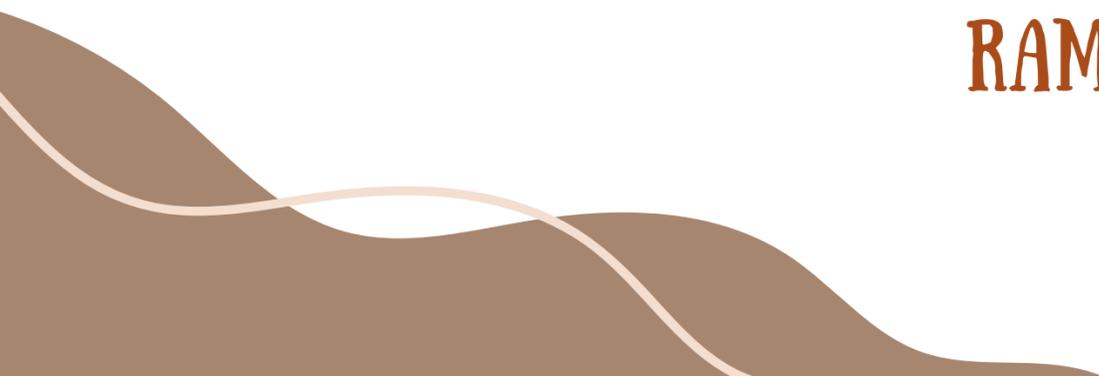




NEUROLOGICAL DISORDERS IN PREGNANCY

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HEADACHE IN PREGNANCY

1. **-Headache is defined as a pain, discomfort in the head or scalp or neck. -Headaches can differ greatly in regard to pain type, severity, location and frequency. --Most headaches in pregnancy are benign (primary headache e.g. migraine or tension-type headache), but the pregnant woman is at risk of life-threatening secondary headaches (headache caused by another condition, e.g. impending eclampsia and cerebral venous thrombosis)**

PRIMARY HEADACHES

Primary headaches in pregnancy Most headaches in pregnant women have no sinister underlying pathology, and migraine and tension-type headache are the most prevalent diagnoses in early pregnancy. Primary headaches peak in women of reproductive age anyway due to the impact of hormones, however 75% of women who experience benign headaches pre-pregnancy find they reduce in the antenatal period. -Most are migraine and tension-type headaches.

MIGRAINE

They are progressive unilateral headache pulsating in character often in the frontotemporal area , worsened by exertion and lasts for 4-72 hours. -patient often present with nausea, vomiting , photophobia etc.

Migraine is influenced by cyclical changes in the sex hormones, and attacks often occur during the menstrual period, attributed to a fall in oestrogen levels.

Migraine often improves in pregnancy, with worsening of headaches occurring infrequently. Throughout pregnancy around 20% of pregnant women will experience migraine-like headaches, many of whom do not get migraines outwith pregnancy.

MIGRAINE

Obstetric complications are not increased in migraine sufferers. Migraine during pregnancy should be treated with analgesics, antiemetics and, where possible, avoidance of factors that trigger the attack. Low-dose aspirin or beta-blockers may be used to prevent attacks.

-Approximately 60-70% of migraine improve spontaneously during pregnancy. On occasion, the first migraine attack occurs during pregnancy, usually during the first trimester. New onset of aura may occur during the second and third trimesters.

TENSION HEADACHE

Tension-type headache (TTH) is a primary headache disorder characterized by a bilateral, nonthrobbing (constant pressing tightening) headache of a mild to moderate intensity, typically without other associated features .

it is often gradual in onset and last from 30m-7days

SECONDARY HEADACHES IN PREGNANCY

Secondary causes of headache are more serious and often refers to underlying serious problem.

- **Hypertension**

- **Subarachnoid hemorrhage**
- **Drug-related**
- **Cerebral venous thrombosis**
- **Arteriovenous malformation (can enlarge/bleed in pregnancy)**
- **Meningitis**
- **Enlargement of a pituitary tumor**
 - **Enlargement of a hormone-sensitive tumor , e.g. meningioma**
 - **Bleeding into a pre-existing tumor**

POST-DURAL PUNCTURE HEADACHE

- CSF leakage from the puncture site
- Decrease in the CSF volume may lead to compensatory vasodilatation of the cerebral vessels that causes severe headache. Also, accumulation of the CSF in the epidural space irritates the meninges
- The headache is usually in the fronto - occipital regions and radiates to the neck. It is characteristically worse on standing , relieved with lying and typically develops 24-48 hours post-puncture.

