD/ADHD organizer and motivational speaker (Steven Plog, founder of the Results Project) to energize and help form clusters of parents with children that have been on drugs and doing poorly in the home, school and society.* The favorable response of many youth has resulted in continued expansion of this grass-roots movement that is helping to improve the future horizons of children with learning and behavior problems. Now private Results Academies are being formed. See the information below for more Results Project materials,** or to book a meeting in your local area.*

*Source of contact for the Results Project:

E-mail - addsteve@resultsproject.net

www.resultsproject.net

**Source for Results Project Manual *Excalibur*, a manual to organize a Results Project in your community and progress towards drug-free academically improving children:

DUPLIPACK (888) 443-1979 E-mail- steveburns1@aol.com.

The favorable responses published above were noted and spread using the communicative power of the worldwide web and internet. Dissemination of this information led to parents using the micronutrients in children compromised by many disorders that include Down's syndrome, autism, cerebral palsy, fragile-X, Tourette's syndrome, leukodystrophy, and other less common disorders impacting school performance and behavior. A host of anecdotal reports indicate a significant number of children have had major benefits following the addition of micronutrients to their diet.

A small prospective pilot study was conducted in 25 autistic children that had micronutrients added to their diets, and the parents completed an evaluation (S Nisinzweig 1999). Significant improvements were reported in this very heterogeneous group of children with a spectrum of additional health problems. The wide range of other health compromises were reported as improved that included asthma, chronic and recurrent infections, rashes, and allergies.

A spin-off of the autistic children's reported benefits in this study was the organization of an open label clinical pilot study in 32 children with asthma that was conducted in the Department of Pediatrics at the Loma Linda School of Medicine. Clinical respiratory benefits and reduction in need for medications were reported by patients and their parents (S Riesen 2002). This response supported the organization of a blinded, placebo-controlled study in 100 children conducted at Garden Valley State University, Michigan (C Pippenger 2003). This study has been completed. Results are being evaluated and will be published at some date estimated to be in 2004.

In 1999, a foster parent in Canada who had made a home for multiple FAS children confronted this author on the street in Edmonton, Alberta. This lady, a mother by choice, that gives her heart and energy to innocent children damaged by careless or thoughtless birth mothers, was so intense in her mission that I could not ignore her despite my plans to get to a time-sensitive commitment. She had nursed the heartache of limited methods and nonexistent means to restore the lives of multiple FAS children for whom she had provided care. She had provided three FAS children, two sisters and their younger brother, dietary micronutrients developed by the research team of which I have been a member. She exclaimed, "It was like turning on a hidden switch inside the child. They opened up to their own thoughts and capacities, and became more aware, alert, attentive, and interactive to all around them. Their behavior and ability to learn and function was improved." I looked at her in proper professional skepticism while this foster mother let me know she had taken care of over a dozen FAS children. She knew what she was talking about. With insistence and growing frustration, she exhorted me to do something to help FAS children all over Canada and the world. Three of the Native American FAS children presented in this syllabus represent this foster mother's care, concern, intervention, and expert assessments of their responses and progress made.

About a year later, I met Sheila Musqua Keewatin of the Kawacatoose Tribe in Saskatchewan. She presented a report of responses to micronutrients by tribal members with diabetes that were not responding to standard medical management. One patient, B.A., was sent home to die with diabetic kidney disease, having refused a kidney transplant or dialysis. On taking the micronutrients, her kidney failure was reversed, vision returned and neuropathy reversed. In ending her story on diabetic benefits, she mentioned that their chief has two FAS children who greatly improved in their abilities and behaviors by taking the dietary supplements. These two FAS children experienced benefits much like those of the foster mother with the 3 Aboriginal children in Alberta. To these observant individuals, all who are concerned about the suffering caused by FAS and FAE owe a great debt of gratitude.

A follow-up visit to the Kawacatoose Reservation in 2002 found the severely disabled diabetic case with advanced kidney damage teaching school and in a fine state of health. She was serving as a foster parent to three additional tribal children with FAS that had responded remarkably to the addition of micronutrients to their diets. The chief's two FAS children had also continued to improve over the expanse of time. This made a total of 5 FAS children on the Kawacatoose Reservation improving their functional capacities through use of micronutrients added to their diet.

Expression of appreciation is made to Mrs. Keewatin for her insight and willingness to observe and validate the initial reports that came from Alberta of micronutrient usage in FAS children. Her contacts make it possible to say that a total of eight First Nation children damaged by FAS have had significant benefits in their behavior, socialization skills, and academic performance.

This Syllabus is dedicated to foster and adoptive mothers who care for FAS children. The mother who ambushed me on the street, broke from tradition, defied policy and procedures, and risked her association with her three children, is especially honored. She took a chance by trying and testing a nutritional innovation she believed could help her FAS foster children. She took a risk that I have come to believe was rooted in limitless love for all FAS afflicted children, because she sought me out to help her share her good news with all infants and youth with maternal fetal alcohol damage. To foster parent, Ghislaine Pedican, known to friends affectionately as "Gigi" of Alberta, Canada, these words and the conference presentation are dedicated.

These thoughts are placed in writing to honor Ghislaine Pedican's efforts in hopes that the voice of love calling out for children in great need will never be silenced. We implore that actions for the benefit of children in pain and disability will never be crippled by systems of control and convictions held by governments and professions. The prayer is offered that the light of hope and happiness held high by motherhood can not and will never be hidden or extinguished. We pray that Gigi's dream and vision of a better life for all FAS children will be realized rapidly in the days that lay before us, as we carry her torch of hope forward to protect and save the once wasted lives of children who will have a future made brighter and more whole when they receive micronutrient containing dietary supplements.

***A special footnote: "Gigi" proudly informed the MannaRelief office in September of 2003 that one of her children had an evaluation of 112 for her Performance IQ recently scored by specialists that serve the Canadian Health Service. Her abstract IQ was still rated as less than 80. However, she is reading above her current grade level, and recently digested the latest Harry Potter book of over 800 pages in one week.

A Video "The Importance of Glyconutrition" by H.R. McDaniel is available at DUPLIPACK: www.glycotools.com, or 888-443-1979. For group showings, arrangements for a conference call question session with Dr. McDaniel can be made by contacting his Administrative Assistant at jimillick@mannaherelief.org. Please give a minimum of one month advance notice!

Other Syllabi topics on micronutrients and educational materials are available from: The Fisher Institute for Medical Research. E-mail helen@fisherinstitute.org (972) 660-1733.

Video tapes and program folders describing the mission of MannaRelief Ministries are available at www.mannaherelief.org. E-mail info@mannaherelief.org (817) 557-8700

**Learning and Behavior Problems in Children with
Maternal Alcohol Damage (FAS) Led to Benefits
Reported in Infants and Youth Responsive to Micronutrients**

H.R. McDaniel, M.D.

Forward

At each step in the development of this narrative that spans from August 1985 to the present, it should be known that time and again it was the patient or parent that informed the author that the addition of micronutrients to the diet had been associated with remarkable health benefits. Usually this was after standard medical therapy was failing or had failed. Despite such reports, each early verbal claim was received with thinly controlled skepticism and a closed-mind. The claimed benefits exceeded anything that my educated mind could conceive, or that my experience as a doctor had ever before experienced. Over 20 years of observation as a physician confirmed the limited degree that numerous conditions can be expected to respond to human efforts. In my training I was taught that in developed nations we have the best diets in the world, especially in the United States. Foods, and especially carbohydrates, provide energy to operate the human body, and essential vitamins and minerals come with each serving of food. "Healthy people taking vitamins and minerals constitute a total waste." "We have the most expensive urine in the world flowing down our city sewers!" "A major problem is consuming too much food, and the accompanying obesity epidemic serves as proof of such a fact." Certainly, according to my allopathic, i.e. M.D., orientation, foods or micronutrients cannot accomplish benefits in chronic and serious diseases that have failed to respond to the best, newest, and most expensive pharmaceuticals drugs and the modalities and miracles provided by high-tech modern medicine. This constituted my frame of reference regarding dietary issues, and their lack of significant relevance as an intervention in human health.

