"Empowering Families: Turning Attention Deficit Hyperactivity Disorder (**ADHD**) Challenges into Strengths,"

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CASE VIGNETTE

Md. “X”, is a 10 years old Muslim boy from a lower middle-class joint family in rural background.. He never attended school. He was a full term baby born by NVD at home by a “dhai”. His birth was complicated by umbilical cord around the neck followed by delayed cry and managed at home.

His parents report low intelligence and behavioral difficulties since early childhood. From around 3 years of age he showed poor social communication, preferred to remain alone, and engaged in restrictive and repetitive activities. Early motor milestones were normal except speech, which declined gradually from toddler age. By 4-5 years of age he was unable to engage in meaningful conversation or acquire preschool skills

Peer interaction was minimal. During this period, he became restless, inattentive, and hyperactive, frequently leaving home when unsupervised. His temperament was difficult, with stubbornness, tantrums, poor toilet training, selective play, and limited emotional reciprocity. Over the last 2 years, he developed self-injurious and aggressive behaviors, especially when demands were not fulfilled.

He had multiple consultations with pediatricians, physicians, and psychiatrists and received medications including antipsychotics, stimulants and non stimulants, clonidine, sodium valproate, and clobazam, with partial improvement but also side effects like excessive salivation.

The illness had a gradual onset, continuous course since early childhood, with worsening aggression in the last 4 months for drug non compliance.

He had no history of seizure attack, fever preceding his illness and behavioral disturbance or substance use.

On Mental state examination, he was an average-built boy, poorly groomed, restless, and moving constantly, occasionally uttering words to his parents.

Rapport and eye contact could not be established, and speech, mood, thought, perception, and cognition were not assessable. Investigations showed normal CBC, renal, liver and thyroid function. Previous EEG and MRI were reportedly normal, though records are unavailable.

Differentials:

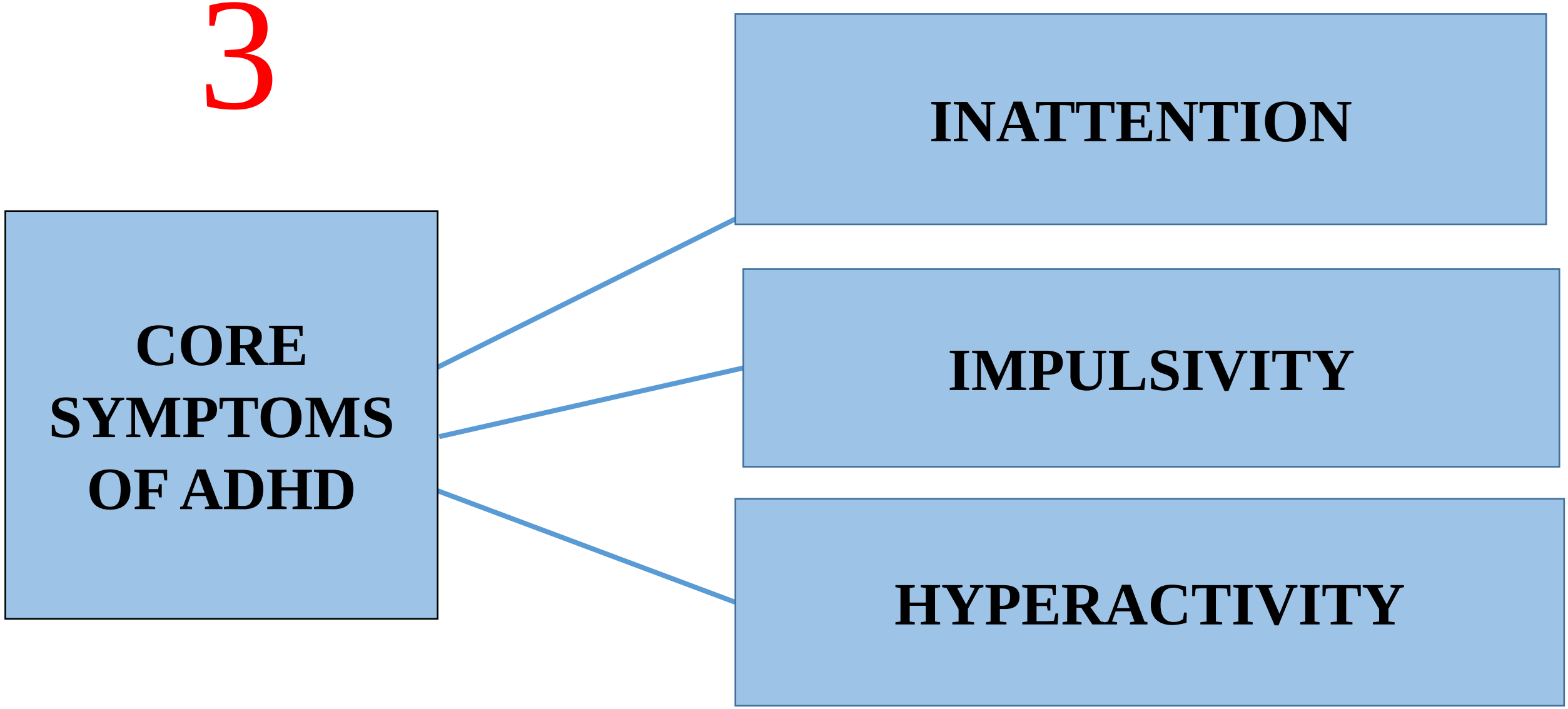
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ADHD

