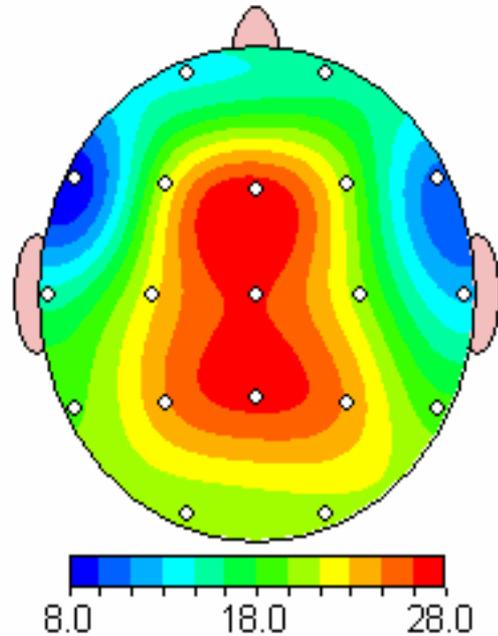


Resource booklet for parents, teachers  
and health professionals

**Behavioural  
Neurotherapy  
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# ADHD

Identifying and treating some of the root  
causes of ADHD, Autism Spectrum  
Disorders and childhood mood and  
behavioural disorders

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This booklet was produced as a collaborative effort by the following scientists and clinicians. The opinions expressed in this booklet and the treatment protocols described are based on current scientific findings and are constantly evolving. The contributors consider that good science should constantly challenge its boundaries and create new horizons.

This booklet is intended to inform the reader and is not intended to serve as diagnosis and treatment for individuals with difficulties. Always consult a suitably qualified health professional when considering treatment.

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**Jacques Duff MAPS; MAAAPB; MASNR; MECNS; AMACNEM**

*Interests: childhood disorders, QEEG Neuroimaging (Brainmapping) in the differential diagnosis of childhood disorders, Behavioural interventions and Neurotherapy to retrain the abnormal patterns of brain activity; Nutritional and environmental medicine.*

Jacques Duff is the founder and Clinical Director of the Behavioural Neurotherapy Clinic. Since 1997 he has been involved in Clinical Neuroscience research at the Brain Sciences Institute, investigating the causes of ADHD and its treatment using Neurotherapy. In addition to being a psychologist, he has Postgraduate training in Clinical Neuroscience and Nutritional and Environmental Medicine.

His daily clinical work with ADHD has been featured on several TV programs such as Good Medicine, Catalyst and Today-Tonight and in national newspapers. He has presented extensively on the treatment of ADHD and childhood disorders at local and International seminars, including last year's keynote address for the Department of education & Training "Student Wellbeing Conference" and the 2<sup>nd</sup> "International Mind of a child" conference.

**Dr Joe Nastasi BSc; MBBS; Dip Acu; MRSM; Grad Dip. APP Sc GSIM**

*Interests: Mechanisms of cellular malnutrition that may underpin the symptoms of ADHD and childhood disorders*

Dr Nastasi is a medical practitioner with a long-standing interest in medical sciences. He was a practicing scientist at Fairfield Infectious Diseases Hospital. He has postgraduate experience in Paediatrics, Geriatrics, Obstetrics, Gynaecology, Psychiatry and Family Practice. He also has a Postgraduate Diploma in Nutritional and Environmental Medicine. His interest is in investigating the anomalies in metabolism that may be responsible for some childhood disorders and many other modern diseases. Dr Nastasi was also a senior Lecturer at the Swinburne University School of Integrative Medicine.

**Dr Henry Butt MSc, PhD (Microbiologist)**

*Interests: Gut bacteria, Intestinal Dysbiosis, Chronic pain and Chronic fatigue.*

Dr Butt is a senior scientist and Research Director of Bioscreen, now based at Melbourne University. Dr Butt has extensive experience in faecal microbiology. He is largely responsible for the development of the testing procedures for the analysis of the profile of bowel bacteria. Dr Butt is interested in how Intestinal Dysbiosis (overgrowth of some bacteria usually found in the gut) may cause leaky gut and lead to nutrient malabsorption and cellular malnutrition. Dr Butt has published several scientific papers and presented his scientific findings nationally and internationally. He has presented his work on TV programs such as: "60minutes", "Quantum" and the "ABC Science show"

**Tania Emms BSc, MNutr & Diet, Clin Sports Nutr (AIS), Accredited Practising Dietitian (Consultant Nutritionist)**

*Interests: Dietary requirements and Nutritional supplementation for IBS, Chronic fatigue and childhood disorders.*

Tania Emms has worked extensively as a nutritionist and dietitian. She has a Masters Degree in Nutrition and has been a researcher at Newcastle University with many publications to her name.