However, the independent reports grew in spectrum, numbers, and extended to different states, provinces and then 6 nations. The numbers of reported benefits for poorly managed conditions mounted, and the spectrum of responses which exceeded anything one could scientifically expect or accept as valid continued to grow. I struggled with, "If it looks too good to be true, it is not true"; and "there are no panaceas." Slowly, a narrow light of inner suspicion arose within me. More attention was given to the claimed health benefits associated with improvement in nutrition as provided by a new generation of concentrated micronutrients. Such formulations were found to contain nutrient molecules that provide substances beyond traditional vitamins and minerals, or the USDA Food Triangle. Could the historical trail of vitamin stories be expanding and unfolding right before my eyes to reveal new types of micronutrients? This thought began to enter my mind.

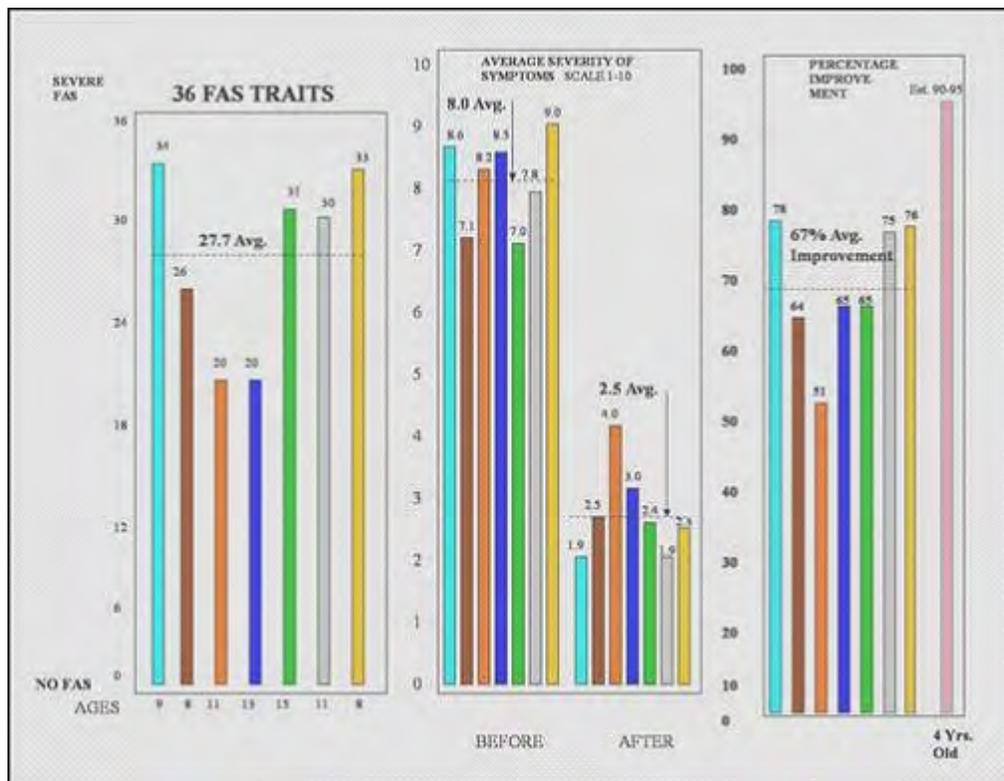
A critical series of events opened new possibilities in the management of health through the supply of micronutrients. A team of analytical chemists at Carrington Laboratories found that the active moiety in aloe vera, used for over 5,000 years to promote health, was a complex carbohydrate composed of chains of mannose sugars. Could this be a glyconutrient? A mind-expanding review published in the Annual Reviews of Biochemistry in 1985 demonstrated that at a critical step in the cellular synthesis where assembly of structure/function compounds are initiated in the endoplasmic reticulum, nine molecules of mannose sugar are required to start this vital process. "Sugars are burned for energy" had been the scientific dogma accepted for generations. Now it was recognized that a sugar, mannose, that is not even sweet, is a vital component in the molecular structure of bio-active compounds that participate in the biochemical processes conducting life. This knowledge led to finding that the addition of other sugars, monosaccharides, needed for cellular synthesis, when added to mannose, increased the health benefits seen. This formulation was named and patented as Ambrotose™.

Having confirmed that aloe promoted better health, and a molecular basis for why, other micronutrients beyond sugars, phytochemicals from plant matured fruits and vegetables, as well as phytosterols, low or absent in the modern food chain, were added to the supplement formulations. The health restorations increased, expanded and continued to be difficult to believe.

Passage of the Dietary Supplement Health and Education Act of 1994 exploded the use and availability of new dietary supplements in the North American population. Claimed health benefits from the masses literally mushroomed. Among the totally new benefits were two clusters of children in Canada and two separate infants in the States whose parents reported major benefits in children with maternal fetal alcohol brain damage, i.e. fetal alcohol syndrome (FAS). Had it not been for prior benefits seen in a number of conditions previously listed in the background that span behavior and academic performance, this small number of responses might have been ignored. We had implications gathered over almost two decades that similar problems in children responded to micronutrition, and the strong suspicion that the younger this supplementation was instituted, the better the clinical response. Due to the bleak prognosis for FAS children's capacities in their future life, intense and energetic investigation of these reports was instituted with a small number of anecdotal cases. An evaluation form for FAS children developed by Streussguth and Brookstein was modified to make it semi-quantitative so it could be used for periodic assessments. The form has 36 questions characteristic of a FAS child that are answered "yes" or "no" as to whether the statement is a problem with their child. The degree of the problem was rated on a scale of 0 to 10 in severity. On subsequent assessments, the scale was used to rate any changes observed. Slide 1 summarizes the adoptive and foster parent assessments who had their children taking these micronutrients for a minimum of 12 months to a maximum of 36 months. Note that the average for seven children was a 67% improvement on the severity scale.

Fetal alcohol syndrome (FAS) is caused by alcohol consumed at a critical time during pregnancy. A mother does not have to be a chronic alcoholic. A few stiff drinks when the developing brain is vulnerable cause major intellectual and behavior disabilities that are listed in the assessment form in Appendix A. It is more accurately used starting at 4 to 6 years of age. There is damage to the developing skull. The face is measured to determine the degree of alcohol damage. The bridge of the nose is flattened, eyes set wide apart, the nose is upturned, the upper lip reduced, and ears are low on the skull (See Middle photo Slide 14). The IQ is less than 80 in FAS. If the IQ is 80 to 100 with the history of maternal alcohol intake, fetal alcohol effects (FAE) is diagnosed.

Slide 1 Aboriginal children old enough to be evaluated by the FAS Behavior Form

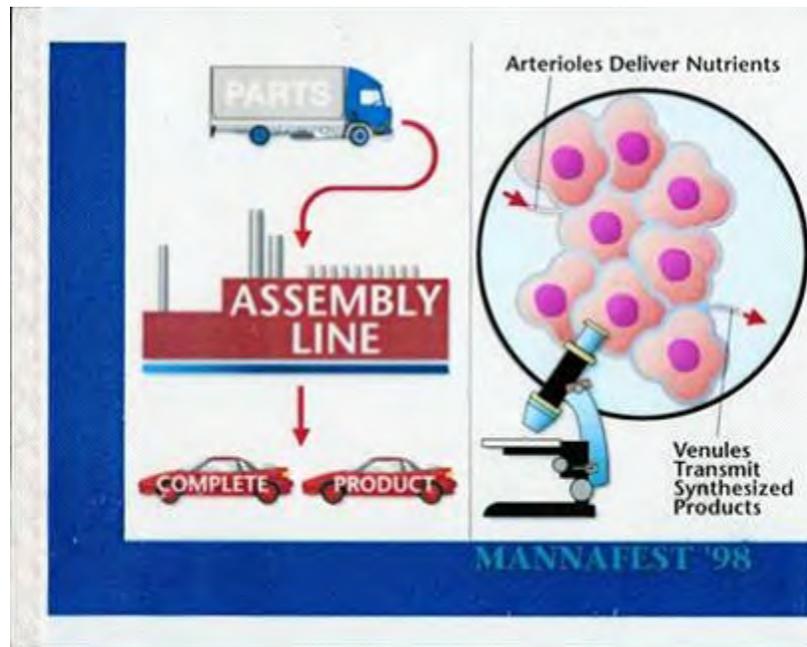


The seven Aboriginal FAS children transferred from parental care on a reservation were all rated in their new environment after having had micronutrients for a minimum of one year. The initial “yes” answers were to such a degree that they would be expected to never be employable or live independently. The average 67% improvement is encouraging, but only time will determine if the horizons for these children have been expanded. The marked improvements in behavior and performance in school and home reported by the parents provide a very optimistic potential for an elevation in these children’s future. These experienced adoptive and foster parents believe these children have a new level of capacity to benefit from education and training. Evidences of such benefits are being seen.

