

Pervasive Developmental Disorders



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Pervasive Developmental Disorders

- ❑ Complex, lifelong, neuro developmental disorder
- ❑ Onset in early developmental period
- ❑ Specific delays and deviance in development
- ❑ Pervasive: affects multiple areas (Social interaction, Language, Communication, Cognition, Behaviour, Play)

Development of Diagnostic Concepts

Diagnostic concept	Current terminology	Originator
Dementia praecocissima	Childhood schizophrenia	De Sanctis, 1906
Dementia infantilis	Childhood disintegrative disorder	Heller, 1908
Early infantile autism	Autistic disorder	Kanner, 1943
Autistic psychopathy	Asperger's disorder	Asperger, 1944
Atypical personality development	PDD- NOS	Rank, 1949
Rett syndrome	Rett disorder	Rett, 1966

Neurodevelopment

- ❑ Neonate is born with double the number of neurons present in adult brain ~ 200 billion neurons.
- ❑ A major developmental task during the early prenatal and postnatal period is the synaptogenesis, pruning and migration of these neurons into a working functional brain.
- ❑ The process of reducing the number of synapses (pruning) is dependent in part on the communication between neurons.
- ❑ The more active synapses tend to be strengthened and less active synapses tend to be weakened or even eliminated (Chechik, Meilijson & Ruppin, 1999).

Neurodevelopment

- ❑ The brain develops if it receives specific, appropriate input through the sensory channels.
- ❑ Specific auditory, visual, and tactile input stimulates the brain and triggers neuro-growth that physically changes the brain and its function. This process is called “Neuroplasticity”.
- ❑ In autism the primary issue is sensory dysfunction.
- ❑ The brain does not correctly process sensory input, thus interfering with the typical neurodevelopment and triggering what is now being referred to as negative plasticity.

Neurodevelopment

- ❑ Function determines structure; how you use your brain determines how it develops
- ❑ Abnormal sensory function coupled with low sequential processing generally leads to DSAs--Debilitating Sensory Addictions; referred to as “stims,” or self-stimulatory behaviors. The reality of DSAs is that the child is playing with what is improperly developed or “broken” in a sensory channel.
- ❑ Delays in auditory and language development create an imbalance between the ability to think in pictures (i.e. visualization--typically very strong in those with autism) and the ability to think in words (i.e. conceptualization--generally significantly delayed in this population).
- ❑ This imbalance, has an effect on the ability to process, understand, and utilize language, as well as the ability to think conceptually, thus impacting global function.

Neurodevelopment

- ❑ Developmental delay produced from the sensory dysfunction creates both neuro developmental delay and an imbalance affecting these critical functions.
- ❑ The delay is in the development of sequential processing- i.e the ability to take in a series or sequence of auditory or visual information and to then hold those pieces together and manipulate them.
- ❑ This ability is that which permits us to learn and think.
- ❑ Delaying the development of sequential processing delays critical aspects of the child's total development.

Nosology

- ❑ DSM- I: Autism classified as a childhood onset type of schizophrenia
- ❑ **Rutter's criteria (1977)**
 - Onset < 30 months
 - Disturbed social development
 - Disturbed language development
 - Stereotyped, restricted repertoire of behavior
 - No delusions or hallucinations
- ❑ DSM-III: Pervasive Developmental Disorders (PDD)
- ❑ DSM-IV & ICD-10: Asperger syndrome was included
- ❑ DSM-V: Autism Spectrum Disorders

Types

- ❑ As per DSM-V: Autism Spectrum Disorders
- ❑ Encompasses
 - Early infantile autism
 - Childhood autism
 - Kanner's autism
 - High functioning autism
 - Atypical autism
 - Pervasive developmental disorders NOS
 - Childhood disintegrative disorders
 - Asperger's disorder
 - Rett's disorder

Autism Spectrum Disorders

- ❑ Spectrum of conditions from mild to severe
- ❑ Autistic traits are continuously distributed in the population – ASD is an extreme of the normal variation of autistic traits.
- ❑ Diagnosis depends upon clinical judgement- where autistic traits are significantly interfering in daily life functioning.
- ❑ Common features – disturbances of social interaction, verbal & non-verbal communication, restricted repetitive behaviour & interests.
- ❑ Component symptoms in each syndrome vary in presence/absence, severity, onset, developmental patterns, level of impairment.

