NEUROBEHAVIORAL DISORDERS ASSOCIATED WITH ABI: CONSIDERATIONS REGARDING THE PRINCIPLES OF ENGAGING IN HCBS WAIVER SERVICES

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DDS/MRC PRESENTATION

presented by

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LEARNING OBJECTIVES

- ❖Overview of Acquired Brain Injury (ABI)
- ❖Common neurobehavioral & neurocognitive disorders associated with ABI and relationship to sites, severity and etiology of ABI
- ❖Impact of neurobehavioral disorders with respect to communication, social interactions, and modulation of behavior and perception
- ❖Guidelines and considerations for presenting the POEWS

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ACQUIRED BRAIN INJURY [ABI]

- ❖INFECTIOUS DISEASES associated with DISORDERS of the CNS: meningitis/encephalitis caused by bacteria, viruses, parasites and other infectious agents
- ❖NEOPLASMS (Brain Tumors): may be primary (arising within the CNS), or secondary representing metastases (spread) of cancer from another site (e.g., lung)
- ❖METABOLIC DISORDERS affecting the CNS: which may be related to systemic disease (e.g., hepatic encephalopathy) or other conditions affecting the brain (e.g., anoxia)

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ACQUIRED BRAIN INJURY [ABI]

- ❖ **NEUROTOXIC DISORDERS: includes brain injury resulting from environmental or occupational exposure to toxins, such as metals (e.g., lead poisoning), gases (e.g., carbon monoxide), as well as drug and alcohol abuse**
- ❖ **NEUROVASCULAR DISEASES and CONDITIONS: includes stroke (second leading cause of ABI)**
- ❖ **TRAUMATIC BRAIN INJURY (TBI): an externally–caused brain injury and leading cause of ABI, most often related to falls. Other external mechanisms include motor vehicles, strikes by objects or persons, firearms, and** IEDs

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FACTORS AFFECTING RECOVERY, NEUROBEHAVIORAL and NEUROCOGNITIVE OUTCOME

- **AGE**
- **SITE(S) and SEVERITY of NEUROLOGICAL INSULT**
  - ❖ **Focal vs Multifocal vs Diffuse**
  - ❖ **Lateralization: left hemisphere (LH) vs right hemisphere (RH)**
- **DISORDER/DISEASE-SPECIFIC DETERMINANTS**
- **VELOCITY: progressive *vs* static *vs* intermittent**

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FACTORS AFFECTING RECOVERY, NEUROBEHAVIORAL and NEUROCOGNITIVE OUTCOME

- **NATURE of COMPLICATIONS**
- **PREMORBID CONDITIONS (e.g., Psychiatric Disorder, Developmental Disorder, Medical Status)**
- **PARTICIPATION in REHABILITATION**
- **TIMELINESS, ACCURACY and ACCESS to DIAGNOSTIC and TREATMENT SERVICES**

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FACTORS AFFECTING RECOVERY, NEUROBEHAVIORAL and NEUROCOGNITIVE OUTCOME

- **POST-INJURY RISK FACTORS (e.g., substance abuse)**
- **PSYCHOSOCIAL HISTORY and POST-INJURY STATUS**
- **LIVING STATUS (e.g., homeless; institutionalized)**
- **LATE EFFECTS and POST-ACUTE DISORDERS**
  (e.g., seizures; shunt malfunction)

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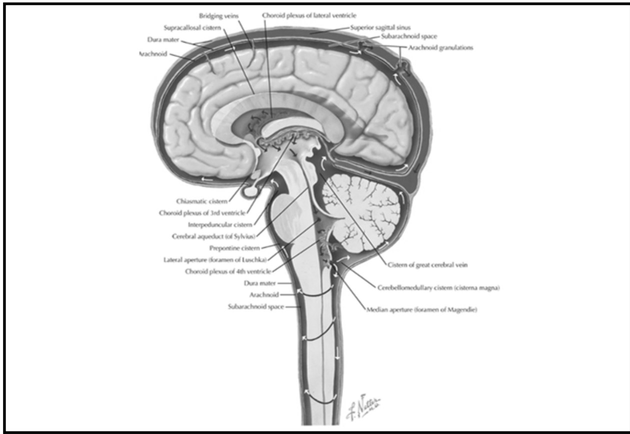

