Medical Treatment for Seizure Disorders

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Outsmarting Brain Tumors
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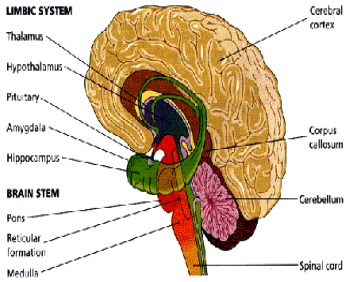
Incidence of Seizures

- Seizures are a common symptom of brain tumors
  - ~50% of children with supratentorial tumors
  - ~20-40% of adults with brain tumors
- New-onset seizures associated with brain tumors
  - <5% of children have an underlying brain tumor
  - ~25% of adults have an underlying brain tumor



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Predisposing Factors

- Whether a brain tumor will be associated with seizure is correlated with a number of factors
  - Histology (type of tumor)
    - In general, the incidence of seizures is
      - Highest in low grade primary brain tumors
      - Less frequent in high grade primary brain tumors
    - Frequency of seizures in people with low grade astrocytomas, oligodendrogliomas, and meningiomas is higher than in people with anaplastic astrocytomas which is higher than in people with glioblastoma

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Predisposing Factors

- Whether a brain tumor will be associated with seizures is correlated with a number of factors
  - Young age and slow rate of tumor growth are correlated with an increased incidence of seizures

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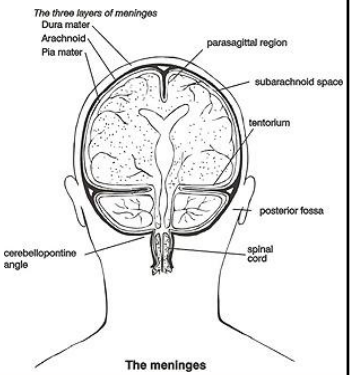
Predisposing Factors

- Most important predictor of seizures
  - — Location
    - More common with supratentorial than infratentorial tumors
    - Superficial and cortically based tumors produce seizures more often than deep-seated tumors



The meninges

What is a Seizure?

- Normally nerve cells in the brain communicate with each other by producing carefully controlled electric signals
- If something interferes with those signals and they are disrupted or become more intense, a seizure results
- Epilepsy is defined as recurrent seizures

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What Happens During a Seizure?

- Seizures can affect movement, emotion, sensations, and feelings in unusual and sometimes frightening ways
- Uncontrolled movements can happen in just about any part of the body
  - — Blinking or face twitching, shaking of a hand or foot is common
  - — In rare cases, there may be flailing movements or running
- Some people find they cannot move at all or feel limp until the seizure is over

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What Happens During a Seizure?

- When seizures affect the parts of the brain that control emotions certain feelings may be triggered
  - — Anger, joy, sadness, or fear
  - — Dramatic mood changes
  - — Uncontrolled bursts of crying or laughter
- When seizures affect the parts of the brain that control touch, hearing, taste, smell, and sight, then unusual sensations can be produced
  - — Sense a tingling breeze on the skin
  - — Hear buzzing or ringing sounds or voices that are not really there
  - — Imagine tastes and smells, typically unpleasant ones
  - — See things that are not there
  - — Experience distortions of the way objects really look

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What Happens During a Seizure?

- If the area of the brain involved with memory is affected
  - Visions of people or places from the past can playback
- The sense of time or place may be affected
  - Well-known places seem unfamiliar (called *jamais vu*)
  - New places or events seem familiar (called *déjà vu*)
  - Out of body experiences

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Types of Seizure

- There are two main types of seizures:
  - Generalized seizures
  - Partial (or focal) seizures

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Generalized Seizures

- Large amounts of electrical energy flood the whole brain at once and may be associated with
  - Loss of consciousness
  - Muscle contractions— twitching (tonic) and relaxing (clonic)
  - Tongue biting
  - Loss of control of body functions
  - Shallow breathing
  - A wide range of changed feelings or behaviors
- What each person does or feels during a seizure is likely to be the same and occur in the same order each time
- Although seizures are usually brief, their effects can linger for several hours
  - Effects can include confusion, sleepiness, headache, or sore muscles or weakness
- Most people are able to return to their normal activities after resting