**Dr. Dennis Shum MBBS; FRANZCP (Psychiatrist)**

*Oral Presentation: The many faces of Adult ADHD: how it can present as other psych disorders*

Dr Shum is a psychiatrist in private practice who has used QEEG and Neurotherapy extensively. He will illustrate the varied presentations of adults with ADHD, in the form of chronic depression, anxiety, OCD, personality disorder and in other ways, as well as situations where adult ADHD co-exists with other psychiatric conditions.

# The Child with ADHD

Imagine living in a fast-moving world, where sounds, images, and thoughts are constantly shifting. You become bored easily, and you find it impossible to keep your mind on tasks you need to complete. Distracted by unimportant sights and sounds, your mind drives you from one thought or activity to the next. You are driven to move, unable to stay still for long and you impulsively respond to events around you without stopping to consider consequences. Perhaps you are so wrapped up in this confused world of thoughts, images and feelings that you don't notice when someone speaks to you, and you soon forget what is asked of you. You are so forgetful you can't remember the simplest daily routine activities. Hence you are constantly in trouble for not listening and following instructions, or for acting "silly" or misbehaving. After a while you start to lie to avoid punishment, getting yourself into yet more trouble.

For many children, this is what it's like to have Attention Deficit Hyperactivity Disorder, or ADHD. They may be unable to sit still, plan ahead, finish tasks, or even be fully aware of what is happening around them. To their family, teachers or classmates, they appear to function in a world full of disorganisation. On some days and in some situations, the child with ADHD appears to function and behave well, and at other times fail miserably. This leads many adults into mistakenly thinking that the child with ADHD can control these behaviours, but misbehaves for "attention seeking".

## Definition of ADHD

Almost all children occasionally display lapses in attention and inappropriate behaviours, feel overly sad or experience academic difficulties. However, the child with ADHD can display some of these shortcomings almost constantly and to such a degree that it disrupts family life and the classroom, affects their relationships, academic output and their self-esteem. There are three subtypes of ADHD:

- Primarily inattentive
- Primarily impulsive/hyperactive
- Combined subtype with features of both of the above.

A diagnosis of ADHD should be made only by an experienced Psychologist, Paediatrician or Psychiatrist.

The following guidelines should be followed to reduce the chances of misdiagnosis:

- Medical causes have been *thoroughly investigated and excluded*.
- Symptoms are not the result of medications prescribed for other conditions.
- The symptoms are not the result of depression or anxiety.
- The behaviours impact adversely on familial, academic and social functioning.
- The age of onset is before 7 years, and symptoms last for at least 6 months.
- The inappropriate behaviours are seen in more than one setting.

There must also be at least six of the following characteristic inattentive, hyperactive or impulsive behaviours:

### **Inattention**

- Often fails to give close attention to details or makes careless mistakes in schoolwork,
- Often has difficulty sustaining attention to a task,
- Often does not seem to listen to what is being said,
- Often does not follow through on instructions and fails to finish schoolwork, chores, or work. (This does not come about as a result of failure to understand or deliberate opposition to the task),
- Often has difficulty organising tasks or activities,
- Often avoids or strongly dislikes tasks that require sustained mental effort,
- Often loses things,
- Often easily distracted,
- Often forgetful in daily activities.

### **Hyperactivity**

- Often fidgets with hands and feet, or squirms in seat,
- Often leaves assigned seat,
- Often runs around or climbs excessively (In teenagers and adults this may be feelings of restlessness).
- Often has difficulty engaging or playing in activities quietly,
- Seems to be in constant motion, and talking excessively.

### **Impulsivity**

- Often has difficulty waiting in line or waiting for own turn,
- Often interrupts others,
- Often blurts out answers.

### **Impact of ADHD on Families, and Society**

“Children with ADHD experience an inability to sit still and pay attention in class. They experience peer rejection and engage in a broad array of disruptive behaviours. Their academic and social difficulties have far-reaching and long-term consequences. These children have higher injury rates. As they grow older, children with untreated ADHD in combination with conduct disorders experience drug abuse, antisocial behaviour, and injuries of all sorts. For many individuals, the impact of ADHD continues into adulthood”[1].

“Families who have children with ADHD, as with other behavioural disorders and chronic diseases, experience increased levels of parental frustration, marital discord, and divorce. In addition, the direct costs of medical care for children and youths with ADHD are substantial. These costs represent a serious burden for many families because they frequently are not covered by health insurance”[1].

## **Problems Often Associated with ADHD**

### **Associated Learning Difficulties**

Many children with ADHD also have specific Learning Difficulties, which means they have trouble mastering language or certain academic skills, typically reading and mathematics. Since Learning difficulties do not respond to medication it is imperative that the diagnosis be accurate. ADHD is not of itself a learning disability but because it can interfere with concentration and attention, ADHD can make it harder for a child with Learning Difficulties to do well in school. Differentiating between learning difficulties and ADHD can be difficult when the symptoms seem to overlap. Quantitative EEG (QEEG) Neurometric brainmapping can differentiate with over 90% accuracy between ADHD and Learning difficulties on the basis of differences in patterns of brain electrical activity [2-7].