Managed by:

1. Analgesia, bed rest and adequate hydration
2. Epidural blood patch is injected at the site of the meningeal tear
3. Other medications: theophylline and hydrocortisone (vasoconstrictors)

SUBARACHNOID HEMORRHAGE

- Bleeding in the space between the brain and the surrounding membrane (subarachnoid space).
- Outside pregnancy the commonest cause is a ruptured berry aneurysm , but arteriovenous malformations (AVMs) may dilate in pregnancy due to the effect of estrogen , resulting in a similar incidence.
- The primary symptom is a sudden, severe headache, associated with nausea/vomiting/stiff neck.

CEREBRAL VENOUS THROMBOSIS

- Distinct neurological emergency caused by occlusion, either partial or complete, of the dural venous sinus and/or the cerebral veins.
- The greatest risk period is the third trimester in Pregnancy and the first few weeks after delivery
- Headache is the most frequently (80–90%) occurring symptom in cerebral venous thrombosis and often the first symptom reported by patients. usually acute or subacute in onset , localized , continuous and moderate to severe. other clinical manifestations present at onset or develop during the course of the disease. include papilledema , focal deficits , altered consciousness , seizures

MANAGEMENT OF HEADACHE IN PREGNANCY

In the initial clinical assessment of a pregnant or postpartum woman with headache , a history and neurological examination often allows the correct cause for the headache to be identified.

HEADACHE HISTORY TAKING

- The vast majority of headache aren't life-threatening ,however in some cases may be the first indication for serous pathology.
- Pain = SOCRATES
- Location
- onset
- Character
- Radiation
- Associates symptoms
- Duration
- Severity

Imaging

The accepted background cumulative dose of ionising radiation during pregnancy is 50 mGy²⁹

Fetal exposure for a computed tomography scan of the head is estimated at <0.005 mGy

Magnetic resonance imaging (MRI) should be avoided in the first trimester because of the potential hazards of hyperthermia and acoustic noise, but MRI remains preferable to any studies using ionising radiation³⁰

Contrast media based on the element iodine should be avoided in pregnancy unless essential. If iodinated contrast media are used the neonatal thyroid function should be checked³¹

Gadolinium-based contrast agents appear to be safe in pregnancy³¹

Lactating women who receive iodinated contrast or gadolinium can continue breastfeeding without interruption

RED FLAG FEATURES

Thunderclap : rapid time to peak headache intensity (seconds to 5 minutes)

- **Focal neurological symptoms (e.g. limb weakness , aura 1 hour)**
- **Non-focal neurological symptoms(e.g. cognitive disturbance)**
- **Change in headache frequency , characteristics or associated symptoms**
 - **Headache that changes with posture**
 - **Headache awakening the patient Headache precipitated by physical exertion or Valsalva manoeuvre**
 - **Jaw claudication or visual disturbance (women over 50 years)**
 - **Fever**
 - **Neck stiffness**
 - **New onset of headache in a patient with a history of HIV infection**
 - **New-onset headache in a patient with a history of cancer**

TREATMENT OF HEADACHE IN PREGNANCY

For treatment of primary and secondary headaches, ACOG recommends acetaminophen 1000 mg orally as initial treatment of acute migraine. For persistent headache in pregnancy, the guideline recommends metoclopramide 10 mg (IV or enteral), alone or in combination with diphenhydramine 15 mg (IV or enteral), as additional treatment. ACOG recommends against the use of ergot alkaloid-containing products (in lactating patients as well) and medications containing opioid narcotics, and recommends cautious use of prednisolone, IV magnesium, or sumatriptan for secondary treatment.

For patients with persistent headache attributed to preeclampsia with severe features, ACOG recommends treatment with magnesium sulfate, blood pressure control, and delivery etc.

