DISCLAIMER

The information contained within this document does not constitute medical advice or diagnosis and is intended for education and information purposes only. It was current at the time of publication and every effort is made to keep the document up to date.

The information contained herein includes both psychological and non psychological interventions. The delivery of psychological services requires a medical referral whilst non psychological services do not.

Each person is an individual and has a unique psychological profile, biochemistry, developmental and social history. As such, advice will not be given over the internet and recommendations and interventions within this website cannot be taken as a substitute for a thorough medical or allied health professional assessment or diagnosis.

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Essential Fatty Acids Research - Linking Nutrition and Children's Behavioural Disorders

ARTICLE 1

INTRODUCTION

Adolescents defines Learning Difficulties as a generic term referring to the substantial proportion (1 0-1 6%) of children and adolescents who exhibit problems in developmental and academic skills. Learning Disabilities refers to a much smaller proportion (2-4%) of children and adolescents who exhibit problems in developmental and academic skills which are significantly below expectation for their age and general ability.

Research suggests that there is a series of related conditions (dyslexia, attention deficit hyperactivity disorder and dyspraxia) which can overlap, so an affected child is likely to display a combination of problems. Some children have only one of these disorders but many have two or all three leading to problems that are extremely distressing both for the child and his or her parents. Such problems often lead to disruptive behaviour and school failure.

Striking results from a major ongoing research programme on Dyslexia, Dyspraxia and Attention Deficit Hyperactivity Disorder (ADHD) show that **lipid supplementation can make a child less clumsy and more able to catch a ball within 12 weeks**. These findings are supported by observations from leading UK medical research centres indicating unusual brain lipid biochemistry in people with Dyslexia.

Efamol Ltd are sponsoring a major series of research programmes into these three linked disorders and important advances have emerged
in findings presented to date.
These include:

- Research by Dr Jackie Stordy published in the Lancet, **indicated abnormal essential fatty acid metabolism in the eyes of dyslexics.** This caused night blindness, which could be corrected by supplementation with essential lipids. The dyslexics showed substantial improvement to near normality in just 4 weeks.

- Research from the Royal Postgraduate Medical School at Hammersmith by Dr Basant Puri, using brain scanning techniques has demonstrated that **dyslexic individuals have abnormal brain lipid chemistry**.

- Research by Dr Stordy on fifteen dyspraxic children who were seriously clumsy, showed substantial objective improvement when treated for three months with a supplement of high DHA tuna oil and thyme oil, which promotes the incorporation of these lipids into brain and eye. This combination made a noticeable **improvement in the children's manual dexterity, ball skills and balance**. The tests measured co-ordination, fine movements and balance. All three tests showed substantial improvements over three months. In practical terms this lead to improved writing skills, better balance and behaviour and co-ordination.

- A major American study from Purdue University compared 52 hyperactive boys to 42 normal ones and found that **hyperactive children were** deficient 'in essential fatty acids. Blood samples showed that the problem was not dietary deficiency but that hyperactive children can't convert dietary EFA's to the long chain EFA's required by the body for brain and eye function.

- A recent study of 35 controls and 37 ADHD (18-65 years) adults (with and without hyperactivity) measured red blood cell (RBC) and serum phospholipid fatty acid concentrations. In the serum phospholipids, subjects with ADHD had lower total saturated fat, polyunsaturated fat, omega-6 fat and lower DHA and higher monounsaturated fat and omega-3 DPA concentrations.

  In the red blood cell membranes subjects with ADHD had lower DHA and consequently lower total omega-3 concentrations. There were no significant differences in serum or red blood cell EPA concentrations between the ADHD and control subjects.

  The higher omega-3 DPA in serum of the ADHD subjects implies they are less able to convert ALA, EPA and DPA to DHA and so are more dependent on a ready made supply of DHA.

  These results confirm earlier findings in children and suggests high-DHA fish oil supplementation of adults with ADHD is likely to be more effective than high-EPA fish oil or flaxseed oil.

  Young GS, Maharaj NJ, Conquer JA. (2004): "Blood Phospholipid Fatty Acid Analysis of Adults With and Without Attention Deficit / Hyperactivity Disorder" Lipids; 39(2):117-123.

Children do not "outgrow" deficiencies of EFA's, they manifest those deficiencies as psychiatric symptoms in adulthood mostly as mood disorders (anxiety and depression).

