Neurology & Pregnancy

Brain Summit 2023

December 16, 2023

Disclosures

- **Lauren Tardo, MD** – No relevant disclosures to this presentation. Dr. Tardo has participated in paid advisory boards for EMD Serono. She has also received paid support from MJH Life Sciences and NeurologyLive. She is a non-paid medical advisor for the MOG Project. Some medications discussed in this presentation are off-label.
- **Jaya Trivedi, MD –** No relevant disclosures to this presentation
- **Kan Ding, MD** – No relevant disclosures to this presentation
- **Ashley Miller, DO** – No relevant disclosures to this presentation

Outline

- Pre-pregnancy Planning
- Neuroimmunology – Multiple Sclerosis
- Neuromuscular – Myasthenia Gravis
- Epilepsy
- Headache

Considerations in Pregnancy

Preconception

- Optimize Rx with attention to teratogenicity
- Genetic counseling, IVF/prenatal testing
- Assess maternal cardiac/bulbar/pulmonary/contractures/functional status
- Multidisciplinary care team

Intrapartum

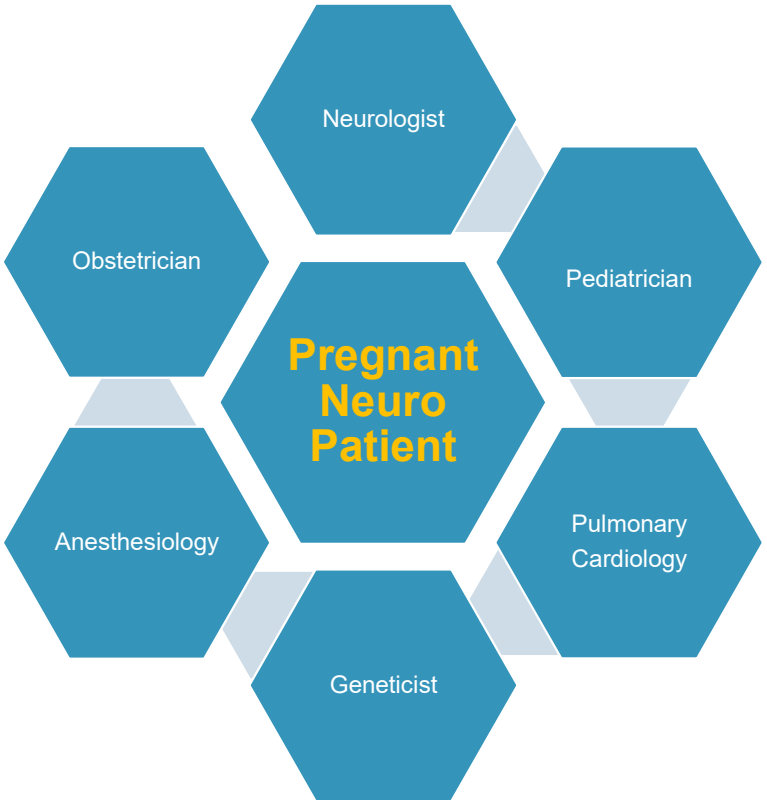
- Thromboembolism risk in wheelchair confined patients
- Establish mode of delivery, fetal presentation, anesthesia

L&D

- Access to ICU for mother & neonate
- Consider shortened 2nd state of labor and assisted vaginal delivery
- C-section: anesthesia, spinal deformities, risk of malignant hyperthermia

Edmundson Semin Neurol 2017

Best Practice – Multidisciplinary Approach



FDA Pharmaceutical Pregnancy Categories	
Category A	Adequate and well-controlled human studies demonstrate no risk.
Category B	Animal studies demonstrate no risk, but no human studies have been performed. OR Animal studies demonstrate a risk, but human studies have demonstrated no risk.
Category C	Animal studies demonstrate a risk, but no human studies have been performed. Potential benefits may outweigh the risks.
Category D	Human studies demonstrate a risk. Potential benefits may outweigh the risks.
Category X	Animal or human studies demonstrate a risk. The risks outweigh the potential benefits.

Neuroimmunology - MS

Lauren Tardo, MD

Multiple Sclerosis

- Female >> Male
- Age of onset is typically during childbearing years
- Initially women were discouraged from getting pregnant
  - → Pre-pregnancy counseling!
- OCP use is safe
- MS does NOT affect fertility or increase risk for miscarriage, prematurity or birth defects

MS and Assisted Reproductive Techniques

- IVF with failure to conceive might lead to a higher risk for clinical or MRI disease activity in the first 3 months
  - Due to use of GnRH agonists → increased pro-inflammatory cytokines, increased CXCL-12, leaky BBB (VEGF)
  - Estrogen fluctuations
  - My preferred approach is to swap to B-cell depletion prior to ovarian stimulation

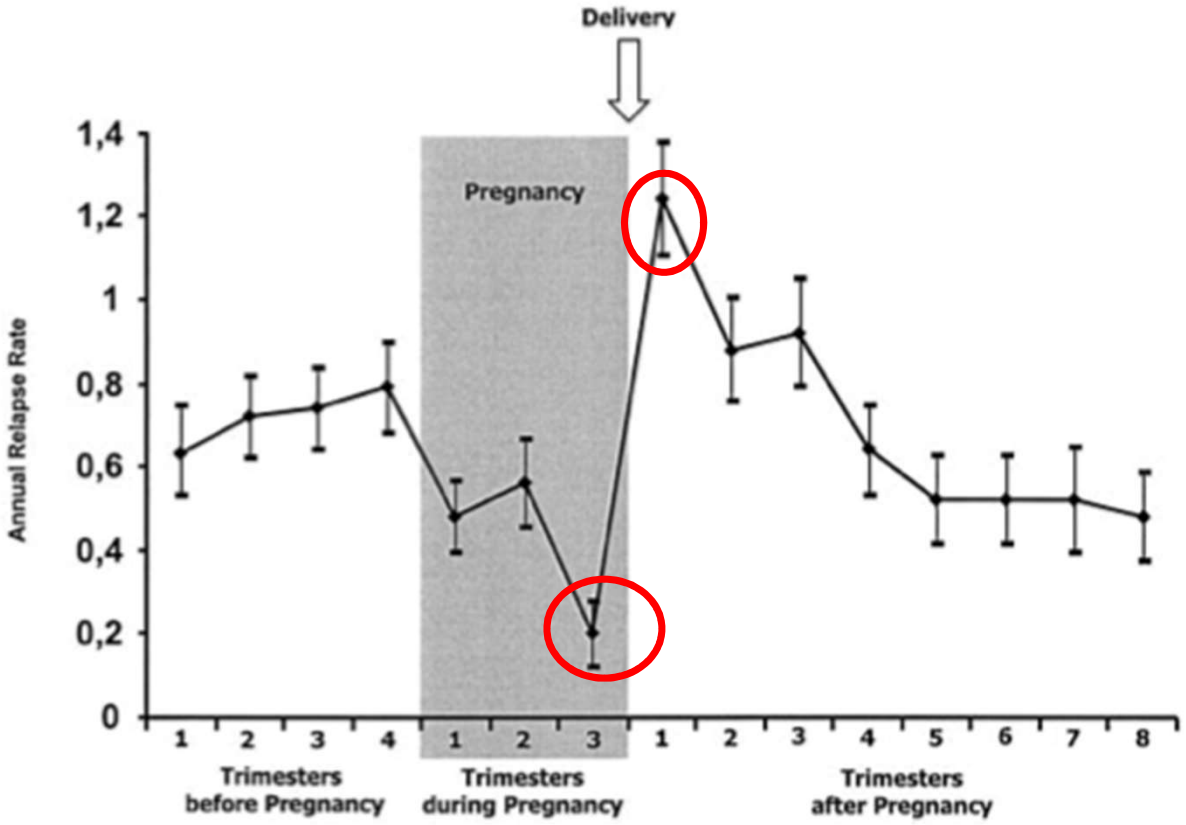
Pregnancy in Multiple Sclerosis Study (PRIMS)