Attention deficit hyperactivity disorder (**ADHD**) is a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity, impulsivity and emotional dysregulation that are excessive and pervasive, impairing in multiple contexts, and developmentally- inappropriate.

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CORE SYMPTOMS OF ADHD
INATTENTION
IMPULSIVITY
HYPERACTIVITY

History of ADHD

- In the early 1900s, impulsive, disinhibited, and hyperactive children many of whom also had neurologic damage due to encephalitis were grouped under the label **hyperactive syndrome.**

- Initially it was believed to be associated with brain lesions and called **minimal brain damage.**

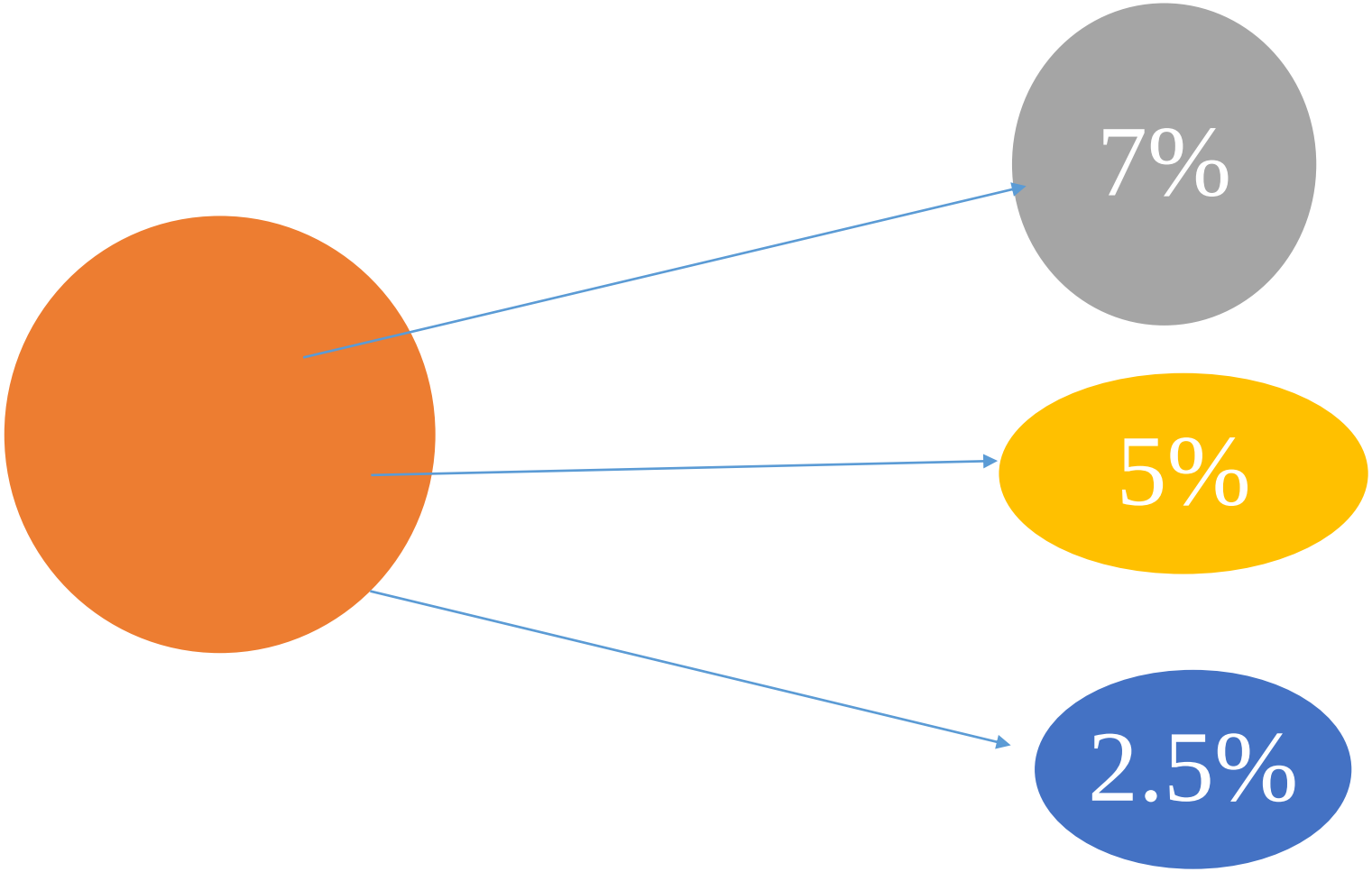
- Later, recognizing that not all children had physical lesions, it was renamed **minimal brain dysfunction.**

- ICD 9 included as **“hyperkinetic syndrome in childhood**” subsequently called hyperkinetic disorder in ICD -10.

