Living with Epilepsy
Community Education Conference
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Puberty and Epilepsy
Epilepsy and Puberty

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Anatomy of a Teenager's Brain

- Embarrassed by parents section
- Sensorimotor area
- Ability to remember the lyrics to offensive hip hop song...
- Have no idea...
- Cars, cars, cars, cars, and... oh, yeah, girls...
- Ability to listen to extremely loud base tracks
- Girls are suddenly fascinating section
- School Work (smallest section of the brain)
Road Map

- Brain changes in adolescence leave an imbalance between risk-taking and pleasure-seeking behaviors
- Puberty is a major change
- Sexual development occurs
- Psychological stages of development
- Impacts of treatment on Bone health
Adolescence ➔ Transitions

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Brain changes in adolescence: risk-taking vs pleasure-seeking

- **Grey matter loses density**
  - *Synaptic pruning, increased myelination, increasing axonal diameter*
  - *Posterior to anterior maturation*

- **White matter connectivity changes**

- **Different brain areas are activated on fMRI in adolescents and adults on tasks involving recognition of emotion**
  - *Impact on social interaction and decision making*

- **Dopamine increases**

- **Reward pathway has less input from frontal cortex**
  - *Emotions and pleasure seeking are less inhibited*

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Puberty: *Endocrine changes*

- **Onset of Puberty = Tanner stage 2**
  - *Breast and testicular development*
    - Around age 10 years for girls and 12 years for boys
  - *Activation of 3 axes:*
    - Hypothalamic-Pituitary-Adrenal axis
    - Hypothalamic-Pituitary-Gonadal axis
    - Growth hormone-insulin like growth factor axis
  - *Seizures and AEDs may affect endocrine function*

Adrenarche

- Starts about 2 years prior to Gonadarche
  - *Maturation of the adrenal glands*
Gonadarche

https://www.researchgate.net/figure/268791949_fig5_Figure-5-Schematic-representation-of-the-hypothalamic-pituitary-gonadal-HPG-axes


Menstrual disorders

- Anovulatory cycles
- Catamenial epilepsy
- Amenorrhea, oligomenorrhea, abnormal cycle interval, PCOS

Hormone pathways ↔ AEDs

Mattson RH, Cramer JA. Epilepsy, sex hormones and antiepileptic drugs. Epilepsia 1985;26:S40-51
Practical Approach to Contraception

- Reduces efficacy of OCPs
  - Carbamazepine
  - Oxcarbazepine
  - Topiramate
  - Phenobarbital
  - Phenytoin
  - Primidone

- AED Blood Levels affected by OCPs
  - Lamotrigine
  - Divalproex sodium

- Little Interaction
  - Levetiracetam
  - Pregabalin
  - Gabapentin
  - Zonisamide
  - Lacosamide
Practical Approach to Contraception

• Other forms of contraception:
  – *Intrauterine device*
    • Hormone-releasing IUD, copper containing IUD
  – *Intramuscular medroxyprogesterone*
  – *Nuva-ring*
  – *Barrier methods*
Growth acceleration
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• All youth ages 13-19 years studied in 1 country (Norway)
  – 85% responder rate

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Psychological stages of development

- Early stage – ages 10-13 years
- Middle stage – ages 14-17 years
- Late stage – ages 18-21 years

- Epilepsy onset in childhood vs adolescence
- FAMILY /Parental coping predicts coping to chronic disease

Erikson EH. Youth identity and crisis. New York: Norton; 1968
Mental Health and Substance Abuse

• Mental illness is common in children
• Psychiatric co-morbidities in YWE can impact QOL
  – Independent of seizures
  – ALL YWE should be screened for depression, anxiety, suicidality

• 353,319 hospitalizations of children ages 6-20
  – 3,280 also had epilepsy
  – Mean age 15.9 years
  – More likely to have coexisting sleep disorder
  – Longer LOS

Rebellious Behaviors in YWE

- Co-morbid: depression, executive function deficits, ADHD
  - Impulsivity, poor decision making
- “perfect storm”
- Predictors of Rebelliousness
  - Age at baseline
- Clinical implications:
  - All YWE at risk
  - Screen all youth
  - Pay attention to Memory

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Bone health

• Peak bone mass achieved in adolescence

• Youth with Epilepsy…
  – increased risk for fracture
  – Reduced bone mineral density
  – Abnormalities in bone/ mineral metabolism

• Biochemical changes with AEDs:
  – CBZ, OXC, PHT, VPA, GBP, PHB and KD → increased risk fx

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Thank you!