- Observational study done in Europe
- Prospectively assessed the influence of pregnancy and the post-partum period on MS clinical course
- 227 women who had full-term delivery with disease duration > 1 year prior to pregnancy
- Followed during pregnancy and 1 year post-delivery

- S. Vukusic et al. *Brain.* 2004

PRIMS

- ~1/3 of patients relapsed post-partum
- Highest in the first 3 months post-partum



S. Vukusic et al. *Brain.* 2004

Factors associated with post-partum relapse

- The number of relapses in the year before pregnancy
- The number of relapses during pregnancy

**Occurrence of post-partum relapse was not related to breastfeeding, use of analgesia during delivery, age, disease duration

S. Vukusic et al. *Brain.* 2004

Relapse management during pregnancy

- Evaluation with MRI without contrast
- Try to avoid steroids in 1st trimester (orofacial malformations)
- 2nd and 3rd trimester – can use pulse methylprednisolone or prednisone
- PLEX ok
- IVIG ok

Post-Partum Management

Steroids post delivery and monthly

IVIG post delivery and monthly

Disease modifying therapy (DMT) resumption?

DMT and Pregnancy

Individualized approach!

Those with high pre-pregnancy relapse rates are at higher risk

Drugs to absolutely avoid in pregnancy

- Teriflunomide
  - 2-year washout period!
  - Cholestyramine or activated charcoal elimination protocols for accidental conceptions
  - Men too!
  - MUST be on contraception and for 2 years after stopping treatment
- S1P receptor modulators (fingolimod, siponimod, ozanimod)
  - 2-month washout period** (rebound)
  - MUST be on contraception and for 2 months after stopping

DMTs and Pregnancy

Table: US FDA categories for use of medications in pregnancy.
Based on table in Boristow N. et al. EPMA J 2012

FDA pregnancy category	Drug	Description
B	Glatiramer acetate	Animal studies have revealed no evidence of harm to the fetus; however, there are no adequate and well-controlled studies in pregnant women. *Or* Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester.
C	Interferon beta, fingolimod, natalizumab, dimethyl fumarate	Animal studies have shown an adverse effect and there are no adequate and well-controlled studies in pregnant women. *Or* No animal studies have been conducted, and there are no adequate and well-controlled studies in pregnant women.
X	Teriflunomide	Adequate well-controlled or observational studies in animals or pregnant women have demonstrated positive evidence of fetal abnormalities or risks. The use of the product is contraindicated in women who are or may become pregnant.

Anti-CD20 agents (infusions)

- FDA label – stop 1 year prior to conception
- Early on there is minimal fetal exposure as IgG1 doesn't cross placenta during first trimester
- ½ life – 20-32 days (cleared by 90-110 days)
- Primary adverse effect – low neonatal B-cell counts
  - Normalized within 6 months
- Typically used in patients with aggressive disease
- Dose and then attempt conception ~ 2-3 months after last infusion

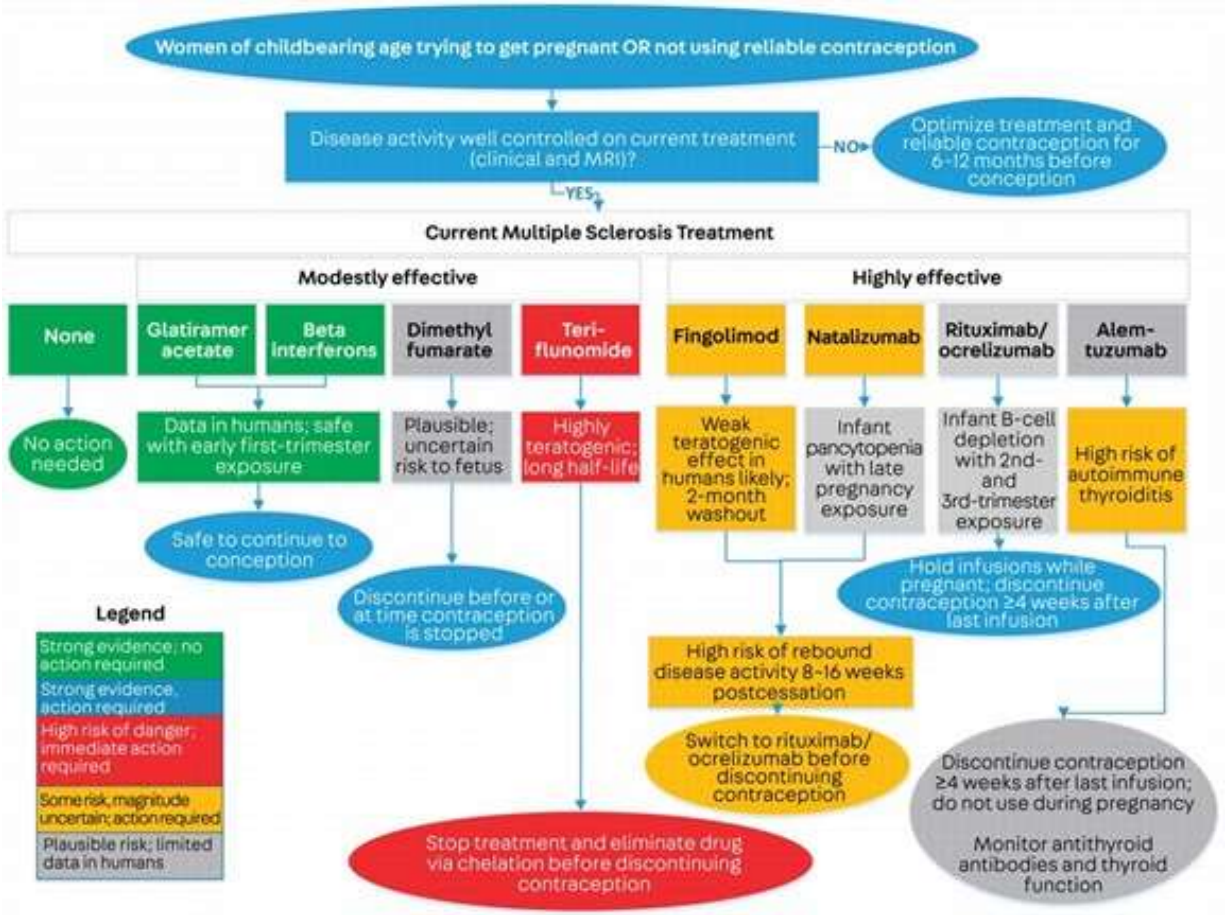
Natalizumab

- FDA Pregnancy Category C
  - Washout period – 1-3 months prior to conception or immediate discontinuation in the event of accidental pregnancy
- NTZ crosses the placenta
- NTZ is measurable in neonatal serum
  - Animal studies – fetal immunologic and hematologic changes
- Must be aware of rebound phenomena with discontinuing treatment

Natalizumab Discontinuation & Disease Reactivation/Rebound

- Discontinuation of NTZ can be associated with severe rebound or disease reactivation
  - Activity is typically greater than pre-treatment disease activity!
- Typically occurs within 2-6 months of discontinuation
- Consider starting another highly efficacious DMT within 2-4 months of stopping therapy
- Italian Pregnancy Registry - Evaluated risk of disease reactivation/rebound in 74 pregnancies previously on natalizumab and 350 control pregnancies (untreated or injectable)
  - Natalizumab group – increased relapse rate during and after pregnancy ($p<0.001$)
  - 36.5% were treated for relapses during pregnancy
  - Highest in women who had a “washout period” prior to conception and delayed DMT resumption after pregnancy

** similar phenomena can occur with S1PR modulator discontinuation



Langer-Gould AM. Pregnancy and family planning in multiple sclerosis. Continuum (Minneap Minn) 2019;25:773–792

