

DAMP Exeter April 2005

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DAMP-concept grew out of "MBD" (Clements 1966)

- ✓ In the 1970s first population-based study of "MBD" started in Sweden under the leadership of Bengt Hagberg and sponsored by the National Educational and Health and Welfare Departments
- ✓ MBD operationally defined as "ADD" + "MPD"
- ✓ ADD = Attention Deficit Disorder (cross-situational)
- ✓ MPD = Motor-Perception Dysfunction

DAMP-concept

- ✓ Moderate MBD = All non-severe MBD
- ✓ Severe MBD =
 - ADD +
 - Gross motor +
 - Fine motor +
 - Perceptual +
 - Speech/language dysfunctions

DAMP-concept

- ✓ First paper from MBD/DAMP-study was published in 1982
- ✓ ADD in DSM-III had arrived
- ✓ MBD as label increasingly criticized including by ourselves (Gillberg & Rasmussen 1981, Rutter 1981, 1982)
- ✓ We therefore introduced the PMAD (Perceptual, Motor, and Attentional Deficits) concept (Gillberg et al 1982)

DAMP-concept

- ✓ We found this ("PMAD") to be too difficult to "say" and – in accordance with widespread ideas at the time – believed the attentional problems to be primary
- ✓ Hence, we changed the order of the letters to DAMP (Deficits in Attention, Motor control, and Perception)

DAMP-concept

- ✓ Since then, there have been at least 57 publications on the DAMP-syndrome, a handful of which derive from countries outside Scandinavia
- ✓ DAMP most commonly used in Sweden and Denmark

DAMP-concept

- ✓ With the event of the DSM-III-R (and the DSM-IV) we looked back at our original cohorts and found that 85% of cases with DAMP met criteria for ADHD (mainly inattentive and combined subtypes)
- ✓ We also found that the MPD-label corresponded very well with DCD (Developmental Coordination Disorder)

DAMP-definition and diagnosis

- ✓ DAMP is now diagnosed on the basis of
- ✓ ADHD according to the DSM-IV plus
- ✓ DCD according to the DSM-IV
- ✓ In individuals who do not meet criteria for cerebral palsy

ADHD/DAMP epidemiology

- ✓ ADHD is a common condition affecting (in clinically severe form) 3-5 (7)% of all school age children; many more boys than girls (but many girls missed/misdiagnosed) – about half of all with ADHD meet criteria for DAMP (Kadesjö & Gillberg 1999)
- ✓ AD/HD is possibly an artificial (?) concoct of AD and HD
 - Two separate syndromes/ends on dimensional scales with considerable overlap
 - AD, HD and AD+HD

ADHD/DAMP diagnosis

- ✓ A-D according to DSM-IV (at least 6 of 9):
 - Careless mistakes
 - Failure to sustain attention
 - Appears not to hear/listen
 - Does not complete tasks
 - Difficulty organising work
 - Reluctant to engage in tasks requiring mental effort
 - Loses things
 - Easily distracted

ADHD/DAMP diagnosis

- ✓ HD according to DSM-IV (at least 6 of 9):
 - Fidgets – overactive
 - Difficulty sitting still
 - Restlessness
 - Difficulty remaining silent
 - Always on the go, acts as if driven by motor
 - Talks too much
 - Impulsive responding
 - Difficulty awaiting turn

ADHD/DAMP diagnosis

- ✓ All three AD/HD variants require handicapping symptoms before age 7 years
- ✓ Impairing symptoms in at least two different settings
- ✓ Clinically significant impairment in at least two of social, school and home setting
- ✓ Exclusionary criteria (counterproductive?) ("not better

ADHD/DAMP diagnosis

✓ DCD:

- gross and/or fine motor function and coordination consistently below level expected for age and overall level of functioning
- Functionally disabling symptoms in everyday life

ADHD/DAMP overlap

✓ ADHD almost always associated with comorbid (or rather “co-existing”) problems (Kadesjö & Gillberg 2001):

- ✓ DCD 50% in both clinical and subclinical cases (ADHD + DCD = DAMP; in particular AD + DCD) and other learning disorders
- ✓ ODD in 60% of clinical cases, only 10% in subclinical cases; 60% at 3 years, 60% at 5 years, 60% at 7 years (more often HD + ODD); doubtful whether strong predictor of CD
- ✓ Affective and anxiety disorders (more often AD and DAMP)
- ✓ Tics (more often HD)

ADHD/DAMP overlap

- ✓ ADHD + DCD (=DAMP) very often associated with **speech-language, reading-writing, and mathematics disorder** (Gillberg et al 1985, Landgren et al 1998, Kadesjö & Gillberg 1998)
- ✓ ADHD+DCD (=DAMP, particularly severe variant) very often associated with **autism spectrum disorder/problems**
- ✓ ADHD+DCD (=DAMP) **interactive effect** on learning problems and autistic features (Kadesjö & Gillberg 1999)

ADHD/DAMP overlap

- ✓ ADHD±DCD usually associated with **5–10 point IQ reduction** (Barkley 1998, Gillberg & Rasmussen 1982, Landgren et al 1998)
 - Mental retardation c. 15% (cf. 2% in general population)
 - WISC Coding, Digit span, and Arithmetic often low and contribute to low IQ
 - Overall low IQ over-represented?
 - Low IQ “mistaken” for ADHD?

