Ch1. Right Middle Temporal Gyrus

Middle temporal gyrus is a gyrus in the brain on the temporal lobe. It is located between the superior temporal gyrus and inferior temporal gyrus. It corresponds largely to Brodmann area 21. The middle temporal gyrus is bounded by the superior temporal sulcus above and the superior temporal sulcus above and the inferior temporal sulcus below. an imaginary line drawn from the preoccipital notch to the lateral sulcus posteriorly.

It has been connected with processes as different as contemplating distance, recognition of known faces, audio-visual emotional recognition,[1] and accessing word meaning while reading. Some studies indicate that lesions of the posterior region of the middle temporal gyrus, in the left cerebral hemisphere, may result in alexia and agraphia for kanji characters (characters of Chinese origin used in Japanese writing).[3] The left middle temporal gyrus is also activated during poem composition.

Lateral surface of left cerebral hemisphere, viewed from the side. (Middle temporal gyrus shown in orange.) Right temporal lobe (shown in green). Middle temporal gyrus is visible at the middle of the green area.

The temporal lobe is one of the four major lobes of the cerebral cortex in the brain of mammals. The temporal lobe is located beneath the lateral fissure on both cerebral hemispheres of the mammalian brain.

The temporal lobe is involved in processing sensory input into derived meanings for the appropriate retention of visual memory, language comprehension, and emotion association. 21Temporal refers to the head's temples. The temporal lobe consists of structures that are vital for declarative or long-term memory. Declarative (denotative) or explicit memory is conscious memory divided into semantic memory (facts) and episodic memory (events). The medial temporal lobe structures are critical for long-term memory, and include the hippocampal formation, perirhinal cortex, parahippocampal, and entorhinal neocortical regions. The hippocampus is critical for memory formation, and the surrounding medial temporal cortex is currently theorized to be critical for memory storage. The prefrontal and visual cortices are also involved in explicit memory. Research has shown that lesions in the hippocampus of monkeys results in limited impairment of function, whereas extensive lesions that include the hippocampus and the medial temporal cortex result in severe impairment. A form of epilepsy that involves the medial lobe is usually known as mesial temporal lobe epilepsy.

The temporal lobe is a vital region of the brain responsible for processes related to declarative or long-term memory, which includes conscious memories divided into two main categories: semantic memory (facts and general knowledge) and episodic memory (personal experiences and events). Within the temporal lobe, the medial temporal structures play a critical role in supporting long-term memory. These structures include the hippocampal formation, perirhinal cortex, parahippocampal cortex, and entorhinal cortex, which together contribute to memory formation and storage.

The hippocampus is specifically essential for the formation of new memories, acting as a central hub in the process of encoding and consolidating information. Surrounding regions in the medial temporal cortex are thought to be crucial for the storage and retrieval of these memories. Additionally, other brain areas, such as the prefrontal cortex and visual cortices, are also involved in explicit memory processes, working in conjunction with the temporal lobe to manage and organize conscious recollections.

Research in this area has highlighted the importance of these structures. For example, studies on monkeys have demonstrated that isolated damage to the hippocampus causes limited functional impairments. However, when damage extends to both the hippocampus and the medial temporal cortex, the resulting memory deficits become significantly more severe, underscoring the interconnected nature of these brain regions in memory processing.

A neurological condition associated with the medial temporal lobe is mesial temporal lobe epilepsy, a form of epilepsy originating in these structures. This condition often highlights the delicate balance and critical functions of the medial temporal lobe in overall brain health and cognitive abilities.

The temporal lobe is a crucial region of the brain that supports a wide range of functions, including memory formation, sensory processing, and language recognition. It plays a key role in forming explicit long-term memories by working closely with the hippocampus, while the amygdala modulates the emotional aspects of these memories. This collaboration allows the temporal lobe to store detailed visual memories and link them to specific contexts or emotions. Sensory input, particularly auditory and visual, is also processed in the temporal lobe. The primary auditory cortex, located in this region, receives sensory signals from the ears, and adjacent areas interpret these signals into meaningful sounds, such as speech or words. The superior temporal gyrus is a significant site for processing auditory signals, with the left temporal lobe being particularly specialized in language-related auditory perception.