DMT and Breastfeeding

- Data is conflicting on protective benefits
- Glatiramer acetate and interferons are safest
- Monoclonal abs unlikely to reach fetal circulation but caution should be advised
- Most people recommend exclusive breast feeding without DMT resumption or with glatiramer acetate or IFN
  - **Highly active disease
- Can consider monthly pulse steroids with 4 hour wait period prior to next feeding
- Resume DMT when able

Disease-Modifying Therapy	Description	Detectable in Breast Milk?	Transluminal Transfer?[a]	Expected Effects With Infant Exposure[b]	Compatible With Lactation?
Large molecules					
Glatiramer acetate	Large molecule (4.7–13 kDa) heterogeneous strings of amino acids	Not done, unlikely	Yes, as with any amino acid	None	Yes
Interferon beta	Large molecule, protein	0.0006% relative infant dose	Exceedingly low	Flulike symptoms	Yes
Monoclonal antibodies					
Natalizumab	IgG4	<1:200 of maternal serum level; 2–5% relative infant dose	Exceedingly low	Infections,[c] impaired vaccine responses or disseminated disease from live vaccines,[c] hepatitis,[c] anemia[c]	Yes, if needed
Rituximab	IgG1	Approximately 1:240 of maternal serum level	Exceedingly low	B-cell depletion, infections,[c] impaired vaccine responses or disseminated disease from live vaccines[c]	Yes, if needed
Small molecules					
Dimethyl fumarate	Immediately metabolized to monomethyl fumarate (129 Da), low protein binding	Animals yes/ humans not done but highly likely in high amounts	High	Neurocognitive impairment, lymphopenia, gastrointestinal upset, infections,[c] vaccine responses[c]	No
Fingolimod	Highly protein bound, long half-life	Animals yes/ humans not done but highly likely in low amounts	Moderate	Infections,[c] vaccine responses,[c] cardiovascular effects,[c] pulmonary toxicity,[c] hepatitis[c]	No
Teriflunomide	Inhibits pyrimidine synthesis, highly protein bound, very long half life	Animals yes/ humans not done but highly likely	High	Pancytopenia, infections, vaccine responses,[c] hepatotoxicity, later-life neoplasms[c]	No

Langer-Gould AM. Pregnancy and family planning in multiple sclerosis. Continuum (Minneap Minn) 2019;25:773–792

Neuromuscular – Myasthenia Gravis

Jaya Trivedi, MD

Effect of Pregnancy on Myasthenia Gravis

MG worsening 41%	Medication dosage adjustments
• 1st trimester • Postpartum	• Increased blood volume • Emesis • Impaired GI absorption

Waters Neurol Clinic 2019

Effect of Myasthenia Gravis on Pregnancy

Eclampsia/ Preeclampsia Miscarriage	Ventilation Issues
• No increase in risk	• Elevated diaphragm • Increased use of intercostal muscles

Waters Neurol Clinic 2019

Management PRIOR to Pregnancy

Preconceptual counseling

Contraception

Drug Safety

- Discontinue MTX (3 months) & Mycophenolate Mofetil (6 weeks)
- Contraception x 12 months post Rituximab
- AZA & steroids may be used

Thymectomy

- Gen AchR ab+ MG
- Recommended prior to pregnancy
  - Hoff et al 2007 & Djelmis et al 2002
    - Lower risk of neonatal MG in thymectomized mothers

Hamel & Ciafaloni 2018

Management DURING Pregnancy

Pharmacological Management

- Pyridostigmine - 1st choice of Rx
  - Dosage < 600 mg/day
  - Avoid IV ChE inhibitors (uterine contractions)
- Corticosteroids
  - Low dose: cleft palate
  - High dose: PROM & gestational DM
- Safe to continue AZA/CSA (IUGR)

MG/Exacerbation/Crisis

- IVIG safe; risk of hype viscosity & volume overload
- Plasmapharesis
  - Effect circulating hormones → premature labor
  - Fluctuating BP
  - Removal of clotting factors, IgG → bleeding, infection

Monitor FVC

Hamel & Ciafaloni 2018

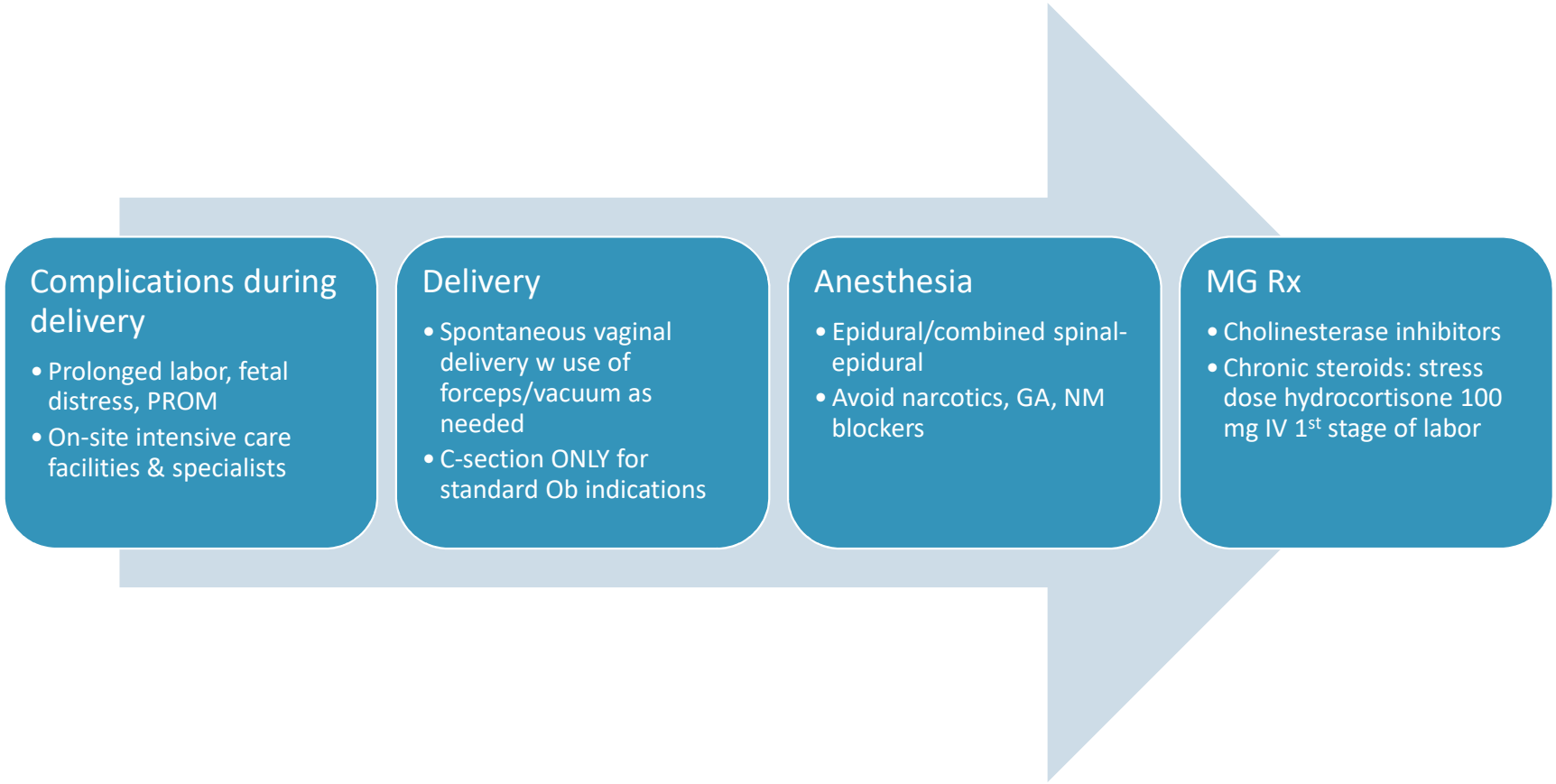
Management During Lactation

Pharmacological Mx

- Pyridostigmine – 1st choice of Rx
- Corticosteroids
  - Dosage <20 mg/day
- Safe to continue AZA/CSA