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Partial Seizures

- Also called focal seizures are limited to one specific area of the brain
  - Symptoms reflect the physical or mental activity that is controlled by the particular part of the brain affected
  - Symptoms of a focal seizure can include:
    - Muscle twitching or jerking
    - Abnormal smells or tastes
    - Problems with speech
    - Numbness and tingling

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Simple and Complex Partial Seizures

- People who have simple partial seizures remain awake and aware throughout the seizure
  - They can talk normally during the seizure and usually remember exactly what happened
- Someone having a complex partial seizure is unaware of what is going on and will not be able to talk normally, follow instructions, obey commands, or even recognize danger from threatening situations
  - A complex partial seizure typically starts with a blank stare and loss of contact with surroundings
  - Actions and movements are usually disorganized, confused, and unfocused during a complex partial seizure

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Types of Seizure

- May experience just one type or more than one type
- The type experienced depends on which area and how much of the brain has the electrical disturbance that produces seizures

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Types of Seizures and Auras

- Seizures are usually sudden and unexpected
- Some people experience warning signals, called auras, in the moments before the seizure happens.
  - These signals may include
    - Headache
    - Mood changes
    - Stomachache
    - Nausea
    - Dizziness

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Prognosis with Tumor-Associated Epilepsy

- Large studies have found no effect of seizures on survival
- In fact some studies have found that presentation with a seizure is a favorable prognostic sign
  - Possible explanations for this observation include:
    - Earlier diagnosis
    - Surgically accessible
    - Over-representation of patients with lower grade tumors

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Consequences

- Even a single seizure can dramatically interfere with one's quality of life
  - — Disrupt normal activities
    - Driving, employment, and independence
  - — Impose new demands
    - Taking pills, blood testing
  - — Produce apprehension about possible subsequent seizures
  - — In patients with malignant gliomas and a seizure at presentation
    - 50-75% will have subsequent seizures
      - — 50% of these patients will have more than one seizure a month
      - — 25% of these patients will have more than one seizure a week

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Other Causes of Seizures

- Subsequent seizures may be related to brain tumors
- There may be other causes
  - — Metabolic abnormalities, including those affecting sodium, magnesium, or calcium
  - — Medications
  - — Injury to the head
  - — Bleeding or strokes
  - — Alcohol or drug withdrawal
  - — Fever or infection

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How to Help

- Having a seizure or observing someone who is having a seizure can be a frightening experience.
- Understanding how to help can dispel some of the fear
- Most of the time, a person having a seizure requires no assistance other than caring observation
- A reassuring presence during the seizure can be the most helpful thing
- Reassure others that any unusual behaviors are brought on by the seizure and that the brain has its own way of bringing the seizure safely to an end after a minute or two
- Provide calm reassurance to the person who has had the seizure until fully recovered

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Generalized Convulsive Seizures: What To Do

- **Keep calm**. Let the seizure take its course. Do not try to stop the seizure or revive the person.
- **Protect from further injury** if possible. Move hard or sharp objects away, but do not interfere with the person's movements. Place something soft and small such as a sweater under the head. Loosen tight clothing, especially at the neck.
- **Do not force anything in the persons' mouth**. This could cause teeth and jaw damage. The person will not swallow their tongue during a seizure.
- **Roll the person on their side as soon as possible**, to allow saliva or other fluids to drain away, helping to clear the airway.
- **On rare occasions**, if a seizure goes on longer than 5 minutes, or repeats without recovery, call for medical help.

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Partial Seizures: What To Do

- **Stay with the person**. Do not try to stop the seizure, but let it take its course. The person may be unaware of his or her actions and may or may not hear you.
- **Gently guide** the person away from danger and move dangerous objects out of the way.
- **Observe carefully**. Note different movements or behaviors.
- **Partial seizures may spread to other areas of the brain**. Do not be alarmed if a convulsive seizure follows.

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Seizures: What To Do

- After all types of seizures:
  - Talk gently to the person
  - Be comforting and reassuring as it may take some time for the person to become reoriented.