In terms of visual processing, the temporal lobe interprets the meaning of visual stimuli and facilitates object recognition. Its ventral stream is responsible for high-level visual tasks, such as recognizing faces through the fusiform gyrus and interpreting scenes via the parahippocampal gyrus, while anterior regions are involved in perceiving and identifying objects. The temporal lobe also plays a vital role in understanding language. Wernicke's area, situated at the junction of the temporal and parietal lobes in the dominant hemisphere (usually the left), is essential for comprehending both spoken and signed languages. This area works in tandem with Broca's area in the frontal lobe to support language acquisition and comprehension, as evidenced by functional MRI studies that show its activation during language processing tasks.

Additionally, the temporal lobe is integral to forming new memories, particularly in its medial structures, which include the hippocampi. These structures are essential for encoding declarative long-term memories and storing them for future retrieval. Damage to this area can lead to anterograde amnesia, impairing the ability to form new memories while leaving previously established memories intact. This region also ties memory to emotions, highlighting its importance in learning and recall. Overall, the temporal lobe serves as a central hub for processing auditory and visual information, forming and storing memories, and comprehending language, making it indispensable for both sensory and cognitive functions.

The clinical significance of temporal lobe lesions varies depending on whether the lesion is unilateral, affects the dominant or non-dominant hemisphere, or is bitemporal. These lesions can lead to a wide range of neurological and cognitive impairments.

A unilateral temporal lesion can result in contralateral homonymous upper quadrantanopia, a visual field defect commonly referred to as "sector anopsia," where the upper quadrant of the visual field is lost. Additionally, such lesions may cause complex hallucinations, which can involve the senses of smell, sound, vision, or even memory recall.

Lesions in the dominant hemisphere of the temporal lobe are particularly impactful on language and verbal functions. They can cause receptive aphasia, such as Wernicke's aphasia, where individuals struggle to understand spoken or written language despite fluent speech that often lacks meaning. Other language-related disorders include anomic aphasia, characterized by difficulty finding the right words, and word agnosia or word deafness, where there is an inability to recognize or comprehend spoken words. Dyslexia and impaired verbal memory are also associated with dominant hemisphere lesions.

In contrast, lesions in the non-dominant hemisphere of the temporal lobe typically affect non-verbal functions. These may lead to impaired non-verbal memory, such as difficulty recalling faces or spatial information, and diminished musical abilities, including recognizing melodies or musical patterns.

Bitemporal lesions, which affect both hemispheres of the temporal lobe, often present with additional and more severe symptoms. These include deafness, emotional indifference or apathy, and significant impairments in learning and memory. Conditions such as amnesia, Korsakoff syndrome (a memory disorder caused by severe thiamine deficiency), and Klüver–Bucy syndrome (characterized by hyperorality, hypersexuality, and emotional blunting) can occur as a result of damage to both temporal lobes.

Understanding the clinical implications of temporal lobe lesions is critical for diagnosing and managing these complex neurological conditions, as the symptoms often provide clues about the specific location and extent of the damage.

Damage to the temporal lobe, particularly the medial and inferior regions, can result in significant cognitive and perceptual impairments, most notably affecting the ability to interpret and recognize visual stimuli. Individuals with medial temporal lobe damage often struggle to recall visual information. This difficulty is not due to an inability to perceive the stimuli but rather to a disruption in the brain's capacity to interpret and make sense of what is perceived, leading to challenges in memory and recognition.

A common consequence of inferior temporal lobe damage is visual agnosia, a condition where individuals lose the ability to identify familiar objects despite being able to see them clearly. For instance, a person with visual agnosia might see a cup but be unable to recognize it as a cup. Another condition associated with damage to this area is prosopagnosia, often referred to as face blindness. This disorder impairs the ability to recognize faces or distinguish individual facial features, making it difficult to identify even close friends or family members.

Interestingly, damage to the anterior portion of the left temporal lobe can lead to rare cases of savant syndrome, where individuals exhibit extraordinary abilities in specific areas such as memory, mathematics, or artistic talent, despite having other cognitive impairments. This phenomenon underscores the complexity of the temporal lobe's functions and its critical role in processing and interpreting a wide range of sensory and cognitive information.

Disorders involving the temporal lobe can lead to significant emotional, cognitive, and sensory impairments due to the critical role this region plays in memory, sensory processing, and language.

Pick's disease, also known as frontotemporal amnesia, arises from the atrophy of the frontotemporal lobe. This condition manifests with a combination of emotional, language, and motor symptoms. Emotionally, patients may experience mood changes, poor attention spans, and aggressive behavior, often without being aware of these changes. Language abilities are severely affected, leading to loss of speech, inability to read or write, and a gradual decline in vocabulary. Over time, motor abilities also deteriorate, further limiting the patient's ability to function independently.