This worldwide research indicates that supplementation with fish oil **high in docosahexaenoic acid** offers hope to those with dyslexia, dyspraxia and ADHD.

SIGNS OF FATTY ACID DEFICIENCIES

IN INFANTS

- Extreme restlessness, crying, poor sleep patterns
- Difficulties in feeding
- Constant thirst
- Frequent tantrums, head banging and rocks the cot

IN OLDER CHILDREN

- Physical and mental restlessness
- Poor concentration and brief attention span
- Increased activity - always on the go
- Impulsive - doesn't stop to think
- Fearless, takes undue risks
- Easily distracted
- Has difficulty doing tasks alone
- Often interrupts others
- Loses things and forgets to do things
- Poor co-ordination - when tying laces, handwriting, ball games
- Weak short term memory
- Inflexible personality - uncooperative, defiant and disobedient
- Problems with making friends
- Lack of self esteem
- Sleep and appetite problems continue
- Normal or high IQ but under-performance at school 'Hot' or explosive temper
- Unpredictable behaviour

RESEARCH HAS SHOWN

- Hyperactivity may be due to a deficiency of EFAs.
- Low levels of EFAs are common in the blood of children with asthma and allergies. It is known that many hyperactive children suffer from colic, eczema, asthma, allergies and repeated infections.
- Zinc deficiency leads to poor EFA processing in the body. Hair analysis has indicated that many hyperactive children are zinc deficient.
- Salicylates block conversion of EFAs to Prostaglandins - EFAs and prostaglandins are important in brain function. Some food additives and natural food ingredients like salicylates can cause rapid deterioration in a hyperactive child's behaviour.
- The problem is unlikely to be due to lack of EFAs in the diet since often only one family member may be affected.
- The most likely cause of the problem is a failure to convert dietary EFAs to long chain EFAs the ones needed by body processes and especially by the brain.

A major study conducted at Purdue University compared 52 hyperactive boys with 42 normal ones and found that many of the hyperactive children are EFA deficient based on clinical signs such as thirst, dry skin and hair, more asthma and infections. They also took blood samples from the boys to test evidence for EFA deficiency. These showed that the problem is not dietary deficiency but that the hyperactive children can't convert the dietary EFAs to the long chain EFAs required by the body for brain and eye function.

A Revolutionary Breakthrough For Eye And Brain Function

ARTICLE 2

Dr Jacqueline Stordy

Nutritionist and a former Senior Lecturer of Nutrition
School of Biological Sciences
The University of Surrey, Guildford, Surrey, GU2 7XH, UK

Journal Article:
B. J. Stordy, 'Benefit of decosahexanoic acid supplements to dark adaptation in dyslexia', Lancet, Vol 346, 1995, p. 385

Note: The author has a patent on the use of DHA for dark adaptation

Dr Jacqueline Stordy, previously Senior Lecturer in Nutrition at the University of Surrey, has recently made a major discovery. She found that both dyslexics* and dyspraxics* to adapt in the dark, they behave on testing as though they are night blind even though they are not vitamin A deficient.

* See Appendix 1 for further information on these disabilities.

Because EFAs are important in retinal function, Dr Stordy investigated the diets of dyslexic children and their mothers and found that EFA intake was lower in the dyslexic families than the controls. She then fed a supplement of fish oil rich in DHA (Docosahexaenoic acid) to dyslexics and showed that within one month their defective dark adaptation had normalised. Some individuals also appeared to have some improvement in their dyslexia.

This observation led to the idea that the dyslexic gene might lead to a reduced rate of incorporation of long chain EFAs into cell membranes. The defect is only minor and so can be overcome by increasing the intake of appropriate EFAS. Since long chain EFAs are important in the brain as well as the eye, such an abnormality could explain why dyslexics have a number of behavioural abnormalities.

It could also explain the following phenomena:

- The greater prevalence in boys. Males have a greater requirement for EFAs than females and so a marginal EFA problem is much more likely to affect boys than girls.
- The greater prevalence in people susceptible to allergies (atopics). Efamol research and that of many other groups has shown that the formation of long chain EFAs is defective in atopics. Atopics would therefore be expected to suffer much more from poor incorporation of such EFAs into cell membranes.

- The changes in prevalence since the 1950's. The consumption of trans fatty acids, a modified chemical form of fatty acids produced in margarine manufacture has increased. These trans fatty acids inhibit conversion of dietary EFAs to their long chain metabolites. This could be expected to have greater effect in carriers of the dyslexic gene than in normal individuals.