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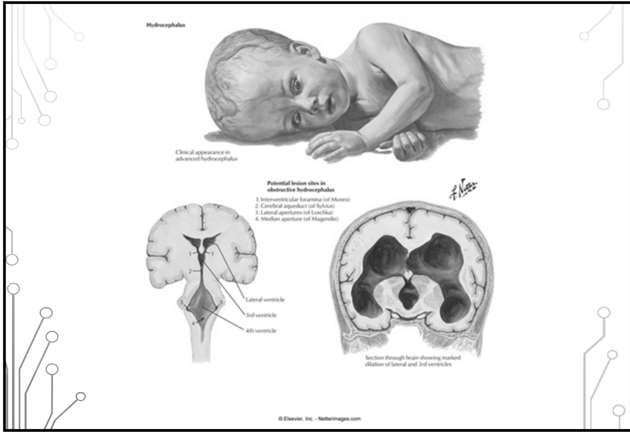

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NEUROCOGNITIVE CONSEQUENCES of ABI

- **DEMENTIA** (e.g., Chronic Traumatic Encephalopathy: CTE)
- **INTELLECTUAL DISABILITY: Mild - Profound**
  (e.g., Shaken Baby Syndrome)
- **SPECIFIC NEUROPSYCHOLOGICAL DEFICITS**

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NEUROPSYCHOLOGICAL DOMAINS

- **ATTENTION and AROUSAL**
- **LEARNING and MEMORY (verbal and non-verbal; short-term and remote; semantic, autobiographical, episodic, procedural)**
- **CONSTRUCTIONAL and VISUOSPATIAL SKILL**
- **LANGUAGE and COMMUNICATION (e.g. aphasia)**

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Dominant Hemisphere Language Dysfunction

Clinical syndromes related to site of region

Broca aphasia · Global aphasia · Wernicke aphasia · Conduction aphasia · Angular gyrus · Inferior temporal lobe · Occipital region

	Broca aphasia	Wernicke aphasia	Conduction aphasia	Angular gyrus	Inferior temporal lobe	Occipital region	Global aphasia
Pronunciation, speech rhythm	Dysarthria stuttering, effortful	Normal, fluent, loquacious	Normal	Normal	Occasional pause in word finding	Normal	Very abnormal
Speech content	Missed syllables, agrammatical, telegraphic	Use of wrong or nonexistent words	Some wrong words	Often normal	Occasional circumlocution	Normal	Very abnormal
Repetition of speech	Abnormal but better than spontaneous	Abnormal	Abnormal	Normal	Normal	Normal	Very abnormal
Comprehension of spoken language	Normal	Very abnormal	Slightly abnormal	Normal	Normal	Normal	Very abnormal
Comprehension of written language	Not as good as for spoken language	Abnormal but better than for spoken	Often normal	Very abnormal	Normal	Very abnormal	Very abnormal
Writing	Clumsy, agrammatical, misspelling	Penmanship OK but misspelling and inaccuracies	Occasional spelling and language errors	Very abnormal, spelling errors	Normal	Normal	Very abnormal
Naming	Better than spontaneous speech	Wrong names	Occasional wrong names	Often abnormal	Very abnormal	Occasionally abnormal	Very abnormal
Other	Hemiplegia, apraxia	Sometimes hemianopsia and apraxia	Slight hemiparesis, neglect of right-sided stimuli	Slight hemiparesis, trouble calculating, finger agnosia, hemianopsia	–	Hemianopsia, color anomia	Hemiplegia

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NEUROPSYCHOLOGICAL DOMAINS

- **PERCEPTION (visual, auditory, haptic)**
- **PRAXIS (e.g., ability to follow motor commands)**
- **ACADEMIC SKILLS**
- **EXECUTIVE SKILLS (e.g., reasoning, problem solving, cognitive flexibility, etc.)**
- **MENTAL STATUS**

