Characteristics of Autism (Classical)

- Abnormalities of complex behaviors
  - Language and Cognition
  - 70% of those with Autism have MR
  - 30% have seizures
  - 90 to 95% do NOT have blindness, deafness or neurological long tract signs
what is the significance of this?

- primary sensory cortex and white matter which are affected in hypoxic injury and cerebral palsy are not affected in Autism.
- suggests Autism is a distributed neural systems abnormality.
- (it is not a specific focal lesion but a wide generalized dysfunction of Association Cortex).

DIAGNOSTIC TYPES

PERVERSIVE DEVELOPMENTAL DISORDERS

- AUTISTIC DISORDER (KANNER SYNDROME)
- CHILDHOOD DISINTEGRATIVE DISORDER
- PERVERSIVE DEVELOPMENTAL DISORDER NOS
- AUTISTIC PHENOTYPE

CLINICAL PRESENTATION

- Impairment in SOCIAL SKILLS
- Impairment in COMMUNICATIVE USE OF VERBAL AND NONVERBAL KNOWLEDGE
- RESTRICTED AND REPETITIVE BEHAVIOURS
GENETIC ASPECTS OF AUTISM

- POLYGENETIC DISORDER
- X LINKED GENETIC COMPONENT
- (PREVALENCE 4 TO 8 TIMES HIGHER IN MALES)
- SIGNIFICANT ASSOCIATION BETWEEN AUTISM AND A 'C' ALLELE IN THE PROMOTER REGION OF MET RECEPTOR TYROSINE KINASE GENE

How cortex develops

- Neurons migrate to a PLATE that develops before the typical six layers of the cortex develop
- They wait here for the six layers to form.
- These then are the six destinations for the neurons to go to
- While they wait they mature --- they get the signal to move
Six layers of Cortex

How Cortex develops

- Glial fibres *the guide wires (like rail tracks)* then develop, connecting the plate to the six layers

- The neurons hop on to these wires and migrate along these guide wires to a specific layer.

- Each Neuron is preprogrammed to go to a specific layer. That is where they will go with a singular purpose.

Understanding the Brain and its Development
Brain in the fetus and new born child

- Just before birth and up to two years after birth:
  - the brain is 50% bigger than the adult brain proportionately.
  - the brain comes equipped with excess wiring.
  - Gradually, from 2 years to puberty the brain size gradually decreases.

Pruning

- this is done through a process called Pruning.
- By puberty the brain size will have reduced to its adult size.
- From puberty to young, mature adulthood, the brain cells interconnect more intricately through wiring that sprouts from the head of the nerve cell.

What is the purpose of Pruning?

- The purpose is to retain the essential wiring that is used frequently.
- And prune away the wiring that is not used.
- Environment has a significant impact on formation of connections.
- However, environment writes on the genetic blueprint, and not on a blank slate.
What goes wrong in autism?

- The autistic brain is still enlarged from 2 to 4 years of age (pruning fails?)
- The brain of adults with autism may be larger in size
- Neurons are found in aberrant places
- General under-connectivity with frontal cortex
- Reduced inter-regional connectivity

Lobes of the Brain

- Frontal and Temporal development is stunted at an early stage leading to lack of differentiation
- This lack of differentiation leads to hyper-connectivity
- Blocks coherence development with other critical brain regions
Lobes of the Brain

Connectivity problems
- HYPO-connectivity
  - Orbito-frontal
  - Mixed sensory-motor
  - Occipital/Parietal-Temporal
  - Frontal-posterior
  - Left Intra-hemisphere

- HYPER-connectivity
  - Frontal-temporal
  - Left Hemisphere intra-hemispheric

Neuro-developmental issues—Scaffolding
- In the younger brain:
  - specialization of circuitry
    - Ex: Remembering, working memory tasks, Novel tasks
  - In response to challenges, initially, a wider set of neural circuits are recruited.
  - These are Scaffolds
  - As the task is over-learned, a specific, honed circuit is developed.
  - This provides the ability for efficient cognitive operations
In the older brain - Firstly>>

- **Scaffolds are invoked *even to perform familiar tasks and basic cognitive processes***

  Ex: (working memory tasks):

  **Young**
  focal, left Para-hippocampal activation

  **Old**
  Wider *Right and left pre-frontal brain activation*

In the older: secondly>>>*

- **Scaffolds (wider net works) are recruited**

  even for low levels of task demand (remembering where one put the car keys)