The work on dyslexia, led to work on dyspraxia which showed that EFAs (as Efalex) made a noticeable improvement in the children's manual dexterity, ball skills and balance.

Efalex is a patented combination of highly purified fish oil rich in DHA with Efamol evening primrose oil, vitamin E and thyme oil. This is the first supplement of its type and provides the key fatty acids previously shown to benefit dyslexics and now shown to be missing in children with ADD, ADHD and dyspraxia.

Research studies have demonstrated that tuna oil and evening primrose oil provide the fatty acids (DHA and GLA) needed to maintain brain and eye function and coordination. Work at the Scottish Agricultural College has shown thyme oil greatly increases the efficiency of the DHA. Thyme oil is also an antioxidant and protects the oils against oxidation. Vitamin E is also present to act as an antioxidant.

NOTE:
Fish oils' generally contain a higher level of eicosapentaenoic acid (EPA) than DHA. In tuna oil, used in Efalex, there is a higher level of DHA, the fatty acid known to be important for brain and eye function. Also Cod Liver oil is from the liver of the fish and contains mainly vitamins A and D and much smaller amounts of the EFAS. To take the required amount of EFA's from cod liver oil you would risk overdosing on the vitamins A and D.

Benefit of docosahexaenoic acid supplements to dark adaptation in dyslexics

Makrides and colleagues (June 10, p 1463) provide strong evidence that docosahexaenoic acid (DHA) is an essential nutrient for the optimum neural maturation of term infants as assessed by visual evoked potential acuity.
I have data indicating that DHA supplementation in adult dyslexics improves dark adaptation (scotopic vision) and thus DHA may also be a dietary essential for this condition.

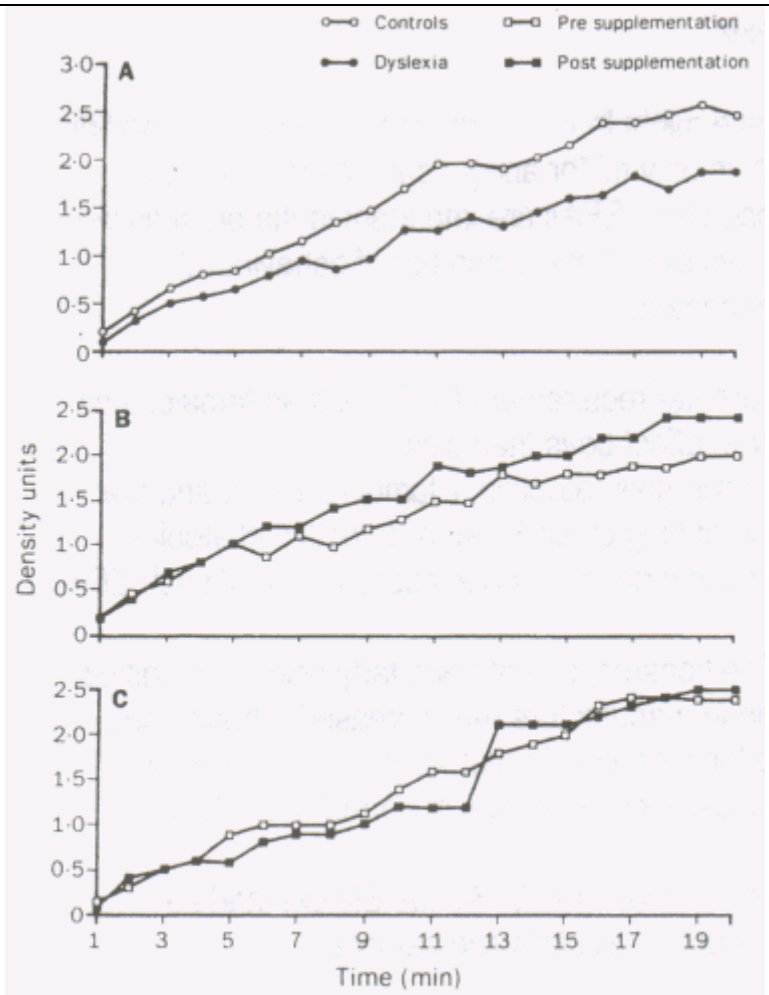

Figure: **Dark adaptation in dyslexics and controls**
Before supplementation with DHA (a); and effect of DHA supplementation in dyslexics (b) and controls (c).

