Attention deficit hyperactivity disorder (ADHD)

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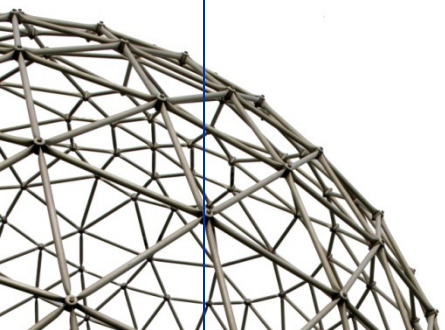

Lecture Objectives

- **Attention deficit hyperactivity disorder (ADHD)**
- Symptoms
- Diagnosis
- Causes
- Treatment
- Chemical Links (trace elements, free fatty acids….)

Attention deficit hyperactivity disorder (ADHD)

- **a group of behavioural symptoms that include inattentiveness, hyperactivity and impulsiveness**
- problems with inattentiveness - attention deficit disorder (ADD)
- ADHD is more than just hyperactive behaviour. It is linked to a specific pattern of behaviour, including reduced attention span and difficulties concentrating to the extent they affect the child's ability to learn and function at home and school

ADHD Symptoms

- categorised as:
  - inattentiveness
  - hyperactivity and impulsiveness
- problems with inattentiveness - attention deficit disorder (ADD)
- additional problems- sleep and anxiety disorders
- most cases are diagnosed in children between the ages of 6 and 12

ADHD Inattentiveness

- having a short attention span and being easily distracted
- making careless mistakes – for example, in schoolwork
- appearing forgetful or losing things
- being unable to stick at tasks that are tedious or time-consuming
- appearing to be unable to listen to or carry out instructions
- constantly changing activity or task
- having difficulty organising tasks

ADHD
(Hyperactivity and impulsiveness)

- being unable to sit still, especially in calm or quiet surroundings
- constantly fidgeting
- being unable to concentrate on tasks
- excessive physical movement or talking
- being unable to wait their turn
- acting without thinking
- interrupting conversations
- little or no sense of danger

Problems or Conditions Alongside ADHD (1)

- **anxiety disorder** – which causes your child to worry and be nervous much of the time; it may also cause physical symptoms, such as a rapid heartbeat, sweating and dizziness
- **oppositional defiant disorder (ODD)** – this is defined by negative and disruptive behaviour, particularly towards authority figures, such as parents and teachers

Problems or Conditions Alongside ADHD (2)

- **conduct disorder** – this often involves a tendency towards highly antisocial behaviour, such as stealing, fighting, vandalism and harming people or animals
- **depression**
- **sleep problems** – finding it difficult to get to sleep at night, and having irregular sleeping patterns

Problems or Conditions Alongside ADHD (3)

- **autistic spectrum disorder (ASD)** – this affects social interaction, communication, interests and behaviour
- **epilepsy**
- **Tourette's syndrome** – a condition of the nervous system, characterised by a combination of involuntary noises and movements
- **learning difficulties** – such as dyslexia

ADHD
Only in Children?

By the **age of 25, an estimated 15% of people diagnosed with ADHD as children still have a full range of symptoms, and 65% still have some symptoms that affect their daily lives** (*www.nhs.uk*)

- hyperactivity tends to decrease in adults, while inattentiveness tends to get worse as the pressure of adult life increases

ADHD in Adults
List of Symptoms

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- carelessness and lack of attention to detail
- continually starting new tasks before finishing old ones
- poor organisational skills; inability to focus or prioritise
- continually losing or misplacing things
- forgetfulness; restlessness and edginess
- difficulty keeping quiet and speaking out of turn; blurting out responses and often interrupting others
- mood swings, irritability and a quick temper
- inability to deal with stress; extreme impatience
- taking risks in activities, often with little or no regard for personal safety or the safety of others – for example, driving dangerously

Problems or Conditions Alongside ADHD in Adults

- **personality disorders** – conditions in which an individual differs significantly from an average person, in terms of how they think, perceive, feel or relate to others
- **bipolar disorder** – a condition that affects your moods
- **obsessive-compulsive disorder (OCD)** – a condition that causes obsessive thoughts and compulsive behaviour

ADHD
Diagnosis (1)

To be diagnosed with ADHD, must have six or more symptoms of inattentiveness, or six or more symptoms of hyperactivity and impulsiveness: assessed by -

- GP
- a child or adult psychiatrist
- a paediatrician (a specialist in children's health)
- a learning disability specialist, social worker or occupational therapist with expertise in ADHD

ADHD
Diagnosis (2)

- been displaying symptoms continuously for at least six months
- started to show symptoms before the age of 12
- been showing symptoms in at least two different settings – at home and at school
- symptoms that are not just part of a developmental disorder or difficult phase, and are not better accounted for by another condition

ADHD
Diagnosis in Adults (1)

