FRONTAL AND PARIETAL LOBE SIGNS
Gnosia synthesis of sensory impulses resulting in perception, appreciation and recognition of stimuli.

Agnosia is inability to recognize the meaning of a sensory stimuli even though it has been perceived.

Apraxia inability to perform a familiar, purposeful motor act on command that the patient is able perform spontaneously.
FRONTAL LOBES

- Precentral cortex - strip immediately anterior to the central or Sylvian fissure
- Prefrontal cortex - extending from the frontal poles to the precentral cortex and including the frontal operculum, dorsolateral, and superior mesial regions
- Orbitofrontal cortex including the orbitobasal or ventromedial and the inferior mesial regions and
- Superior mesial regions containing, primarily, the anterior cingulate gyrus
The dorsolateral frontal cortex is concerned with planning, strategy formation, and executive function.

The frontal operculum contains the centre for expression of language.

The orbitofrontal cortex is concerned with response inhibition.

Patients with superior mesial lesions affecting the cingulate cortex typically develop akinetic mutism.

Patients with inferior mesial (basal forebrain) lesions tend to manifest anterograde and retrograde amnesia and confabulation.
FRONTAL LOBES

- Motor strip (area 4)
- Supplementary motor area (area 6)
- Frontal eye fields (area 8)
- Cortical center for micturition
- Motor speech area
- Prefrontal area
Prefrontal Area

- Main projection site for dorsomedial nucleus of thalamus
- Project to basal ganglia and substantia nigra
- 3 parts- dorsolateral, medial, orbitofrontal
Organization of self ordered tasks
Executive function-plan, carry out and monitor a series of actions
Voluntary eye movements
Pain perception
Emotional expression, decision making, personality, sense of time & calculation
MEDIAL PFC

- Auditory & visual associations
- Pneumonic processing

Orbitofrontal cortex
- Disinhibition
- Poor judgment and insight
- Distractibility
FRONTAL LOBE LESION

- **Precentral gyrus**
  - Face area: dysarthria, dysphagia
  - Hand area: C/L weakness, clumsiness, spasticity
  - Leg area: C/L weakness, gait apraxia, urinary incontinence

- **Mesial aspect (cingulate gyrus F1)**
  - Akinesia (bilateral akinetic mutism)
  - Perseveration
  - Hand and foot grasp
  - Salutatory seizures (fencer’s posture)
  - Alien hand sign
  - Transcortical motor aphasia (dom. hemisphere)
  - Difficulty in initiating C/L arm movements
  - B/L ideomotor apraxia
FRONTAL LOBE LESION

- **Lateral aspect (premotor area)**
  - **Middle frontal gyrus (F2)**
    - Impaired C/L saccades
    - Pure agraphia (dom. hemisphere)
    - C/L weakness of shoulder and hip
    - Hemiakinesia (intentional neglect)
  - **F3**
    - Motor aphasia (dom. hemisphere)
    - Motor aprosodia (nondon. hemisphere)
FRONTAL LOBE LESION

- Orbitofrontal area (prefrontal)
  - Blunted affect (apathetic, indifferent)
  - Impaired appreciation of social nuances
  - Impaired goal directed behaviour
  - Impotence
  - Facetiousness (witzelscuht)
  - Speech apraxia
  - Inability to plan and executive multisteped process
  - Abulia (poverty of thought action and emotion)
FRONTAL LOBE SYNDROMES

- Orbitofrontal (disinhibited) - Disinhibition and changes of affect, impulsive, jocular affect (witzelsucht), euphoria, emotional lability, poor judgment, insight & distractibility

- Frontal convexity (apathetic) disturbance of movement and action, angry aggressive, psychomotor retardation, motor perseveration, poor abstraction
Medial frontal syndrome (akinetiс)  
Mutism, gait disturbance and incontinence  
 paucity of spontaneous movement, gesture  
and verbal output, loss of sensation and  
incontinence  

Massive frontal syndrome- apathetic,  
akinetic, abulia syndrome, pt unaroused,  
unable to complete tasks or listen to  
commands
Loss of drive, apathy, decreasing concern about personal appearance, hygiene, family/business affairs

“Apathetic dementia”

Inability to inhibit micturition reflex

Antisocial behavior

Memory impairment
Clinic Disorders - Frontal Lobe

- Impaired judgment
- Sexual promiscuity
- Lack of adaptation to unfamiliar situations
- Emotional lability
- Senseless joking-witzelsucht
- Abulia - difficulty in initiation and sustaining spontaneous movements
Epileptic Events

- 4 types of seizures point to Frontal disturbance
  - Adversive fits-head and eye turn away from discharging cortex
  - Focal motor epilepsy
  - Status epilepticus
  - Temporal lobe attacks- frontal polar lesions
EXTRA-CEREBRAL MANIFESTATIONS

- Intellectual deficits
- Blindness
- Loss of sense of smell
FRONTAL RELEASE SIGNS

- Primitive reflex- sign of frontal lobe disorders
- Normally elicited in the newborn.
- As the brain matures, certain areas (usually within the frontal lobes) exert an inhibitory effect causing the reflex to disappear.
- When disease processes disrupt these inhibitory pathways the reflex is "released”
- Palmar reflex has good localizing value-signifies damage to the frontal lobe of the opposite side.

