Dyslexia, Dyspraxia, Autism Spectrum Disorders, ADHD: Assessment and Intervention

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Dubai Feb 2015

‘Movement is a child’s first language – it is the first medium of expansion of the physical and emotional conditions of an individual. Self control begins with the control of movement’.


Dyslexia, Dyspraxia ADHD and ASD

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslexia</td>
<td>Specific problems with written language skills (reading / spelling)</td>
</tr>
<tr>
<td>Dyspraxia</td>
<td>Problems in planning / execution, poor motor coordination, attention, perception</td>
</tr>
<tr>
<td>ADHD</td>
<td>Hyperactivity / impulsivity attentional problems</td>
</tr>
<tr>
<td>Autism Spectrum</td>
<td>Impaired social &amp; communication skills</td>
</tr>
<tr>
<td>Disorders</td>
<td></td>
</tr>
</tbody>
</table>
Dyslexia, Dyspraxia, ADHD and the Autism Spectrum – the Overlap

Studies of the effects of nutrition on brain development

Information based on a multi-centre study from Cambridge and East Anglia carried out by Professor Alan Lucas

1990
Pre-term vs term formula. Period of nutritional intervention. 4 weeks showed significant developmental advantages at 18 months.

1992
Lucas reported 8.3 IQ advantage in 7 1/2-8 year old children born pre-term after feeding human milk by tube vs donor breastmilk and formula.

Hypothesis: Brain human milk is lower in most nutrients compared with formula milk: it must contain something more specific which helps the development of the CNS.

1994
Donor breastmilk vs pre-term formula reports no difference in developmental outcome at 18 months.

1996

M Makrides and R Gibson (Recent developments in Infant Nutrition 202-211) defining the LCPUFA (long chain polyunsaturated fatty acids) requirement in term infants. Suggested that LCPUFAs are the probable explanation for the substance in breastmilk responsible for the results observed by Lucas.

Linoleic acid (LA) ▼
 Γamma-linolenic acid (GLA) ▼
 Dihomogammalinolenic acid (DGLA) ▼
 Arachidonic acid (AA) ▼
 Adrenic acid (AdrA) ▼
 Docosapentaenoic acid (ω6-DPA) ▼

Alpha-linolenic acid (ALA) ▼
 Stearidonic acid (SA) ▼
 Eicosatetraenoic acid (ETA) ▼
 Eicosapentaenoic acid (EPA) ▼
 Docosapentaenoic acid (ω3-DPA) ▼
 Docosahexaenoic acid (DHA) ▼

Synthesis of HUFA from EFA

The omega-6 EFA’s The omega-3 EFA’s

Linoleic acid (LA) ▼
 Gamma-linolenic acid (GLA) ▼
 Dihomogammalinolenic acid (DGLA) ▼
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Formula Vs Breastmilk

‘Maternal Malnutrition Is the Most Significant Factor for Adverse Outcomes in Pregnancy’

Symptoms of EFA Deficiency
- Dry itchy skin
- Coarse bumpy patches particularly at the back of the arms
- Soft broken nails
- Frequent urination
- Excessive thirst
- Dull dry hair
- Allergies
LA to ALA Ratios of Foods

<table>
<thead>
<tr>
<th>OILS</th>
<th>LA</th>
<th>ALA</th>
<th>LA/ALA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapeseed</td>
<td>13.02</td>
<td>6.50</td>
<td>2</td>
</tr>
<tr>
<td>Soybean</td>
<td>51.50</td>
<td>7.30</td>
<td>7</td>
</tr>
<tr>
<td>Olive</td>
<td>7.50</td>
<td>0.70</td>
<td>11</td>
</tr>
<tr>
<td>Corn</td>
<td>80.40</td>
<td>0.90</td>
<td>56</td>
</tr>
<tr>
<td>Sesame</td>
<td>43.10</td>
<td>0.30</td>
<td>144</td>
</tr>
<tr>
<td>Sunflower</td>
<td>63.20</td>
<td>0.10</td>
<td>632</td>
</tr>
</tbody>
</table>

LA to ALA Ratios of Foods

<table>
<thead>
<tr>
<th>FATS</th>
<th>LA</th>
<th>ALA</th>
<th>LA/ALA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter</td>
<td>0.95</td>
<td>0.46</td>
<td>2</td>
</tr>
<tr>
<td>Cream</td>
<td>1.95</td>
<td>0.65</td>
<td>3</td>
</tr>
<tr>
<td>Chocolate</td>
<td>7.34</td>
<td>0.67</td>
<td>11</td>
</tr>
<tr>
<td>Ice Cream</td>
<td>14.70</td>
<td>0.98</td>
<td>15</td>
</tr>
<tr>
<td>Fat Spread (70% fat,</td>
<td>33.26</td>
<td>0.09</td>
<td>370</td>
</tr>
<tr>
<td>polyunsaturated)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Study Design