- more complex than for children
- there is some disagreement with symptoms linked to child diagnosis
- had problems as a child?
- not diagnosed with ADHD when younger?
- GP can't formally diagnose ADHD, but can discuss concerns with an adult and refer individual for a specialist assessment

ADHD
Diagnosis in Adults (2)

Symptoms should also have a moderate impact on different areas of their life, such as:

- underachieving at work or in education
- driving dangerously
- difficultly making or keeping friends
- difficulty in relationships with partners

ADHD
Causes (1)

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Genetics

- tends to run in families
- both parents and siblings of a child with ADHD are four to five times more likely to have ADHD themselves
- the way ADHD is inherited is likely to be complex and isn't thought to be related to a single genetic fault

ADHD
Causes (2)

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Brain function and structure

- differences in the brains of people with ADHD (certain areas of the brain may be smaller in people with ADHD)
- the brain may take an average of two to three years longer to mature in children with ADHD
- imbalance in the level of chemicals in the brain called neurotransmitters, or may not work properly

ADHD

Causes (3) Inconclusive Factors

- being born prematurely (before the 37th week of pregnancy)
- having a low birthweight
- brain damage either in the womb or in the first few years of life
- drinking alcohol, smoking or misusing drugs while pregnant
- exposure to high levels of toxic lead at a young age

ADHD
Treatment (1)

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Medication

- four types of medication licensed for the treatment of ADHD:
- methylphenidate
- dexamfetamine
- Lisdexamfetamine
- atomoxetine

Methylphenidate hydrochloride

- called stimulants that work by increasing activity in the brain, particularly in areas that play a part in controlling attention and behaviour. May not prescribe it at all if you:
- are emotionally unstable
- are feeling agitated, anxious or tense
- have behavioural problems
- have or have a family history of tics, Tourette's syndrome or other movement disorders
- have or have had a personality disorder
- have or have had depression

Common side effects of methylphenidate include

- a small increase in blood pressure and heart rate
- loss of appetite, which can lead to weight loss or poor weight gain
- trouble sleeping
- headaches
- stomach aches
- mood swings

Dexamfetamine

- a stimulant medication
- taken as a tablet once or twice a day, or as an oral solution

Side effects of dexamfetamine include:

- decreased appetite
- mood swings
- agitation and aggression
- dizziness
- headaches
- diarrhoea
- nausea and vomiting

Lisdexamfetamine

- used by children with ADHD over the age of six if treatment with methylphenidate hasn't helped

Common side effects of lisdexamfetamine include:

- decreased appetite, which can lead to weight loss or poor weight gain
- aggression
- drowsiness and dizziness
- headaches
- diarrhoea
- nausea and vomiting

Atomoxetine

- a selective noradrenaline uptake inhibitor (SNRI), increases the amount of a chemical in the brain called noradrenaline
- serious side effects that it's important to look out for, including suicidal thoughts and liver damage
- licensed for use in adults who are continuing treatment after taking the medication as a teenager

ADHD and Food Colours (1)

Eliminating some colours from the diet might have beneficial effects on the behaviour of children: include:

- sunset yellow (E110)
- quinoline yellow (E104)
- carmoisine (E122)
- allura red (E129)
- tartrazine (E102)
- ponceau 4R (E124)

ADHD and Food Colours (2)

- colours are used in a number of foods, including soft drinks, sweets, cakes and ice cream
- since July 20 2010, when colours are used in food they must be declared in the list of ingredients as 'colour', plus either their name or E number
- the food label must also have a specific warning saying that the colour 'may have an adverse effect on activity and attention in children'.

ADHD and Food Colours (3)

- advice on food additives and hyperactivity is issued after being evaluated by the independent Committee on Toxicity and the European Food Safety Authority (EFSA) of research commissioned by the FSA
- all food additives must go through rigorous safety assessment and approval procedures, and must comply with European Union (EU) legislation

The Hyperactive Children's Support Group

- is a registered charity which has been successfully helping ADHD and hyperactive children and their families for over 35 years
- specialism is advocating a dietary approach to the problem of hyperactivity
- **Food Additives, Food Intolerance, Omega Fatty Acids, Vitamins & Minerals**
- **http://www.hacsg.org.uk/**

Essential Fatty Acids and ADHD (1)

Omega's 3, 6 and 9 are the major components of fats and oils

- different types of omega-3 fatty acids, the key health benefits come from long chain omega-3s, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA
- found in oily fish sardines, mackerel, pilchards
- omega-3 fatty acids cannot be synthesised de novo by humans and instead are required in our diet

Essential Fatty Acids and ADHD (2)

Omega-3 fatty acids are anti-inflammatory

- a high dietary omega-6 to omega-3 fatty ratio can promote neuro-inflammation
- increased omega-3 fatty acid levels in cell membranes affect serotonin and dopamine neurotransmission especially in the frontal cortex

Omega-6 essential fatty acids are found in Evening Primrose Oil, Starflower Oil, Nuts, Seeds, Sunflower, Hemp, Safflower and Linseed (Flax) oil

EFAs and Hyperactivity – HACSG (1981)

- many ADHD children have a deficiency of EFAs, either because they cannot metabolise linoleic acid correctly, they cannot absorb EFAs from the gut, or their EFA requirements are higher than would normally be the case
- **"A Lack of EFAs as a possible cause of hyperactivity in children"** (Medical Hypotheses, 7(5), 1981, Irene Colquhoun & Sally Bunday).