Temporal lobe epilepsy is a chronic neurological disorder characterized by recurrent seizures that originate in the temporal lobe. This condition can produce a range of sensory hallucinations, including visual, auditory, olfactory, and gustatory experiences. It also affects memory processing, impairing both semantic (fact-based) and episodic (event-based) memory. These symptoms reflect the temporal lobe's role in sensory integration and memory encoding.

Schizophrenia, a severe psychotic disorder, frequently involves deficits in the temporal lobe, particularly the left hemisphere and the primary auditory cortex. The hallmark symptom of schizophrenia is auditory hallucinations, where patients perceive external voices as though they are real. Research attributes these hallucinations to abnormalities in the left temporal lobe, including decreased gray matter and cellular deficits. These structural changes lead to spontaneous neural activity in the primary auditory cortex, mimicking the experience of actual auditory input. This misrepresentation results in the perception of external voices. Functional and structural MRI studies have corroborated these findings by comparing the neural responses of individuals with and without schizophrenia to auditory stimuli, offering insights into the neural basis of these hallucinations.

Together, these disorders illustrate the wide-ranging impact that temporal lobe dysfunction can have on sensory processing, memory, language, and emotional regulation, highlighting its crucial role in maintaining normal cognitive and neurological function.

What happens if a brain tumor occurs in Right Middle Temporal Gyrus?

A brain tumor in the right middle temporal gyrus can lead to a variety of symptoms that affect speech, memory, vision, and emotional regulation. Individuals with such a tumor may experience difficulties in speaking, understanding language, or hearing properly. Memory-related issues are also common, including trouble recalling information or learning new things. Changes in vision can occur, such as seeing things that are not there or perceiving objects as larger or smaller than they actually are. Additionally, the presence of the tumor can trigger seizures or blackouts, even in those who have never had a history of seizures. Some people might encounter unusual sensations, such as smelling or tasting something that isn't there, or hearing sounds that don't exist, known as auditory hallucinations. Emotional changes can also arise, including heightened aggressiveness or an inability to recognize emotions in others. Furthermore, the tumor might cause physical symptoms like numbness or weakness, usually affecting one side of the body.

The temporal lobe, located near the ears on the side of the brain, is responsible for crucial functions such as hearing, understanding language, memory, and processing visual information. Tumors in the right hemisphere of the temporal lobe can specifically impact the left side of the body. Diagnosing a lesion in this area involves gathering a detailed history of symptoms, performing an MRI scan, and conducting psychological assessments. The treatment for such a tumor depends on its underlying cause and the specific effects it has on the individual.

Ch2. Right Superior Frontal Gyrus

In neuroanatomy, the superior frontal gyrus (SFG, also marginal gyrus) is a gyrus – a ridge on the brain's cerebral cortex – which makes up about one third of the frontal lobe. It is bounded laterally by the superior frontal sulcus. The superior frontal gyrus is one of the frontal gyri.

The superior frontal gyrus (SFG) plays a critical role in several high-level cognitive and emotional functions, including self-awareness, language, laughter, and working memory, highlighting its importance in coordinating various aspects of human behavior and thought processes.

Self-awareness is one of the primary functions associated with the SFG, particularly its medial portion, known as the medial frontal gyrus (MFG). Functional MRI studies, such as those conducted by Goldberg et al., have shown that the MFG becomes active during tasks involving self-reflection and self-referential processing. This activity is essential for maintaining a coherent sense of self, as individuals evaluate their traits and actions. Interestingly, heightened and broader activation of the MFG has been observed in individuals with major depressive disorder (MDD). This excessive activation reflects the persistent negative, self-focused thoughts characteristic of depression, which require greater cognitive control to manage. Such maladaptive patterns of self-reflection contribute to emotional distress and difficulty shifting focus from negative thoughts, demonstrating how self-awareness, while crucial, can become dysregulated in certain mental health conditions.

The **SFG is also integral to language**, particularly in functions like speech spontaneity and initiation. The discovery of the "frontal aslant tract," a neural pathway connecting the SFG and Broca's area, has expanded our understanding of the language network beyond the traditional Broca's and Wernicke's areas. This tract facilitates a reciprocal corticocortical connection, underscoring the SFG's role in language production. Recent research has explored treatments for aphasia, revealing that combining speech and language therapy with repetitive transcranial magnetic stimulation (rTMS) targeted at the SFG improves language outcomes more effectively than therapy alone.