- This was a randomised, double-blind placebo-controlled trial, with a total duration of 6 months. On recruitment, children were allocated at random to either the active treatment (the HUFA supplement, 'eye-q') or an identical-looking placebo (1).
- At the three-month point there was a one-way treatment crossover (placebo to active treatment) and all children were then followed up for a further 3 months.
- Assessments at: baseline, 3 months, 6 months.
- Group 1 (N=50) active active.
- Group 2 (N=50) placebo active.
- Randomisation and blinding of treatments were organised by the suppliers, Equazen Ltd, who kept the register of treatment codes. Allocation of subjects to treatments was pre-randomised with the constraint that the numbers of active and placebo-treated subjects were balanced within males and females.
Study Design

Treatments.
- Eye Q is on open sale in the UK as a food supplement, and contains premium quality fish oil and evening primrose oil. Study dosage will be fixed at the recommended initial intake of 6 small capsules/day, supplying omega-3 HUFA (EPA, DHA), and the omega-6 HUFA GLA and AA plus vitamin E (alpha-tocopherol).
- The placebo treatment was an identical-looking capsules of an oil containing medium-chain triglycerides (MCT) – derived from tropical oils such as coconut, palm etc. These fatty acids contain neither omega-3 nor omega-6 HUFA, but are often used in food supplements designed as an energy source, e.g. For athletes.

Exclusion criteria.
- Significant neurological psychiatric, or other medical problems, current medication (unless this is judged irrelevant by the GP).
- NB: GP consent was required for all participants, but we excluded a priori children receiving treatment for major health problems e.g. Cerebral palsy, epilepsy, MS, ME or any other major physical condition.

Gains in Reading and Spelling

Effect size of Active and Placebo treatments on ADHD Global Scales (CTRS-R:L)
The Durham Trial

We need to remember that this is not about chemistry. This is about children.

What’s the issue?

- we try to help before we know what the issue is.
- importance of effective, timely screening and simple interventions

What we discovered

- less excitability
- greater memory and concentration
- improved reading and spelling
Eston Park School

- 40% made better than expected gains in reading (in some cases 2yrs 3mths over 3 months).
- 83% showed improvements in auditory memory.
- At the beginning of the trial, 33% of children reported having mild-moderate emotional difficulties. After the trial only one pupil reported mild-moderate problems in this area.
- The results the Head Teacher and senior management noted for themselves on individual pupils was enough for the sceptical Head Teacher to subsidise continuing the supplements. He is not known for parting with school money easily.

Ian Hoy, Inclusions Officer, Eston Park School

Changing how we do things

- longer sequence of instructions can be remembered
- more able to stay ‘on task’ and less likely to be disruptive
- more able to access texts (so less adult input needed)
- writing less physically exhausting
- more energy for creative processes
- self esteem raised

Clinical Features in Infancy

- Hyperactive
  + Sleep Problems
  + Feeding Difficulties
  + ‘Colic’
  + High Levels of Motor Activity
  + Slow to achieve independent sitting
  + Usually do NOT go through crawling stage
  + Late to walk
  + Delayed Acquisition of Language

- Hypoactive
  + Underdemanding
  + Repetitive Behaviour

- Hyperactive
  + Sleep Problems
  + Feeding Difficulties
  + ‘Colic’
  + High Levels of Motor Activity
  + Slow to achieve independent sitting
  + Usually do NOT go through crawling stage
  + Late to walk
  + Delayed Acquisition of Language
Pre-School (3 – 5 Years)

- Very High levels of motor activity
  - Feet swinging and tapping when seated
  - Hands clapping or twisting
  - Unable to stay in place longer than 5 minutes
- Very Excitable
  - Voice Loud and Shrill
  - Easily distressed, temper Tantrums
- Move Awkwardly
  - Constantly bumping into objects and falling
  - Associated Mirror movements, hands flap when running or jumping
- Difficulty pedalling tricycle or similar toy

- Poor figure ground awareness
  - No sense of dangers
  - Jump from inappropriate heights
- Continue to be messy eaters
  - Often spill liquid from drinking cups
  - Prefer to use fingers to feed
- Avoid Constructional Toys
  - Lego
- Language difficulties persist
  - Children often referred to speech therapist
- Limited Creative Play
  - Does not enjoy “dressing up” or playing in home corner/Wendy House
- Isolated in Peer group
  - Rejected by peers – prefers adult company
- Laterality still not established
  - Problems crossing mid-line

The differences between the processing styles of the left and right hemispheres represented both verbally and visually