### **Depression and anxiety**

Many children with ADHD experience emotional disorders. They may, for example, experience fear or anxiety even when there's nothing to fear. Because the feelings are scarier, stronger, and more frequent than normal rational fears, they can affect the child's thinking and behaviours. Others may experience depressed mood that extends beyond the sadness that we feel in times of loss. Depression may lead the child to feel hopeless and unable to deal with everyday tasks. Depression can disrupt sleep, appetite, self-esteem and the ability to think. Depressed children are easily frustrated and have frequent anger outbursts. Symptoms of mood disorders are:

- Excessive anxiety and worry that the child has difficulties controlling. Restlessness or feeling keyed up or on edge, fatigue easily, poor concentration or mind going blank, irritability, muscle tension, sleep disturbance (Sleeping too little or too much, difficulty falling or staying asleep, or restless unsatisfying sleep).
- Feeling sad, empty, moody and/or in an irritable mood most of the time or loss of interest or pleasure in daily activities. Feelings of worthlessness and poor self-image. Failure to thrive or significant weight loss or gain when not dieting. Hyperactive or lethargic, fatigue and/or loss of energy, diminished ability to think or concentrate, or indecisiveness, recurrent thoughts of death (not just fear of dying) and suicidal ideation

Many children who suffer from anxiety or depression as the primary problem also have attention deficits as a secondary presentation. Unfortunately all too often they may be misdiagnosed as ADHD and treated with stimulant medication which, although may improve attending and concentration, leaves the depression and anxiety untreated, or worse still may exacerbate the feelings of anxiety and depression.

Stimulant medication (which increases availability of the neurotransmitter dopamine) is given to children with ADHD based on the premise that the frontal lobes are underaroused and lacking in dopamine. Children who do not have this underarousal and are given stimulant medication may experience unacceptable side effects of excess dopamine.

### **Recurrent abdominal pain, Intestinal dysbiosis and mood disorder**

There is emerging research suggesting that children with recurrent abdominal pains may in fact suffer from intestinal dysbiosis. This is a condition whereby the various bacteria usually found in the large bowel are abnormally distributed. Often there is an overgrowth of streptococcus and enterococcus and a reduction in the beneficial flora lactobacillus and bifidobacteria. This imbalance can interfere in the proper breakdown of food into nutrients and may lead to nutrient malabsorption. In addition a number of studies have linked such bacterial imbalance to Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD).

Dr Campo and colleagues from the University of Pittsburg School of medicine conducted a study published in Pediatrics in July 2001, which highlighted the problem. They found that children with unexplained recurrent abdominal pains did not seem to simply outgrow them. In a controlled study, they found trends suggesting associations between childhood recurrent abdominal pains and lifetime psychiatric disorder, depression, migraine, and family history of depression at 11-year follow-up.

A recent study from Mt Sinai Medical Dept of Psychiatry in New York found that 70-90% of patients with Irritable Bowel Syndrome also suffered from psychiatric problems, mostly anxiety and depression. After reviewing a number of recent studies, an editorial expert opinion published in Gastroenterology, July 2000, stated that the studies established unequivocally that in some genetically susceptible persons there is an autoimmune response to bacteria in the gut causing IBD.

In our clinical experience many children with anxiety, irritability and temper outbursts, irregular stools, frequent tummy aches and sometimes recurrent headaches seem to have abnormal bowel bacteria profile, and more often than not, a leaky gut. Leaky gut is a medical expression meaning that large molecules (food or bacterial toxins) are able to cross the gut barrier and irritate the gut wall or cross into the blood stream. Treating the bacteria and leaky gut and improving nutrient malabsorption significantly improves symptoms.

Bioscreen Laboratory at Melbourne University is the only Pathology Laboratory in Australia at the time of writing that grows the faecal bacteria over a period of weeks and counts the colonies to estimate the bacterial profile. Other laboratories do not provide such a detailed faecal microbiology profile.

### **Oppositional Defiant Disorder (ODD) and Conduct disorder (CD)**

Oppositional and defiant behaviours are characterised by stubbornness, tantrums, disobedience and defiance of adults and authority. The child can be argumentative, have a low frustration threshold, loses temper easily, and blames others for his or her mistakes. The child can often seem to be angry and resentful and seems to violate rules with no regards for consequences.

A child with chronic oppositional behaviours is at risk of developing Conduct Disorder. Neither of these disorders respond to medication since medication cannot teach people how to interact. The best treatment option for these disorders may involve: (a) identification and treatment of the root causes of the ADHD and associated symptoms (b) early expert family counselling and behaviour modification program to help parents develop the appropriate skills to moderate the child's behaviours rather than exacerbating them (c) Neurotherapy to attempt to normalise brainwave patterns (d) Nutritional supplementation to optimise brain function.