Epidemiology

- ❑ First epidemiological studies reported population prevalence at ~ 4-5 per 10,000 (Lotter, 1966)
- ❑ 1980's - 10 per 10,000 autism cases
- ❑ 1990's - extreme variation; 5-72 per 10, 000 autism cases
- ❑ Current estimates (Fombonne, 1999, 2003)
 - 30-100 per 10,000 for all ASD
 - 13- 30 per 10,000 for autism
 - 3 per 10,000 for Asperger syndrome

Epidemiology contd...

- ❑ Associations of ASD with gender, IQ, medical disorders.
- ❑ Male: female ratio- 4-6:1; gender differences more pronounced in normal range of intellectual functioning.
- ❑ Coexisting severe to profound intellectual impairment is seen in ~ 40%.
- ❑ Mild to moderate cognitive impairments are found in 30%
- ❑ Normal intellectual functioning in another 30%.

Epidemiology contd...

- ❑ Potentially causal medical associations are found in about 5–10% of the cases - strongest connection is found for tuberous sclerosis
- ❑ 20% patients with Tuberous Sclerosis have autism
- ❑ Cerebral palsy, fragile X, phenylketonuria, neurofibromatosis, congenital rubella and Down's syndrome (Fombonne, 2003).
- ❑ The use of thimerosal, a vaccine preservative that contains ethyl mercury, is linked in a similar way to a rise in incidence of ASD. Because mercury, in high dosage, can cause neurodevelopmental sequelae, there is greater biological plausibility in this argument.
- ❑ These associations with intellectual impairment and known medical conditions are much stronger for typical autism than more broadly defined ASD.

Clinical Features

Qualitative impairment in social interactions - not the absolute lack of social behaviors

- ❑ Wide variation in social symptoms, which range from a total lack of awareness of another person to intrusive social approaches that are inappropriate to context.
- ❑ Children do not make eye contact, often in brief glances, make inappropriate eye contact.
- ❑ The capacity to make social connections and engage in relationships appropriate to age level is limited;
- ❑ Lack of interest in, or even lack of awareness of other children.
- ❑ They lack the pragmatics of “how socially to do what, when and where”.

Clinical Features contd...

Qualitative impairment in communication

- ❑ Wide variation in communication impairments, vary from simple speech delay to muteness, to fluency with subtle peculiarities of intonation and inability to adjust vocabulary and conversational style to social context.
- ❑ Fluency is often accompanied by many semantic (word meaning) and verbal pragmatic errors.
- ❑ Even if verbal, almost universally have comprehension deficits, in particular deficits in understanding higher order complex questions.
- ❑ A characteristic behavior of many children with autism is mechanically to use another person's hand to indicate the desired object, often called "hand over hand pointing."

Clinical Features contd...

Qualitative impairment in communication

- ❑ Speech tends to be monotonous
- ❑ Use of neologisms, echoing or pronoun reversal is common
- ❑ Deficits in nonverbal communication, (including the use of gestures such as pointing, showing and nodding).
- ❑ Some children with autism do not use miniature objects, animals or dolls appropriately in pretend play.
- ❑ Some highly verbal children may invent a fantasy world which becomes the sole focus of repetitive play.
- ❑ Imitation skills are weak or absent, as is the ability to engage in social play, such as peek-a-boo or hide and seek.

Clinical Features contd...