The third set of values contains an 8th FAS child that was not included in the calculations. He was 18 months old when started on the micronutrients and too young for the questions asked. This child’s foster parent has taken care of over a dozen FAS children, and she estimates from her experience that he has improved between 90 to 95%.

Most importantly, it is believed this anecdotal group provides significant data to warrant pursuit of progressively larger and more formal studies into the potential for micronutrition to support innate physiological mechanisms that restore the intellectual and emotional capacity of FAS children. The molecular biology and biochemistry that provides a scientific rationale for such restorations will be provided.

Slide 4 Auto Assembly Plant Illustration



If one can understand how General Motors or Ford makes vehicles, you can understand how the cells in the human body function. Parts must be supplied to the auto plant, which are then connected together according to an engineer's design. Parts called elements and nutrients contained in food must be supplied to all the cells of the body that operate under the instructions coded in genes supplied by the mother and father. In the auto plant, as in the cell, the component parts are connected together according to a very specific plan. If all the parts are supplied, the vehicle works and can be controlled. If all the nutrients and elements are supplied in the diet, one has the potential status of good health.

The author has lived near a GM assembly plant for over 30 years. On occasion they have an error and do not get sufficient numbers of clutches or brakes. The plant shuts down due to a parts deficiency. A vehicle cannot be sent out without brakes or clutches. There are observable symptoms of parts deficiency. The big door at the end of the assembly line is closed and no new vehicles roll out. The employee's parking lot is empty. These are minor symptoms of parts deficiency. The parts problem is corrected rapidly and the plant returns to normal production. However, if the parts did not come in, one could imagine the symptoms of parts deficiency getting much worse. Workers could not pay their bills. If the lack of supply for clutches and brakes lingered, the symptoms in the community could get to ICU or Emergency Room conditions. The employees might have to declare bankruptcy, abandon their homes, debts, and move to where there are new jobs. There would be an economic collapse in Arlington, Texas, all symptoms due to a parts deficiency.

Let's shift gears back to the supply of nutrients for human cells. A human must have dozens of trace elements supplied along with large amounts of calcium, iron, sodium, chlorine, phosphorus, potassium, and almost 100 other trace elements. In addition there must be amino acids, fats, sugars, vitamins, and other micronutrients that must be supplied, or it is like trying to live a life with vital parts missing, not unlike brakes or clutches. If one or more of these parts are missing, nutrient deficiency symptoms result in the human body like fatigue, no endurance, inability to rest or sleep, loss of appetite, and often memory and weight loss. Depression usually follows with the above inability to work or be productive. All this is due to a lack of parts or nutrient units necessary to assemble or synthesize the molecules within cells that conduct life. Virtually everyone knows the problems of not enough iron to make hemoglobin in red cells of the blood that carry oxygen to the body from the lungs. Lack of this one element can bring on all the symptoms previously listed.

In this analogy one should consider that decades ago in human urbanized diets, scientists identified when “critical parts”, i.e. vital nutrients, having the magnitude of brakes and clutches, are missing. Such vital micronutrients are called vitamins A, B, C, D, E, K and other essential dietary source molecules.

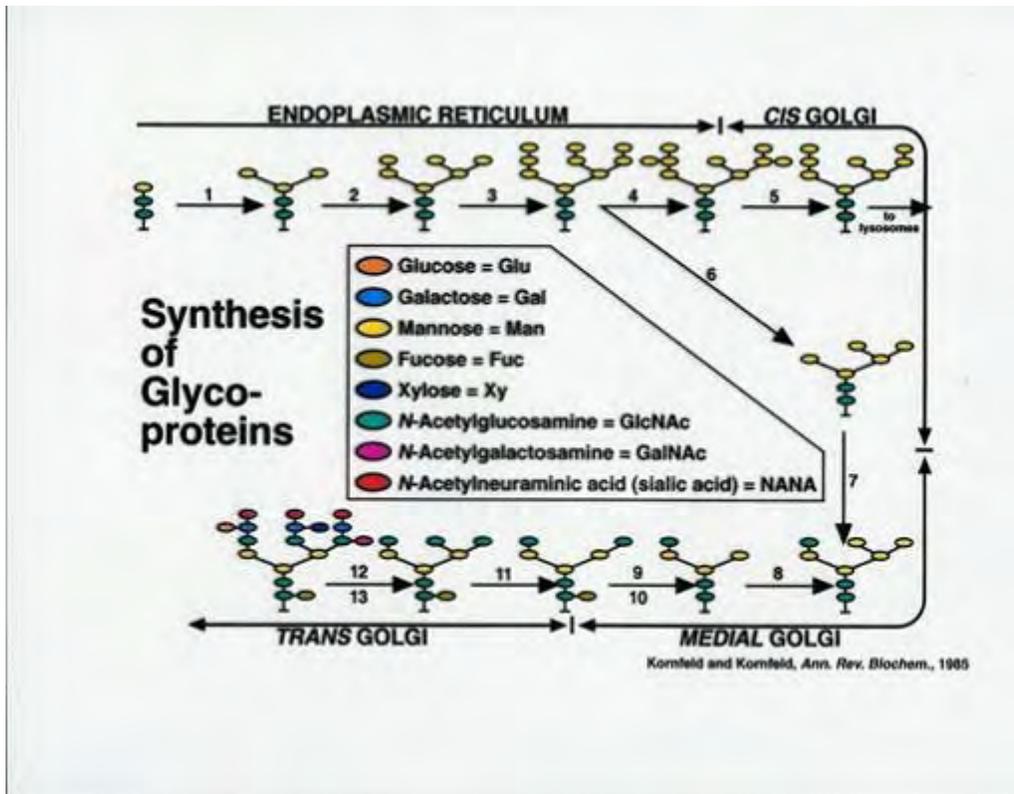
In more recent times we have plowed up our family gardens, chopped down our orchards, and processed and insulted food in multitudes of ways that reduce the supply of once abundant micronutrients beyond the vitamins and minerals. We now have health compromises which were absent or rare a few decades ago that do not respond to prescription drugs. In the pursuit of patient reports that certain dietary supplements resolved modern compromises and diseases, it was found that there are a host of monosaccharides, fatty acids, phytochemicals with free radical and antioxidant properties, which constitute a newly recognized group of micronutrients essential for optimal biochemistry within cells, that are missing or deficient in the modern diet. When these micronutrients are supplied, in a high percentage of modern health conditions, the patients recover. Reference is made to such maladies as Chronic Fatigue Syndrome/Fibromyalgia, ADD/ADHD, Hepatitis C, AIDS, Asthma, Autism, Autoimmune Diseases, Depression, Multiple Sclerosis, Amyotrophic Lateral Sclerosis, the neurodegenerative diseases associated with aging, and other conditions poorly responsive to pharmaceuticals. The scene is not greatly different from the fact that scurvy, pellagra, and beriberi are not ameliorated when drugs are administered. These deficiency conditions respond to micronutrients once abundant in the primitive diets that are called vitamins. A similar response is being seen in these new diseases when missing micronutrients are restored to the modern urban food chain.

We return to the Kornfeld display (Slide 3) of how cells assemble the molecules of life. This illustrates how inside each microscopic cell the synthesis of the molecules that conduct life follow a pattern of assembly not unlike the automobile assembly plant. The design and blueprint of life is coded in the genes inherited upon the union of the mother's egg and the sperm from the father. The instructions are written in the genes coded in DNA, deoxyribose nucleic acid, which are used for building a human body and the operating systems. There are two sets of genes. One set comes from the father and the other from the mother. A copy of the working instructions is made to send out of the cell's central nucleus that functions much like a library of coded instructions for the assembly line. The complementary copy of instructions is written along RNA, ribose nucleic acid chains. The RNA chain of information is read like a player piano roll at the first step in assembly called the ribosome to start the symphony of life. In the ribosome, amino acids are joined together in a very specific order according to the dictate of the gene activated to make a required substance needed by the body. For example, if an alert were sent out that a virus like SARS is attacking the body, amino acids would be coupled together in a manner to start the assembly for the proper molecular structure of interferon that fights against a virus.