We measured dark adaptation with a Friedmann Visual Field Analyser 2, set for the dark adaptation function, in ten adults with dyslexia and ten controls. Dyslexics showed poorer dark adaptation than controls, especially in the second part of the curve, which corresponds with rod dark adaptation (figure, a; repeated measures Anova p<0-05). We subsequently tested the possibility that dark adaptation might be influenced by DHA.

For 1 month five dyslexics and five controls were given 480 mg of DHA daily with no additional Vitamin A or Vitamin D. Dark adaptation was then retested (figure, b and c). In four controls DHA had no effect on dark adaptation, although in one (a strict vegetarian) adaptation clearly improved. By contrast, in the dyslexics with poor scotopic vision DHA consistently and significantly improved dark adaptation (figure, b; paired t-test on final rod threshold, p<0-04).

It has long been recognised that dyslexics have both retinal and central processing defects, but defective dark adaptation has to my knowledge not previously been reported. DHA is a key fatty acid in both retina and brain and is usually present in large quantities in these tissues. In these studies I show the benefit of DHA supplementation for one aspect of retinal function. I have found that DHA supplements given to dyslexics can also be associated with improvements in reading ability and behaviour. These reports are anecdotal and subjective but more formal controlled studies are in preparation.

I thank Ms Kacrina Searle, Mr Uam Trow, and Ms Katy Woid for technical assistance.

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Further research data is available in the American Journal of Clinical Nutrition 1995 Volume 62 pp 761-8

APPENDIX 1

WHAT IS DYSLEXIA?

Dyslexia is a condition that inhibits the reading and writing ability of between 10% - 15% of children and adults. It is found across the whole IQ range and indeed many dyslexics are of above average intelligence and with some extraordinary talents.

Many dyslexics have the ability to think more creatively than a 'normal' person does because they often think on pictures instead of words. This is known as non-verbal perception. It is this unusual way of perceiving their world that can throw dyslexic children into confusion when they see the written world.

There are several symptoms associated with dyslexia, but a dyslexic will not necessarily suffer all of these:

- Difficulties in reading, writing, spelling, addition and subtraction
- Lack of understanding between time and tense
- Confusion between left and right
- Are clumsy in some respects but are good at manipulating things like Lego
- Many dyslexics are left handed or ambidextrous
- Have difficulty processing visual and auditory stimuli
- Dyslexics are also often hyperactive

These commonly lead to teasing, bullying and criticism that in turn results in low self-esteem and behavioural problems.

Dyslexia is usually inherited. If either parent is dyslexic then the child is 17 times more likely to be dyslexic than the child of non-dyslexic parents is.

The dyslexic gene is found in between 5 and 15% of the population and is found equally in males and females. However many more males are affected by dyslexia, indicating that the gene has much more damaging effects in boys.

WHAT IS DYSPRAXIA?

This is defined as a difficulty in planning and carrying out skilled motor acts in the correct sequence. It is not thought to be a problem with the actual movements necessary to perform certain functions, but rather a difficulty in formulating the plan of action, and in developing certain motor based performance at an automatic level. Clumsiness is the most distinctive feature of this condition, perhaps in sports or usual household activities.

INDIVIDUALS SUFFERING DYSPRAXIA:

- Are overactive & restless or hypoactive
- Are impulsive and need immediate satisfaction
- Are irritated by touch, smells and sounds
- Are stressed by new or unpredictable situations
- Have poor ball skills and balance
- Lack sense of direction, position or time
- Have difficulty running or climbing or riding a bike or hopping or skipping
- Have poor writing skills
- Lack co-ordination between the two sides of the body
- Have poor attention and concentration
- Have poor memory - both visual and auditory

Many terms have been used to describe a child with specific problems in motor organisation:

- Developmental dyspraxia
- Clumsy Child Syndrome
- Minimal Brain Dysfunction
- Perceptual Motor Dysfunction
- Motor Learning Difficulties
- Developmental Co-ordination Disorder.

NOTE:
Verbal Dyspraxia, some investigators have also found articulation deficits in these children which is likely to be as a result of the same difficulties of planning what words they wish to speak and in which sequence.