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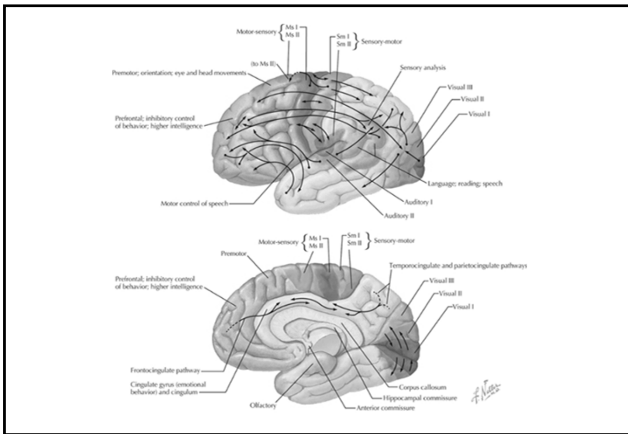

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PRIMARY SENSORY IMPAIRMENTS ASSOCIATED with ABI

- **AUDITORY (e.g., hearing loss associated with SBS)**
- **OLFACTORY (e.g., anosmia associated with TBI)**
- **TACTILE (e.g., damage to post-central gyrus in parietal lobe)**
- **VISUAL (e.g., visual field impairment)**

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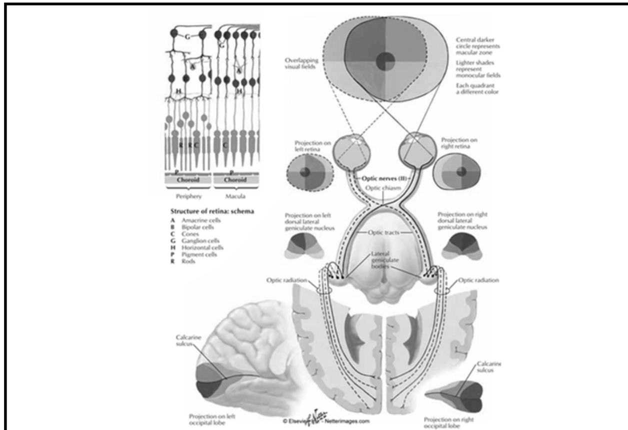

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AGNOSIAS

[*G. lack of knowledge*]

INABILITY to RECOGNIZE PERCEIVED SENSORY INFORMATION THAT CANNOT BE EXPLAINED ON THE BASIS OF:

- -SENSORY LOSS
- -APHASIA
- -DEMENTIA
- -GENERALIZED CONDITION (e.g., delirium)

- **TYPICALLY MODALITY SPECIFIC**

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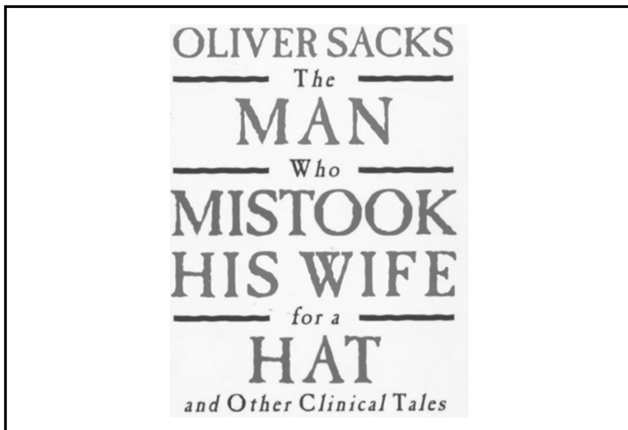

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VISUAL AGNOSIA

- Inability to recognize objects
- Perception, acuity, visual fields and scanning are adequate
- Related to stroke
- May be associated with dyslexia, prosopagnosia, or achromatopsia (loss of color vision)

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ANOSOGNOSIA

- Inability to recognize or acknowledge deficits or impairments (e.g., hemiplegia)
- More often associated with injury to the right cerebral hemisphere
- May resolve to anosodiaphoria (failure to recognize/appreciate significance of impairment)
- May be associated with hemispatial agnosia (hemineglect)

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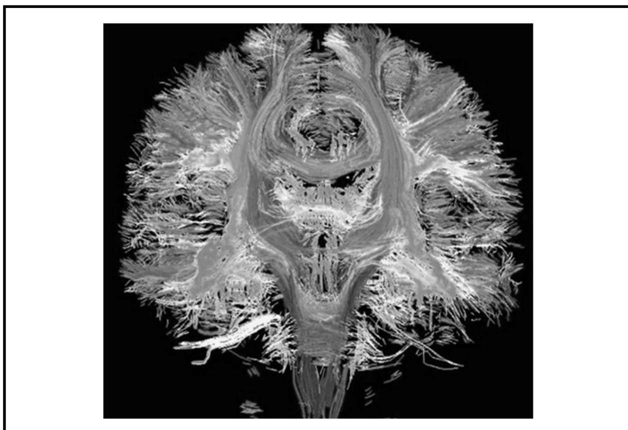