The next step in cellular assembly is monumental in the story of how this technology came into our research team's knowledge and application to improve the health of millions of people suffering from the ravages of an inadequate modern diet. The amino acid chain, now called a peptide, which was assembled in the ribosome, moves to the second assembly line step called the ER, short for endoplasmic reticulum. In the ER, 9 molecules of mannose sugar that are not sweet and have nothing to do with the ravages of diabetes are added to the end of the peptide chain. This is the first step in making a glycoprotein, or sugar combined with a peptide chain of amino acids. This type of compound is the most important of all of the substances that conduct life processes on a daily basis. The 3 mannose chains are a domain for coding of instructions for cell to cell relationships and activities, such as defense, repair, and healing of body tissues.

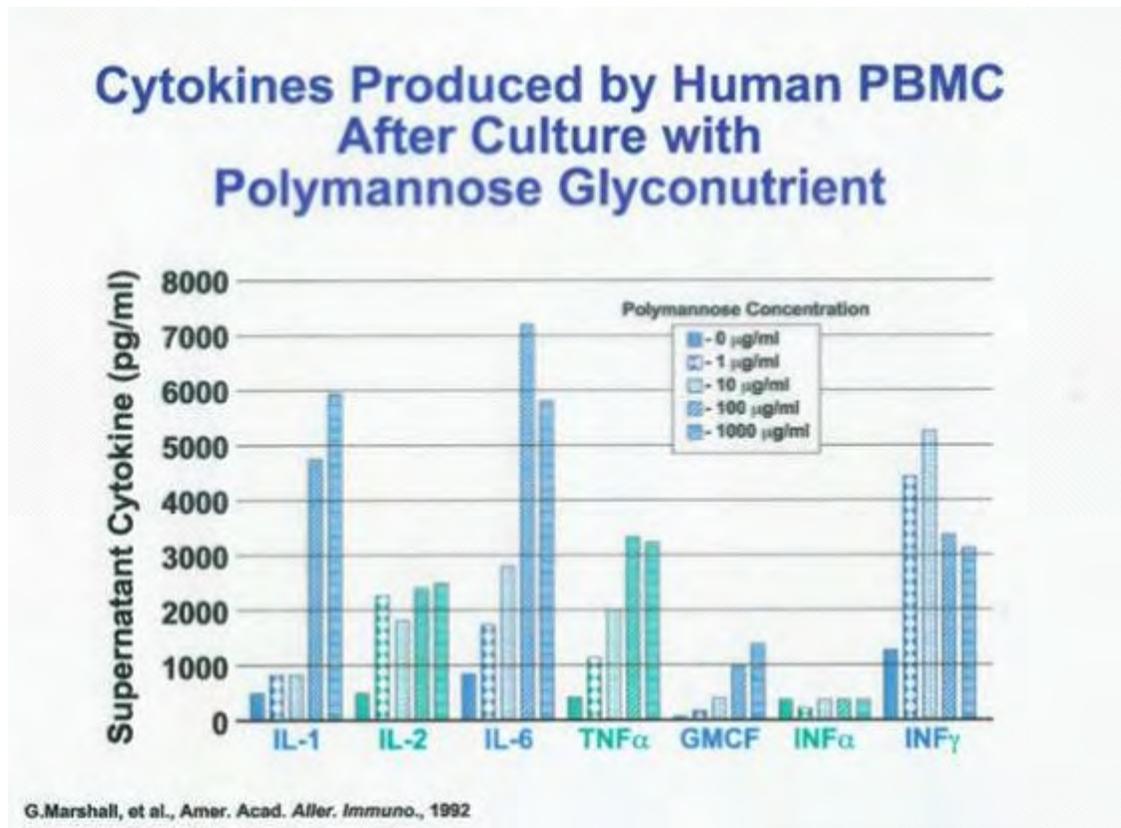
This research started by seeking to determine why aloe vera leaf gel has been used for over 5,000 years by human beings for health promotion. This is why the mannose sugars are so important. It was found that the active molecule in the aloe gel was chains of mannose sugars. Slide 5 shows that in the ER, 9 mannose molecules are required to establish the domain for coding cell to cell instructions. This graphic shows the biochemistry and electron microscopy for why aloe vera, a rich source of mannose, has been used since the edge of recorded history for health promotion.

Slide 5 Central section of the Kornfeld diagram



This schema also shows that the last assembly step in synthesis is the Golgi. Here other sugars, mostly deficient in the modern diet, are required to properly complete the synthesis of critical areas on the surface of cells and to allow cell to cell transfer of information. More recent reports indicate that 10 to 11 sugars may be needed for optimal glycoprotein and glycolipid synthesis in the ER (Sci. Amer. July 2002). The white cells of the body must communicate to defend and repair the body. This is done by special communication and instruction molecules called cytokines. These are interferons, interleukins, chemokines, growth factors, and other molecules sent between cells that are coded and read much like an IBM card by cell membrane receptor sites. In the Golgi, additional sugars are required to complete the proper molecular coding sequences, stereometric conformation, and charges so that normal structure and function of the body can be maintained. These sugars are commonly deficient in the modern diet. Sugars or monosaccharides produced by plants in nature were added to the polymannose of aloe origin. All of the benefits seen with aloe were enhanced with the addition of these sugars, because more of the nutrient resources needed for cell synthesis, as in all the parts required to assemble a car, were now more abundantly supplied. This mixture of sugars, glyconutrients, is called Ambrotose™.

Slide 6 ELISA Assays for Cytokines



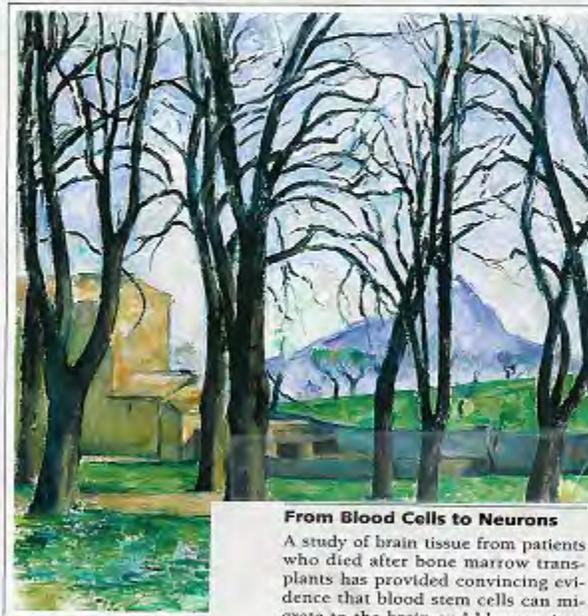
There are a number of important bioactive molecules in which synthesis is increased on the described assembly-line within cells in direct proportion to glyconutrient supply being increased in the diet. Improvements in function have been noted in children suffering from toxic damage to the brain caused by maternal alcohol intake when provided glyconutrients with other micronutrients. Adults have benefited by reversal of presumed permanent liver and neurological damage. ELISA assays shown above demonstrate that M/M colony growth factor production, increasing along a concentration gradient, potentially supports synthesis of bioactive molecules required for regeneration of aged or toxic damaged cells (G Marshal 1993). The experiments depicted in Slide 6 are support for a regenerative mechanism for various types of damaged cells in failing organs.

In liver cells, it was reported that glyconutrients added to cultures increased synthesis of reduced-glutathione 50% in 300 seconds (R Barhomi 1997). This activity indicates that the master antioxidant, reduced-glutathione, synthesized by the intracellular assembly line that is bioactive inside the cell, increases protection against free-radical and oxidative damage. Reduced-glutathione protects the cell membranes and DNA from damage, and functions to maintain an optimal level of all antioxidants that are essential for function of brain cells, especially those injured by the metabolic products of alcohol.

JAMA[®]

The Journal of the American Medical Association

February 19, 2003



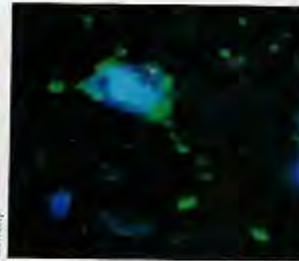
From Blood Cells to Neurons

A study of brain tissue from patients who died after bone marrow transplants has provided convincing evidence that blood stem cells can migrate to the brain and blossom into clumps of active gray and white matter, report researchers from the National Institute of Neurological Disorders and Stroke (NINDS) and the Johns Hopkins Medical Institutions.