- DSM 2 included as **hyperkinetic reaction of childhood** now renamed subsequently as attention deficit hyperactivity disorder (**ADHD**) in DSM-5.

Epidemiology

- Male:Female ratio is around 3:1. It is commoner in younger children than in adolescents.



- School Age
- Adolescent
- Adult

Aetiology

- Multifactorial, Genetic and Environmental factors.

- Twin study demonstrated a heritability of 70% to 80% in both children and adults with 5-10 fold risk among first degree relatives of patient.

- **Prenatal and perinatal factors:** Low birth weight, Prematurity, in utero maternal stress, maternal obesity, Hypertension, cigarette smoking, Alcohol, prescribed drugs (Acetaminophen, Valproate) and elicit substance.

- **Environment toxins :** Lead, Organophosphorus compound.

- **Nutritional deficiencies:** Zinc, magnesium, iron, omega-3 polyunsaturated fatty acids.

- **Nutritional surpluses:** Sugar, Artificial food colouring, low or high IgG foods.

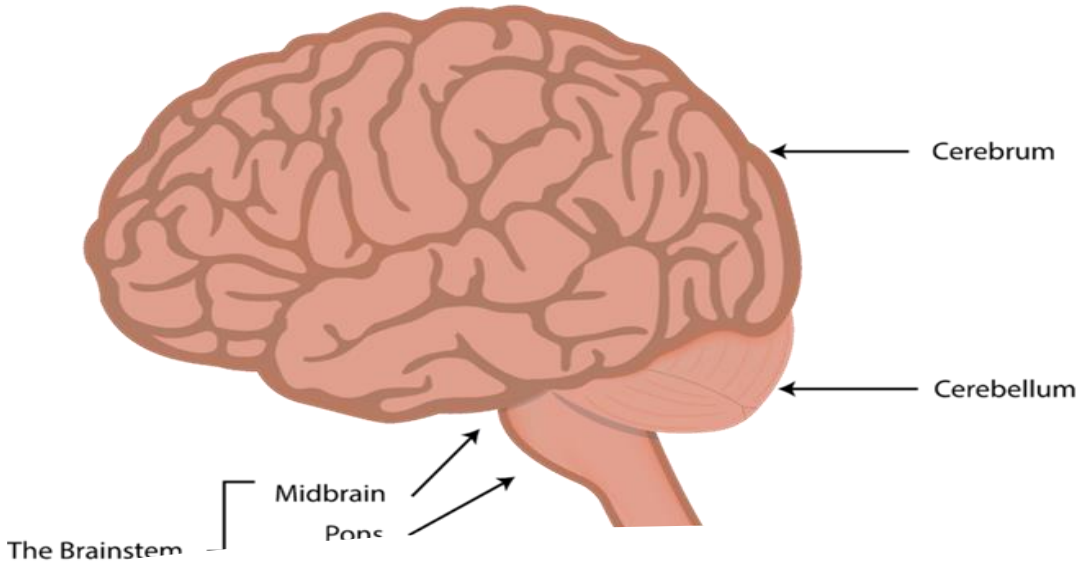
- **Psychosocial factors:** Low income, family adversity, harsh or hostile parenting.