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DISCONNECTION DISORDERS

- Disruption of interhemispheric commissures (e.g., corpus callosum) or intrahemispheric connecting fibers (e.g., arcuate fasciculus)
- May involve specific connecting fibers or occur in the context of DAI (diffuse axonal injury)
- Etiology: acquired brain injuries

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KLUVER BUCY SYNDROME

- Hyperorality; bulimia (human studies)
- Indiscriminant sexual behavior (autosexual, heterosexual, homosexual); in humans: altered sexual orientation, verbal sexual disinhibition
- Hypermetamorphosis (e.g., impulsive reactivity)
- Flat affect; decreased aggressiveness
- Visual agnosia and prosopagnosia

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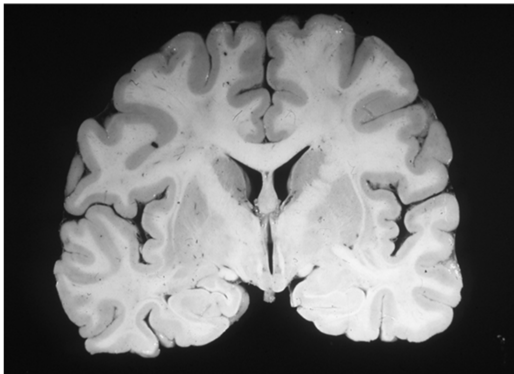

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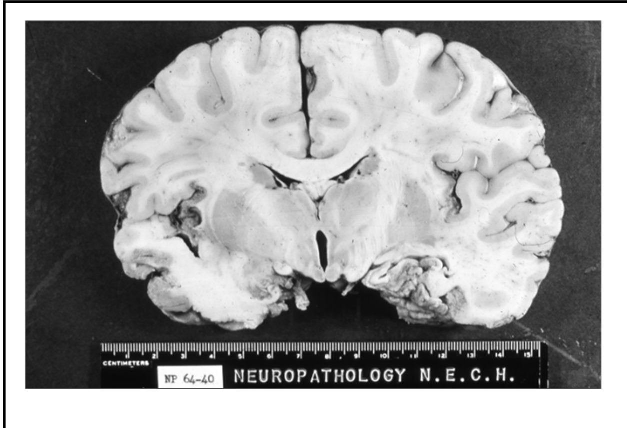

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KLUVER-BUCY SYNDROME

- VISUAL-LIMBIC DISCONNECTION DISORDER
- ASSOCIATED WITH ABI: e.g., Herpes Simplex encephalitis; TBI; as well as cortical dementia. (e.g., Frontotemporal Dementia)

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MOOD DISORDERS and ABI

- DEPRESSION: Most common psychological response and mood disorder; in stroke associated with left-sided lesions (acute period)
- MANIA: Uncommon and associated with right-sided basal frontotemporal and subcortical lesions
- BIPOLAR DISORDER: Associated with right-sided lesions

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DEPRESSION: DIFFERENTIAL DIAGNOSIS IN PERSONS with ABI

- **PSEUDODEPRESSION (dorsolateral prefrontal cortex syndrome)**
- **AKINETIC MUTISM (anterior cingulate syndrome)**
- **PSEUDOBULBAR AFFECT (corticobulbar lesions)**

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DEPRESSION: DIFFERENTIAL DIAGNOSIS IN PERSONS with ABI

- **PSEUDODEMENTIA (associated with intractable depression)**
- **DEMENTIA (associated with depression)**

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PERSONALITY

- **VALUES, BELIEF SYSTEMS, WORLDVIEW**
- **INTROVERSION-EXTROVERSION**
- **NEUROTICISM**
- **PSYCHOTICISM**
- **BIOPSYCHOSOCIAL DETERMINANTS**

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PERSONALITY CHANGES associated with ABI

- Intensification of characterological traits
- Development de novo behaviors not exhibited prior to ABI
- Associated with frontal lesions
- Psychiatric co-morbidities (e.g., trauma history)