Laughter is another fascinating function associated with the SFG. In a landmark 1998 case, neurosurgeon Itzhak Fried demonstrated that electrical stimulation of a specific area within the left SFG of a patient consistently elicited laughter. This response was accompanied by a sensation of mirth, although the patient attributed the laughter to external, often unrelated stimuli. The intensity and duration of laughter varied with the stimulation current, providing unique insights into the SFG's role in emotional expression and its potential neural basis for humor and joy.

Lastly, the **SFG contributes to working memory and executive functions**, including self-monitoring, organization, and planning. Studies have shown that patients with left prefrontal lesions affecting the SFG perform poorly on working memory tasks compared to control groups. Mapping has indicated that the lateral and posterior portions of the SFG, particularly Brodmann area 8 near the frontal eye field, are most involved in these deficits. This suggests that the SFG is crucial for the integration and management of complex cognitive processes required for goal-directed behavior.

Together, these diverse functions illustrate the superior frontal gyrus's central role in enabling self-awareness, facilitating communication, expressing emotions like laughter, and supporting executive functions, making it a key area for understanding human cognition and behavior.

Abnormalities in the superior frontal gyrus (SFG) have been linked to a range of emotional and behavioral disorders, reflecting its critical role in regulating mood, emotional responses, and social behavior. Atrophy in the SFG, characterized by reduced cortical thickness and gray matter volume, has been associated with severe irritability in youth affected by conditions such as attention-deficit/hyperactivity disorder (ADHD), disruptive mood dysregulation disorder, oppositional defiant disorder, and conduct disorder. Severe irritability in these conditions is marked by heightened sensitivity to negative emotional stimuli and difficulty inhibiting anger and reactive aggression, leading to frequent outbursts and difficulty managing frustration.

In major depressive disorder (MDD), the SFG has also been implicated, particularly in cases involving **anhedonia**, the inability to experience pleasure. A 2022 study observed that the left SFG in depressed patients with severe anhedonia exhibited higher neural efficiency compared to depressed individuals without this symptom. This increased efficiency may represent a compensatory mechanism that the brain employs to cope with the loss of pleasure. Furthermore, this finding suggests that the SFG could serve as a potential biomarker for identifying anhedonia in patients with MDD, offering new avenues for targeted treatments.

The SFG is also connected to social anxiety. A 2023 study found a positive correlation between the cortical thickness of the SFG and social anxiety levels in individuals with subthreshold social anxiety. This suggests that structural variations in the SFG may influence how people perceive and respond to social situations, contributing to heightened anxiety in social contexts.

These findings highlight the SFG's importance in emotional regulation and social functioning, showing how abnormalities in this region can manifest in various disorders. They also underscore the potential of the SFG as a biomarker for understanding and diagnosing emotional and behavioral symptoms, paving the way for more precise and effective interventions.

What happens if a brain tumor occurs in Right Superior Frontal Gyrus?

A brain tumor in the **right superior frontal gyrus** can lead to a wide range of symptoms due to the critical functions this region controls, including cognitive processes, emotional regulation, and motor abilities. The **right superior frontal gyrus**, part of the frontal lobe, plays a key role in executive functions, such as decision-making, attention, and self-awareness, as well as in maintaining balance and coordination.

Individuals with a tumor in this area may experience **cognitive difficulties**, such as problems with concentrating, learning, remembering information, and making decisions. These impairments can interfere with daily tasks and overall quality of life. In addition, **personality changes** are common, including forgetfulness, a lack of interest in previously enjoyable activities, and shifts in mood or behavior that may be uncharacteristic or troubling to those close to the individual.

The tumor may also cause **motor-related symptoms**, such as weakness on the side of the body opposite the tumor's location (due to the brain's contralateral control of motor functions), balance problems, and difficulties with walking. These issues may progressively worsen as the tumor grows.

Communication can also be affected. Patients may experience **language and speech difficulties**, making it challenging to express thoughts, communicate effectively, or find the right words. This can further complicate their interactions with others. On an emotional level, tumors in this area are often associated with a **loss of inhibition**, decreased impulse control, and episodes of agitation or aggression. These emotional changes can be distressing for both the patient and their loved ones.

Other potential effects include a **loss of smell**, partial **vision loss**, and an overall decline in **mental abilities**, such as slower processing speed and reduced problem-solving capabilities. These symptoms reflect the broad influence of the frontal lobe on higher-order cognitive and sensory functions.