## **Asperger's Syndrome and Autism Spectrum Disorders**

The main features of Asperger's Syndrome are (a) Reduced quality of social interactions, (b) Unusual patterns of interest and/or behaviours, (c) Poor motor co-ordination, (d) Unusual speech patterns (e) Sensory sensitivities. Children with Asperger's have very high anxiety, and research indicates that 40% of children diagnosed with Asperger's Syndrome also meet the criteria for ADHD. Treating only the ADHD symptoms leaves the debilitating anxiety untreated.

Children with Aspergers Syndrome and Autism Spectrum Disorders frequently have abnormal bacterial profile and respond well to treatment that normalises their bowel flora and improves bowel function. The assessment and treatment model described in this booklet also applies to children with Autism Spectrum disorders.

In our clinical experience of evaluating and treating hundreds of children, socialisation difficulties are most of the times associated with excessive posterior right hemisphere slow wave activity seen in the Quantitative EEG (Brainmapping). Correcting this pattern with Neurotherapy reduces these problems significantly. When bowel function is normalised, Neurotherapy can also be used to correct abnormal brainwave patterns associated with anxiety and ADHD. Follow-up counselling using Cognitive Behaviour Therapy can be used if deemed necessary.

### **Diagnosing ADHD and comorbidities**

After years of scientific investigations, leading scientists and clinicians have come to the conclusion that ADHD is not a single disease nor is it a single identifiable disorder. A review of research and clinical work has led to the conclusion that ADHD is a catch-all acronym that includes a whole range of underlying disorders leading to a range of behavioural and academic difficulties in children[8].

This suggests that to treat ADHD effectively clinicians may need to:

- Seek to identify the underlying metabolic causes and treat these as required.
- Treat the symptoms in the short-term with stimulant medication
- Treat the abnormal brainwave patterns with Neurotherapy
- Treat the behavioural aspects with Cognitive Behaviour Therapy and behaviour modification techniques.

## Multimodal assessment

Recommended assessment tools for ADHD assessment include standardised behaviour rating scales, laboratory measures of ADHD where available, and behavioural observations in classroom and/or clinical setting. Treatment should be multidisciplinary, multimodal, and maintained as long as necessary, with periodic reintervention after treatment termination as necessary [9].

In a multidisciplinary model, pathology laboratory tests, measures from Psychology, Neuroscience and Psychophysiology can be used to thoroughly investigate medical and psychophysiological conditions that can give rise to or

ADHD is not a “disease” for which there is a single test. Rather it is a collection of symptoms that describes a “disorder” for which there may be several causes. Consequently a multimodal approach to assessment and treatment is essential.

mimic ADHD. The information provided by these tests guide treatment protocols that are tailored to the causal factors responsible for the difficulties of each individual child. Combinations of the following tests and assessments may be used, as required, guided by an extensive clinical intake questionnaire and interview.

### QEEG Neuroimaging

Quantitative EEG (QEEG) is the statistical analysis of the electrical activity of the brain. It is a brainmapping tool used to evaluate differences in brain function from a database of people without difficulties. In the brainmap sample, the colour black, and one colour gradation above and below on the scale represents the normal range. The hotter and colder colours represent excesses and deficits respectively. QEEG enables the formulation of treatment options guided by the brain patterns associated with abnormal behaviours rather than relying only on questionnaires.

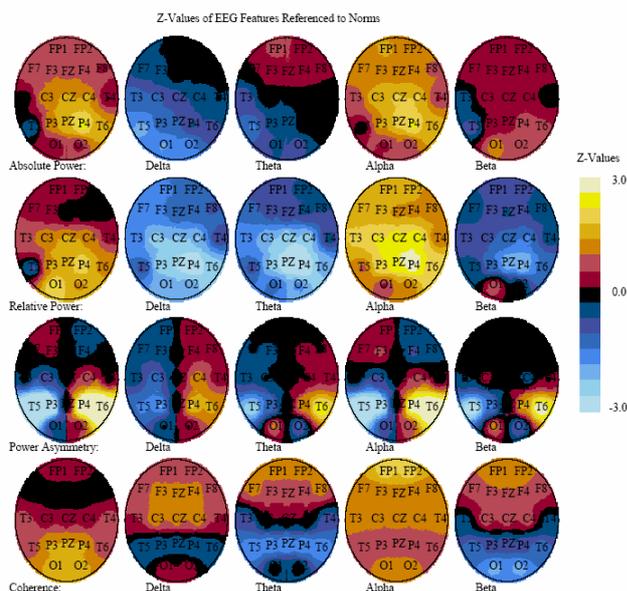
Until recently QEEG studies were carried out mostly by neuroscientists in Brain Research and Neurophysiology Laboratories. Although the technique is taught and used at many Medical Schools in the United States: e.g. UCLA Medical School, Harvard Medical School and New York University Medical school (to name a few). QEEG has not been taught in Australian Medical schools, although QEEG is used at the Brain Sciences Institute at Swinburne and other Universities in Australia for research. Only a few health professionals with specialised training use QEEG clinically. Over 90% of published EEG studies use QEEG methods.