Previous experiments had shown that 1% to 2% of all neurons in mice that had received bone marrow transplants were derived from blood stem cells. "I thought this was all well and good for mousekind, but what about

people?" said Eva Mezey, MD, PhD, a neuroanatomist at the NINDS.

Mezey contacted Hopkins pathologist Barbara Crain, MD, who provided brain autopsy samples from two women and two girls; all had died from leukemia and other diseases after bone



The ancestor of this frontal cortex neuron from a woman's brain was a blood stem cell from a male bone marrow donor. Blue and yellow fluorescent tags confirm the cell's identity as a neuron; red highlights the Y chromosome—a legacy of the male donor.

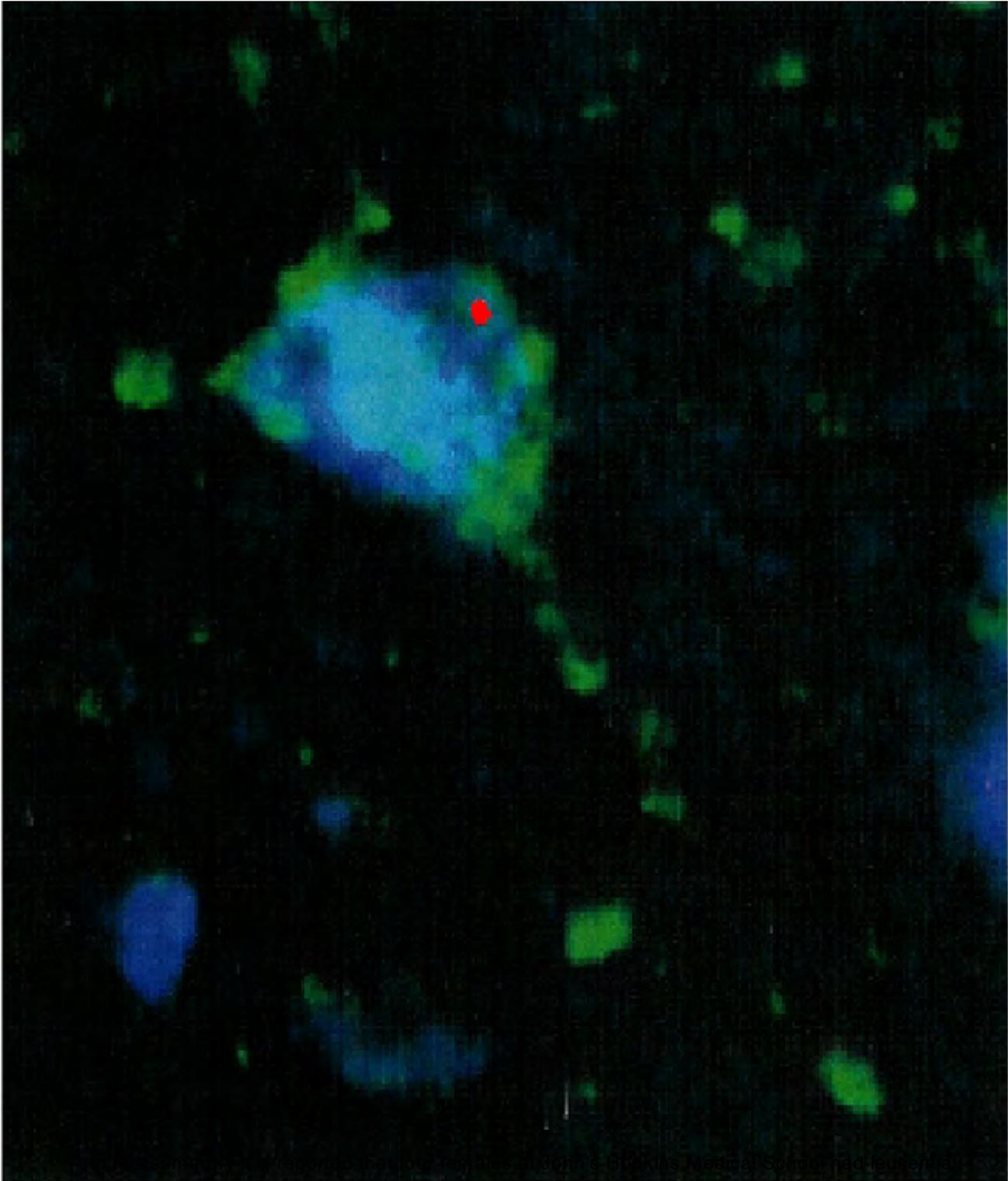
marrow transplants. All of the females had received bone marrow from male donors. This eased the search for neurons with stem-cell heritages—finding such neurons became as easy as finding Y-chromosomes.

While the proportion of these neurons was lower in the human tissue than in the mice, Mezey said that these patients' short survival times after transplant could be a factor.

The study lends weight to the idea that blood stem cells can respond to brain signals. "You have a bunch of cells circulating and somehow they get into the brain," said Mezey. "There must be something, some factor, that tells them, 'You are needed here.'"

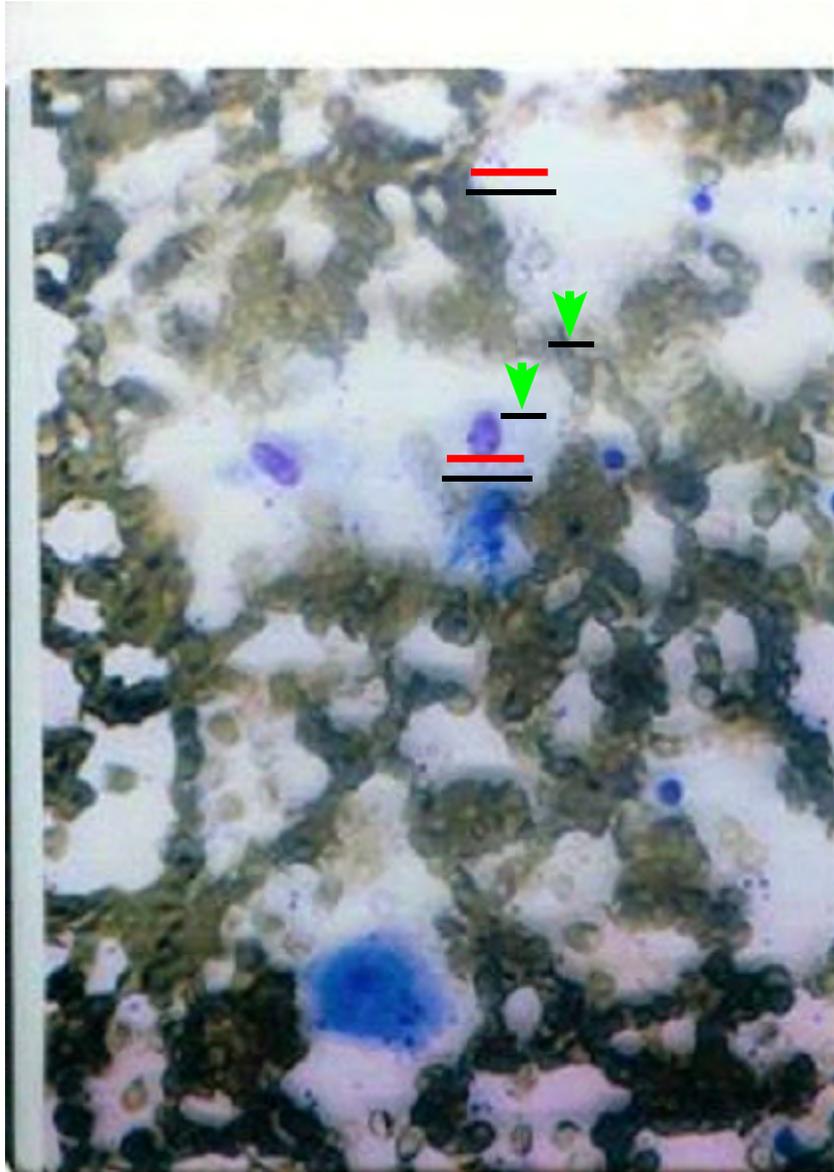
The findings were published January 21 in the on-line edition of the *Proceedings of the National Academy of Sciences* (*Proc Natl Acad Sci U S A*. 10.1073/pnas.0237386100).