Some frontal release signs and their role in infancy:
- Palmar grasp:- Baby naturally grabs objects.
- Palmomental reflex:- unknown.
- Rooting reflex:- Baby finds breast to suckle.
- Sucking reflex:- Baby sucks breast / bottle teat to get milk.
- Snout reflex:- Involved in suckling.
- Glabellar reflex:- May protect eyes in certain situations.
Phineas Gage suffered a severe frontal lobe injury in 1848. He has been called a case of Dysexecutive syndrome, characterized by anger and frustration, slight memory impairment, and "difficulty in planning". Other symptoms include utilisation behaviour, depression, aggression, inappropriate sexual behaviour, or "inappropriate humour and telling of pointless and boring stories". He was not able to return to his work for the railroad.
Cognitive symptoms
- Short attention span
- Poor working memory
- Poor short term memory
- Difficulty in planning and reasoning
- Environmental dependence syndrome

Emotional symptoms
- Difficulty in inhibiting emotions, anger, excitement, sadness etc…
- Depression, possibly due to above.
- Occasionally, difficulty in understanding others' points of view, leading to anger and frustration.

Behavioural symptoms
- Utilization behaviour
- Perseveration behaviour
- Inappropriate aggression
- Inappropriate sexual behaviour
- Inappropriate humour and telling of pointless and boring stories (Witzelsucht)
CAUSES OF FRONTAL LOBE DYSFUNCTION

- Closed head injury - damage to the orbitofrontal cortex
- Pre-frontal lobotomies results in a frontal lobe syndrome.
- Cerebrovascular disease may cause a stroke in the frontal lobe
- Tumours - meningiomas may present with a frontal lobe syndrome
- Degenerative diseases - Alzheimer's disease, frontotemporal dementia and Pick's disease.
- Mental retardation
- Normal-pressure hydrocephalus and other hydrocephalic disorders
- Alcohol & recreational drugs intoxication
- Psychiatric disorders- schizophrenia, depression, attention-deficit hyperactivity disorder (ADHD), and antisocial personality disorder or psychopathy
FURTHER INVESTIGATION

- Wisconsin card sort test - concept formation and ability to shift mental sets
- Mazes subtest - planning
- Trail making test - switching between plans
- Stroop test - distracting stimuli
- Brain imaging
PARIETAL LOBE FUNCTION

- Somesthetic/reception area - tactile, pressure and position sensation, intensity recognition
- Sensory association area - synthesis and interpretation of impulses - stereognosis, graphesthesia, two point discrimination and tactile localization
- Angular and supramarginal gyri - language
PARIETAL LOBE LESION

- Post central gyrus
  - Contralateral sensory loss
    (astereognosia > JPS > touch > pain, temp, vibration)
  - Contralateral pain, paraesthesias

- Cuneus
  - Transcortical sensory aphasia (dom. hemisphere)
  - Attention disorder
Superior and inferior Parietal lobules

- Dominant hemisphere
  - Parietal apraxia
  - Finger agnosia
  - Acalculia
  - Right-left disorientation
  - Literal alexia (supramarginal gyrus)
  - Conduction aphasia
Superior and inferior Parietal lobules

Non-dominant hemisphere

- Anosognosia
- Autotopagnosia
- Spatial disorientation
- Hemispatial neglect (sensory inattention)
- Construction apraxia
- Dressing apraxia
- Loss of topographical memory
- Allesthesia
- Hemisomatognosia
- Asymbolia for pain
CLINICAL FEATURES-PARIETAL LOBE DAMAGE

- Cortical sensory loss- astereognosis, agraphesthesa, loss of 2 pt discrimination
- Dysphasia-dominant hemisphere
- Non dominant lobe- apraxia, hemi-inattention, denial of disability
- Inferior quadrant/hemianopia, Loss of optokinetic nystagmus
Contra-lateral muscle atrophy

Deafferentation - hypotonia, bradykinesia, ataxia and pseudoathetoid movements

Focal motor seizures, Soft motor signs- slight increased reflexes, mild C/L facial and limb weakness and an extensor plantar response
**SENSE**

**ORY SYNDROMES**

- **Pseudothalamic syndrome**
  - Fasciobrachiocrural impairment of touch, pain, temp, vibration
  - Parietal operculum, post. Insula

- **Cortical sensory syndrome**
  - Astereognosia, agraphthesias, JPS
  - Superior post. Parietal stroke

- **Atypical sensory syndrome**
  - All modalities in a partial distribution
Thank you