In the older: thirdly >>>

- Generating scaffolds and recruiting them is even more inefficient

  because of aging pathology
In Developmentally disabled (including Autism) we propose

Scaffolding, even in younger ages is inefficient

There is impaired ability to recruit Pre-frontal networks, especially bilaterally

In older ages neurobiological decline is rapid or more profound in its impact resulting in poor scaffolding capacity

Whatever scaffolding there is, is penetrated by neural pathology leading to collapse of the scaffolds

(Parks, Reuter-Lorenz; Burke and Barnes;)

Some consequences of lower functional connectivity

- Less activation in Broca’s area (sentence integration area)
- More activation in Wernicke’s area (word processing area)
- Poorer comprehension of complex sentences
- Good word reading
In autism

- Non-Verbal visually oriented processing is efficient
- Letters are retained as Visual-Graphical codes
- Lack of understanding of Intention, Emotions and Internal Experiences of others (Theory of Mind)

In Autism

- Processing of Information is difficult as the connection problems do not allow for efficient operation
- Integration of sensory and other information, usage of the appropriate areas of the brain to process input, problem solving ability, are affected because of the underlying mis-wiring.
- Results in behavioural, emotional sensori-motor dysregulation

VTS
Executive Brain

Executive Functions
- Inhibit
- Shift
- Emotional Control
- Monitor

Working Memory
- Plan/organize
- Organization of Materials
- Task Completion
Signs and Symptoms

- Perseveration
- Organic Sameness
- Inflexibility
- Catastrophic Anxiety
- Emotional Dysregulation
- Working Memory Deficits
- Poor judgement

Signs and Symptoms

- Low threshold for frustration
- Impulse control difficulties
- Dyspraxia—Speech / motor
- Difficulty in postponing gratification
- Emotional ‘incontinence’

Dysfunction
In Autism

* Perceiving/Integrating difficulties
  * Selective or poor attention
  * Poor Sensory modulation
  * Absence of prior knowledge/Experience
  * Poor problem solving skills
  * Lack of ability to generalize

Processing in the autistic person

* Faulty: given the faulty input
  * Can not base on prior knowledge
  * Not Flexible
  * Problems with sequencing and Logical operations
  * Linked to basic ‘survival’ emotions

Results in

* High anxiety
  * Disorganized behaviour
  * Perseveration
Inability to process information efficiently

- Inability to dampen unnecessary inflow
- Inability to focus on what is essential
- Bombarded by stimuli, fragmented experiencing of the world
- Inability to handle the resulting chaos
- Wanting to withdraw, "turn off" the sensory inflow.

- Anxiety  →  Self Injury (Endorphin response)

Self Injury - Opioid Dynamics

Stress Adaptation Fails  →  Stress conflict  →  helplessness

- ANXIETY REDUCED
- OPIOIDS Released
- Self Injury  →  Impervious to pain

- High CRH
- High ACTH

- High NE, Cortisol
- High Metenkephalin

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Typical Responses in OBS

- Rapid cycling mood changes
- aimless energy
- High Anxiety
- Irritability
- Impulsivity
- Disinhibition
- perseveration
DIAGNOSTIC CHALLENGE

- Do not attribute everything to “autism”
- Avoid Diagnostic overshadowing
- Give each individual the full benefit of unbiased assessment
- Autism may be the substrate, but a full range of disorders may occur

MULTI FACTOR ASSESSMENT

1. Bio-medical factors
2. Psychiatric Factors
3. Developmental Factors
4. Environmental Factors
5. Sensory Modulation Factors
6. Communication Factors
7. Emotional Factors
8. Behavior Factors
Assessment and Treatment in Dual Diagnosis

Case 1

Presenting Problems
- Aggression
- Mood swings
- Manic to depressed
- Inter-personal difficulties
- Restlessness

Previous Diagnoses
Psychiatric
- Bipolar Disorder
- Psychosis NOS
- Autistic behaviour
- Depression
- Schizophrenia
- ADHD

Based on
- Mood swings
- Disorganized behaviours
- Withdrawn, isolative
- Constant movement, pacing
- Poor concentration
- Unprovoked outbursts

Medications
- Ritalin
- Atypical anti-psychotics
- Mood stabilizers
- SSRI's
- Benzodiazepines
- Anti Convulsants
- Typical Anti-psychotics

- Ineffective
- Side-effects
- Worsening behaviours
Specialized assessments

- Neuro-medical
  - Epilepsy, Left fronto-temporal, Motor dyspraxia (Only one step of an action at a time)

- Neuro-Cognitive
  - Executive Dysfunction
    - Poor Inhibition, Mood Dysregulation, Unable to Shift, Poor working memory, Poor problem solving skills

- Sensory Modulation
  - Proprioceptive deficits
    - bodily position, changes in position in space, movement pressure, weight, stretch Results in constant movement, rocking

Specialized assessments: contd.