Restricted, Repetitive and Stereotypic Patterns of Behaviors, Interests and Activities

- ❑ Unusual and intense preoccupation with a topic of private interest such as washing machines, trains or railway schedules.
- ❑ Fixed daily routines and rituals.
- ❑ Preoccupied with “sameness” in home and school environments, or with routines.
- ❑ Repetitive behaviors include motor mannerisms- hand-flapping, rocking, flipping objects or lining up toys in a fixed fashion.
- ❑ Some display sensory abnormalities, and are preoccupied by auditory, visual, tactile, haptic or kinesthetic stimuli and apparently are hypo- or hyper-responsive to these.
- ❑ These repetitive and sensory abnormalities can be a source of pleasure or self stimulation.

Classification

Typical Autism

- ❑ Marked symptoms in all three of the key domains of qualitative impairments in social interactions, qualitatively impaired communication and restricted range of interests.
- ❑ Manifest by the age of 3 years

Asperger syndrome

- ❑ No overall delay in language development- single words by age 2 and communicative phrases by age 3 years.
- ❑ Normal or near-normal IQ is the rule
- ❑ Have pedantic and poorly modulated speech, poor non-verbal pragmatic or communication skills, and intense preoccupations with circumscribed topics.

Classification contd....

Asperger syndrome

- ❑ Validity of Asperger disorder as a discrete diagnostic entity distinct from high-functioning (verbal) autism has remained controversial (Klin, McPartland, & Volkmar, 2005a).

PDD- NOS

- ❑ Impairments in social interactions, impaired communication or restricted range of interests, but does not meet the full criteria for autistic disorder or Asperger disorder.
- ❑ Number of criteria met is subthreshold, age of onset is after age 3 years, atypical symptoms are present or more than one of these are present.

Classification contd....

Rett syndrome

- ❑ Progressive developmental disorder- affects 1 in 10,000–15,000 girls (Kozinetz, Skender, MacNaughton et al., 1993)
- ❑ Only PDD with a known genetic cause
- ❑ Mutations in the X-linked gene encoding methyl-CpG-binding protein 2
- ❑ Relatively normal general & psychomotor development through the first 6–18 months of life -> stagnation of developmental acquisitions and a rapid deterioration of behavior and mental status.
- ❑ Loss of purposeful movements of hands, jerky ataxia of trunk and limbs, unsteady gait, acquired microcephaly.
- ❑ Spasticity and epilepsy over years

Classification contd....

Childhood disintegrative disorder

- ❑ Heller syndrome- rare disorder, (prevalence rate 0.2 per 10,000)
- ❑ Manifests after an apparently normal development for the first 2 years of life.
- ❑ Loss of receptive & expressive language function
- ❑ Loss of coordination & development of fecal & urine incontinence
- ❑ Emergence of social withdrawal, hand & finger stereotypies, simple rituals similar to those seen in autism
- ❑ Deterioration continues till it either plateaus or progresses and also have comorbid epilepsy, motor dysfunction

Course and Outcome

- ❑ 2/3rd - dependent
- ❑ 1/3rd - somewhat independent
- ❑ 10% high functioning autistics - work, live in the community
- ❑ 20-30%- deterioration (seizures)
- ❑ Some deteriorate over years

Etiology- Environmental Factors

❑ Prenatal Risk Factors:

- ✓ Advanced maternal and paternal age
- ✓ Gestational diabetes
- ✓ Use of Valproic acid, Thalidomide, Misoprostol
- ✓ Viral infections with rubella and cytomegalovirus
- ✓ Maternal smoking
- ✓ Maternal stress
- ✓ Closer spacing of pregnancies and
- ✓ Extremely premature birth (<26 weeks gestational age).

Etiology - Environmental Factors contd...

❑ **Perinatal risk factors:**

- ✓ Preterm birth
- ✓ Low birth weight
- ✓ Birth asphyxia

❑ **Postnatal risk factors:**

- ✓ Infections
- ✓ Exposure to heavy metals
- ✓ Autoimmune mechanisms
- ✓ Vaccines – the infamous MMR vaccine theory of autism and Thiomersal (No association found subsequently)

Etiology - Psychosocial Theories

- ❑ Leo Kanner speculated - emotional factors might be involved in pathogenesis of autism - “refrigerator mothers”.
- ❑ No evidence for this hypothesis

Etiology - Biological Theories

- ❑ Various factors were suggested which indicated biological basis for the condition.
- ❑ These include high rates of
 - ✓ Mental retardation
 - ✓ Seizure disorder
 - ✓ Medical and genetic conditions associated with autism
- ❑ Current consensus - autism is a behavioural syndrome caused by one or more factors acting on the central nervous system.