Essential Fatty Acid Metabolism in Boys with Attention-Deficit Hyperactivity Disorder

ARTICLE 3

Laura J Stevens; Sydney S Zentall; Marcey L. Abate; Bruce A Watkins; Steven R Lipp and John R Burgess

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Journal Article:
Stevens LJ, Zentall SS, Deck JL, Abate ML, Watkins BA, Lipp SR, Burgess JR, 1995, 'Essential fatty acid metabolism in boys with attention-deficit hyperactivity disorder', American Journal of Nutrition, October; Vol 62 (4), p. 761-8

DESIGN: Survey behaviour and learning, health assessment and blood fatty acids.

SUBJECTS: 100 volunteers age 6 - 12 years.

ABSTRACT:
Attention-deficit hyperactivity disorder (ADHD) is the term used to describe children who are inattentive, impulsive, and hyperactive. The cause is unknown and is thought to be multi factorial. Based on the work of others, we hypothesized that some children with ADHD have altered fatty acid metabolism. The present study found that 53 subjects with ADHD had significantly lower concentrations of key fatty acids subjects. Also, a subgroup of 21 subjects with ADHD exhibiting many symptoms of essential fatty acids (EFA) deficiency had significantly lower plasma concentrations of 20:4n-6 and 22:6n-3 than did 32 subjects with ADHD with few EFA-deficiency symptoms. The data are discussed with respect to cause, but the precise reason for lower fatty acid concentrations in some children with ADHD is not clear. Diet deficiency is unlikely but a poorer ability to convert diet fatty acids to longer chain more highly unsaturated fatty acids is a possible cause as was implicated in the 2004 study on Adults with ADHD.

OTHER ESSENTIAL VITAMINS AND MINERALS:
In addition to glyconutrients and essential fatty acids, the brain needs adequate amounts of numerous other nutrients. These include the B group vitamins (thiamine [B1], pyridoxine [B6], niacin and vitamin B12), proteins which provide amino acids particularly tyrosine and phenylalanine which are used to manufacture the nuerotransmitters dopamine and norepinephrine, glutamine which is used for the production of GABA, and tryptohan which is used to make serotonin. Poor breakdown of protein or inefficient absorption of amino acids may be significant factor in both addiction and ADHD (Blum 1996).

Trace minerals also have a significant role to play in ADHD. Iron deficiency which leads to anemia reduces the quantity of red blood cells within the blood stream depriving the oxygen-hungry brain of its fuel. Iron is also incorporated into enzymes such as cytochromes which help detoxify drugs and poisons. Dopamine producing neurons in the brain's executive centre require the highest concentration of iron. Thus a deficiency in iron robs the brain of energy to perform adequately and cognitive impairments and behavioural problems can result. In one Polish study, iron deficiency was found in 50 hyperactive children. Low iron levels were found in plasma, RBC, urine and hair.
(Psychiatr Pol 1994 28 (3): 343-53, Neuropsychobiology 1997, 35(4):178-80)

Another trace element that is highly important in ADHD is magnesium. Magnesium has a multitude of different uses in the and is an essential cofactor of the enzyme delta 6 desaturase which converts vegetable derived omega 3 fatty acids to the brain critical omega 3 fatty acid DHA (docosahexaenoic acid) which is essential for the rapid release of dopamine. Thus if magnesium levels are low, DHA deficiency is very likely to exist. Magnesium is also a calming mineral that relaxes nerves and muscles. Emotional and physical stress, chemical abuse (caffeine, cortisone, alcohol, nicotine, Ritalin, dextroamphetamine,), recurrent infection, food or environmental allergies and gastrointestinal parasites can all result in magnesium depletion and can increase hyperactivity. Magnesium (Mg) deficiency was found in 95% of 116 Polish children with ADHD (78% low hair, 59% low RBC, 34% low serum). Double blind administration of 200 mg elemental Mg to 25% of the above group over 6 months led to decreased hyperactivity. (Magnesium Research 10 (2): 143-8, 1997).