QEEG is very useful in revealing the underlying abnormal brainwave patterns associated with ADHD and many other disorders. The system can discriminate with more than 90% accuracy ADHD from Learning difficulties and from normal. Consequently, it is a very useful adjunct tool in helping determine which treatment is best suited for an individual child, rather than relying solely on behavioural questionnaires that lack the objectivity and specificity.

The Behavioural Neurotherapy Clinic uses the Neurometric QEEG system, from the Brain Research Laboratories of New York University Medical Centre. This system has in excess of 20,000 subjects in the database and has been used in over 200 scientific studies.

### Test of Variables of Attention (T.O.V.A)

The Test of Variables of Attention (TOVA) is a computer administered continuous performance task, which was initially designed by Dr Lawrence Greenberg MD. It’s uses include:



- An aid in the diagnosis of ADHD
- A tool to predict and test the effectiveness of stimulant medication
- To help determine optimal dosages of medication so as to minimise adverse side effects.
- To measure the effectiveness of treatment for ADHD and attention disorders from other factors.

The task requires students to press a specially designed microswitch whenever a "target" appears on the screen, and to refrain from pressing when a "non-target" appears. The scores are compared to an age appropriate database to produce standardised scores, which gives useful objective information on four variables of attention:

- Ability to sustain attention and mental effort
- Impulse control
- Brain processing speed (reaction time).
- Distractibility (variability in the response times)

### **Weschler Intelligence Scale for Children (WISC)**

The WISC is used to test the general thinking and reasoning skills of students aged between six to sixteen. The scores show how well a student performed compared to thousands of students the same age from across the United States and Australia.

The WISC has 13 subscales, which are used to assess various aspects of verbal intelligence (reasoning with the use of words) and non-verbal intelligence (reasoning without the use of language). The results can give a good indication of which cognitive functions are not optimal and may help in the formulation of more appropriate treatment strategies.

### **Extended Faecal Microbiology Investigation (EFMI)**

This highly sensitive test is used to examine in detail the distribution of the normally-occurring bacteria in the large bowel. For example, often a reduction in the E.Coli count and an overgrowth of streptococcus and/or enterococcus. Abnormal bacteria profile is called intestinal dysbiosis and is often associated with irritable bowel syndrome (IBS), mood disorders, ADHD, Aspergers and Autism Spectrum disorders. Intestinal dysbiosis can cause a weakening of the protective mucosa of the gut and cause a leaky gut and malnutrition through malabsorption, despite what appears a normal diet. EFMI is conducted by BIOSCREEN, located at Melbourne University in Parkville.

## **Treatment Options**

### **Medication**

Psychostimulants, such as Dexamphetamine and Ritalin, are the most popular treatment for some of the "symptoms" of ADHD. Psychostimulant medications have been reported to reduce the problematic hyperactive symptoms in approximately 60-70% of children with ADHD. Research and clinical findings indicate that the ability to attend increases, that social behaviours improve, and that impulsivity decreases with the use of psychostimulants [10]. Swanson and fifteen co-authors conducted a comprehensive examination of 341 reviews of the effects of stimulant medication on children with attention deficit disorders. Their review found that stimulant medication was ineffective for 25 to 40 percent of children with ADHD. A large proportion of those responding to stimulants also showed improvements on a placebo (a harmless sugar pill)[11].

Swanson found that amongst those that responded to stimulant medication, temporary management of over activity, inattention and impulsivity could be expected, as well as temporary improvement in compliance. Hyperactivity and aggression may be reduced, and consequently the amount of academic work completed may increase in the short term (months). However contrary to the hopes of parents and practitioners, there was no evidence of long term significant improvement in reading, athletic or game skills, proactive social skills, learning and achievement other than improved attending[11].

Stimulant medication allows many children with ADHD to spend a near-normal day at school, and gives teachers and parents a welcome relief from their disruptive or inattentive behaviours. However medication does not treat the causes of ADHD, only some of its symptoms.

Stimulant Medications only work when in the system, and since they clear the system in about 4 hours, up to three doses may be required each day. When medication is stopped, even if after extended periods, many of the undesirable behaviours reappear. Clinical experience indicates that a common complaint of parents whose children take medication for ADHD is that while the child is less hyperactive and is more on task at school, the same child has dif-

difficulties getting started in doing homework at home, continues to experience difficulties following rules, and cannot understand why certain behaviours are inappropriate[12].

A review of the literature reported by Barkley revealed that between 79% to 90% of children on these medications experienced undesirable side effects. Side effects reported in clinical studies are: loss of appetite, headaches, sleep problems, gastrointestinal disturbances, increased tic disorders, mood instability and growth reduction[10]. A small but significant number of children show negative physiological side effects that do not diminish or resolve over time despite cessation of the medication. Psychostimulants are not appropriate for all children with ADHD. According to the manufacturer of Ritalin, it is not recommended for children with anxiety or motor tics or Tourette's Syndrome due to the risk of exacerbating these conditions.