Hamel & Ciafaloni 2018

Labor & Delivery



Hamel & Ciafaloni 2018, Edmundson et al 2017

Other Pregnancy-Related Complications

Eclampsia & Pre-eclampsia

- Avoid magnesium sulfate

Avoid Ca channel blockers, β-blockers

Seizures: barbiturate & phenytoin

HTN: methyldopa & hydralazine

UTI & chorioamnionitis more common in pregnancy

Effects of Myasthenia Gravis on the Fetus

Waters Neurol Clinic 2019

Neonatal myasthenia	Mechanism	Symptoms	Severe form
• 10-20% newborns • Onset:12 hours to several days	• Placental transfer of maternal IgG abs	• Floppy • Poor suck • Ptosis • Respiratory symptoms	• Abs to fetal AchR • Polyhdramnios • Arthrogryposis • PROM

Neonatal & Lactation Considerations

Consider inpatient observation for 2 days

Treatment Options

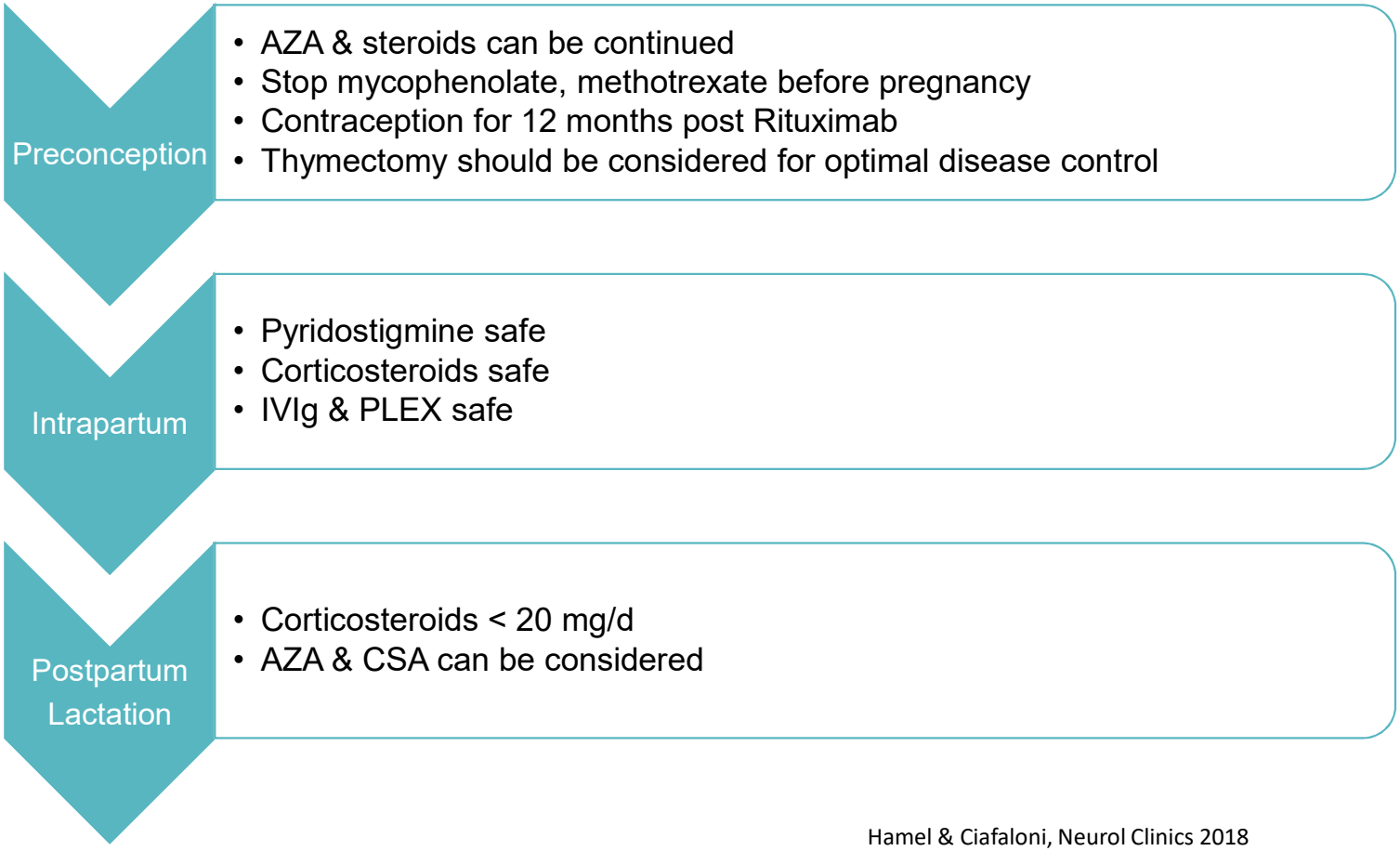
- Acetylcholine esterase inhibitors
- IVIG/PLEX if needed
- Ventilatory support
- Tube feeds

Lactation

- Does not increase risk of MG in newborns
- Positioning, supportive pillows, baby carriers

Edmundson et al 2017

MG Mx in Pregnancy



Hamel & Ciafaloni, Neurol Clinics 2018

Epilepsy

Kan Ding, MD

Seizure Frequency During Pregnancy

- 67% remained seizure-free throughout pregnancy
- Women with idiopathic generalized epilepsies were more likely to remain seizure-free
- The increase of ASM dose or the introduction of a second ASM were required in near 30% WWE with monotherapy

~3,800 pregnancies

Battino et al Epilepsia (2013) 54(9) 1621-7

Seizure Frequency During Pregnancy

Compared with other monotherapies during pregnancy,

LTG ($p < 0.001$)

- Less likely to be seizure free (58%)
- Had more GTCs (21%)
- A greater likelihood of deterioration in seizure control (20%)
- More likely to require a dose adjustment (48%)

Need closer monitoring

~3,800 pregnancies

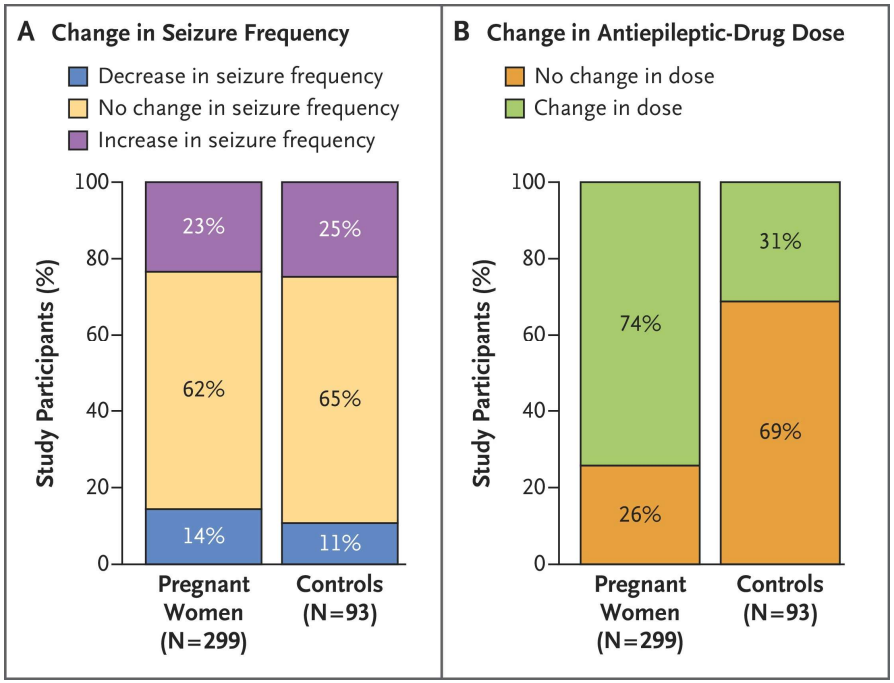
Battino et al Epilepsia (2013) 54(9) 1621-7