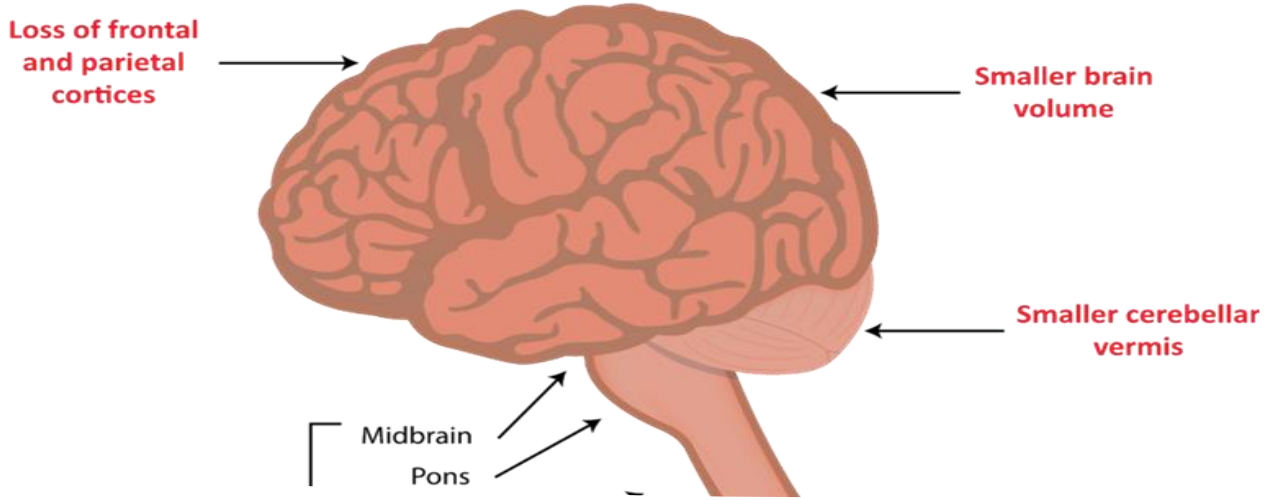
Neurobiology

The monoaminergic systems, specifically the dopaminergic and the noradrenergic pathways are intimately related to brain process affected by the disorder.

(ADHD as a disorder of insufficient “ TUNING” of the Prefrontal cortex by Dopamine and Norepinephrine).

- **Dopamine** system plays an important part in planning and in initiation of motor response, activation, switching, reaction to Novelty and processing of reward.
- The **noradrenergic** system influences arousal modulation, signal to noise ratio in cortical areas , state dependant cognitive process and cognitive preparation of urgent stimuli.





A 3% to 5% difference in brain size between individuals with or without ADHD . Regarding subcortical region smaller size in basal ganglia and limbic system . ADHD brain matures slowly than brain from typically developing children . This delay was more significant in prefrontal regions.

ADHD: Deconstruct the Syndrome into Diagnostic Symptoms

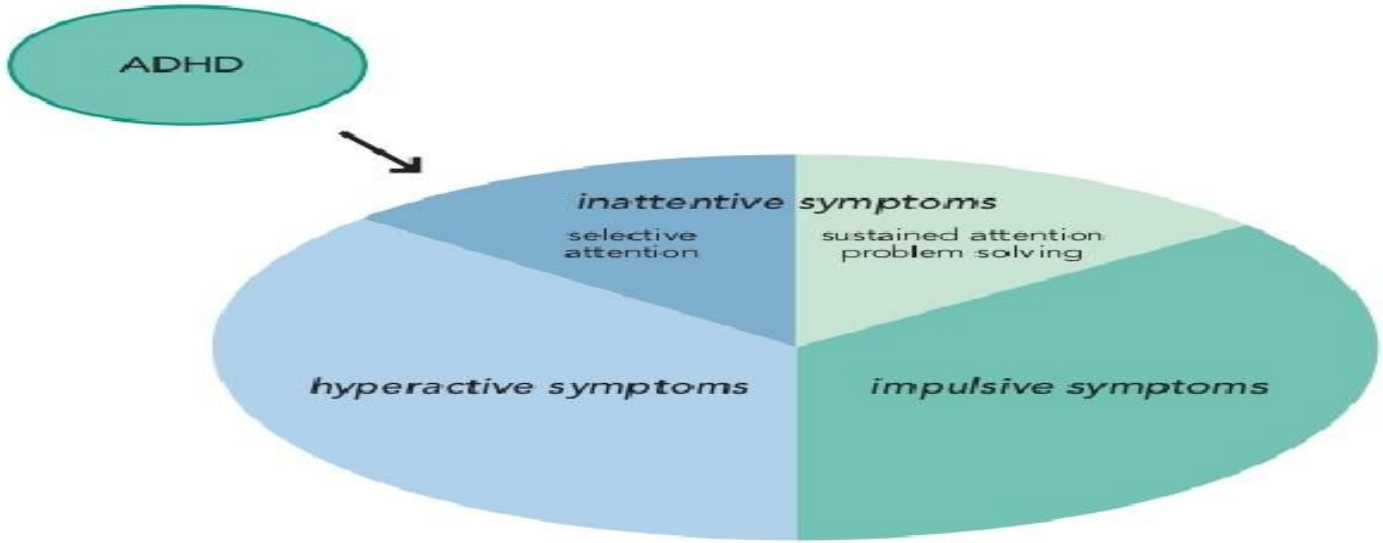


Figure 11-1 Symptoms of ADHD. There are three major categories of symptoms associated with attention deficit hyperactivity disorder (ADHD): inattention, hyperactivity, and impulsivity. Inattention itself can be divided into difficulty with selective attention and difficulty with sustained attention and problem solving.

