Dietary factors in attention deficit/hyperactivity disorder

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Attention deficit/hyperactivity disorder

Impaired sustained attention

Behavioral hyperactivity

Impulsiveness
Worldwide Prevalence of ADHD in Children

Prevalence of ADHD (%)

NY, MI, WI
N. Carolina
Virginia
Missouri
Oregon
Minnesota
Tennessee
Iowa
Pittsburgh
New York City
Puerto Rico
Spain
New Zealand
Canada
Ireland
United Kingdom
Israel
Switzerland
Netherlands/Belgium
Germany
Ukraine
Brazil
Japan
New Zealand
Netherlands
China
India

US prevalence of ADHD
ADHD = several disorders of different etiologies?

Inattention without hyperactivity/impulsiveness (ADD)

Impulsiveness, impaired sustained attention and hyperactivity (ADHD)
Etiology of ADHD

Genetic factors

Environmental factors (e.g. maternal smoking, institutional care)

Adverse experiential factors (e.g. premature birth)

Dietary factors
Dietary factors in the etiology of ADHD

- Food sensitivities
- Artificial food additives
- Free fatty acid deficiency
- Trace element deficiency
- “Western“ style diet
- Poor nutrition
Dietary therapy of ADHD

Food sensitivities

- Restricted elimination diets

Artificial food additives

- Artificial food colour exclusion

Free fatty acid deficiency

- Free fatty acid supplementation
Free fatty acids in the brain

Brain growth and development

Influence on numerous neuronal processes, e.g. expression of proteins involved in signal transduction, neural plasticity and learning

Modulation of neuronal membrane which can influence membrane receptors, neurotransmission and signal transduction
Statistical significance ≠ Clinical relevance
What is effect size?

Standardised mean difference ........

is a widely used measure of effect size,

states how many standard deviation units difference exist between two conditions,

is independent of the scales being used,

can be calculated as Cohen’s d.
Meta-analysis effect sizes for dietary treatments of ADHD

From Stevenson et al. 2014

- Restricted elimination diets
- Artificial food colour elimination
- Free fatty acid supplementation
Problems of dietary intervention studies

Selection of participants
Cross-over and parallel group randomized controlled trials
Choice of placebo
Blind assessment of outcome
Outcome measurement (behaviour scales, neuropsychological tests, reports from parents/teachers/others)
Outcome selection bias (multiple scales and observers)
Long-term outcome
Adverse effects of dietary treatment
Publication bias
Summary

**Restricted elimination diets**
may be beneficial for children with a history of adverse reactions to food

**Artificial food colour exclusion**
may be beneficial for children that adversely react to food colours

**Free fatty acid supplementation**
average effect size of three studies 0.2
i.e. small effect
Future directions

Large-scale randomized controlled trials

No selection of children with ADHD on the basis of previous responses to foodstuffs

Blind assessment of children’s behaviour

Control for non-specific treatment effects
“Omega-3” Fish Fingers
Definition of Functional Food

Functional Food is a natural or processed food that contains known or unknown biologically active compounds, which, when in defined quantitative and qualitative amounts, provides a documented health benefit and as a result, becomes an important source in the prevention, management, and treatment of chronic diseases of the modern age.

Functional Food Center/Functional Food Institute
ADHD and Diet