On February 19, 2003, a most remarkable scientific finding was reported in the JAMA. A brief summary article reports that in bone marrow research, it has been known for years that in mice, donor stem cells cross the blood brain barrier and become neurons in the recipient. Neurons are the most highly advanced functional cells in the body. Humans learn, remember, make decisions, interpret, and control muscles with neurons. This phenomenon had not been reported in human beings, until now.



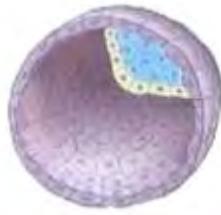
and eventually died after having had bone marrow transplants. In the brains of the women they found, as shown in the photomicrograph (Slide8), neurons present in the four females that came from the stem cells of the donor. This is a fact because all female cells have XX sex chromosomes. In this neuron from one woman's brain, the red spot glows because a tagged antibody against the male Y chromosome is apparent, and is proof that this neuron came from the male donor's stem cells. This is recent revolutionary information in regard to the potential to foster repair and regeneration in the human brain.

Slide 9 Photomicrograph of peripheral stem cells



These are stem cells from a person who has not had a bone marrow transplant. These cells are in everyone's peripheral blood, and can be found in each drop of blood, if one knows how to look for and identify them. The two horizontal red arrows point to three large Leu M3 + stem cells. The dark blue cell at the bottom is producing cytokines (seen in slide 6) as detected by the darker staining glycoproteins being synthesized in the flowing cytoplasm. The lower green arrow indicates a cluster of red cells approximately 6 microns in diameter. The upper green arrow is a lymphocyte provided for comparative size references. Our research team received an award for presenting this finding at a national scientific meeting, "The American Society of Clinical Pathology".

Slide 10 Early Stage of Human Development: Blastula

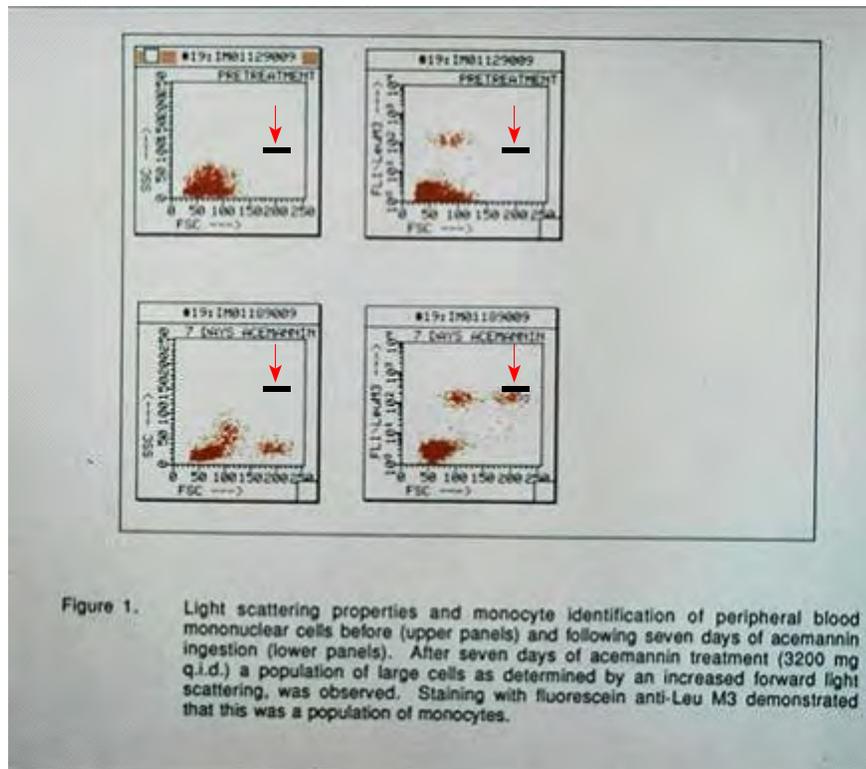


To comprehend the significance of finding increased numbers of stem cells in the peripheral blood without having a bone marrow transplant, here is an artist's view of a very early stage in embryonic development. When the egg and sperm unite, cell division starts rapidly to initiate the development of a new human being. In the blastula stage, the human being is a round ball of cells in a single layer. Every cell in this blastula stage can develop into any cell in any part of the body. These cells at this stage have the capacity required to make any of the organs and any part of the structure of the body. This is called total plasticity. Divide the blastula and you get two humans called identical twins. The twins are so identical that skin and organs can be transplanted, and immune suppression drugs are not needed. The twins' immune systems see the other twin's cells as "self". The stem cells from one's own bone marrow have the total plasticity of blastula cells. **This is an incredible potential capacity to be used for repair and regeneration of a damaged human being, including brain cells damaged by toxic products of alcohol and drugs.**

In the next stage of development, the blastula folds in on itself to make a double layer of cells, and a new middle layer forms. This is the gastrula stage of embryo development composed of the outside layer of cells, the ectoderm, the middle layer, the mesoderm, and the inner layer, the endoderm. Moving cells at this point causes deformities, or abnormal cell, to be located in the wrong place as the cell layers continue to develop. Plasticity has been reduced and this loss of plasticity continues to progress as the new being becomes more fully developed.

On reading the above February JAMA article, there was the sudden recognition of the significance of a number of assays conducted on the blood of controls and patients over 15 years in the past. When dogs were given an increasing intake of aloe polymannose, the experimental veterinarians noted an unusual group of large cells in the peripheral blood (R. Carpenter 1986). Use of special stains led to identifying these cells as belonging to the precursor cells of the monocyte/macrophage lineage. These cells have been called many names over the last century. One of the more appropriate is reticulo-endothelial cells (RE). This term alludes to the broad capacity for these cells to migrate into organs or tissue and transform into cells need for defense, repair, healing and replacement of cells no longer functioning. These cells were eventually demonstrated in the human blood of subjects adding glyconutrients to their diets.

Slide 11 Flow cytometry scattergram



In fundamental health classes it is taught that the blood contains a white cell army to defend the body from infectious agents like bacteria and viruses. There are different types of white cells which have different protective functions. The flow cytometer is an instrument that is used to identify and count different types of white cells in the peripheral blood. The mechanics for how the instrument works is beyond this discussion. What one sees in slide 12 are two assays done on the same research subject a week apart. At the top are two different assays done on the same day on blood before dietary glyconutrients were taken. On the left, one sees all the different types of white cells grouped together with their size or diameter plotted on the horizontal line and complexity that scatters light on the vertical axis. The pattern on the right top shows the addition of a specific fluorescent antibody that tags to monocyte/macrophages, i.e. RE cells, and they are under 150 microns in diameter. These tagged cells are displayed on the vertical axis as a cluster of dots above the majority of white cell types. Each tiny dot represents one fluorescent cell counted. Monocyte/macrophages have many functions. They not only defend the body against infectious agents, but like the military Seabees or engineers in a war zone, these white cells have the capacity to repair and heal damaged cells. They are committed at this stage to the immune and healing system of the body.

Now give attention to the two lower scattergrams of white cells from this same individual after adding the polymannose glyconutrient to the daily diet for one week. Note that a much larger in size, low complexity, new population of cells is in the peripheral blood (Slide 9). By adding the same fluorescent Leu M3 antibody, it can be shown that these cells greater than 150 microns in

diameters, as was noted on the peripheral blood smears, are labeled by the same antibody that binds with the monocyte/macrophages that defend, repair and replace damaged tissues. These new populations of cells are stem cells that come from the person's own bone marrow. These large cells having the total plasticity of young RE cells, serve to solve the clinical mystery that has challenged our research team for over a decade. It has been beyond known science to explain how adults with Alzheimer's, Parkinson's, Huntington's, and children with Cerebral Palsy, Leukodystrophy, Down's syndrome, Autism, and now Fetal Alcohol Syndrome (FAS) experience restorations in brain function. That came to an end in February 2003. It was heretical to share many examples of presumed permanent brain injury from strokes or trauma, or neurodegenerative disorders that experienced return of lost central nervous systems that had been regarded as permanent and irreversible for generations by physicians and scientists. The generation and support of these stem cells that have the capacity to develop into any type of cell the body needs, as in total plasticity like in the blastula cells of the embryo, provide a scientific basis for how such unparalleled restorations of brain function can be induced by dietary supplementation of glyconutrients.