ADHD: Core Symptoms Hypothetically Linked to Malfunctioning Prefrontal Cortex

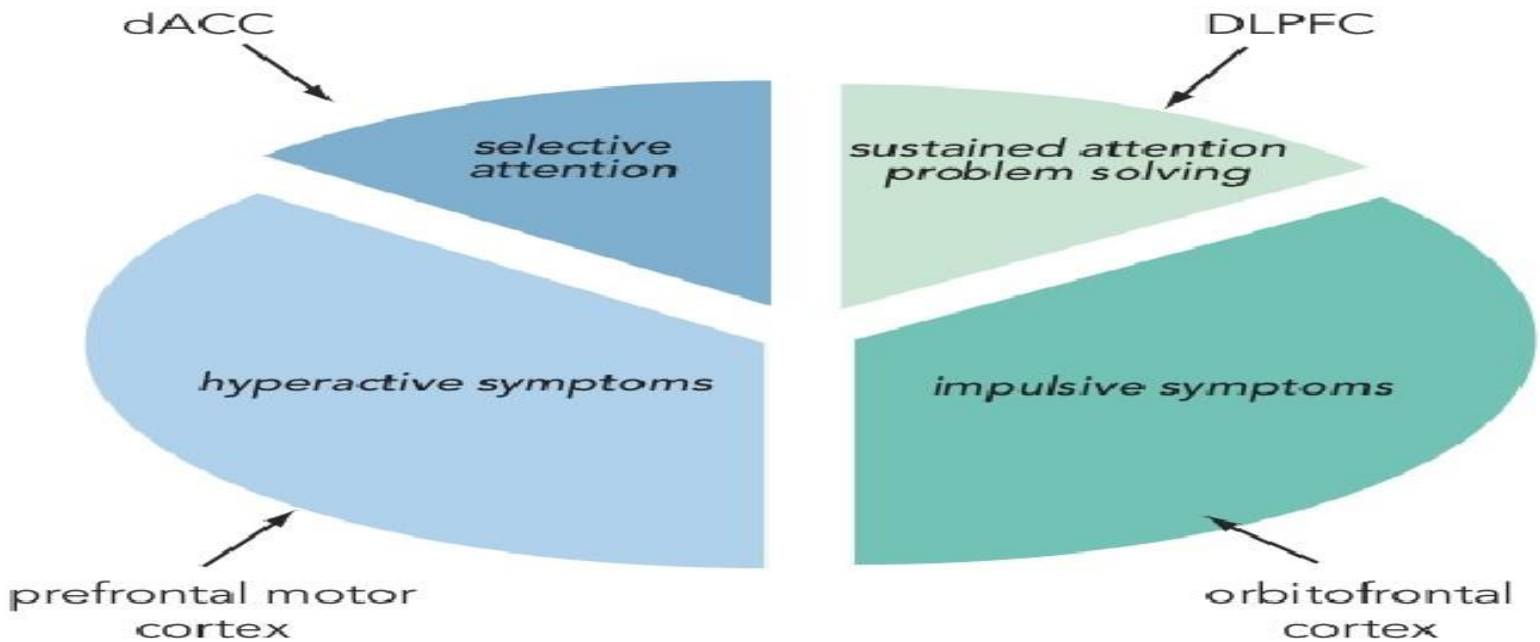


Figure 11-2 Matching ADHD symptoms to circuits. Problems with selective attention are believed to be linked to inefficient information processing in the dorsal anterior cingulate cortex (dACC), while problems with sustained attention are linked to inefficient information processing in the dorsolateral prefrontal cortex (DLPFC). Hyperactivity may be modulated by the prefrontal motor cortex and impulsivity by the orbital frontal cortex.

