Learning Objectives

• Treatment options for seizures
• What factors affect which medication is prescribed for you?
• Common side effects of medications
• Drug interactions
• Monitoring of medications
• Medication adherence
Seizures and Epilepsy

Seizure
Abnormal electrical activity in brain cells

Epilepsy
Recurrent unprovoked seizures
Anti-Seizure Medications

Anti-Seizure Medications

Past and Present

Anti-Seizure Medications

The Future

• Gap needs to be filled to find treatment options for refractory patients

• Research is being done to:
   Find new drugs with novel chemical structures, new targets and different mechanisms of action
   To understand how epilepsy occurs
    ☐ Look for disease modifying agents
    ☐ Look for genetic biomarkers that can identify people at risk of developing epilepsy
Anti-seizure Medications continued

- 50-70% of patients respond to one medication

**Strategies when a medication has not helped**

- Increase the dose of medication
- Add another medication
- Switch medication
How are Medications Selected?

- Type of Seizure
- Side Effects
- Patient
- Patient Specific Factors
- Drug Interactions
- Other Medical Conditions
- Cost and Coverage
Type of Seizure

• Seizures can be divided into two main categories
  ➢ Generalized seizures
  ➢ Focal seizures

• Some medications tend to work better for certain types of seizures than others
<table>
<thead>
<tr>
<th>Generalized Seizures</th>
<th>Focal Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Valproic acid / Divalproex sodium (Epival)</td>
<td>• Carbamazepine (Tegretol)</td>
</tr>
<tr>
<td>• Phenytoin (Dilantin)</td>
<td>• Phenytoin (Dilantin)</td>
</tr>
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<td>• Valproic acid / Divalproex sodium (Epival)</td>
</tr>
<tr>
<td>• Oxcarbazepine (Trileptal)</td>
<td>• Phenobarbital</td>
</tr>
<tr>
<td>• Topiramate (Topamax)</td>
<td>• Primidone</td>
</tr>
<tr>
<td>• Lamotrigine (Lamictal)</td>
<td>• Oxcarbazepine (Trileptal)</td>
</tr>
<tr>
<td>• Levetiracetam (Keppra)</td>
<td>• Topiramate (Topamax)</td>
</tr>
<tr>
<td>• Clonazepam</td>
<td>• Lamotrigine (Lamictal)</td>
</tr>
<tr>
<td>• Ethosuximide (Zarontin)</td>
<td>• Levetiracetam (Keppra)</td>
</tr>
<tr>
<td>• Rufinamide (Banzel)</td>
<td>• Clobazam</td>
</tr>
<tr>
<td></td>
<td>• Gabapentin (Neurontin)</td>
</tr>
<tr>
<td></td>
<td>• Pregabalin (Lyrica)</td>
</tr>
<tr>
<td></td>
<td>• Vigabatrin (Sabril)</td>
</tr>
<tr>
<td></td>
<td>• Lacosamide (Vimpat)</td>
</tr>
<tr>
<td></td>
<td>• Perampanel (Fycompa)</td>
</tr>
<tr>
<td></td>
<td>• Eslicarbazepne (Aptiom)</td>
</tr>
</tbody>
</table>
Side Effects

Medication side effects

How well medication works
Patient Specific Factors - Women

- Some medications may be avoided because of their side effect profile
- Certain medications may be preferred for women of child-bearing age
- During pregnancy, seizure frequency can change
  - Decrease in seizure threshold
  - Decrease in medication concentrations
Patient Specific Factors - Women

Birth Defects

- Increased rate of birth defects in children of mothers with epilepsy
- **Seizures can be harmful to mother and fetus**
- Higher risk in the 1st trimester
- **Tips when considering pregnancy:**
  - Plan ahead and see your Neurologist early
  - Ensure you are taking folic acid and prenatal vitamins
Patient Specific Factors - Elderly

- May be on multiple medications for other conditions that can interact
- May be more at risk of having side effects
- **Tips for managing medications:**
  - Tell Doctors and Pharmacists about all new medications
  - Doctor may make dose adjustments more slowly
  - Pay attention to how you feel after any changes have been made
Patient Specific Factors -
What has Worked in the Past

• Helpful to know which medications have been trialed in the past
  ➢ What has worked
  ➢ What was not helpful or not tolerated

• Tips for managing medications:
  ➢ Keep a log of medications you have been on (dates and response)
  ➢ Keep a list of medications you have reacted to or not tolerated well
Seizure medications can be useful for other conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Anti-seizure Drug of Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigeminal neuralgia</td>
<td>Gabapentin, pregabalin, carbamazepine</td>
</tr>
<tr>
<td>Bipolar disorder</td>
<td>Lamotrigine, valproic acid</td>
</tr>
<tr>
<td>Migraine</td>
<td>Topiramate, valproic acid</td>
</tr>
<tr>
<td>Neuropathic pain</td>
<td>Gabapentien, pregabalin</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>Pregabalin</td>
</tr>
</tbody>
</table>
Cost and Coverage