ADHD/DAMP pathogenesis

(Biederman 2002, Gillberg 2003)

- ✓ ADHD very often **familial/hereditary** (64–91% of variance explained by genes, lowest for dimensional ADHD, highest for categorical ADHD)
 - Dopamine (and NA) variant genes important in a proportion
 - Chromosome 16p? (cf autism, cf tuberous sclerosis)
- ✓ ADHD sometimes associated with **pre- or perinatal adversity** (prematurity, FAS, smoking)
- ✓ **Interaction gene–environment** in many (?) cases
- ✓ DAMP often **familial** (Gillberg & Rasmussen 1982)
- ✓ DAMP rather often associated with **pre- or perinatal adversity** (prematurity, smoking, reduced optimality) (Landgren et al 1998)
- ✓ Both ADHD and DAMP associated with **low social class**
 - Social class cannot explain ADHD/DAMP
 - Non-optimal reading contributes to ODD/CD (Gillberg 1983)

ADHD/DAMP brain

- ✓ ADHD associated with **slightly smaller brain** (cf autism and bigger brain)
- ✓ Unclear whether this is due to ADHD or reduced IQ
- ✓ MRI longitudinally shows ADHD to be associated with smaller brain throughout childhood
- ✓ White matter reduction
- ✓ Cerebellar reduction
- ✓ Frontal and striatal areas implicated
- ✓ Right frontal rather than left frontal?
- ✓ Frontal = executive dysfunction? and Striatal = motor control and tics?

ADHD/DAMP work-up: what needs to be done in all cases?

- ✓ Child examination
 - Neuromotor performance, speech-language, psychiatric and physical status, hearing/vision
 - Neuropsychological: at least WISC-testing (dysexec syndrome; low on DSP, DSY, AR), CPT (long reaction time, omissions (AD), commissions (HD))
- ✓ Parent interview
 - ADHDRS, K-SADS?, Goodman (DAWBA)
- ✓ Questionnaires

ADHD/DAMP work-up: what should be done in some cases?

- ✓ ADHD/DAMP work-up
- ✓ Possibly
 - EEG
 - Moderate increase low frequencies, epileptogenic, paroxysmal activity on activation, sleep abnormalities
 - DNA- and/or karyotype
 - 22qdel, FMR-1, premutation Frax-A?, Frax-E, XXY, XYY, XO
 - MRI
 - Migration defects, white matter lesions
 - Other

ADHD/DAMP outcome

- ✓ ADHD has poor outcome in 40–50% of cases; unmedicated individuals appear to have higher rates of later drug abuse
 - Barkley 2001, Biederman et al 1998
- ✓ DAMP has poor outcome in 50–60% of cases; academic success almost unheard of in this group
 - Rasmussen & Gillberg 2000

ADHD/DAMP outcome

- ✓ ADHD
 - Antisocial personality disorder (30%), substance use disorder (10–40%), violent and criminal behaviours, psychiatric disorder including persistence of inattentive ADHD (mood and anxiety disorders)
- ✓ DAMP
 - Antisocial personality disorder (20%), substance use disorder (30%), violent and criminal behaviours (15%), psychiatric disorder including persistence of inattentive ADHD (50%), mood and anxiety disorders learning problems (60%)
including severe dyslexia, dyscalculic problems

ADHD/DAMP associations

- ✓ Accidents
- ✓ Allergies?
- ✓ Fibromyalgia?
- ✓ Somatization?

ADHD/DAMP intervention

- ✓ ADHD/DAMP interventions (not treatment)
- ✓ **PSYCHOEDUCATION FIRST AND FOREMOST**
 - Information about the implications of the diagnosis
 - Child, parents, siblings, other relatives, teachers, others
- ✓ Psychological support
- ✓ **Educational measures** at school (dysexec syndrome)
- ✓ Physical exercise
- ✓ *Training in "real-life" settings (incl motor)*

ADHD/DAMP intervention

- ✓ **Psychoeducation** makes a positive difference
 - Psychologically and socially for family
 - Psychologically for child
 - Economically for family
 - Economically for society (Gillberg et al 1993, Nydén et al 2000, Nydén et al 2003)

ADHD/DAMP medication

- ✓ ADHD: always **consider medication if**
- ✓ Extreme problems
- ✓ In-patient, school removal, social authorities
- ✓ When other interventions have proved ineffective for 6 months or longer
- ✓ **Consider medication treatment for**