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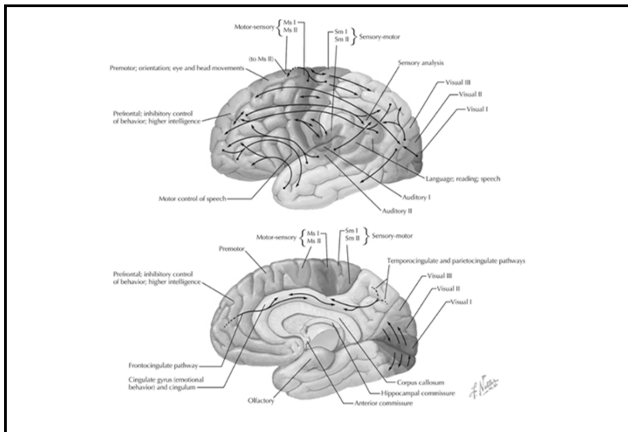

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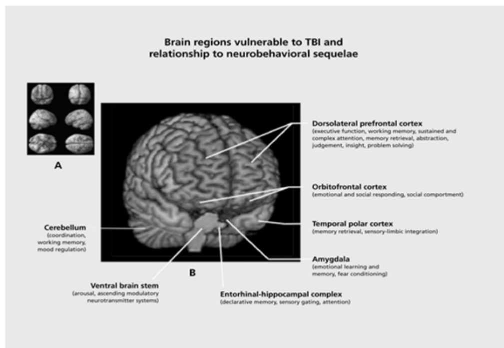
NEUROBIOLOGICAL CONSEQUENCES OF TRAUMATIC BRAIN INJURY

TW MCALLISTER

www.dialogues-cns.org



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FRONTAL LOBE SUBDIVISIONS

- **DORSOLATERAL PREFRONTAL CORTEX (PFC)**
- **ORBITOFRONTAL PREFRONTAL CORTEX (PFC)**
- **SUPERIOR MESIAL (includes supplementary motor cortex and anterior cingulate gyrus)**

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DORSOLATERAL PFC SYNDROME NEUROCOGNITIVE SEQUELAE

- **COMPROMISED GENERAL INTELLECTUAL LEVEL**
- **IMPAIRMENT of WORKING MEMORY: verbal [LH] and non-verbal [RH]**
- **EXECUTIVE SKILL DEFICITS: e.g., compromised ability to establish, maintain and shift cognitive set (cognitive inflexibility); perseveration**

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DORSOLATERAL PFC SYNDROME NEUROCOGNITIVE SEQUELAE

- **DIMINISHED FLUENCY: verbal [LH or bilateral]-e.g., word list generation; non-verbal [RH]-e.g., design fluency**
- **COMPROMISED CAPACITY for ORGANIZING, PLANNING, SEQUENCING**

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DORSOLATERAL PRE-FRONTAL CORTEX (PFC) SYNDROME: NEUROBEHAVIORAL PRESENTATION

- **APATHY:** indifference; "unmotivated" (Disorder of Diminished Motivation (DDM)
- **ABULIA:** (*G-aboulia*-"lack of will") difficulty making decisions, initiating and/or sustaining purposeful effort; diminished spontaneity; psychomotor slowness
- **STIMULUS-BOUND BEHAVIOR or AFFECT**
- **PSEUDODEPRESSION; MAY EXHIBIT EPISODIC DISINHIBITION**

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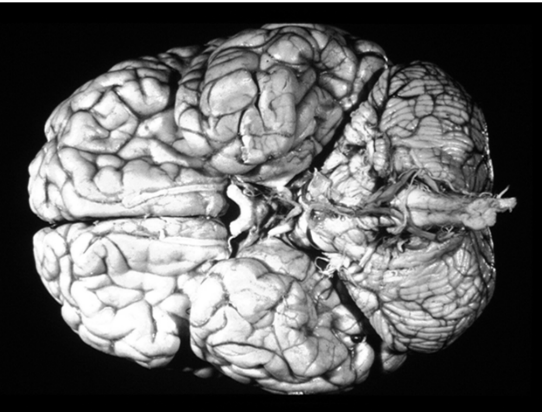