Seizure Frequency During Pregnancy

- The best predictor of seizure control during pregnancy is the seizure frequency 1 year prior to pregnancy.
- The increased seizure frequency during pregnancy is associated with
  - Seizures 12 months prior to conception
  - Focal epilepsy
  - ASM polytherapy

Battino et al Epilepsia (2013) 54(9) 1621-7

Changes in Seizure Frequency and Antiseizure-Drug Dose

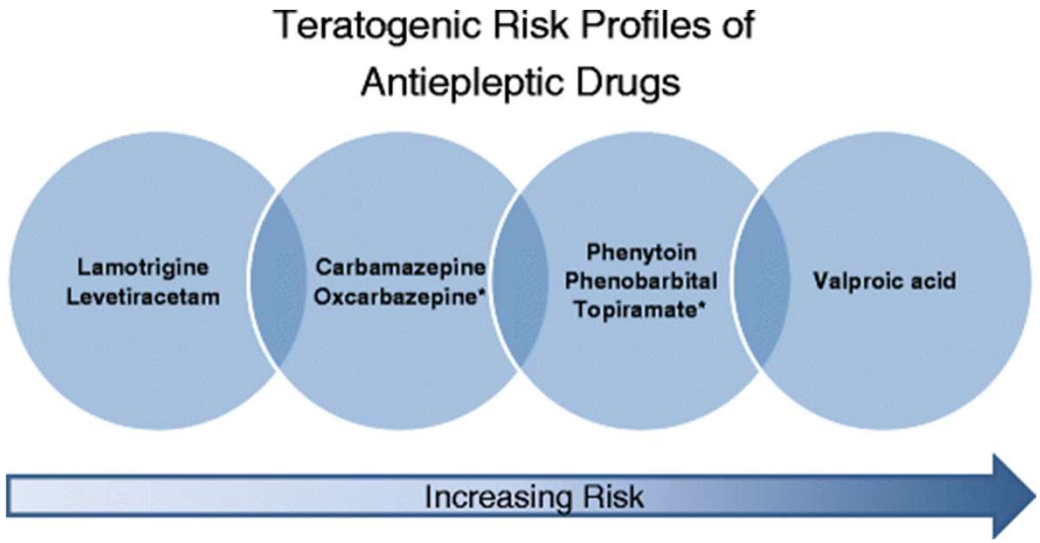


- The incidence of seizures was similar regardless of whether women were pregnant or not during similar time periods
- Changes in doses of antiepileptic drugs occurred more frequently in pregnant women than in nonpregnant women during similar time periods.

Pennell PB et al. N Engl J Med 2020;383:2547-2556

Safety of ASMs during Pregnancy

Teratogenic Risk Profiles of Antiseizure Medications



Pennell et al Neurotherapeutics (2016) 13:811-820

Folate Supplement during Pregnancy

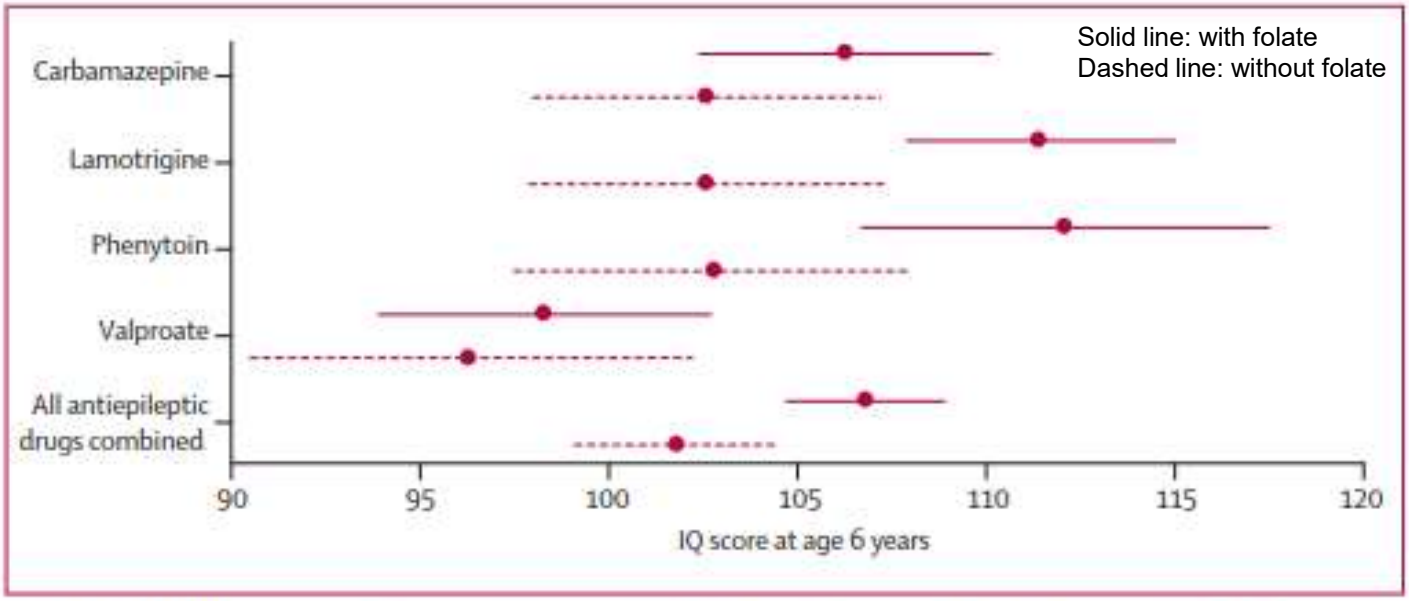


Figure 3: **Child IQ at 6 years, by exposure to maternal antiepileptic drug use and periconceptional folate**

Mean IQs were higher in children exposed to periconceptional folate (108, 95% CI 106-111) than they were in unexposed children (101, 58-104; p=0.009)

Meador et al: Lancet Neurology 2013; 12: 244-52

Folate Dose

Table 5 Periconceptional folate dose categories for mothers and children with nonmissing FSIQ at age 6 years

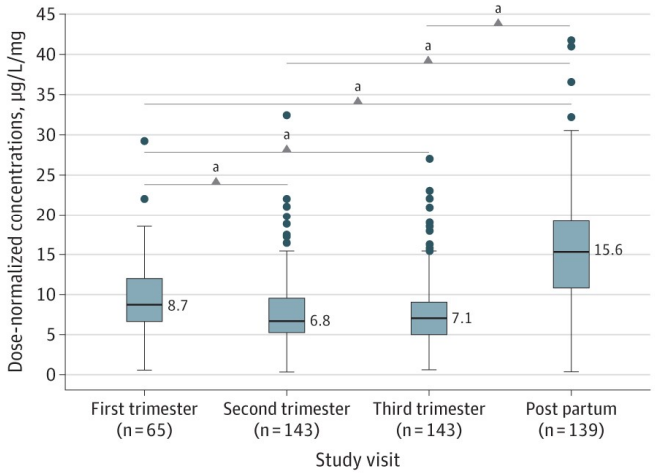
Folate dose categories	Mothers, n (%)	Children, n (%)
Folate not taken	91 (41.2)	91 (40.4)
≤0.4 mg	6 (2.7)	6 (2.7)
>0.4–1 mg	27 (12.2)	29 (12.9)
>1–<4 mg	41 (18.6)	42 (18.7)
≥4 mg	53 (24.0)	54 (24.0)
Unknown	3 (1.4)	3 (1.3)
All	221 (100.0)	225 (100.0)

Abbreviation: FSIQ = Full Scale Intelligence Quotient.