Etiology - Genetic Factors

- ❑ ASD amongst the most heritable complex disorders
- ❑ Family studies:
 - ✓ Concordance rate of 2-5% in sibs of autism and 15-20% in sibs of ASD
- ❑ Twin studies:
 - ✓ Monozygotic-: autism- 36-91%; ASD- 86-92%
 - ✓ Dizygotic-: autism- 0%; ASD- 10%
- ❑ Linkage studies:
 - ✓ Multiple loci
 - ✓ Separate loci for social, language deficits
 - ✓ Polygenic inheritance
- ❑ Candidate gene studies- inconsistent results

Neuroimaging

- ❑ Evidence of marked disruption in relationships between cortical–subcortical and cortical–cortical gray matter volumes.
- ❑ Aberrant correlations between frontal lobe gray matter volume and temporal lobe, parietal lobe and subcortical gray matter.
- ❑ Aberrant or reduced connectivity patterns found in brain areas during task performance measuring social attribution, sentence comprehension and working memory.
- ❑ Individuals with autism appear to be using different cognitive strategies and some different brain areas to process information during tasks or in response to visual and auditory stimuli.

Neuropathology

- ❑ Postmortem studies
 - ❑ Increased cell packing in the limbic system,
 - ❑ Reduced numbers of Purkinje cells in the cerebellum,
 - ❑ Age-related changes in cerebellar nuclei and inferior olives,
 - ❑ Cortical dysgenesis and increased brain weight
- ❑ Minicolumns in the brains of autistic persons were more numerous, “narrower” with less peripheral neuropil space and increased spacing among the constituent cells
- ❑ Micro-architectural abnormalities originate during prenatal development and reflect progressive encephalization, defined as a disproportionate increase in white matter relative to gray matter

Neurophysiology

- ❑ EEG abnormalities are found in about 50% of individuals with autism
- ❑ No evidence of regional localization of abnormalities
- ❑ Behavioural studies have shown subjects with ASD to have a variety of abnormalities in attentional processing.
- ❑ In noisy environments, individuals with autism appear to have neural based deficits in recognizing and understanding speech and attending to socially relevant sounds.

Neurochemistry

- ❑ Most robust and well-replicated biological finding is the 25–50% increase in levels of serotonin in blood platelets in subjects with autism.
- ❑ Serotonin acts as a growth factor and regulator of early neuronal development before assuming its role as a neurotransmitter in the mature brain, this suggests that developmental dysregulation of serotonin synthesis may be involved in the pathogenesis of ASD.
- ❑ Hyperdopaminergia may explain overactivity, stereotypy
- ❑ Animal studies: role of neuropeptides (endogenous opioids, oxytocin & vasopressin) in regulating social behavior.

Neuropsychological impairments

- ❑ Deficits in Emotional Cognition
- ❑ Deficits in Social Cognition
- ❑ Theory of Mind deficits
- ❑ Deficits in executive functions
- ❑ Deficits in joint attention
- ❑ Language deficits
- ❑ Intellectual Cognitive deficits

Assessment

When to suspect?