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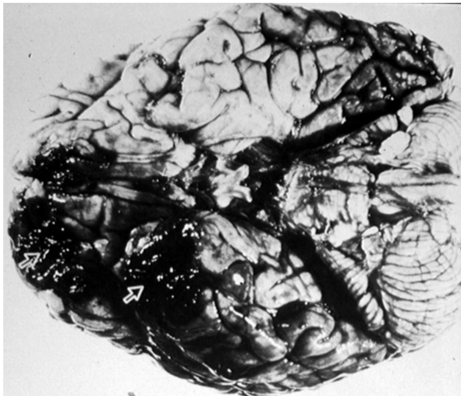

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ORBITOFRONTAL PFC SYNDROME NEUROCOGNITIVE PESENTATION

- GENERAL INTELLECTUAL LEVEL USUALLY WNL
- RELATIVELY PRESERVED PERFORMANCES on DOMAIN-SPECIFIC NEUROPSYCHOLOGICAL TESTS
- COMPROMISED INSIGHT, DECISION-MAKING, PLANNING, JUDGEMENT

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ORBITOFRONTAL PFC SYNDROME NEUROBEHAVIORAL PRESENTATION

- IMPULSIVITY
- DIMINISHED CAPACITY for ANTICIPATING OR RECOGNIZNG THE CONSEQUENCES of ONE'S BEHAVIOR
- IRRITABILITY and EMOTIONAL LABILITY, often with minimal provocation
- INAPPROPRIATE JOCULARITY (*Witzelsucht*); puerile behavior
- STEREOTYPICAL but CORRECT MANNERS

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ORBITOFRONTAL PFC SYNDROME NEUROBEHAVIORAL PRESENTATION

- BEHAVIORAL INFLEXIBILITY
- ACQUIRED SOCIOPATHY
  (pseudosociopathy; pseudopsychopathy):
  - -lack of empathy/concern for others; narcissism
  - -disinhibition/emotional dysregulation (verbal, physical, sexual aggression)
  - -impaired social judgment; social and/or physical intrusiveness
- EUPHORIA, HYPOMANIA/MANIA (RH>LH)

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VERBAL DISINHIBITION and ABI

- Diminished capacity to modulate/regulate verbalizations; may manifest as explosive outbursts
- Compromised capacity to appreciate boundaries, evidenced in verbal intrusiveness (e.g., inappropriate questions, comments)
- Use of vulgar, racist, sexually disinhibited language
- May represent onset of neurodegenerative disorder

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AGGRESSION and ABI

- Reactive in nature, often in response to minimal stimulus or provocation
- Usually not planned, premeditated or goal-directed
- May be episodic
- May be associated with either no or exaggerated remorse (e.g., when behavior is perceived to be ego-dystonic)

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LEARNED BEHAVIOR

- Belief systems and biases (prejudices, stereotypes) of family of origin
- Influence of those beliefs, with respect to development of the individual's beliefs, viewpoints, behavior
- History of overt or covert pre-injury prejudicial behavior (e.g., racist verbalizations, beliefs)
- Ability to modulate prejudicial/racist verbalizations and behavior prior to injury, but compromised capacity post-injury

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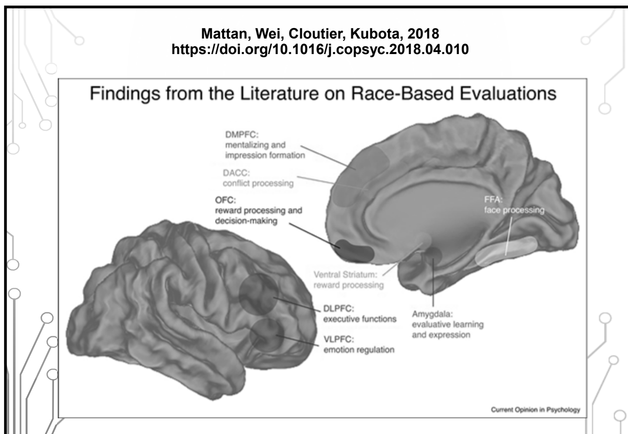