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Treating Seizures

- Most seizures associated with brain tumors can be controlled by medications called anticonvulsants or antiepileptic drugs
- The type your doctor prescribes for you depends on the type of seizure you are experiencing
- Some individuals require a combination of anticonvulsant medications to obtain the best possible control of their seizures
- In order for the seizure medications to be effective, they must be taken exactly as prescribed
  - The dose and the time of administration are very important since the drug needs to reach and remain at an ideal level in the bloodstream in order to be effective
  - If there is too little of the drug, there may be a risk for having a seizure
  - If there is too much of the drug, there may be seizures or side effects

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Older Antiepileptic Drugs

- Carbamazepine (Carbatrol, Tegretol)
  - Adverse effects
    - Double vision, dizziness, low sodium levels, low blood counts, bone marrow stops producing red and white blood cells
- Dilantin (Phenytoin, Phenytek)
  - Adverse effects
    - Thickening of the gums, hair growth, acne, difficulty with balance, rash
- Phenobarbital (Luminal)
  - Adverse effects
    - Impairment of cognitive ability, changes in behavior
- Valproic acid (Depakene, Depakote)
  - Adverse effects
    - Liver toxicity, low platelet counts, weight gain

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Newer Antiepileptic Drugs

- Monotherapy-FDA Approved
  - Oxcarbazepine (Trileptal)
    - Adverse effects
      - Low sodium levels, sedation, dizziness
  - Lamotrigine (Lamictal)
    - Adverse effects
      - Dizziness, double vision, rash, tics, insomnia
  - Felbamate (Felbatol)
    - Adverse effects
      - Liver toxicity, bone marrow stops producing red and white blood cells

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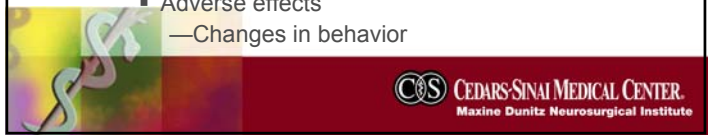
Newer Antiepileptic Drugs

- Monotherapy-Probably Effective
  - Topiramate (Topamax)
    - Adverse effects
      - Word finding difficulties, cognitive impairment, kidney stones, weight loss
  - Zonisamide (Zonegran)
    - Adverse effects
      - Cognitive impairment, sedation, kidney stones, weight loss, reduced perspiration
  - Levetiracetam (Keppra)
    - Adverse effects
      - Changes in behavior



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Newer Antiepileptic Drugs

- Monotherapy-Efficacy Unproved
  - Gabapentin (Neurontin)
    - Adverse effects
      - Changes in behavior, weight gain
  - Tiagabine (Gabitril)
    - Adverse effects
      - Sedation, drop attacks

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Adverse Effects of Anticonvulsants

- People with brain tumors are at risk of side-effects
  - Skin rashes
  - Changes in level of consciousness
  - Difficulties with balance
  - Reduced white blood cell counts or platelets
  - Abnormalities of liver enzymes
  - Interactions with steroids or chemotherapy may lead to changes in anticonvulsant levels
  - Interactions with food, particularly grapefruit juice

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Important Rules About Anticonvulsants

- Be sure your doctor is aware of all the medications you take. Many medications, both prescription and over-the-counter, can influence the way your anticonvulsant works
- Never stop taking anticonvulsant medications or change the dosage without talking to your doctor
- It is important to tell your doctor if your seizures and/or the medications affect your quality of life
- Your doctor will work with you to find the best medication to control your seizures and keep side-effects to a minimum

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Important Rules

- If your seizures cause you to fall, lose consciousness, or become unaware of your surroundings, then remember these safety tips:
  - Don't drive!
  - Tell friends what kind of seizures you have, how to recognize them, and what to do if you have one
  - Keep water levels in the bathtub low
  - When you use the stove, try to use the back burners as much as possible
  - Hang bathroom doors so they open outwards instead of inwards - if someone falls against the door, it can be opened
  - Wearing a life vest is a good idea when you are on or close to water
  - Use the buddy system—especially if hiking, skiing, or playing in remote areas

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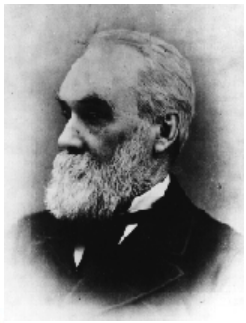
John Hughlings Jackson (1835 - 1911)



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THANK YOU

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