Zinc is another mineral that may be of prime importance in ADHD. Zinc is responsible for the activation of numerous enzyme systems in the body. Low-grade zinc deficiency results in a weakened immune system (recurrent infections) and diminished digestive system function (intestinal parasites, bacteria and yeast in the gut). Kids who are zinc deficient are often fussy eaters who love junk food, have poor appetites and a poor sense of taste. Zinc is also a cofactor for the enzyme delta 6 desaturase mentioned above. Additionally, inadequate zinc levels affect the production of a complex protein called metallothionein which acts likes a "metal clean up service" for toxic metals such as lead, cadium, mercury, aluminum and arsenic. Since the ADHD brain is very susceptible to these toxins adequate levels of zinc may be of critical importance. Zinc deficiency has been reported in many studies. Low Zinc levels have been found in urine, serum, nail and hair than in controls. Furthermore, there is a quick drop in serum and salivary zinc upon the double blind administration of tartrazinea common food colouring used in junk food in Australia.
(UK J Nutr Med 1:51-57, 1990, Isreal Biol Psychiatry 40 (12) 1308-10, 1996; Poland, Psychiatr Pol 28 (3): 345-53, 1994, Canada Can J Physiol Pharmacol 68 (7) 903-907, 1990)

Other important minerals include calcium, chromium and selenium. For those who are allergic to dairy products eating adequate amounts of vegetables from the cabbage family, nuts, seeds, sardines, tofu and legumes is essential. Calcium is the key component in bones and teeth but is also necessary for blood clotting, nerve conduction, muscle contraction, and enzyme activity. Calcium also helps the body detoxify from lead poisoning and calcium citrate and micro-

crystalline hydroxyapatite are usually free of heavy metals contamination. Supplementation if the diet is inadequate needs to occur. Calcium deficiency was reported in a study of 15 Polish ADHD children. Lower plasma, RBC, urine and hair levels were found in ADHD than in controls. (Psychiatry Pol 1994, 28(3)).

Chromium is thought to play a vital role in the immune system and is known to be important in the regulation of blood sugar levels. Hypoglycemia (weakness, shakiness, irritability, moodiness, cognitive problems, sweating, rapid heart rate, hyperactivity or lethargy) result when there is an excessive drop in the blood sugar level. Avoiding sugary foods, beginning the day with breakfast and frequent balanced meals during the day as well as supplementation if necessary are ways to overcome hypoglycaemia and keep the blood sugar levels stable and the brain on an even keel.

Another mineral worth considering is selenium which is important for the production of antioxidant enzymes the most important of which is glutathione peroxidise. Inadequate levels of this enzyme leaves the body highly susceptible to oxidative damage and the brain vulnerable to toxic stress. Furthermore, selenium plays a major role in thyroid function. The enzyme 5'deiodinase depends on selenium for its activity. It is responsible for converting the hormone T4 to the active hormone T3 which is difficult to measure and thus subtle thyroid problems often go undetected. It has been suggested that inadequate T3 activity may result in profound diminishing of brain function. Those who are selenium deficient are also at greater risk to the accumulation of toxic mercury (amalgam filings, fresh water fish) because the activity of the enzymes glutathione peroxidise and 5'deiodinase are decreased. Since Australian soils are depleted in Selenium, supplementation is prudent.

Other trace elements may also play a role in ADHD. The most important way to ensure an adequate intake of nutritional traces minerals is to eat a whole foods diet with adequate whole grains (be careful of gluten), proteins, fruits and vegetables. Care should be taken to ensure that multivitamin supplements supply adequate quantities of the desired trace minerals and vitamins in a highly absorbable form and they should be free from common allergens (wheat, dairy, soy), artificial colours, flavours and sweeteners.

If children and adults with ADHD and neurodevelopmental disorders are not absorbing Zinc and B6 or have low levels while on supplementation then it may be worthwhile having them assessed for Pyroluria which is a genetic abnormality. Polyuria results in over production of pyroles found in urine and this increases the body's need for Zn and B6. The condition found in 11% normal's, 24% disturbed children, 42% psychiatric patients and 52% schizophrenics (Pfeifer Sohler 1971).

Perhaps the most overlooked piece of the puzzle in ADHD, Dyslexia, Dyspraxia, neurodevelopmental and psychiatric disorders is the gut brain connection.

- Nerve cells "talk" with a chemical language
- The "ears" that hear the chemical language are receptors on membranes of responding cells
- Signalling molecules bind to these receptors which triggers a physiological event or cellular action (transduction)
- Drugs, incompletely digested food molecules and toxins from bacteria take over the molecular switches that activate cells by mimicking natural signalling molecules and binding to receptors.

The enteric nervous system that controls the gut is the only element of the peripheral nervous system that does not have to do the bidding of the brain and spinal cord. It is an independent site of neural integration and processing and is often referred to as the "second brain". (Gershon, MD (1998) "The Second Brain")

Neurotransmitters found in the brain have also been located in the gut. 95% of serotonin is found in the gut. More than 75% of our immune system is in the gut.