Demonstrating such a restorative potential into a fixed-idea professional environment has not been received without stiff resistance. Almost immediately the counter argument was, "So, cells that look like neurons are present in females that have had stem cell transplants from males. There is no proof that these structures appearing to be brain cells can function."

The next case is an example of documented clinical changes that are extraordinary. On October 29, 2002, this child was started on glyconutrients, and then other micronutrients were added to his feeding tube. In five days he moved his right hand, the first movement of his totally flaccid body in 3 years. In a few weeks, he was videotaped trying to crawl off his bed. He is currently trying to talk, and speech specialists are assisting him, along with physical therapists in more intensive rehabilitation efforts. C.W. was scheduled to start kindergarten in September 2003. As one can readily see, neurons are now functioning in the laboratory and in daily living. C. W.'s response has stimulated physicians to plan a pilot study in other children in sustained coma. If the 20 pilot patients respond anything like C.W., and four other children whose mothers, by way of the internet, have given the dietary supplements to awaken their children in coma, these pediatric neurologists, who follow over 200 helpless, hopeless children in coma, will use this nutrient technology to make a difference in the quality of life for these children and their families.

Slide 12 EEG March 1, 2000 C.W.



There may be experts in biology and medicine that are not impressed with these findings on patient C.W. (Slides 12-13). Such opinions are considered locked in the nihilistic, dark, blind alleys of past education, practices and beliefs. They may question whether an increased supply of endogenous stem cells can constitute proof of a cause and effect for the phenomenon observed. Even though male stem cells are now neurons in a female bone marrow recipient's brain, the challenge might be, "Show proof that there are neurons that function." "The presence of a structure under the microscope such as a neuron does not prove that there is neuronal or brain function of the cell." "Idiot's brains have neurons at autopsy." The reply is that "all individuals whose neurons do not function well are not in mental institutions." However, slide 12 is a two year old boy's brain electrical activity shown on an electrographic display of 19 cranial electrodes done in 2000 and repeated in 2003 (Slide 13) after about 6 months of micronutrient supplementation. This patient, now 6 years old, had been in a deep, totally unresponsive coma for three years due to toxic fumes inhaled in a home fire. Note that the pattern is virtually a flat line for all leads in Slide 12.

Slide 13 EEG March 10, 2003 C.W



This phenomenal response has been repeated in other children in prolonged coma due to various causes for which laboratory evidence for parallel restored neurological function associated with micronutrient dietary intake has been recorded. These anecdotal responses do not constitute scientific evidence sufficient for wide clinical application. A formal study with controls and formal monitoring must be conducted. However, those specialists who have cared for children in extended comas and in large numbers are impressed that mechanisms are present that are worthy of intensive further study, and such success for improving the quality of life of some of these children is highly likely to be found.

Slide 14 Sarah



This presentation was started by displaying what optimized dietary supplementation can do for children with critical needs. Since 1985 when our micronutrient research was started, no benefit for a single subject has matched the restoration in life that this child has received. Sarah was born premature to a chain-smoking, alcohol and drug using birth mother. Problems of being a little over 2 pounds and two months premature with septal and cushion defects in the heart were projected to require difficult heart surgery. However, at the medical school where she was delivered, she was diagnosed as having FAS, sensory integrative defect, and cerebral palsy. Adoption was discouraged. In the premature nursery, the adoptive mother rubbed Sarah's body daily with the micronutrients in a cream form over her entire body. After she became old enough to drink from a bottle, she got the glyconutrients, followed by all the micronutrients, mixed in each bottle of formula. A recent photograph taken at five years of age (Slide 14) is provided by the adoptive parents. In the evaluation at 4 years, the developmental pediatric specialists were said to be puzzled. There was no evidence of FAS, or cerebral palsy. Her heart "developed as if she were in her mother's uterus." Sarah will require no heart surgery. She has a little residual of sensory integrative defects, and her IQ is estimated to be over 100, no longer less than 80, as when younger. Note that the center infant picture of Sara is the face of severe FAS.

Slide 15 Chealsea



Chealsea-9 months Old



Chealsea 5 years old

Chealsea was 9 months old when she was adopted. She was only 11 lbs. She was born on March 10, 1994. Doctors said that she would never walk or talk due to brain damage and severe FAS. She was very sickly. After 3 months, the adoptive parents were told about the gummy bears with the micronutrients in them. After taking these micronutrient gummy bears, she became settled and very smart, according to her adoptive mother, who is also a teacher. Chealsea is a Pow Wow Dancer, swims, roller blades, plays soccer, skates, and rides a bicycle.

Slide 16 Johnny



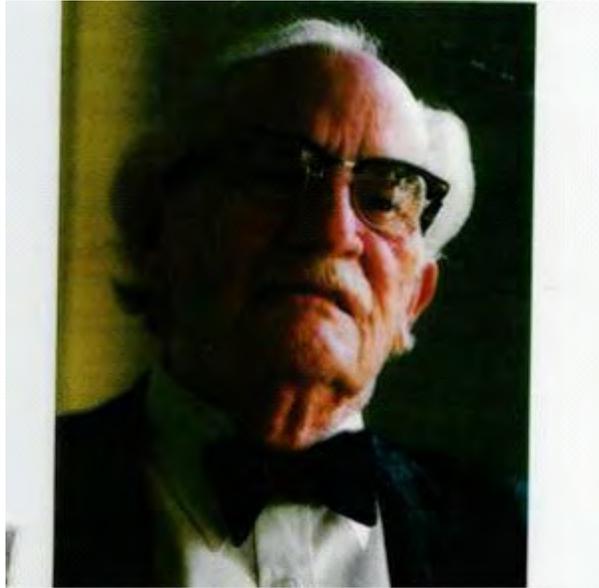
Johnny-2 yrs. Old Johnny-8 yrs. Old

Johnny was born May 7, 1995, and his adoptive parents were told that he was an FAS child and may also not ever speak or walk, due to severe seizures as an infant. But he now plays hockey, baseball, roller blades, skate boards, rides bicycle, and jumps on the trampoline. He is taking swimming lessons, level 3, and as of 2003, is in third grade.

This is an example of what you now have the knowledge to provide to children with FAS damage and other brain compromises. At the Canadian FAS First Nation's Conference the group was urged to use recently provided government funds for FAS research using micronutrients for this national and international problem that damages all races and ethnic groups.

Starting in the fall of 1985 and continuing to the present date, there have been multiple restorations of lost function in the central nervous system, beta cells of the pancreas, lung, kidney, and heart patients that defy explanation for how such a turn around in health could transpire. Such challenging events have been reported in infants, children, youth and adults that include some that are quite elderly. Previously thought hopeless health situations and irreversible damage have been noted to repeatedly be reversed and corrected. Only recently, the events being recognized by science regarding the capacity of transplanted stem cells to replace damaged or destroyed organ cells could be correlated with laboratory observations made in the late 1980s at the Fisher Institute for Medical Research. A large population of very large cells appeared in the peripheral blood within one week in individuals that added a glyconutrient formulation to their diet. Now it is known that these cells are stem cells coming from the individual's own bone marrow. The epiphany this realization has fostered is shared with the readers of this syllabus with a focus on FAS children. The potential benefits for supporting health recovery in society are beyond material measure.

Slide 17 Roger Williams, Ph.D



If you have never heard of Dr. Roger Williams, I regard him as a patron saint in nutritional biochemistry and his picture is provided as slide 17. You know more about Dr. Williams than you think you do. When you look at the label of multiple vitamins, he discovered and named Pantothenic Acid. He did the pioneering work on Folic Acid and named it. On some dietary supplements you will see inositol listed on the label. He defined the role of this parent molecule and how it is used to properly turn on genes that control cellular synthesis. Dr. Williams was a giant in the biochemistry of nutrition and how it supports health during the years that medicine was at its peak in its infatuation and romance with pharmaceutical agents. This is the reason that his name is not widely known.