Impulsivity Is Modulated by the Orbitofrontal Cortex



impulsivity

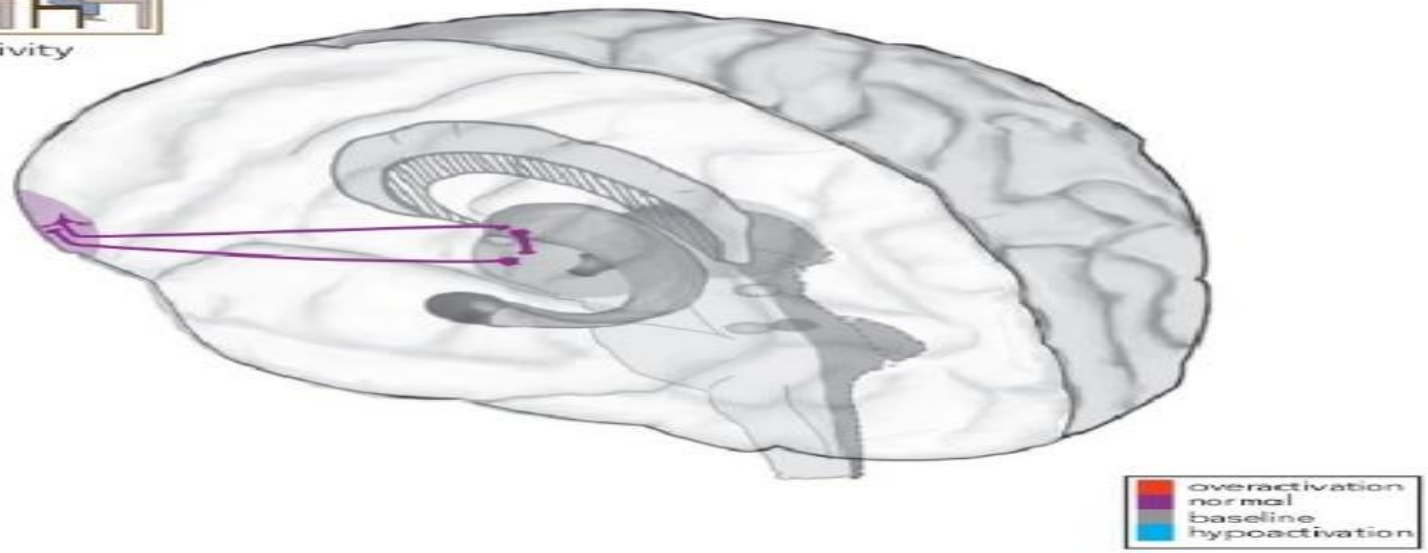


Figure 11-5 Impulsivity. Impulsivity is associated with a cortico-striato-thalamo-cortical loop that involves the orbital frontal cortex (OFC), the striatal complex, and the thalamus. Examples of impulsive symptoms in ADHD include talking excessively, blurting things out, not waiting one's turn, and interrupting.

Motor Hyperactivity Is Modulated by the Prefrontal Cortex


hyperactivity

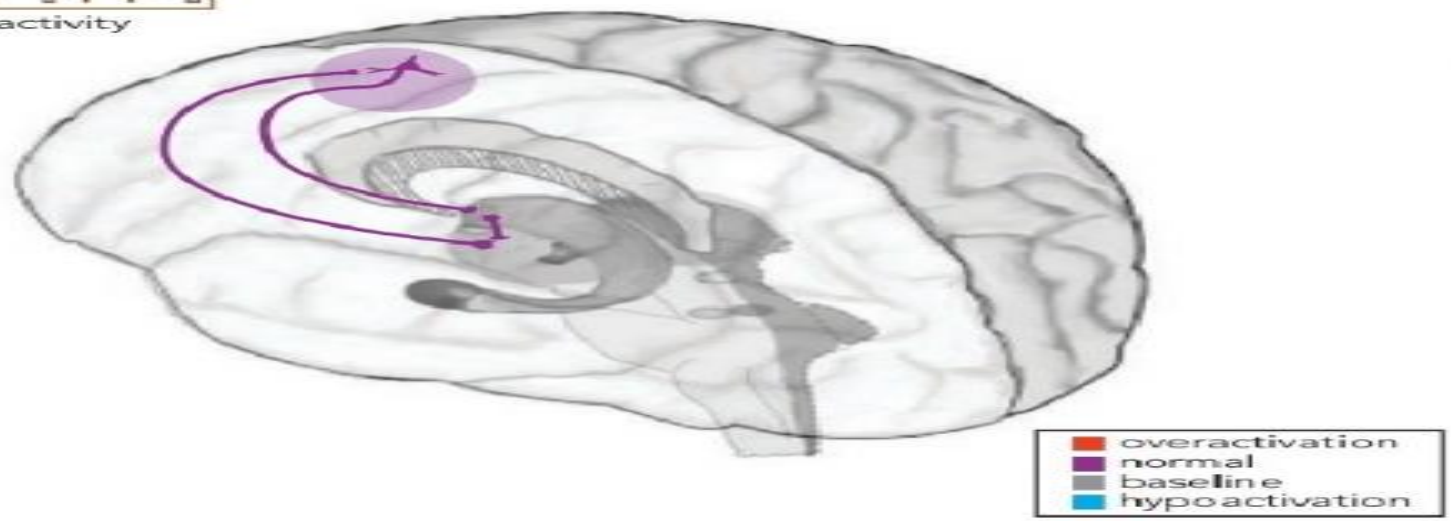


Figure 11-6 Hyperactivity. Motor activity, such as hyperactivity and psychomotor agitation or retardation, can be modulated by a cortico-striato-thalamo-cortical loop from the prefrontal motor cortex to the putamen (lateral striatum) to the thalamus and back to the prefrontal motor cortex. Common symptoms of hyperactivity in children with ADHD include fidgeting, leaving one's seat, running/climbing, being constantly on the go, and having trouble playing quietly.