ADHD/DAMP CS

- ✓ ADHD central stimulant treatment
- ✓ Meticulous physical and mental examination
- ✓ Child aged 5 or older
- ✓ Have other measures been systematically evaluated?
- ✓ How severe are the child's problems?
 - Will family be able to comply with treatment plan?
 - Parent and child attitudes to treatment essential
 - Drug abuse in family?
- ✓ Will prescriber/nurse have sufficient services available?
- ✓ Child's attitude should be constantly re-

ADHD/DAMP CS

- ✓ ADHD medication
- ✓ Methylphenidate usually drug of choice
- ✓ If no effect: try D-amphetamine
- ✓ If no effect: consider the possibility that comorbidity (anxiety, aggression, explosive behaviours (mania?), tics, autistic symptoms) might be the explanation
- ✓ Reduce use of other drugs to a

ADHD/DAMP CS

- ✓ ADHD: central stimulants (CS)
 - Methylphenidate and D-amphetamine have comparable effects (about double the dose of amphetamine for methylphenidate)
 - Few if any absolute contraindications
 - Other medications should only rarely be tried if CS have not been carefully evaluated in the individual case (atomoxetine may change this)

ADHD/DAMP CS adverse effects

- ✓ Adverse effects of CS
 - ✓ decreased appetite (13-50%), insomnia (18-70%), belly aches (6-35%), headaches (4-20%)
 - ✓ rebound-phenomena (1-30%)
 - ✓ hallucinations, psychosis, high blood pressure
 - ✓ depressive symptoms no more common than in placebo groups, but may be clinically significant in some cases
 - ✓ 0.1-1 cm reduction of final height
 - ✓ 1-5 kg weight loss --- gradual normalisation

ADHD/DAMP dosing CS

✓ Dosing central stimulants

- Methylphenidate (5–12 years): 5 mg x 1–4 or max 1 mg/kg will give positive response in 75% of all cases with severe ADHD/DAMP
- D-amphetamine (5–12 years) 2.5–5 mg x 1–4 will give positive effect in 1/3 of cases not responding to methylphenidate
- Older (and younger?) patients appear to respond only in 50%, but recent studies suggest equal response rate
- Slow release much more convenient but poorer effect??? (Pelham et al 1987); Concerta vs

ADHD/DAMP when not to use CS

- ✓ Contraindication/caution in CS-medication
- ✓ When you do not expect good compliance
- ✓ No other absolute contraindications
- ✓ Caution in heart disease/high blood pressure (consult with cardiologist)
- ✓ Caution when combined with TCA
- ✓ Caution in epilepsy (but CS may have specific anti-epileptic effects)
- ✓ Careful monitoring when ADHD co-morbid with tics
- ✓ Lithium and CS counteract each other

ADHD/DAMP CS caution

✓ Before starting treatment with CS

- Try psychoeducation
- Careful neuropsychiatric examination of child including assessment of co-morbid features
- Height, weight and head circumference
- Blood pressure
- Adverse effects monitoring

✓ During treatment with CS

- Follow-up as above

ADHD/DAMP other meds

✓ Other medication treatments

- ✓ Atomoxetine – better for ADHD with tics, depression, anxiety, sleep problems? Liver damage extremely rare (2 in 2 million treated)
- ✓ Atypical neuroleptics for comorbid violent and chaotic behaviours
- ✓ SRIs for anxiety, panic, OCD, depressed mood?
 - Note risk of provoking explosive behaviours
- ✓ Venlafaxine
- ✓ Melatonin for sleep problems
- ✓ Buspirone for anxiety, aggression?
- ✓ Bupropione??
- ✓ Tricyclics???
- ✓ Clonidine???

ADHD/DAMP intervention

✓ How long should interventions continue?

✓ Most will need education support throughout childhood into adulthood

✓ Some children and adults need medication only occasionally and for specific events

✓ All medication treatment should be individualised

ADHD/DAMP intervention

✓ Once stimulant medication has been started, other interventions need to be re-evaluated

✓ “Comorbidity” should inform treatment options

- Anxiety, autistic features, tics, OCD, ODD

✓ CBT, but long-term effects are doubtful

- Robo-Memo (Klingberg et al 2005)

✓ Special education measures

- Learning, language and motor problems of various kinds

ADHD/DAMP consensus documents

- ✓ **AMA:** American Medical Association (Council of Scientific Affairs) (1997)
- ✓ **NIH:** Consensus Development Program: Diagnosis and Treatment of ADHD (1998) (odp.od.nih.gov/consensus/)
- ✓ **European:** Clinical guidelines for HKD (Taylor et al 1998)
- ✓ **AAP:** Clinical Practice Guidelines (American Academy of Pediatrics) (2001) (aap.org/policy/)
- ✓ **AACAP:** Practice parameters (2002)
- ✓ **Socialstyrelsen:** ADHD (strd.se/webshop/socialstyrelsen) (2002)