Research into EFAs and ADHD (1)

- Raz, R., Gabis, L. (2009) **Essential fatty acids and attention-deficit-hyperactivity disorder: a systematic review.** *Dev Med Child Neurol.* 2009 Aug;51(8):580-92
- Bloch, M.H., Qawasmi, A. (2011) **Omega-3 Fatty Acid Supplementation for the Treatment of Children with Attention-Deficit/Hyperactivity Disorder Symptomatology: Systematic Review and Meta-Analysis** *J Am Acad Child Adolesc Psychiatry* 50(10): 991–1000.

  - [small but statistically significant benefit of omega-3 fatty acid supplementation in the treatment of ADHD]

Research into EFAs and ADHD (2)

- Richardson, A. (2006) Omega-3 fatty acids in ADHD and related neurodevelopmental disorders. *Int Rev Psychiatry* 18(2), 155-72

- dietary supplementation with fish oils (providing EPA and DHA) appears to alleviate ADHD-related symptoms in at least some children

Multinutrient Formula as Effective as Methylphenidate for ADHD Management (a)

McLean hospital in Massachusetts divided 20 children with ADHD into 2 groups

- one group of 10 children received 5–15 mg of Ritalin® 2-3 times daily; other received a comprehensive multi-nutrient formula designed to target several factors that possibly play a role in ADHD development

Multinutrient Formula (b)

- multi-nutrient formula used included gastrointestinal support (eg, lactobacillus acidophilus and bifidus), amino acids (eg, tyrosine, histidine, glutamine, glycine, methionine and cysteine), essential fatty acids and phospholipids (eg, EPA, DHA, and phosphatidylcholine), and vitamins and minerals

Multinutrient Formula (c)

- ADHD symptoms among children who took the multi-nutrient formula improved just as much as among those who received Ritalin
- Harding KL, Judah RD, Gant C. (2003) Outcome-based comparison of Ritalin versus food-supplement treated children with AD/HD. *Altern Med Rev* 8:319–330.

Vitamin–mineral treatment of attention-deficit hyperactivity disorder in adults: double-blind randomised placebo-controlled trial

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Rucklidge J.J. , Frampton C.M., Gorman B., Boggis A. (2014) *The British Journal of Psychiatry* 204, 306–315.

- double-blind randomised controlled trial assigned 80 adults with ADHD in a 1:1 ratio to either micronutrients (n = 42) or placebo (n = 38) for 8 weeks
- preliminary evidence of efficacy for micronutrients in the treatment of ADHD symptoms in adults

Can Micronutrients Improve Neurocognitive Functioning in Adults with ADHD and Severe Mood Dysregulation? A Pilot Study (a)

- Rucklidge J.J., Harrison R., Johnstone J. (2011) *J Alternative Complement Med* 17(12) 1125–1131
- the impact of a 36-ingredient micronutrient formula consisting mainly of vitamins and minerals on neurocognitive functioning in 14 adults with ADHD and severe mood dysregulation.

Can Micronutrients Improve Neurocognitive Functioning in Adults with ADHD and Severe Mood Dysregulation? A Pilot Study (b)

- significant improvement was observed in the ADHD group, but not the control group, across a range of verbal abilities including verbal learning, verbal cognitive flexibility and fluency, and verbal inhibition
- supports a growing body of literature recognising the importance of nutrients for mental health and cognition

Zinc and ADHD (1)

- BMC Psychiatry in 2004, which involved 44 Iranian children with ADHD, found that adding zinc to existing ADHD treatment helped improve their symptoms
- 2004, involved 400 children and was done by Turkish researchers, found that zinc therapy was significantly better than a placebo at improving hyperactivity, impulsivity, and socialisation problems of kids with ADHD

Zinc and ADHD (2)

- 2011 study in the Journal of Child Adolescent Psychopharmacology found mixed results for zinc, and pointed out that the Middle Eastern studies may show promise for zinc because nutritional deficiencies are more endemic in those areas of the world
- '*Most children in the United States are well nourished, and zinc deficiency isn't common*'

Concluding Remarks HACSG

- books, publications and literature, Parents, Carers and Professionals can learn more about the benefits of a dietary change
- The Hyperactive Children's Support Group
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