Inattention

- Six or more of the following symptoms in children, and five or more in adults, excluding situations where these symptoms are better explained by another psychiatric or medical condition:

- ➢ Frequently overlooks details or makes careless mistakes
- ➢ Often has difficulty maintaining focus on one task or play activity
- ➢ Often appears not to be listening when spoken to, including when there is no obvious distraction
- ➢ Frequently does not finish following instructions, failing to complete tasks

- Often struggles to organise tasks and activities, to meet deadlines, and to keep belongings in order
- Is frequently reluctant to engage in tasks which require sustained attention
- Frequently loses items required for tasks and activities
- Often forgets daily activities, or is forgetful while completing them
- Is frequently easily distracted by extraneous stimuli, including thoughts in adults and older teenagers

Hyperactivity or impulsivity

- Six or more of the following symptoms in children, and five or more in adults, excluding situations where these symptoms are better explained by another psychiatric or medical condition:
- Is often fidgeting or squirming in seat
- Frequently has trouble sitting still during dinner, class, in meetings, etc.
- Frequently runs around or climbs in inappropriate situations. In adults and teenagers, this may be present only as restlessness.

- Often cannot quietly engage in leisure activities or play
- Frequently seems to be "on the go" or appears uncomfortable when not in motion
- Often talks excessively
- Often answers a question before it is finished, or finishes people's sentences
- Often struggles to wait their turn, including waiting in lines
- Frequently interrupts or intrudes, including into others' conversations or activities, or by using people's things without asking

Diagnosis

- The American Psychiatric Association has defined consensus criteria for the diagnosis of ADHD, which are published in the Diagnostic and Statistical Manual of Mental Disorders, Fifth edition
  - Children less than 17 years of age requires equal to or greater than 6 symptoms of inattention or equal to or greater than 6 symptoms of hyperactivity/impulsivity
  - Adolescents equal to or greater than 17 and adults, requires equal or greater than 5 symptoms of inattention or equal to or greater than 5 symptoms of hyperactivity/impulsivity

- ✓These symptoms of inattention, hyperactivity/impulsivity must[3]
- ✓Occur often
- ✓Be present in more than one setting (i.e. school, home)
- ✓Persist for at least six months
- ✓Be present before the age of 12
- ✓Impair function in academic, social or occupational activities
- ✓Be excessive for the development of the child