- Sensory Modulation deficits: contd.
  - Proprioceptive: Contd.
    - Sensory Seeking: jumping, crashing, kicks, swings legs, banging on objects, bites on fingers, squirms, fidgets, constantly on the move.
    - Difficulty in Grading Movements: misjudges how much to flex or extend muscles, breaks objects, too much force while closing doors, slamming doors, slamming objects down, pressing too hard, misjudges weight, plays with too much force hurting others or pets inadvertently.

Sensory Modulation Deficits : Contd.

- Auditory Dysfunction
  - Distressed and upset by background noises, refrigerators, air conditioners, flushing of toilets, dogs barking, crying and covering ears, avoids malls, restaurants, crowds.

- Self-Regulation Difficulties
  - Hyper sensitivity to sounds
  - Unpredictable state of Arousal or low arousal (hyper active to Lethargic; over stimulated to under stimulated)
  - Severe mood swings (happy to angry to dysphoric)
Communication Deficit

- Expressive Language Deficits
  - Approximate answers
  - Mixing up sequences
  - Can not find words
  - Rambling, imprecise speech

- Receptive language Deficits
  - Can process only a small fragment of what is said
  - Mis-interprets, ‘mis – hears’

Motor
- Poorly regulated movements
- Poorly graded movements
- Hyper activity
- Aggression

Mood
- Dysregulated moods
- Extreme reactions

Cognitive
- Perseveration, Poor Impulse Control
- Working Memory deficits
- Poor problem solving skills

Management

Pharmacological
- Anti-Convulsants for seizure control
- Beta- blockers for anxiety/ explosiveness
Management: contd:

- Sensory Processing
- Communication
- Behavioural
- Neuro-Cognitive
- Occupational Therapy
- Speech and language intervention using Visual Programmes
- Functional behavioural intervention
- Interventions to help with Executive dysfunction

Case 2

- Physical aggression
- Irritability
- Restlessness
- Poor attention
- Decline in cognitive abilities
  - No longer able to work as before, fine motor difficulties, forgetfulness, perseverative, personal care declining, needs constant reminders.

Initial findings

- Medically stable
- History of seizures - last reported 7 years ago.
- Fluctuating cognitive abilities - some good days and some bad days in the week.

Assessment results

- Daily symptom check list logs indicate several days of relatively normal functions
- Interspersed with days on which “everything is a struggle”:
  - Irritability
  - Impatience
  - Explosiveness
  - Stuckness
  - Difficulty with simplest of tasks
  - Forgetful, needs reminders

Neuro Psychological Assessment Battery (on a "good" day)

- Attention Capacity: average
- Auditory Comprehension: some impairment
- Working memory: moderately impaired
- Memory for auditory items: poor
- Memory for Visual items: good
- Some problems in recall of with logical, sequential items.
- Procedural memory: good
- Constructional tasks: good
- Simple visual problem solving: good
Reassessment
(on a “bad day”)

• NAB battery could not be completed.
• Poor attention
• Extremely poor auditory comprehension
• Dyspraxia
• Very poor working memory
• Very poor recall on all tasks
• Word finding difficulties

Investigations

➢ Careful and detailed history taking
➢ Restless sleep: bed sheets in disarray
➢ Difficulty waking up and performing daily tasks
➢ Irritability, explosiveness
➢ Step by step guidance required

Sleep EEG/ MRI

Fronto temporal seizures
No significant degenerative changes
No focal lesion

• Fluctuating cognitive presentation related to:
• Nocturnal seizures: waking up in a post-ictal state
• Had been taking sub therapeutic doses of Dilantin for several years.
• Even though mild fluctuations had occurred for several years, this had been diagnosed as ‘oppositional’, ‘impulse control problems’, ‘bipolar’.
7 months ago, started on Risperidone
Subsequently Paxil added
Both drugs lower seizure threshold.
Nocturnal seizures increased in frequency
Occurred 4 to 5 nights a week.
Treated effectively with carbamazepine.