<table>
<thead>
<tr>
<th>Left Hemisphere</th>
<th>Right Hemisphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT Words</td>
<td>Images</td>
</tr>
<tr>
<td>6 Numbers</td>
<td>Patterns</td>
</tr>
<tr>
<td>Parts</td>
<td>Wholes</td>
</tr>
<tr>
<td>Sequential</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>Linear</td>
<td>Connections</td>
</tr>
</tbody>
</table>
The Effects of a Motor-Skills Programme

Assessing Motor Skills

Age 3+
Gross Motor Skills
• Crawling through a tunnel (two metres length) coordinating arms and legs appropriately.
• Walking backwards, forwards and sideways, arms alongside the body
• Running a distance of 10 metres without tripping or falling over
• Jumping from a low step, or on the spot with feet together
• Climbing up and down stairs in an adult fashion, placing one foot on each step
• Walking heel / toe along a measured distance of three metres
• Balancing along a bench / plank raised (10cm) from the floor
Fine Motor Skills
- Established hand preference
- Building a tower of 6+ (2.5cm) bricks
- Reassemble a screw toy or remove the top from a jar or bottle
- Thread a determined sequence of large beads e.g. two red, one blue, two yellow
- Complete a 6-piece inset puzzle / jigsaw
- Copy simple shapes e.g. line, cross, circle, square
Handedness

**RIGHT**

**LEFT**

Motor Skills Screening

<table>
<thead>
<tr>
<th>Activity</th>
<th>Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Walking on toes forward and backward</td>
<td></td>
</tr>
<tr>
<td>2. Walking on heels forward and backward</td>
<td></td>
</tr>
<tr>
<td>3. Walking on insteps of feet</td>
<td></td>
</tr>
<tr>
<td>4. Walking on outside of feet</td>
<td></td>
</tr>
<tr>
<td>5. Recognizing shapes located between thumb and little finger</td>
<td></td>
</tr>
<tr>
<td>6. Identifying shapes located between little and index finger</td>
<td></td>
</tr>
<tr>
<td>7. Finger sequencing - right hand</td>
<td></td>
</tr>
<tr>
<td>8. Mold catalin</td>
<td></td>
</tr>
<tr>
<td>9. Balancing on each foot</td>
<td></td>
</tr>
<tr>
<td>10. Jumping head to side with each</td>
<td></td>
</tr>
<tr>
<td>11. Jumping two feet together</td>
<td></td>
</tr>
</tbody>
</table>

School-based Primary Programme
Emotional Wellbeing

Conners Rating Scales
- Self Assessment
- Parents’
- Teachers’

Completing Teacher Rating Scale
<table>
<thead>
<tr>
<th>Letters</th>
<th>Parental</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Oppositional</td>
<td>Oppositional</td>
</tr>
<tr>
<td>B</td>
<td>Cognitive Problems/Inattention</td>
<td>Cognitive Problems/Inattention</td>
</tr>
<tr>
<td>C</td>
<td>Hyperactivity</td>
<td>Hyperactivity</td>
</tr>
<tr>
<td>D</td>
<td>Anxious–Shy</td>
<td>Anxious–Shy</td>
</tr>
<tr>
<td>E</td>
<td>Perfectionism</td>
<td>Perfectionism</td>
</tr>
<tr>
<td>F</td>
<td>Social Problems</td>
<td>Social Problems</td>
</tr>
<tr>
<td>G</td>
<td>Psychosomatic</td>
<td>Psychosomatic</td>
</tr>
<tr>
<td>H</td>
<td>ADHD Index</td>
<td>ADHD Index</td>
</tr>
<tr>
<td>I</td>
<td>CARS: Emotional Lability</td>
<td>CARS: Emotional Lability</td>
</tr>
<tr>
<td>J</td>
<td>CARS: Total</td>
<td>CARS: Total</td>
</tr>
<tr>
<td>K</td>
<td>CARS: Hyperactive-Impulsive</td>
<td>CARS: Hyperactive-Impulsive</td>
</tr>
<tr>
<td>L</td>
<td>CARS: Total</td>
<td>CARS: Total</td>
</tr>
<tr>
<td>M</td>
<td>DSM-IV Symptoms: Inattentive</td>
<td>DSM-IV Symptoms: Inattentive</td>
</tr>
<tr>
<td>N</td>
<td>DSM-IV Symptoms: Hyperactive-Impulsive</td>
<td>DSM-IV Symptoms: Hyperactive-Impulsive</td>
</tr>
<tr>
<td>O</td>
<td>DSM-IV Symptoms: Total</td>
<td>DSM-IV Symptoms: Total</td>
</tr>
</tbody>
</table>

**Autism Spectrum Disorder**

**Childhood Autism Rating Scales (CARS)**

**Resources**
- Text Checker
- Supporting the SENCO
- Ideas to support children with ASD at home and in school
- Developing Speech and Language
- Building Self Esteem
- Managing Behaviour
References