It is appropriate to end this presentation with these words from Dr. William's most important book, Nutrition Against Disease, published in 1971:

**“The human body heals itself,
and nutrition provides the resources to accomplish the task.”**

These are the most important words that have been shared with you. It is a cardinal message that this syllabus has provided concerning the means to improve health care. The philosophy that has dominated the practice of medicine for over a century has been sickness care. You have been provided the evidence that this statement of seldom matched wisdom and insight left by a great scientist is constantly being further authenticated. You have been given the technical truth that supports the basis for these inspired words. This statement provides a legacy of immeasurable value that Dr. Williams has left that each and every citizen of earth can apply and share. The impact and benefit for restoring the horizons for FAS children, and all others who experience pain, suffering, disability, and disease is a universal gift for all peoples. HRMcD 5/19/03

APPENDIX 1

FAS RETROSPECTIVE SURVEY FORM:

MannaRelief Ministries and Fisher Institute for Medical Research

44.06.01 Photographic Screening Tool for the Fetal Alcohol Facial Phenotype

We have omitted the detailed photo evaluation with multiple measurements. The photo and facial appearance is used heavily to evaluate the very young FAS child. If there has been a change in facial parameters that is significant, a pre- and post- dietary supplement photo side by side of the same dimensions will say volumes to observers. Know that such a picture erases any privacy considerations for the child. However, "A picture is worth a thousand words", is appropriate to recall. The changes to more normal features we are seeing foster great hope for the parents. Two comparison photos are worth a lot and we already are seeing that the behavior and function scores parallel the normalization of the facial features. If there is no initial photo or if you wish to maximize privacy, read the following descriptions and ask several friends and relatives that do not see the child everyday whether they see changes in features? Respond to the following:

44.06-

10 Persons who do not see this child daily, and observed him or her prior to dietary supplementation rate the initial or pre-dietary support appearance on the following scale as:

Appearance of the face due to Fetal Alcohol Syndrome damage initially or before adding dietary supplements to the diet:

0 1 2 3 4 5 6 7 8 9 10

Normal Mild Modest Significant Strong Expression Very Abnormal

44.06-11 Improvements in facial features that are more normal after consuming dietary supplements. Estimate the changes relative to the above scale you chose to rate features initially- (It is recognized that maturation and time also figure into this assessment.)

0 1 2 3 4 5 6 7 8 9 10

Normal Mild Modest Significant Strong Expression Very Abnormal

Overview: Infants affected by the fetal alcohol syndrome need to be identified so that early interventions can be made. Several facial characteristics are associated with the degree of damage from fetal alcohol syndrome. A photograph of an infant's face can allow for quantization of features which can be used in a discriminating assessment to identify affected infants.

44.06.03 Fetal Alcohol Behavior Scale (FABS)

Overview: The Fetal Alcohol Behavior Scale consists of 36 behavior characteristics found in persons with the fetal alcohol syndrome (FAS), or with fetal alcohol exposure (FAE). These are independent of age, race, sex, and IQ. Children under 5-6 years may not be easily or appropriately evaluated on some characteristics or behaviors.

The questionnaire is to be completed by a person or caregiver familiar with the child, youth, or adult.

- Responses are "yes" or "no" when that is appropriate. If "Yes" is the answer indicating that it is a feature or problem of this individual, then rate the answer from 0 to 10 for the degree of a problem for the child or household, school, and in the community. This allows one to indicate if there has been an improvement following use of dietary supplements along with maturing, training, education, socialization, and care received. It is recognized that influences can be good or bad, are complex, and cannot be separated.
- The test has been given to patients ranging in age from childhood to middle age adults for a "yes" or "no" response for an initial diagnosis of FAS. The caregiver is to ask, "Does this child, youth, or adult characteristically show the listed behavior or problem? Then check the "yes" or "no". Then ask, "Just how serious was this problem initially or in the past?" and score it with a CIRCLE, ○. Choose a number up to 10 as very serious, if not intolerable. Then ask, "Has there been improvement that I associate with adding dietary supplements to the diet?" and score again by putting a SQUARE □ around the number indicating the current status as to how it rates as a problem in the individual's life and functioning in the home, or community. This is an estimate based on experience.

Summary instructions:

If the answer "yes" applies to the characteristics of FAS seen or displayed by this child, make a check mark in the "yes" space. In your mind estimate the degree of this trait which has been a problem. Draw a circle ○ around the initial or pre-dietary supplement status. Now ask, "Has there been an improvement, or no change, or things are worse?" Mark a square box □ for the current status of post-dietary supplement or current status. If you answer "No" initially and the trait continues to be no problem, check the "No" Box. No rating is needed. There are not right or wrong answers, only characteristic responses. This is an attempt to profile and evaluate this child's problems before and after dietary supplementation.

(1) Overreacts: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

Normal Mild Modest Significant Strong Expression Very Abnormal

(2) Chats with no content: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(3) Talks of unusual or bizarre topics: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(4) Often demands attention: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(5) Unaware of consequences of actions taken or things said: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(6) Often does not complete tasks: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(7) Inappropriate actions taken outside of home: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(8) Likes to talk: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(9) Interrupts: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(10) Seeks to be the center of attention: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(11) Touches others frequently: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(12) Can't play on a team, or can't share in completing tasks in a group: Yes____No____

0 1 2 3 4 5 6 7 8 9 10

(13) Can't take or grasp a hint: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(14) Has a sleeping problem: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

Normal Mild Modest Significant Strong Expression Very Abnormal

(15) Poor manners in home and public: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(16) Over stimulated by surrounding actions or activity: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(17) Acts out of context, actions or speaking do not fit established conversation or group activity: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(18) Klutzy- awkward, actions that others regard as foolish or below expectations for age: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(19) Hygiene problems, toilet urine__ or bowel movement___ self-care, brushing teeth: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(20) Physical loving "needs or must touch and be in physical contact with those liked, or loved as in touching with hands, face, lips, hugs, etc. Emotion of love is not sufficient: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(21) Repeats sentences, words, and ideas often: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(22) Messy: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(23) Talks fast: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(24) Inappropriate actions and activities in the home setting: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(25) Is a very superficial friend, then hostile or aggressive or rejecting: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(26) Fidgety: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(27) Poor judgment is commonly demonstrated: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

Normal Mild Modest Significant Strong Expression Very Abnormal

(28) Difficulty performing tasks, duties, a role, being in front of people: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(29) Loud and/or unusual voice: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(30) Overly friendly: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(31) Loses things: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(32) Sensitive, upset, irritated, agitated by noises: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(33) Wide mood swings: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(34) Pays poor attention: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(35) Problems in sexual functioning, relating inappropriately to opposite sex, keeping one's sex private and personal:
Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

(36) Tries hard but cannot complete or succeed at tasks, play, performance, sports: Yes____ No____

0 1 2 3 4 5 6 7 8 9 10

Important: **Additional Comments** are requested that the caregiver wishes to make regarding changes noted in this individual: (Use back of page if needed.) These comments are very valuable and in functioning parents with experience with multiple FAS children , comments may be more valuable than the above survey questions generated by “experts and academicians”.

Caregiver or person completing this survey may be interested in the following:

Fetal alcohol behavior (FAS) scale = SUM of yes answers indicate traits associated with FAS

(Number of "yes" answers should only apply as a problem for the child in responses provided)

Interpretation:

- Minimum score: 0 No evidence of FAS
- Maximum score: 36 Very severe FAS, if due to maternal alcohol intake damage
- History of 80 persons with the fetal alcohol syndrome or exposure had a score ≥ 12
- Persons with the fetal alcohol syndrome who are able to live independently have had scores up to about 20 (tails off to 24); the mean score was 8.5. Persons who are in a dependent living situation had scores from about 15 (tails down to 2) to 26 (tails to 36 the mean score was 21.5. This should only be considered as a rough estimate and not a sentence or firm prediction for any individual.

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Your cooperation, time, and effort is greatly appreciated. It is the sincere hope and mission of our research team to improve the life of FAS and FAE children along with the quality of daily living for the home and family of each such innocent child.

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www.lpch.org/DiseaseHealthinfo/HealthLibrary/genetics/fas.html

Northwest Portland Area Indian Health Board, Characteristics and Symptoms of Fetal Alcohol Syndrome,
www.npajhb.org/epi/fas/characteristics.html

Diagnosis of Individuals with Prenatal Exposure to Alcohol The 4 Digit Diagnostic Code, Washington State FAS Diagnostic and Prevention Network www.depts.washington.edu/fasdpn/