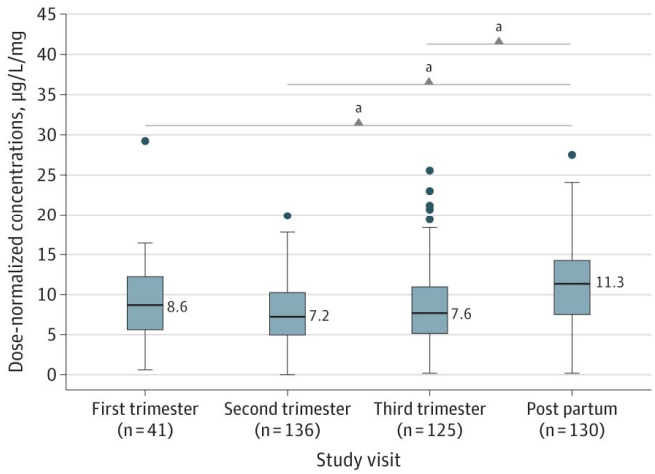
Meador et al. Neurology 2020;94:e729-e740

Role of Monitoring Drug Level During Pregnancy

Lamotrigine

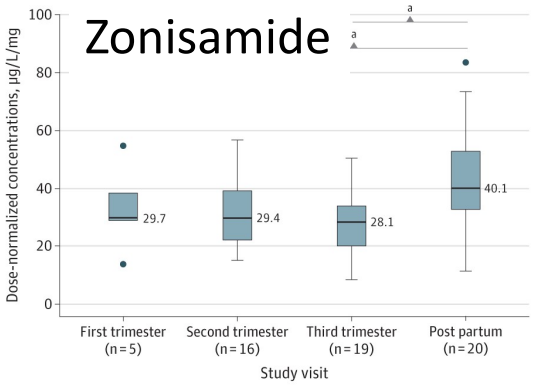


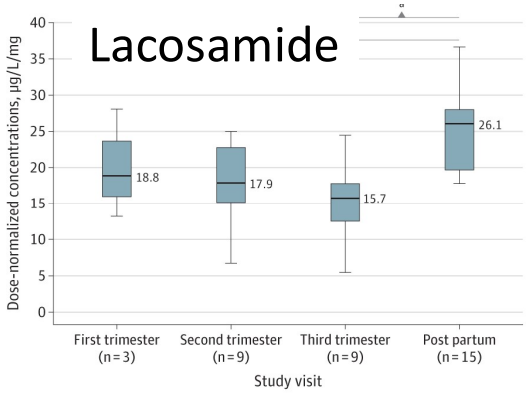
Levetiracetam

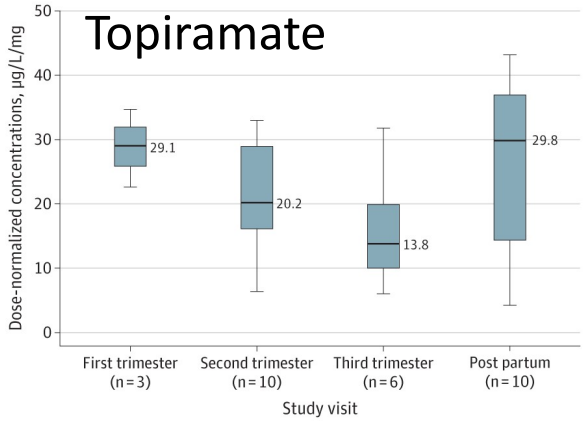


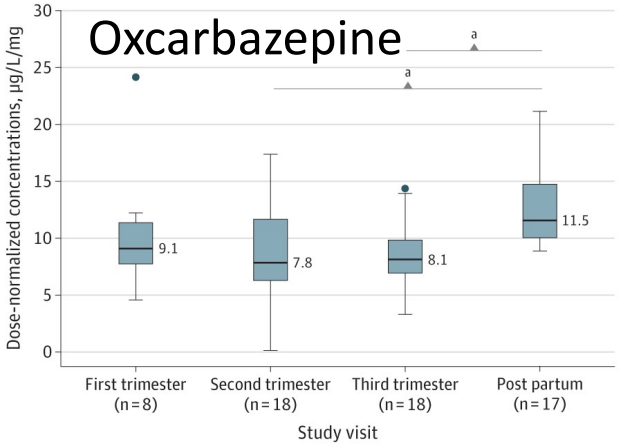
P. B. Pennell et al. JAMA Neurology 2022 Feb Online First

Role of Monitoring Drug Level During Pregnancy









P. B. Pennell et al. JAMA Neurology 2022 Feb Online First

Role of Monitoring Drug Level During Pregnancy

- Close monitoring during pregnancy
- Standard taper schedule over 10 days postpartum to return to pre-pregnant dose

P. B. Pennell et al. Neurology 2008;70:2130-2136

Breastfeeding on Anti-Seizure Medications

Table 3. Adjusted IQs at Age 6 Years Across Antiepileptic Drugs (AEDs) Comparing Breastfed vs Nonbreastfed Children[a]

	IQ, Mean (95% CI)			
AED Group	Breastfed	Nonbreastfed	Difference	*P* Value
All AEDs	108 (105 to 111) (n = 78)	104 (101 to 106) (n = 103)	4 (0 to 8)	.04
Carbamazepine	107 (101 to 113) (n = 23)	105 (99 to 110) (n = 24)	2 (−6 to 11)	.61
Lamotrigine	113 (110 to 117) (n = 27)	110 (107 to 113) (n = 34)	3 (2 to 8)	.23
Phenytoin	104 (99 to 110) (n = 17)	108 (103 to 113) (n = 20)	−4 (−12 to 4)	.23
Valproate	106 (97 to 115) (n = 11)	94 (88 to 100) (n = 25)	12 (1 to 24)	.04

[a] Adjusted for other significant factors in the model (ie, maternal IQ, AED group, AED dosage, periconception folate use, and breastfeeding) plus the propensity score. The following were not significant: socioeconomic status, educational level, race/ethnicity, seizure or epilepsy type, maternal age, number of convulsions (none vs >5), United Kingdom site, any use of alcohol during pregnancy, any use of tobacco during pregnancy, employment (at the time of enrollment), pregnancy complications, prior pregnancy complications, prior pregnancy birth defects, and whether the pregnancy was unwanted.

- **No adverse effects of ASM exposure via breast milk were observed at age of 6 years**
- **Breastfed children exhibited higher IQ**

Meador et al JAMA Pediatr 2014; 168 (8): 729-36

Headache

Ashley Miller, DO

SNNOOP10- Red flags

Systemic symptoms/fever	Meningitis, encephalitis, brain abscess
Neoplasm	Metastasis, primary brain tumors
Neurologic deficit	Vision loss, aphasia, focal weakness, sensory change
Onset- thunderclap	SAH, ICH, RCVS, CVST, arterial dissection
Onset- new headache in a patient >50	GCA
Pattern change	Neoplasm, vascular
Progressive	Neoplasm, CVST

Do TP, Remmers A, Schytz HW, et al. Red and orange flags for secondary headaches in clinical practice: SNNOOP10 list. *Neurology*. 2019;92(3):134-144.
doi:10.1212/WNL.0000000000006697

Positional	Intracranial hypertension/hypotension
Papilledema	IIH
Precipitated by valsalva/exercise	Chiari malformation
Painful eye with autonomic symptoms	Posterior fossa/pituitary/cavernous sinus, tolosa hunt
Post traumatic	SDH/SAH/EDH, concussion
Pathology- HIV	Opportunistic- toxoplasmosis, CNS lymphoma, PML
Painkiller overuse Medications	Medication overuse headaches PDE inhibitors, CO, cocaine, exogenous hormones, acute pressors
Pregnancy	Pre-eclampsia, CVST, hypothyroidism, anemia