## **NEUROTHERAPY**

Since the 1960s, research in neuroscience and psychophysiology, in universities and clinical practice settings have shown that through Neurotherapy patients can be taught to restore self-regulation in the brain by retraining brain-wave patterns. The research literature and clinical work supporting this view has been published in peer reviewed journals for decades. There are currently in excess of 1000 clinics worldwide using Neurotherapy. There are consistent reports that permanent remediation of around 80% of ADHD cases and significant improvement of many other mental disorders, without the use of drugs.

The work of psychologists, psychiatrists neurologists and medical practitioners practicing Neurotherapy is largely unrecognised in mainstream. This is partly due to the criteria that have been established by the medical and pharmaceutical community, requiring double blind studies for proof of the efficacy of a treatment. In double blind studies, neither the experimenter nor the subjects know whether the subject is receiving a placebo or the treatment being investigated. While this method is effective and reliable in the short-term investigation of the effectiveness of medications, it is rarely applicable to client intensive psychotherapies due to ethical and practical reasons. Forty sessions of dummy treatment would cause harm to a vulnerable patient group by promoting learned helplessness.

A recent book (The ADD Book: New ways of Parenting your child) by William Sears, a Paediatrician and former Assistant Professor at the University of Southern California School of Medicine outlines the current state of the clinical use of Neurotherapy. According to Sears and co-author Linda Thompson, Director of the ADD Center in Toronto, although Neurotherapy studies to-date lack the power of double blind studies, there is sufficient valid research, such as series of case studies and several studies with comparison groups using subjective and empirical measures to justify the mainstream clinical use of the treatment [38].

Neurotherapy is a computer-based technique for retraining the brain to produce more normal patterns of electrical activity, and has been shown to be an effective treatment for around 80% of children with ADHD and Learning Difficulties. Neurotherapy was developed at the UCLA Medical School EEG Laboratory by Professor Barry Sterman in the early 1970s as a treatment for childhood epilepsy[13]. It was further developed extensively by Professor Joel Lubar of Tennessee University as a treatment for ADHD and Learning Difficulties[12, 14].

To date there are in excess of 60 studies indicating that Neurotherapy is effective in the treatment of ADHD and Learning difficulties. Many more studies have been conducted indicating that Neurotherapy is also effective in epilepsy, depression, traumatic brain injuries and other conditions. A Recent placebo blinded controlled studies with have shown that the treatment effects are indeed due to Neurotherapy. Treatment effects appear to last for years perhaps for life. A comprehensive list of these studies is available on line at <http://www.adhd.com.au>.

The January 2000 issue of the journal "EEG and Clinical Electroencephalography", the journal of the EEG and Clinical Neuroscience Society was dedicated entirely to reviewing Neurotherapy. Professor Frank H. Duffy, M.D., the Neurology editor and a Paediatric Neurologist at Harvard Medical School, stated in the editorial that the scholarly literature suggests that Neurotherapy should play a major therapeutic role in many difficult areas.

Studies have revealed patterns in the QEEG of ADHD children, which are consistent with findings revealed by PET, fMRI, SPECT and other neuro-imaging studies. ADHD children have consistently been found to have increased slow wave Theta (4-7Hz) activity, and reduced fast wave Beta (16-20 Hz) activity in their EEG, when compared to age matched controls [25, 39-54]

During Neurotherapy, real-time QEEG is displayed on a computer in the *form of a game*, and the patient is given contingent audio-visual rewards for producing less Theta and more Beta waves. There is now significant evidence in

the literature, which suggest that most ADHD children can learn to produce a brainwave pattern with more normal theta/beta ratios [16, 24, 46, 55].



Improvements in theta/beta ratios of ADHD subjects following Neurotherapy have been found to correlate significantly with a number of empirical and subjective measures. Studies have shown improvement in impulsivity, attention, response time and variability of response time scores on Continuous Performance Tasks (TOVA). In addition there were reductions in hyperactivity and impulsivity on behaviour scales, increase in attention and cognitive skills in Individual Achievement Tests scores, and increases in IQ scores [40, 44, 49, 56-59].

Overall, results of several studies indicate that Neurotherapy treatment is effective in over 80% of cases in significantly reducing the undesirable ADHD symptoms, and the effects appear to be permanent [25, 38, 57, 60, 61]. In many of the studies cited, the ADHD subjects were on psychostimulants at the start of the study.

In all of the studies when medication was involved, the subjects were able to reduce their stimulant medication or completely come off the medication by the end of Neurotherapy treatment.

Many researchers, scientists and clinicians have expressed the opinion that Neurotherapy is not more widely used mostly because the largest research funding sources, the pharmaceutical companies, have no interest in promoting its research and clinical application.