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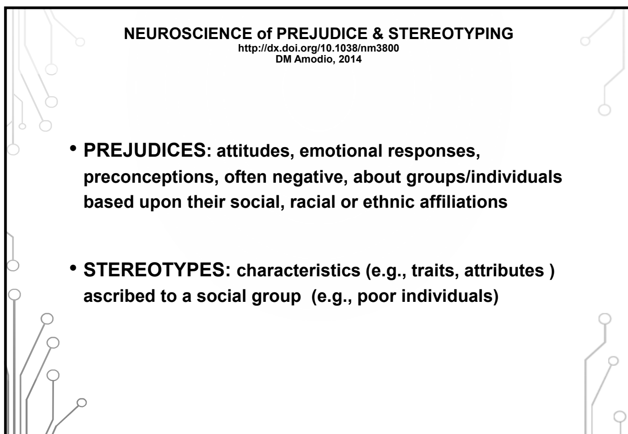

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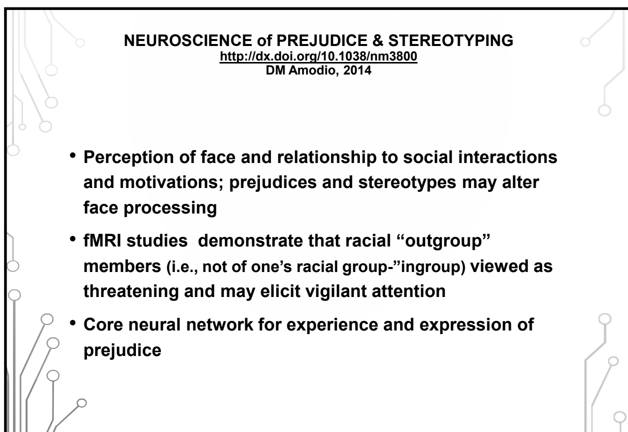

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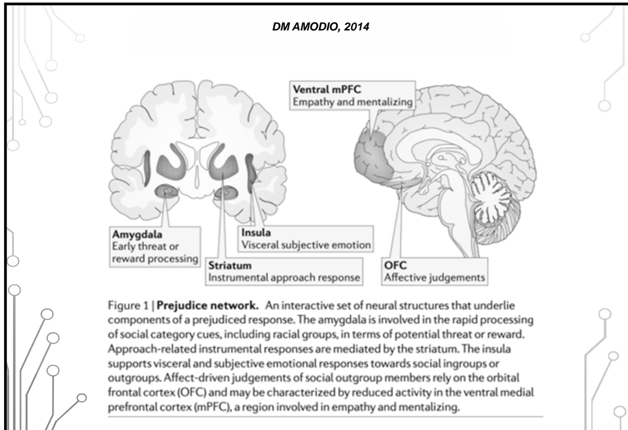

Figure 1 | **Prejudice network.** An interactive set of neural structures that underlie components of a prejudiced response. The amygdala is involved in the rapid processing of social category cues, including racial groups, in terms of potential threat or reward. Approach-related instrumental responses are mediated by the striatum. The insula supports visceral and subjective emotional responses towards social ingroups or outgroups. Affect-driven judgements of social outgroup members rely on the orbital frontal cortex (OFC) and may be characterized by reduced activity in the ventral medial prefrontal cortex (mPFC), a region involved in empathy and mentalizing.

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THE EGALITARIAN BRAIN
David Amodio, Ph.D.

- **Reflexive responses to respond to perceived threat** **(fight or flight response; "reptilian" brain)**
- **Evolution of social networks and increase in size of human brain and complexity of brain functions (neocortex)**
- **Humans have the capacity for overcoming fears and expression of biases**

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NEUROPSYCHIATRIC CONSEQUENCES of ABI

- **DELUSIONAL DISORDERS which may be associated with memory disorders (e.g., amnestic confabulatory syndrome)**
- **PSYCHOSIS**
- **PTSD and OTHER ANXIETY DISORDERS (e.g., when circumstances of injury associated with psychological trauma; pre-injury trauma history)**
- **HALLUCINATIONS**

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HALLUCINATIONS in PERSONS with ABI