The prognosis for a brain tumor in the right superior frontal gyrus depends on several factors, including its size, growth rate, and whether it is benign or malignant. Small, benign tumors may have a relatively good prognosis and may not require immediate treatment. However, malignant tumors, such as a meningioma, often necessitate surgical intervention and additional therapies to manage symptoms, improve quality of life, and extend life expectancy. Early diagnosis and a tailored treatment plan are critical in addressing the challenges posed by such a tumor.

Ch3. Left Inferior Parietal Lobule

The inferior parietal lobule (subparietal district) lies below the horizontal portion of the intraparietal sulcus, and behind the lower part of the postcentral sulcus. Also known as Geschwind's territory after Norman Geschwind, an American neurologist, who in the early 1960s recognised its importance. It is a part of the parietal lobe.

The inferior parietal lobule (IPL) is a complex and functionally significant region of the brain, divided into two distinct gyri that are critical for integrating sensory information and supporting higher cognitive functions. The first of these is the **supramarginal gyrus**, which corresponds to Brodmann area 40. This gyrus arches over the upturned end of the lateral fissure, forming connections with the postcentral gyrus at the front and the superior temporal gyrus at the back. The supramarginal gyrus plays a vital role in phonological processing, language comprehension, and the integration of sensory modalities, making it essential for coordinating input from different senses.

The second structure within the IPL is the **angular gyrus**, designated as Brodmann area 39. This gyrus arches over the posterior end of the superior temporal sulcus and is continuous with the middle temporal gyrus. The angular gyrus is involved in complex cognitive tasks such as reading, writing, mathematical reasoning, and spatial awareness. These functions highlight its importance in bridging sensory perception with abstract cognitive processing.

The IPL also exhibits significant asymmetry, particularly in males, where the left hemisphere is more voluminous than the right. This structural difference is less pronounced in females and may contribute to cognitive differences between the sexes, such as variations in language processing and visuospatial abilities.

In comparative neuroanatomy, particularly in macaque monkeys, the IPL is further subdivided into caudal and rostral portions. The **caudal IPL (cIPL)** includes areas Opt and PG, which are involved in sensory integration and visuospatial processing. Meanwhile, the **rostral IPL (rIPL)** consists of areas PFG and PF, which are associated with motor planning, attention, and object manipulation. These subdivisions in macaques underscore the evolutionary complexity of the IPL and its role in supporting diverse functions across species.

Overall, the IPL's intricate structure and connections make it a critical hub for integrating sensory inputs and facilitating higher-order cognitive and motor functions, emphasizing its importance in both basic sensory processes and sophisticated mental activities.

The inferior parietal lobule (IPL) plays a multifaceted role in interpreting sensory information and facilitating higher cognitive processes. One of its key functions is the **perception of emotions in facial stimuli**, where the IPL contributes to recognizing and interpreting emotional expressions on faces, a fundamental aspect of social interaction. This ability allows individuals to navigate social contexts effectively by understanding the emotional states of others.

The IPL is also critically involved in the **interpretation of sensory information**, integrating inputs from various sensory modalities to create a cohesive understanding of the environment. This function is essential for tasks that require spatial awareness, sensory coordination, and the ability to interact with the surrounding world.

In addition to these perceptual roles, the IPL is heavily implicated in **language processing** and **mathematical reasoning**. The **supramarginal gyrus** within the IPL is particularly important for phonological processing and language comprehension, while the **angular gyrus** is associated with more abstract cognitive functions, such as reading, writing, and numerical operations. These regions work together to facilitate the understanding and manipulation of complex linguistic and mathematical concepts.

Furthermore, the IPL contributes to the concept of **body image**, helping individuals maintain an awareness of their body's position and movements in space. This aspect of IPL function is critical for coordinating motor activities and ensuring seamless interaction with the physical environment.

Overall, the IPL serves as a hub for integrating sensory, emotional, linguistic, and mathematical information, making it a cornerstone of cognitive and perceptual functioning. Its ability to process and interpret diverse types of input underscores its importance in both everyday activities and advanced cognitive tasks.

The inferior parietal lobule (IPL) is a vital region of the brain, and damage to this area can result in significant neurological and functional impairments, depending on whether the injury occurs in the dominant or non-dominant hemisphere. When the IPL of the dominant hemisphere is damaged, it often leads to **Gerstmann's syndrome**, a neurological condition characterized by a set of distinct symptoms. These include difficulty in distinguishing right from left, known as right-to-left confusion, and an inability to recognize or differentiate between one’s own fingers, called finger agnosia. Language and numerical skills are also affected, with individuals experiencing dysgraphia (difficulty in writing), dyslexia (difficulty in reading), and dyscalculia (problems with mathematical reasoning and calculations). Additionally, visual impairments such as contralateral hemianopia, where vision is lost in half of the visual field, or lower quadrantanopia, where the lower quarter of the visual field is affected, may occur.