### **Diet and Nutritional Supplementation**

Diet is what you eat, while nutrition is what you assimilate from your diet. Food is prepared through the digestive process and broken down into nutrients in the small and large intestines by beneficial bacteria. If the bacteria profile is abnormal, characterised by a significant reduction in the total count of beneficial bacteria and an increase in the count of other bacteria, then breakdown of foods may be less than optimal and the nutrient production inadequate. The additives, artificial colourings, flavourings and other chemicals that we ingest daily may interfere with the delicate balance of beneficial bacteria in our gut, not to mention prescribed medications (including antibiotics), and antibiotics found in the food chain.

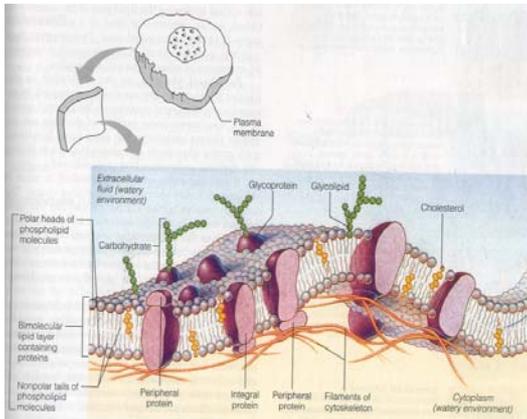
Added to this list of “foreign” substances, which were not in the diet of our evolutionary ancestors, modern agricultural methods and food processing have significantly reduced the availability of nutrients in the foods that we eat. The “Medline” medical database contains numerous references to studies highlighting the benefits of various specific vitamins and nutrients for a whole range of disorders.

### **The critical importance of Omega 3 Essential Fatty Acid (EFA)**

Of all the nutrients that we are depleted in, none appear to have such widespread ill-effects as deficiencies in the Omega 3 EFAs derived from fish. Most book stores have at least a dozen books on the benefits of fish or fish-oil consumption. All modern diseases have been linked to deficits in fish derived Omega 3 fatty acid. This includes to name a few: childhood behavioural disorders such as ADHD and Learning difficulties, depression anxiety, bipolar disorder, schizophrenia, diabetes, cancer, cardiovascular disease and Alzheimers. For a review of this literature we recommend the excellent book by Professor A. Stoll, the head of Psychiatric Pharmacology at Harvard Medical Centre, entitled: “The omega 3 Connection”.

Several studies and reports by the World Health Organisation, the US. National Institute of Health and in Australia, the NHMRC, recommend that we should consume a ratio of Omega 6 to Omega 3 of around 2:1. Countries and communities who consume this ratio have a very low incidence of all the modern diseases. In our modern western diet we consume a ratio of Omega 6 to omega 3 which is between 20:1 to 40:1.

Every cell in the body has a lipid (Essential Fatty Acid) membrane which acts to protect the cell from substances outside of it. Omega 3 fatty acids play a crucial role in this protective system. A lack of Omega 3 EFAs renders every cell in the body vulnerable. The most vulnerable areas being the brain and the gut wall, and in younger children the ear and the mucous membranes of the nose throat and lungs.



### **Omega3 EFAs and brain function**

The brain consists of 70% lipids and 40% of the brain is made up of Omega 3 EFAs (of the kind we get from fish). There are in excess of 8000 studies on Essential Fatty Acids in the scientific literature. Many are animal studies proving that deficiencies of the long chain Omega 3 EFAs (derived from fish) are associated with serious brain and systemic dysfunctions. Many prove that Omega 3 EFAs are essential for brain function. It is known that deficits are associated with all kinds of Psychiatric disorders including ADHD and Learning Difficulties.

### **Omega3 EFAs and Gut function**

The gut cell wall, the epithelium, is constantly exposed to billions of organisms and toxins daily. The importance of the protective effect of the lipid membrane of each cell in the epithelium cannot be understated. If the lipid membrane is faulty, such as if there are deficits in Omega 3 fatty acids, the protection fails and unfriendly organisms, irritants and toxins irritate the gut wall, possibly associated with Irritable Bowel Syndrome and Inflammatory Bowel Diseases. Of course it is not as simple as that, there are hundreds of nutrient interactions and systems at play. However, basically the lipid membrane hypothesis suggests that in genetically susceptible people, Omega 3 fatty acid deficiencies and deficiencies in associated nutrients may be the environmental triggers that start the chain of events that lead to most modern diseases.

### **Irritants and ADHD**

In a double-blind placebo-controlled crossover study, twenty-seven children, *whose behaviours had improved significantly* on the Royal Prince Alfred Hospital elimination diet, which excludes food additives, natural salicylates, amines and glutamates, were either challenged with calcium propionate (preservative 282) or given a placebo in their

Omega 3 fatty acid supplements (from fish) are an important component of a nutritional supplementation protocol that the Behavioural Neurotherapy Clinic has devised as PART of the treatment for ADHD, Learning Difficulties and other Childhood Disorders, and for that matter many related disorders in adults.

daily bread. There was a statistically significant difference in the proportion of children whose behaviours 'worsened' with 282 challenge compared to placebo. Dengate and Ruben who conducted the study concluded that irritability, restlessness, inattention and sleep disturbance in some children who are sensitive to amines, glutamates and food additives may be caused by this common preservative.