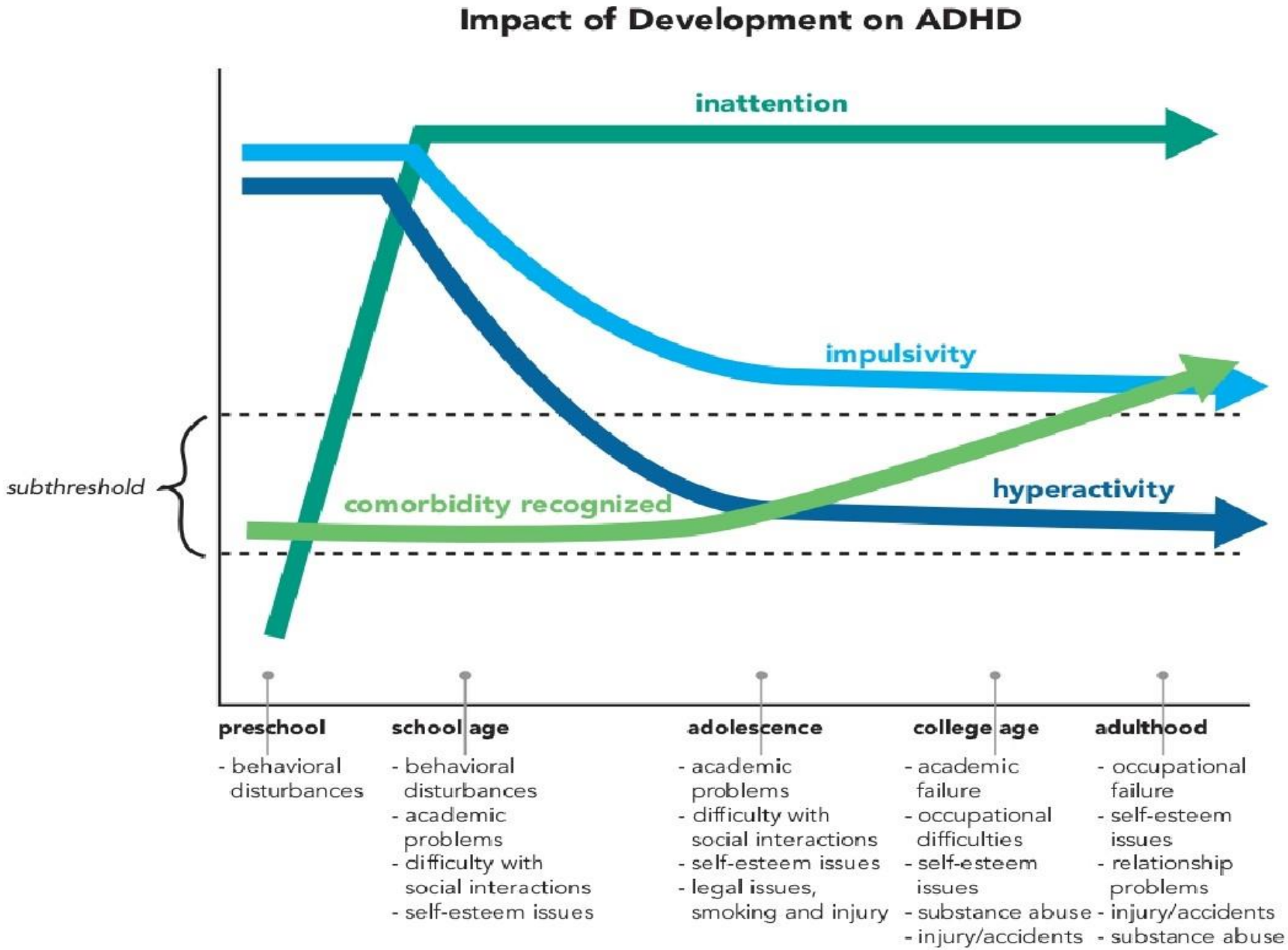


Figure 11-24 Impact of development on ADHD. Consistent with our understanding of neurodevelopment, the evolution of symptoms in ADHD shows that inattention is generally not identified in preschool but becomes prevalent as the patient ages and continues into adulthood. Hyperactivity and impulsivity are key symptoms in childhood but are less likely to manifest overtly in adulthood, although they may simply be expressed differently. The rates of comorbidities increase over time; this could be due to the fact that the comorbidities were overlooked in children with ADHD or that they truly develop later, consistent with data showing later onset of other psychiatric disorders compared to ADHD.

Difference according to developmental age

	Preschool years	Primary school years	Adolescence	Adulthood
Inattention	• Short play sequences (<3 min) • Leaving activities incomplete • Not listening	• Brief activities (<10 min) • Premature changes of activity •Forgetful; disorganized; distracted environment	• Less persistence than peers (<30 min) • Lack of focus on the details of a task • Poor planning ahead	• Details not completed • Appointments forgotten • Lack of foresight
Overactivity	• “Whirlwind”	• Restless when calm expected	• Fidgety	• Subjective feelings of restlessness
Impulsivity	• Does not listen • No sense of danger (hard to distinguish from compositionality)	• Acting out of turn; interrupting other children and blurting out answers • Thoughtless rule breaking • Intrusions on peers; accidents	• Poor self-control • Reckless risk-taking	• Motor and other accidents • Premature and unwise decision-making • Impatience

Comorbidities

- Intellectual disability disorder (Mental Retardation)
- Learning disorder
- Language disorder
- ASDs (Autism spectrum disorder)
- Tics
- Depressive disorder
- Anxiety disorder
- ODD
- Conduct disorder

Prognosis:

- Over-activity typically wanes in adolescence
- Many individuals have continuing problems in adult life
- High risk of antisocial personality disorder and substance abuse in adult

Management:

- **PHARMACOLOGICAL:**
- **NON – PHARMACOLOGICAL :**

MANAGEMENT : PHARMACOLOGICAL

- **Stimulant drugs**

➢ Norepinephrine and dopamine reuptake inhibitors

Methylphenidate hydrochloride

lisdexamfetamine

Dexmethylphenidates

- **Non stimulant drugs**

✓Alpha 2 adrenergic receptor agonists

Clonidine

Guanfacine

✓Selective noradrenaline reuptake inhibitor

Atomoxetine

Other drugs:

- ✓ antidepressant(Bupropion ,Venlafaxine , Desipramin)
- ✓Antipsychotic(Risperidone , Aripiprazole)

MANGEMENT : NON PHARMACOLOGICAL

- **Psychoeducation**
- **Behaviour management intervention**
  - Parent training
  - Classroom intervention
  - Cognitive therapy
  - Organizational skill intervention
  - Social skill training

Psycho- education

- Asking the family and patient to explain their understanding
- Provide accurate information , debunking myths and misconception.
- Explaining that diagnosis is completely based on clinical assessment.
- Treatment options , medications with benefits and side effects.
- With parents permission inform teachers about the disorder and what can they do to support their student.
- Informing about self help , support group , voluntary organizations.

- **Supplimentary interventions and dietary interventions**(poly unsaturated fatty acids , vitamin , minerals , amino acids),exclusion of artificial additives.
- **Complimentary and alternative methods**:
- Mind body interventions
- Meditation , yoga , tai chi , mindfulness ,hypnotherapy , massage , acupuncture , physical activity.
- **Combind interventions**


Thank
you!!