- ❑ A child presenting with language/ communication deficits
- ❑ Deficits in social and emotional reciprocity
- ❑ Behaviour/ play abnormalities
- ❑ Cognitive impairment

Differential diagnosis

- ❑ Subtypes of PDD
- ❑ MR & other developmental disorders
- ❑ Sensory impairments
- ❑ Neurological-physical disorders
- ❑ Psychiatric disorders
- ❑ Neglect

Confusion / Controversies

- ❑ Schizophrenia beginning < 30 months (VEOS) Vs Autism
- ❑ Childhood onset PDD with onset > 30 months Vs VEOS
- ❑ Autism in children of normal intelligence
- ❑ MR with autistic features
- ❑ Developmental language delays in children Vs Autism
- ❑ Selective mutism, social anxiety Vs Autism

Assessments

- ❑ Medical evaluation by a paediatrician- seizure activity, brain injury, gastrointestinal disease, pica and other medical conditions
- ❑ Neurological evaluation
- ❑ Neuropsychological assessment - IQ, executive functions, memory, language
- ❑ Speech assessment
- ❑ Hearing assessment
- ❑ Play observation
- ❑ Social skills assessment
- ❑ Family assessment
- ❑ Specialized assessments: Metabolic Screen, Toxic screen, Chromosomal study

Assessment Scales

- ❑ **Screening instruments**
 - ❑ Checklist for Autism in Toddlers
 - ❑ Childhood Autism Rating Scale
 - ❑ Autism Behavior Checklist
- ❑ **Diagnostic interviews**
 - ❑ Autism Diagnostic Observation Schedule
 - ❑ Autism Diagnostic Interview

Principles of Treatment

- ❑ **Early identification and intervention:** enables avoidance of unnecessary medical shopping for parents with clinical concerns, provides for early guidance and genetic counselling and starting early interventions.
- ❑ **Comprehensive assessment** (including a comprehensive physical examination).
- ❑ **Individualized treatment**
- ❑ Special settings
- ❑ Parental involvement
- ❑ Regular review of goals and achievements

Treatment Goals

- ❑ To facilitate and stimulate normal development,
- ❑ Promote language and socialization
- ❑ Enhance adaptation
- ❑ Reduce autism bound maladaptive behaviours - rigidity, stereotypy
- ❑ Reduce non specific maladaptive behaviours - hyperactivity, irritability, impulsivity
- ❑ Treat comorbid psychiatric disorders
- ❑ Treat comorbid medical disorders
- ❑ Address caregiver burden and stress
- ❑ Remediation, Access to services and benefits

Treatment

Multimodal treatment approach

- ❑ Family counselling
- ❑ Structured and special educational techniques
- ❑ Individual behaviour modification: employing principles of applied behaviour analysis
- ❑ Home training
- ❑ Placement in special schools or day care centres

Medication

- ❑ Psychotropic medications have no influence on core ASD symptoms
- ❑ Considered for comorbid symptoms such as aggression, temper tantrums, irritability, hyperactivity, self-injurious behaviour, rigidity, anxiety & sleeping problems
- ❑ That are not responding to behavioural interventions, or
- ❑ Those that seriously interfere with the application of these interventions.
- ❑ Use antipsychotics, SSRI's, Clonidine,
- ❑ Oxytocin

Social Interventions

- ❑ Social Interaction therapy
 - ❑ Proximity
 - ❑ Prompts
 - ❑ Peer initiation
- ❑ Play therapy
- ❑ Social Skills training
 - ❑ Behavioural, developmental & ecological approaches
- ❑ Vocational/Residential approaches

Other Treatments

- ❑ Speech Therapy
- ❑ Physiotherapy
- ❑ Occupational Therapy
- ❑ Sensory Integration Therapy
- ❑ Art Therapy
- ❑ Behaviour Therapy
- ❑ Cognitive Remediation
- ❑ Parent Training
- ❑ Special Education

TEACCH

Treatment and **E**ducation of **A**utistic and related **C**ommunication-handicapped **C**hildren program.

- ❑ Comprehensive treatment package developed at the University of North Carolina since 1970s.
- ❑ Based on principles from cognitive-behavioral theory, a system is developed with stepwise visualization of the actions needed to fulfill a task.
- ❑ Improve skills & improve environmental adaptation
- ❑ Enhance skills, accept deficits
- ❑ Use of visual structures for optimum education
- ❑ Parents can act as co-therapists and continue with the principles of TEACCH at home.

**THANK
YOU!**