Do TP, Remmers A, Schytz HW, et al. Red and orange flags for secondary headaches in clinical practice: SNNOOP10 list. *Neurology*. 2019;92(3):134-144. doi:10.1212/WNL.0000000000006697

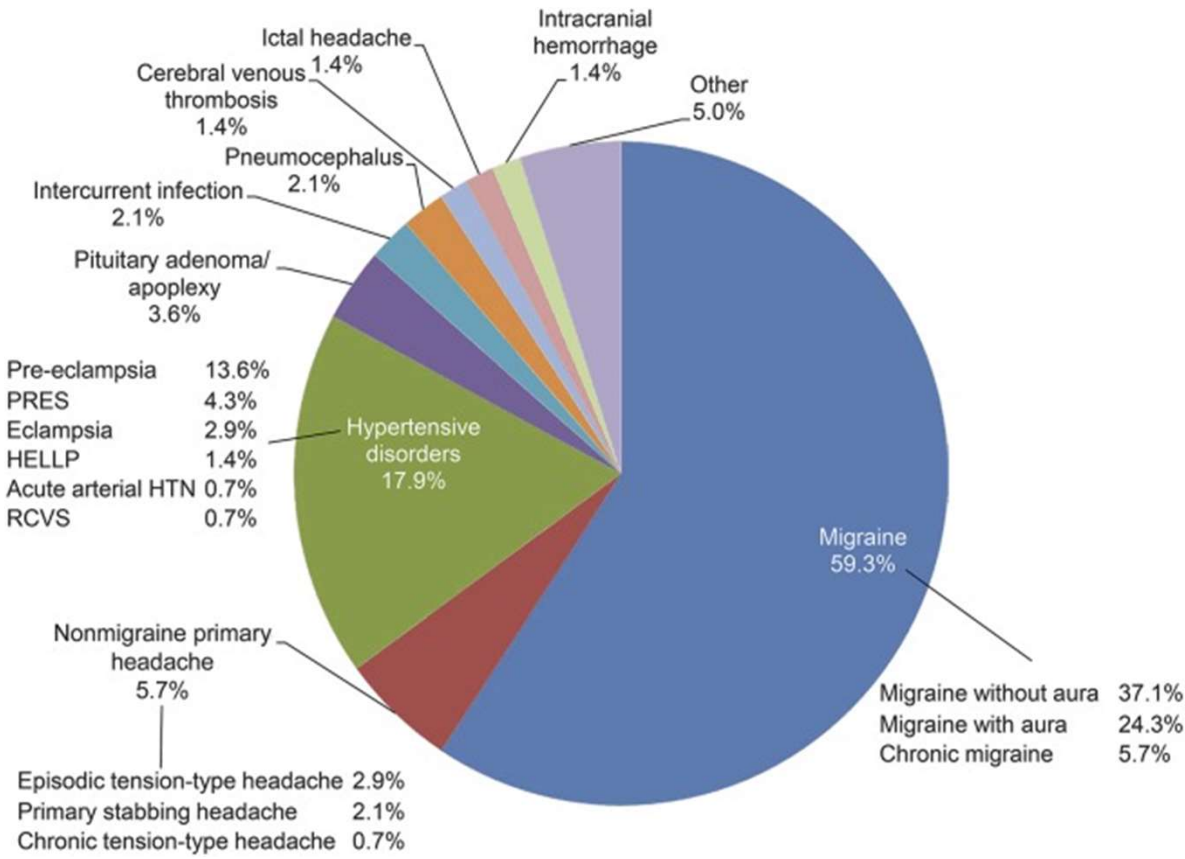
Secondary headaches

12-18% general population has secondary HA, most commonly medication overuse headache.

A 140 patient retrospective study out of Bronx, NY found that 35% of headaches were secondary and 56% of those were in the 3rd trimester.

The most common causes are hypertensive disorders (50%), pituitary adenoma, and pituitary apoplexy.

MRI without contrast is the preferred imaging option



Robbins MS, Farmakidis C, Dayal AK, Lipton RB. Acute headache diagnosis in pregnant women: a hospital-based study. *Neurology*. 2015;85(12):1024-1030. doi:10.1212/WNL.0000000000001954
Sandoe CH, Lay C. Secondary Headaches During Pregnancy: When to Worry. *Curr Neurol Neurosci Rep*. 2019;19(6):27. Published 2019 Apr 22. doi:10.1007/s11910-019-0944-9

Primary Headaches

25% of childbearing age women have migraine

During pregnancy 67-80% of women have improvement of headaches, usually during 2nd and 3rd trimester.

- Patients with migraine with aura tend to worsen
- Patients with migraine without aura can develop migraine with aura
- Patient with tension type headache can develop migraine without aura and vice versa

Sandoe CH, Lay C. Secondary Headaches During Pregnancy: When to Worry. *Curr Neurol Neurosci Rep*. 2019;19(6):27. Published 2019 Apr 22. doi:10.1007/s11910-019-0944-9

Primary headache types

Migraine without aura, episodic

At least five attacks[1] fulfilling criteria B-D

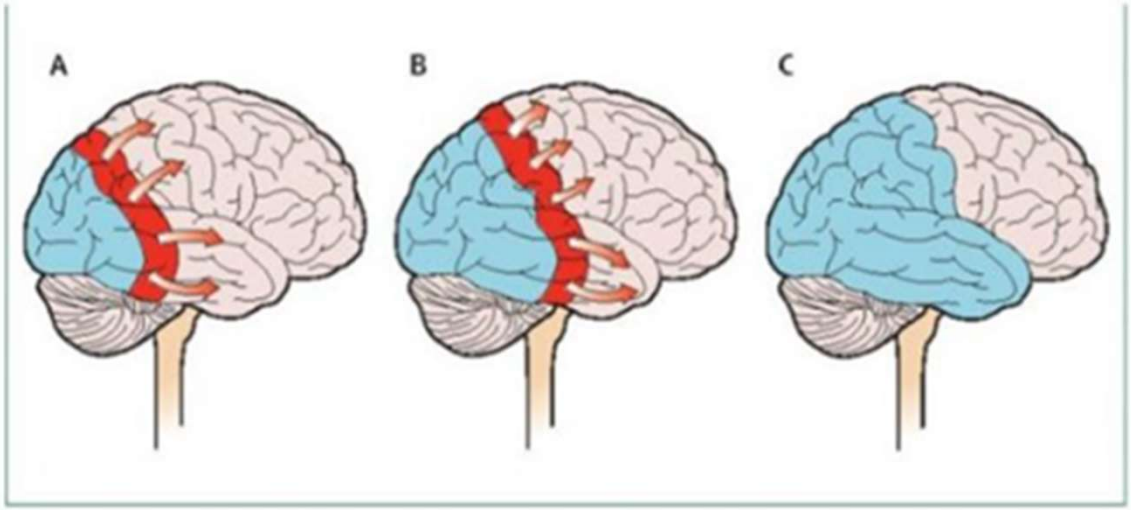
A. Headache **attacks lasting 4-72 hr** (untreated or unsuccessfully treated)[2;3]
B. Headache has at least **two of the following four** characteristics:
    1. unilateral location
    2. pulsating quality
    3. moderate or severe pain intensity
    4. aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)
C. During headache **at least one** of the following:
    1. nausea and/or vomiting
    2. photophobia and phonophobia

Chronic migraine

A. Headache (migraine-like or tension-type-like[1]) **on ≥15 days/month for >3 months**, and fulfilling criteria B and C
B. Occurring in a patient who has had at least five attacks fulfilling criteria B-D for 1.1 *Migraine without aura* and/or criteria B and C for 1.2 *Migraine with aura*
C. **On ≥8 days/month for >3 months,** fulfilling any of the following[2]:
    1. criteria C and D for 1.1 *Migraine without aura*
    2. criteria B and C for 1.2 *Migraine with aura*
    3. believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative
D. Not better accounted for by another ICHD-3 diagnosis[3;4;5].