- Some medications can have higher costs
- Private insurance companies usually cover most medications
- Government programs
  - Ontario Drug Benefit Program (ODB)
  - Trillium Drug Program
SIDE EFFECTS OF MEDICATIONS
One Pair Does Not Fit All

http://www.elle.com/fashion/trend-reports/news/g18326/falls-best-jeans/
# Dose Related Side Effects

<table>
<thead>
<tr>
<th>Side Effect</th>
<th>Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double vision, feeling unsteady, dizziness, feeling tired</td>
<td>Most medications</td>
</tr>
<tr>
<td>Irritability</td>
<td>Levetiracetam (Keppra)</td>
</tr>
<tr>
<td>Word-finding difficulty</td>
<td>Topiramate (Topamax)</td>
</tr>
<tr>
<td>Tremor</td>
<td>Valproic acid / Divalproex sodium (Epival)</td>
</tr>
</tbody>
</table>
# Long-term Side Effects

<table>
<thead>
<tr>
<th>Side Effect</th>
<th>Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic changes</td>
<td>Phenytoin (Dilantin)</td>
</tr>
<tr>
<td>Decreased bone mineral density</td>
<td>Phenytoin, phenobarbital, carbamazepine, valproic acid</td>
</tr>
<tr>
<td>Kidney stones</td>
<td>Topiramate (Topamax)</td>
</tr>
<tr>
<td>Difficulty with vision</td>
<td>Vigabatrin (Sabril)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>Topiramate (Topamax)</td>
</tr>
<tr>
<td>Weight gain</td>
<td>Valproic acid, carbamazepine, gabapentin, pregabalin, vigabatrin</td>
</tr>
</tbody>
</table>
Rash related to Anti-seizure Medications

• Can occur in medications with similar chemical structure:

<table>
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<tr>
<th>Phenytoin (Dilantin)</th>
<th>Carbamazepine (Tegretol)</th>
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<tbody>
<tr>
<td>Phenobarbital</td>
<td>Lamotrigine (Lamictal)</td>
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<td>Oxcarbazepine (Trileptal)</td>
<td>Primidone</td>
</tr>
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</table>

• Usually happens within the first 2 months of starting the medication
• Can become a serious reaction that affects internal organs
• Must seek medical attention
Rash related to Anti-seizure Medications

Treatment

• Discontinue offending anti-seizure medication
• Switch to alternate agent
• Treat the symptoms
  ➢ Antihistamines
  ➢ Steroids may be necessary
DRUG INTERACTIONS
Drug Interactions

- Many anti-seizure medications can interfere with
  - Other medications for epilepsy
  - Drugs for other conditions

- This can lead to higher or lower drug concentrations in the body
Some Common Drug Interactions

- Oral Contraceptives
- Blood thinners
- Cholesterol Lowering Medications
- Heart medications
- Antidepressants
- Antibiotics
- Antiviral medications
- Anticancer medication
- Herbals/Natural Products
Drug Interactions

Tips for managing drug interactions:

• Ensure all Doctors and Pharmacists know the medications you are taking
  ➢ Including non-prescription medications
• Have medications filled at one pharmacy
• Keep notes on:
  ➢ Any change to seizure type or frequency
  ➢ Any new side effects
MONITORING OF MEDICATION LEVELS
Drug Monitoring

• Blood tests can be done to check levels of certain medications

• Some common examples:

<table>
<thead>
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<th>Valproic acid / Divalproex sodium (Epival)</th>
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<tbody>
<tr>
<td>Carbamazepine (Tegretol)</td>
<td>Phenobarbital</td>
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Drug Monitoring

• Levels may be checked when:
  ➢ Starting a new medication
  ➢ Changing medication dose
  ➢ Possible drug interaction

• Levels are usually drawn prior to dose

• Doses may not always be changed based on levels alone
MEDICATION ADHERENCE
Adherence

• For medications to help prevent seizures, there needs to be a consistent amount in the body
  ➢ Take medications regularly
  ➢ Do not miss doses

• **Tips to help remember medications**
  ➢ Request blister packs from pharmacy
  ➢ Set alarm on clock
  ➢ Smartphone App to track medications
Non-Pharmacological Options

- Avoid triggers
- Maintain seizure and side effect diary
- Dietary changes (useful in some children)
- Surgery (for treatment resistant patients that are appropriate candidates)
Key Messages

• Seizure treatment options have increased in recent years and more research is in progress
• Many factors are considered when selecting a medication for each patient
• Monitor for side effects when starting new medications
• Many anti-seizure medications can interact with other drugs
• Blood tests can be done for some medications
• Medication adherence is important for seizure control
Useful Websites

Epilepsy Toronto
• http://epilepsytoronto.org/

Canadian Epilepsy Alliance
• http://epilepsymatters.com/

Epilepsy Foundation
http://www.epilepsy.com/
Questions
References

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