In contrast, damage to the IPL of the non-dominant hemisphere typically impacts spatial and perceptual abilities. This can result in topographic memory loss, where individuals struggle to navigate familiar places, and anosognosia, a lack of awareness about their own deficits, such as paralysis or cognitive impairments. Spatial awareness deficits may also manifest as construction apraxia, where individuals have difficulty building or drawing objects, and dressing apraxia, where they are unable to dress themselves properly. Furthermore, contralateral hemispatial neglect, a condition in which individuals fail to acknowledge or respond to one side of their body or surroundings (often the left side when the right hemisphere is damaged), is a common consequence. Like in the dominant hemisphere, visual field deficits such as contralateral hemianopia or lower quadrantanopia may also be present.

These varied clinical symptoms highlight the IPL's essential role in sensory integration, language processing, spatial reasoning, and body awareness. Damage to this region disrupts these functions, significantly affecting an individual’s ability to interact with and interpret their environment. Understanding the specific deficits associated with IPL damage provides crucial insights for diagnosis, rehabilitation, and tailored therapeutic approaches aimed at mitigating the impact of such injuries.

The left anterior supramarginal gyrus (aSMG) of the human inferior parietal lobule appears to have evolved a unique specialization related to tool use, based on evidence from functional imaging studies. This region is thought to play a critical role in the ability to conceptualize and execute the use of tools, a hallmark of advanced cognitive and motor capabilities. However, it is not yet clear whether this specialization is unique to humans, as research involving other primates has been limited. Comparative experiments have been conducted with macaque monkeys, but similar studies with great apes, such as chimpanzees, have not yet been performed.

The question of whether the aSMG's specialization for tool use is uniquely human remains open, particularly given the habitual use of tools observed in chimpanzees. For instance, chimpanzees demonstrate sophisticated tool use in tasks such as termite fishing and nut cracking, suggesting that the cognitive and neural foundations for tool use may have evolved before humans and chimpanzees diverged from their last common ancestor. Further research comparing the neural activity and functionality of the aSMG in humans, chimpanzees, and other primates could provide deeper insights into the evolutionary origins of this specialization and its role in the development of complex behaviors.

What happens if a brain tumor occurs in Left Inferior Parietal Lob?

A brain tumor in the **left inferior parietal lobe** can lead to a range of neurological symptoms due to the region's critical role in processing sensory information, spatial awareness, and language functions. The **left inferior parietal lobe** is responsible for integrating information from different senses, aiding in spatial reasoning, and supporting linguistic and cognitive abilities. When a tumor develops in this area, it can disrupt these functions, resulting in noticeable impairments.

One of the most common effects of such a tumor is **sensory difficulties**, where individuals may struggle to process sensory input from touch, taste, smell, vision, and hearing. This can make everyday tasks that rely on these senses more challenging. Additionally, the tumor can impair **spatial awareness**, leading to difficulty judging distances, navigating environments, or coordinating hand-eye movements.

Language difficulties are also a significant consequence of a tumor in this area. Individuals may experience trouble speaking, understanding words, reading, or writing, reflecting the left inferior parietal lobe's role in language processing. **Numbness and weakness** on the side of the body opposite the tumor are common motor symptoms, as the brain's control of motor and sensory functions is contralateral. These issues may be accompanied by **orientation problems**, such as difficulty distinguishing directions or recognizing the difference between up and down.

The tumor may also affect the ability to recognize faces or objects, a condition known as **agnosia**, and disrupt the interpretation of sensory inputs like temperature, pressure, or pain. In some cases, individuals may experience **spontaneous pain** without any external stimulus or an altered perception of physical sensations.

The **parietal lobe**, situated in the upper middle part of the brain behind the frontal lobe, is essential for processing sensory data, supporting spatial reasoning, and enabling language and reading abilities. A tumor in the left inferior portion of this lobe can profoundly impact these functions, leading to a combination of sensory, motor, linguistic, and cognitive deficits. The severity and specific symptoms depend on the tumor's size, location, and progression, making early diagnosis and intervention critical for managing these challenges and improving outcomes.