In addition to showing that additive 282 may exacerbate childhood behaviours, this study also highlighted that some children benefit significantly from a diet that exclude a number of substances including *amines*. In this study removing the irritants from the GUT helped reduce inappropriate behaviours. When reintroduced the behaviours returned.

We believe that in addition to removing irritants from the gut, the gut wall needs to be repaired using specific nutrients, including Omega 3 EFAs and the balance of the gut bacteria restored. Although this can take several months, in our experience most children thrive physically and emotionally on this approach and parents and teachers report that their behaviours improve. Some of the children that we treat also need Neurotherapy to redress abnormal brainwave patterns and CBT to help them adapt to their environment and promote more beneficial behaviours.

### **Amines, depression and impaired mental function**

Amines are naturally-occurring substances in food, which the body can cope with in small amounts. However in larger amounts they can cause serious disturbances in the brain, triggering depression and reduced mental alertness. Recent studies have found amine receptors in the brain of mammals, suggesting that increased dietary amines, and increased amine production from food allergies and from overgrowth of some gut bacteria may cause depression, which is resistant to medication treatment.

Food allergies and abnormally high levels of some naturally occurring bowel bacteria can increase *trace amine* production in the gut. Recent research suggests that these trace amines trigger neurotransmitter receptors in the brain and may result in mental fog, fatigue and depression which is resistant to treatment by medication. This may explain why only 40% or people respond to anti depressants, and 30% to

### **Cognitive Behavioural Therapy (CBT)**

CBT refers to a group of therapies that aim to reduce dysfunctional emotions and behaviours by altering behaviour and thinking patterns. A basic concept in CBT is that a change in behaviour follows a change in thinking (or *cognitive* change) which is brought about by a variety of possible interventions, including the practice of new behaviours, the analysis of faulty thinking patterns, and the teaching of more adaptive self-talk.

There is no evidence in the scientific literature that CBT and Behaviour Interventions are effective at bringing about permanent changes in symptoms of ADHD. In our experience however, CBT and behaviour interventions are very effective once nutritional supplementation and Neurotherapy have been effective at minimising or eliminating the biological predispositions that drive the inappropriate behaviours.

### **Behaviour modification programs**

Behaviour modification programs such as Applied Behaviour Analysis (ABA) are useful when the child has minimal cognitive skills. Our first priority when treating an Autistic child would be to attempt to remove biological impediments to normal brain function, such as bowel dysfunction, heavy metal toxicity, and food allergies. Our main objective is to restore and maximize the child's cognitive potential so that they do not need ABA. We have been very successful at achieving this objective in many children with Autism Spectrum Disorders. However in some 20% of children our approach has had limited success. While their general health has improved significantly, their autistic behaviours have not changed to our satisfaction. We believe that in these children there are other confounding factors that we are not addressing or that cannot be corrected. We continue to look for redressable underlying causes.

In ADHD children behaviour modification has not been shown to be successful in the long term. They are successful in the short term while the intervention is under way, but the behaviours return to baseline soon after the intervention is stopped. Consequently parents need to be trained to continue to apply the principles consistently and over a long period of time to minimise undesirable behaviours. Hence ABA is useful in the ongoing management of some ADHD behaviours but does not address the root causes.

### **Family counselling**

Family counselling is used to help families learn the skills necessary for optimum interactions within the family. It involves training in communication skills, interpersonal relations skills, skills in preempting and defusing conflict, conflict resolution, setting of boundaries, discipline and the inappropriate use of punishment. Not all families need counselling and those who do may need help only in some of these areas.

## **Summary**

### **Assessments: These are used only as required**

- Quantitative EEG to evaluate the brain patterns, help in differentiating ADHD from other disorders and guide treatment.
- TOVA (Test of variables of Attention) continuous performance tasks to evaluate which aspects of attention are abnormal.
- WISC III IQ test to evaluate aspects of intellectual functioning.
- Red cell Essential fatty Acids (blood test) to test whether EFAs are normal or abnormal.
- Extended Faecal microbiology (faeces sample) to evaluate bowel bacteria profile.
- IgG food allergy panel (Blood test) to test for autoimmune antibodies to foods.
- Intestinal Permeability test (urine test) to test for Leaky Gut.
- Mineral hair analysis (hair sample) to test for deposits of nutritional and heavy metals.
- Blood tests for nutritional and/or toxic elements.

### **Treatment modalities. These are used as required, based on individual requirements**

- Medications such as stimulants and antidepressants may be recommended in the short term.
- Medication such as antibiotics may be used in cases of confirmed bacterial infections.
- Neurotherapy, to redress abnormal brainwave patterns .
- Dietary interventions.
- Nutritional supplementation including the use of probiotics (beneficial bacteria supplements).
- Family counselling. Cognitive Behaviour Therapy and behavioural intervention programs (ABA)
- Behaviour modification, including ABA.

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