Although the reciprocal interaction between enteric and brain neurons via neuropeptides and neurotransmitters is now well established it is yet to be accepted by mainstream medicine. (Editorial opinion. Gastroenterology Vol. 119, No. 1, July 2000)

When the enteric nervous system runs the bowel well there is bliss in the body. When it fails, and the gut behaves badly, a host of physical, emotional and psychiatric disorders follow. The basis of bowel health is the balance of microflora (gut bacteria).

Many children with ADHD exhibit Intestinal Dysbiosis (overgrowth of detrimental bacteria, yeast, protozoa instead of beneficial micororganisms), food allergies, and recurrent abdominal pain. Adults with ADHD, anxiety and depression also commonly exhibit symptoms of Irritable Bowel Syndrome (IBS), Inflammatory Bowel Disorder (IBD) in addition to intestinal dysbiosis, food and chemical sensitivities.

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Spiller, R. C. (2003), ‘Infection as a cause of irritable bowel syndrome’, Hosp Med, May, 64(5): 270-4.

Swidsinski et. al. (2000) Mucosal Flora in Inflammatory Bowel Disease. Gastroenterology. Vol.122: 44–54.

Children who suffer from recurrent abdominal pain (RAP) in childhood are significantly more likely as adults to endorse anxiety symptoms and disorders, migraine, hypochondriacal beliefs, greater perceived susceptibility to physical impairment, poorer social functioning, current treatment with psychoactive medication than controls 11.1 years after an initial visit to a gastroenterologist. (Campo, J.V., et al., Adult outcomes of paediatric recurrent abdominal pain: do they just grow out of it? Paediatrics, 2001. 108(1): p. E1.)

70% to 90% of adults with IBS have at least one psychiatric comorbidity, most notably **mood and anxiety** disorders. There is a high prevalence of IBS in psychiatric patients who seek treatment, with a prevalence of 19% in schizophrenia, 29% in major depression, 46% in panic disorder. (Garakani, A., T. Win, et al. (2003). "Comorbidity of irritable bowel syndrome in psychiatric patients: a review." Am J Ther 10(1): 61-7.)

Therefore assessing gut, immune and brain function whenever neurodevelopmental, learning, behavioural or psychiatric disorders is suspected is of paramount importance.

Perhaps the simplest and least inexpensive dietary intervention is to ensure that a person has an adequate intake of clean, filtered water. Chronic low grade dehydration is common in children with ADHD and learning disabilities for a variety of reasons - they don't slow down long enough to think about drinking water; a fatty acid deficiency may have a diuretic effect on the kidneys, low zinc levels and food allergies are often associated with excessive thirst and urination. Eventually a sense of thirst can become inefficient and these children feel miserable when they become dehydrated.

Minor degrees of dehydration can cause irritability, malaise, cognitive problems, lethargy or hyperactive behaviour. Furthermore, dehydration also causes significant impairment of the immune system, constipation and increases the risk of respiratory infections. Detoxification also requires optimal function of the liver, kidneys and bowel all of which require good hydration.

The usual recommendation of six to eight glasses of water may be insufficient for children who are active, have food allergies or fatty acid deficiencies. Sending a child to school with a litre bottle of filtered water is one way for parents to control the quality of water and allows some degree of monitoring the child's intake of water. Make sure the water has been alkalinised after reverse osmosis to prevent further acidosis in the body. Invest in a reputable water filter.

"One of the most important skills that children and adults with ADHD must learn is how to properly feed their own brains for life" (Lyon, p121).

For more information or to make an appointment please contact us on (02) 9637 9998 during business hours.

LINKS

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  https://www.mannatech.com/Default.aspx

  Founded in the US in 1994, MannatechTM Incorporated is a publicly traded global wellness solutions company is a pioneer and world leader in glycol nutrients, occupying a unique niche in the dynamic field of carbohydrate technology.

- **True Food Guide by Greenpeace Australia Pacific**

  http://www.truefood.org.au/truefoodguide/

  Australia currently has limited labelling laws for genetically engineered (GE) foods. That's where the Truefood Guide comes in handy. The Guide rates food brands and products as Green (GE-free) and Red (may contain GE ingredients).

  This is essential reading for all people especially those with young children, and those who experience developmental, learning, behavioural or psychiatric disorders.

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