International Headache Society. IHS Classification ICHD-3. Part I: The Primary Headaches, 3. Trigeminal autonomic cephalalgias. https://ichd-3.org/. 2021.

Typical aura



https://migrainecanada.org/posts/the-migraine-tree/trunk/core-skills/cause-of-migraine-electrical-and-chemical-sides/

B. Aura with both of the following:

1. **fully reversible visual, sensory and/or speech/language symptoms**
2. no motor, brainstem or retinal symptoms.

C. At least **three of the following six** characteristics:

1. at least one aura symptom spreads gradually over ≥5 minutes
2. two or more aura symptoms occur in succession
3. each individual aura symptom lasts 5-60 minutes[1]
4. at least one aura symptom is unilateral[2]
5. at least one aura symptom is positive[3]
6. the aura is accompanied, or followed within 60 minutes, by headache

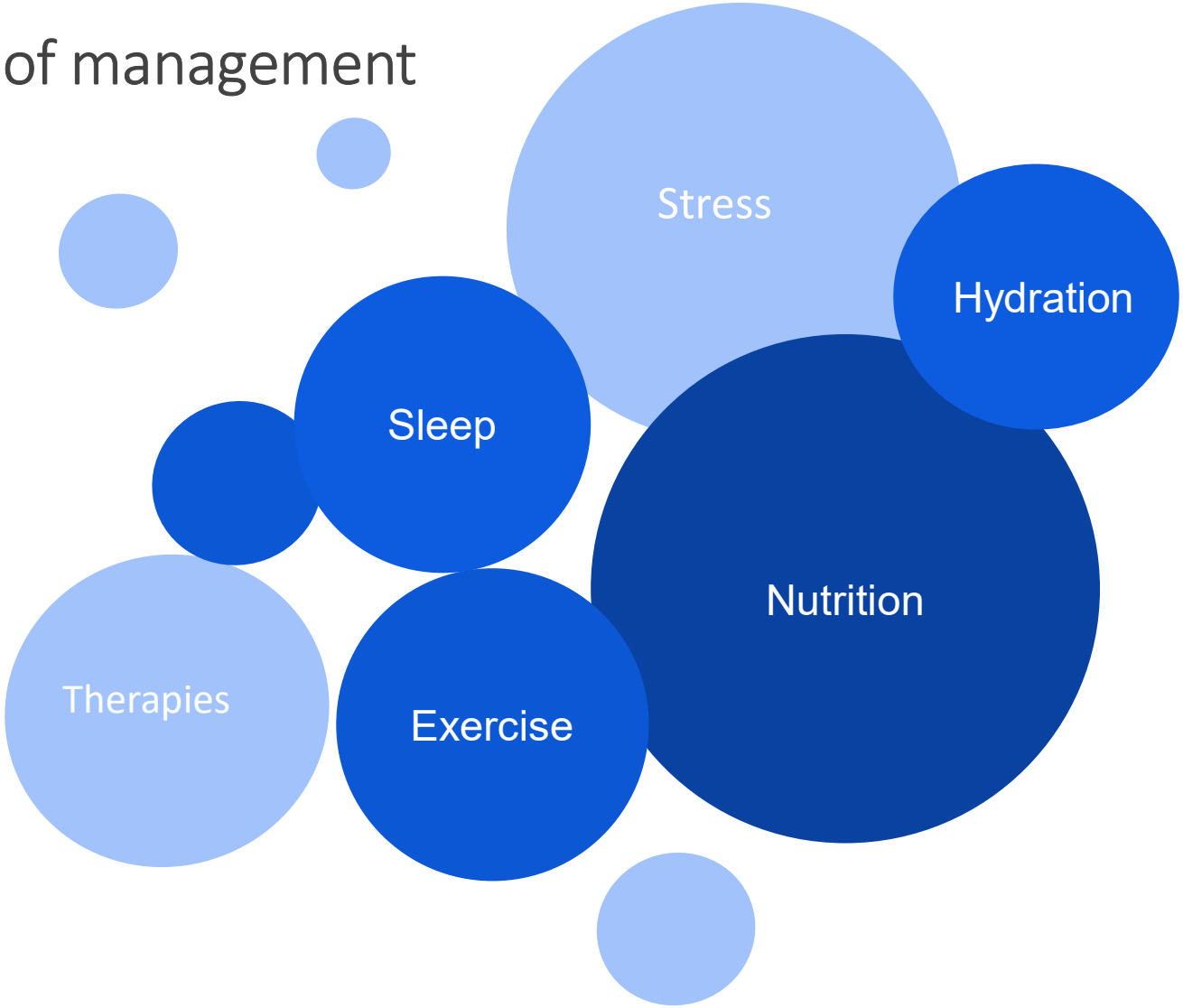
Tension type headache

Chronic

1. Headache occurring on ≥15 days/month on average for >3 months (≥180 days/year), fulfilling criteria B-D
2. Lasting hours to days, or unremitting
3. At least **two of the following four** characteristics:
    1. bilateral location
    2. pressing or tightening (non-pulsating) quality
    3. mild or moderate intensity
    4. not aggravated by routine physical activity such as walking or climbing stairs
4. **Both of the following**:
    1. no more than one of photophobia, phonophobia or mild nausea
    2. neither moderate or severe nausea nor vomiting
5. Not better accounted for by another ICHD-3 diagnosis[1;2;3].

International Headache Society. IHS Classification ICHD-3. Part I: The Primary Headaches, 3. Trigeminal autonomic cephalalgias. https://ichd-3.org/. 2021.

First steps of management



Rescue therapies

More safe

**Metoclopramide

**Acetaminophen 1000mg +/- caffeine <200mg

**Lidocaine ONB

- avoid in patients with recent skull fracture/craniotomy

**Cyclobenzaprine

*Diphenhydramine

- used in conjunction with prochlorperazine or metoclopramide

Conditional recommendation per ACOG

***Ondansetron

***Sumatriptan

Moderately safe

**Ibuprofen (2nd trimester)

**Prednisone/ methylprednisolone

**Prochlorperazine

*IV magnesium sulfate

- no more than 5 doses due to risk of skeletal abnormalities

*Oxycodone

*Butalbital

Other considerations: devices e.g neurivio, cefaly

Rayhill, Melissa. Headache in Pregnancy and Lactation. *Continuum Neurology of Pregnancy.* 2022: 28(1): 72-92. Doi: 10.1212/CON.0000000000001070

Preventative therapies

No risk per ACOG:

Cyproheptadine

Verapamil

More safe

***Propranolol

**Memantine

- Insufficient data per ACOG

*Magnesium

*Co Q10

Moderately safe

***OnabotulinumtoxinA

**Venlafaxine

**Amitriptyline/nortriptyline

*Riboflavin

*Verapamil

*Gabapentin

Rayhill, Melissa. Headache in Pregnancy and Lactation. *Continuum Neurology of Pregnancy.* 2022: 28(1): 72-92. Doi: 10.1212/CON.0000000000001070

Contraindicated medications

Pregnancy

cGRPs

Lasmiditan

Topiramate

Depakote

Lisinopril

Candesartan

Feverfew

Ergots

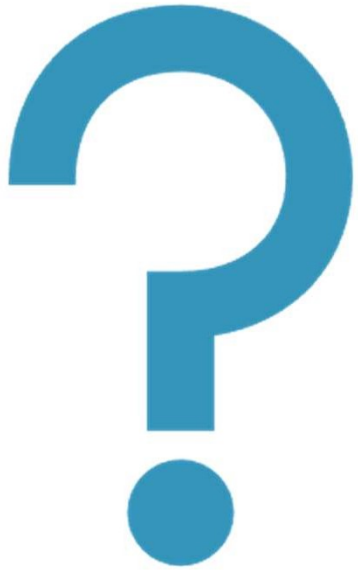
Lactation

cGRPs

- Potential use in lactation given large molecule size

Lasmiditan

Ergots



Questions