Case 1
- 28 yr. old female
- Mild mental retardation (IQ<55)
- Presents with:
  - Agitation
  - Restlessness
  - Poor sleep
  - Irritability
  - Biting self
  - Distractible
- Had been manifesting increased anxiousness over 4-5 months. Prescribed Paxil (20 mg) daily.

Case 2
- 48 yr. old female with cerebral palsy with history of a psychosis. Autistic.
- Agitated, increasingly psychotic
- Several anti-psychotics tried without success
- On Haldol (5 mg) bid – more manageable
- Losing skills – not walking anymore
- Wheel-chair bound
Case 3

- 20 yr. old male with mild mental retardation
- Diagnosed with schizophrenia
- Auditory hallucinations: talking to himself
- Paranoid delusions:
  - Seems afraid of some staff
  - Refuses to go out
  - Seems to be saying ‘don’t hurt’
  - Tells people not to hurt him
- Treated with a variety of typical and atypical antipsychotics
- On examination: multiple motor and phonic tics

Case 4: Larry

- 34 yr. old, moderately retarded
- h/o congenital syphilis
- c/o seeing “monsters”
  - “scary faces”
  - “the bogeyman”

  Initial impressions – paranoid, delusional

Communication & Diagnosis

Linguistic Difficulties
- Designing Info

Distress
- Piecemeal Info
- Omit necessary details
- Intentions unclear
- Voice incomplete thoughts
Communication & Diagnosis Cont’d

Intention – starting point

has to be communicated clearly

Difficulty in grasping intention
Fitting a jigsaw puzzle with pieces missing

Association between behavioural disturbance & violations of linguistic rules

Awareness of problem → isolation, avoidance

Theory Of Mind

Combination of Problems

- ADHD
- Epilepsy
- Autism
- Depression
- Phobia
- Anxiety
- Physical Handicaps
Components of a Psychiatric Assessment

History

- Talk to the patient, even if it appears that the patient might not understand, because a person's receptive language skills are likely to exceed his or her expressive skills.
- Pay attention to the patient's developmental level, which may necessitate talking in a more concrete fashion, focusing on the here and now, using words appropriate to the patient's level of understanding.

- Recent changes in the patient's physical or social environment.
- Circumstantial patterns such as symptoms associated with a particular setting or time of day.
- A longitudinal history to correlate with concurrent events such as stressors, medical problems, and medication changes.

- Psychological evaluation – baseline data on IQ, level of adaptive functioning, language and communication skills, and ability to interact with others. These data can be contrasted with current status to identify decompensation.
- Social and developmental history.
- Family history.
Medical history – incidence of cerebral palsy, sensory deficits, epilepsy, and other neurologic disorders increases as IQ decreases. A dysmorphologic syndrome often is associated with medical problems.

Physicians' and nurses' notes – sleep, weight, and activity levels; previous consultations; laboratory findings; medication history. Drug interactions can precipitate aggression or self-injurious behavior.

Behavioral Data

Longitudinal behavioral data, when correlated with concurrent events such as environmental stresses, medical problems, and changes in medications, can contribute significantly to diagnosis and treatment.

Mental Status Examination
Physical Examination and Diagnostic Studies

Drug interactions and medication side effects must also be considered.

- Benzodiazepines with long half-lives may accumulate, leading to drowsiness and mental clouding. Short-acting benzodiazepines may cause interdose rebound symptoms, with marked worsening of anxiety just prior to scheduled doses.

Components of Assessment

- Sensory Assessment
- Speech and Language Assessment
- Functional Behaviour assessment

Components of Assessment

Component I: Initial consultation
- Define referral problem
- Obtain h/o difficulties
- Obtain treatment history
- Obtain initial sample of behaviour
- Obtain appropriate consents
Components of Assessment Cont’d
Component 2: Evaluation of strengths & deficits
- Complete psychological testing
- Obtain adaptive behaviour profile
- Define roles of significant caregivers
- Conduct reinforcer survey

Components of Assessment Cont’d
Component 3: Neuromedical assessment
- Medical & developmental history
- Physical exam
- Neurological exam
- Lab tests

Components of Assessment Cont’d
Component 4: Observational Analysis
- Mental status
- Functional analysis of behaviour