AUDITORY

OLFACTORY

TACTILE

VISUAL

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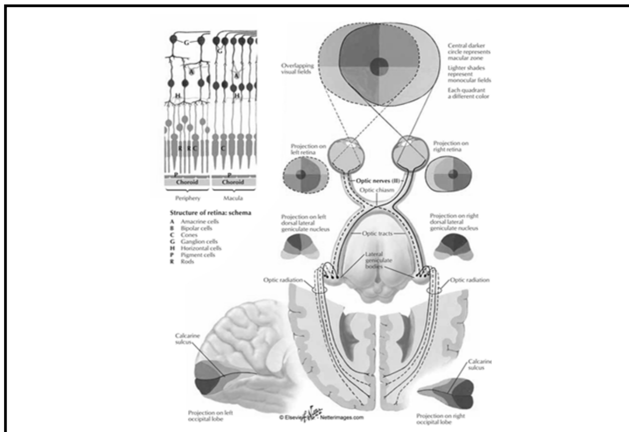

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SEIZURES: BEHAVIORAL MANIFESTATIONS

- HALLUCINATIONS (all modalities)
- PERCEPTUAL DISTURBANCES/ILLUSIONS: déjà vu; jamais vu; depersonalization; macropsia/micropsia
- AUTOMATISMS: may include smiling, crying, sexual behavior, repetitive motor behaviors
- INTERICTAL PERSONALITY TRAITS:
  (e.g., hyper-religiosity, hypergraphia, hyposexuality)

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CONSIDERATIONS REGARDING PRESENTATION PRINCIPLES OF ENGAGING in HCBS WAIVERS

- Cognitive accessibility (e.g., persons with aphasia; acquired dyslexia associated with left hemisphere injury)
- Accommodations for individuals with visual and auditory impairments
- Translation of POEWS, when applicable
- Cognitive supports to facilitate retention of information and cuing when problematic behaviors reoccur

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CONSIDERATIONS REGARDING PRESENTATION PRINCIPLES of ENGAGING in HCBS WAIVERS

- Anticipatory preparation, particularly when individual exhibits known history of problematic and/or disinhibited behavior
- Trauma-informed approach when applicable (e.g., combat-related TBI)
- Clinical consultation in advance of presenting the POEWS when indicated
- Collaboration with provider staff, including clinical staff when indicated

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CONSIDERATIONS REGARDING PRESENTATION PRINCIPLES of ENGAGING in HCBS WAIVERS

- Plan for presentation of POEWS to legal guardian, when applicable
- Family meeting when indicated (e.g., family members' or significant others' behavior is contributory)
- Follow-up plan with waiver participant and provider staff (e.g., staff support)
- Clinical evaluation (e.g., neurology) when problematic behaviors have emerged recently or have intensified (R/O neurodegenerative process; shunt malfunction)

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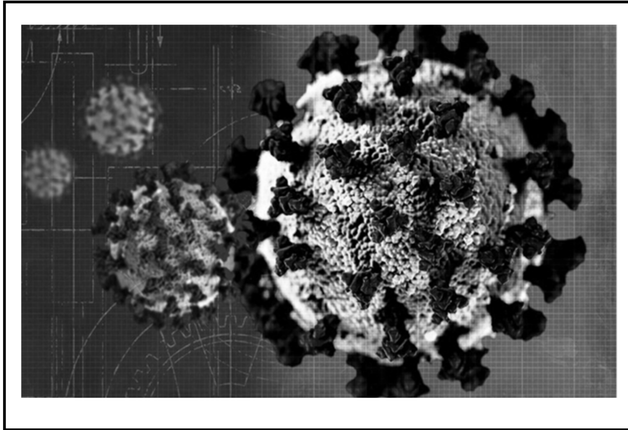

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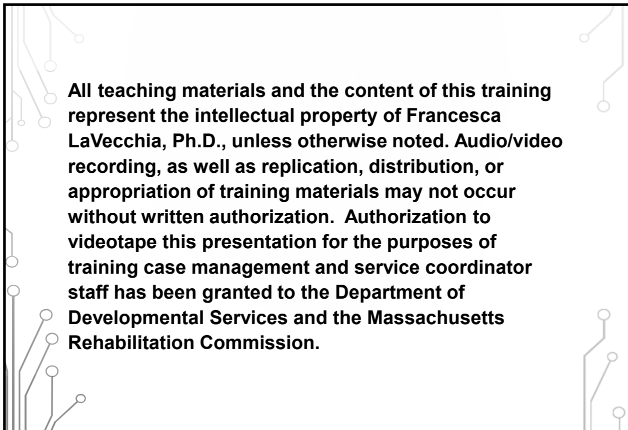

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