medscape , neurological disorders and pregnancy

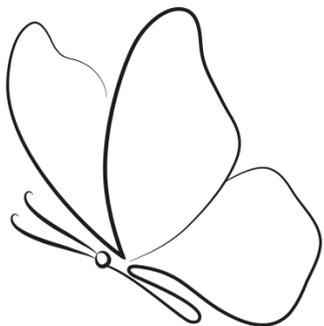
Headache type	Onset	Location	Character	Duration	Worsened by	Other symptoms	Course with pregnancy	Diagnosis
Tension type	Gradual	Bilateral	Constant, pressing/tightening, mild/moderate	30 minutes to 7 days	–	Pericranial tenderness, minimal photophobia	No change	Symptomatology and history
Migraine	Progressive, may be preceded by aura	Unilateral, frontotemporal	Pulsating, moderate/severe	4–72 h	Exertion	Nausea, vomiting, photo/phonophobia	Majority improve	Requires at least 5 attacks to fulfill definition
Cluster	Sudden, up to 8 times per day	Unilateral, periorbital	Severe, constant	15–180 minutes	–	Ipsilateral tearing, sweating, congestion, edema, miosis, agitation	Rare	Symptomatology and history
Pre-eclampsia/eclampsia	Gradual	Bilateral	Pulsating	Persists intermittently until delivery	Exertion	Scotomata, right upper quadrant and epigastric pain	Occurs during pregnancy after 20 weeks gestation and up to 7 days post partum	Typically blood pressure >140/90 on 2 instances 6 hrs apart and proteinuria >300mg/24hrs
Hypertensive crisis	Gradual	Bilateral	Pulsating	Resolves within 1 hour of normalization of blood pressure	Exertion	–	Increased incidence in women with chronic hypertension	Blood pressure >160/120
Cerebral venous thrombosis	Progressive	Diffuse	Severe	Weeks, until dissolution of thrombus by anticoagulation	–	Neurologic deficits, seizures, loss of consciousness, increased intracranial pressure	Increased incidence	MR or CT angiography
Subarachnoid hemorrhage	Abrupt	Unilateral	Incapacitating, worst ever	Days	Exertion	Nausea/vomiting, altered consciousness	Unchanged	CT, MRI, LP
Idiopathic intracranial hypertension	Progressive	Diffuse	Constant	Resolves within 72 h of normalization of ICP	Coughing, Valsalva	Papilledema, visual field defects	Unchanged	LP to measure ICP (>200mm H2O)
Postdural puncture	Progressive within 5 days of dural puncture	Diffuse	Constant	1 week or 48 h after epidural blood patch	Upright position	Neck stiffness, tinnitus, hypacusia, photophobia, nausea	Associated with epidural and spinal analgesia	Symptomatology and history
Neoplasm	Progressive	Localized	Worse in morning	Indefinite, unless surgically resected	Cough or bending forward	Focal neurologic signs	Unchanged	CT, MRI
Caffeine withdrawal	Within 24 h of last caffeine intake	Bilateral	Pulsating	1 h if caffeine ingested, 7 days if not	–	–	Frequent in first trimester	Symptomatology and history
Meningitis	Progressive	Diffuse	Constant	Up to months after resolution of infection	–	Fever, stiff neck, nausea, photo/phonophobia	Unchanged	LP
Sinus headache	Gradual	Frontal, facial	Constant	7 days	–	Acute sinusitis	Unclear	CT, MRI

EPILEPSY

Epilepsy is a chronic disorder, characterized by recurrent unprovoked seizures. Seizure is a temporary dysfunction of the brain in which neurons will produce excessive electrical discharges. Most of childbearing potential who have epilepsy expected to become pregnant. Epilepsy is not in itself a contraindication to pregnancy. Approximately 30% of those with epilepsy are woman in their childbearing age years

Most common neurological disorder in pregnancy.

Seizure management should be optimized before pregnancy is considered.



-In the majority of cases, pregnancy does not affect seizure frequency.
(20–35% of pregnant female individuals with epilepsy experience an increased seizure frequency)

-Factors associated with an increased risk of epileptic seizures during pregnancy include:

1-Reduced plasma concentration of AEDs due to physiologic changes in pregnancy (e.g., steroid-hormone induced hepatic enzyme induction, increased renal clearance, nausea and vomiting leading to missed doses)

2-Psychosocial stress

3-Sleep deprivation

4-Hormonal changes (e.g., increased estrogen: progesterone ratio)– low threshold for seizures

Risk consideration

-What effect do maternal epilepsy and seizures have on the course of pregnancy?

Women with epilepsy are at increased risk for a range of **perinatal complications** compared with the general population, complications range from mild to severe and include :

Lactic acidosis

Increased cardiac output

transient elevation of blood pressure

Increased intra-abdominal pressure

Redistribution of blood flow to the brain and muscles, with consequent decrease in visceral and uterine flow.

The risk of developing a seizure during labor is nine times that during the rest of pregnancy

preeclampsia, preterm labor, antepartum hemorrhage, postpartum hemorrhage, placental abruption, poor fetal growth, hemorrhagic diseases and intracranial hemorrhage in newborn baby prematurity, fetal death, and maternal mortality.

Effect of seizures on the fetus – In addition to concerns about fetal exposure to ASMs, there are risks to the fetus from maternal seizures. In particular, generalized tonic-clonic seizures can lead to hypoxia and lactic acidosis, which may harm the fetus via placental transfer

-What effect do ASMs have on the fetus?

One of the main adverse effects of antiseizure medications (ASMs) on the fetus and neonate is an increased risk of major congenital malformations.

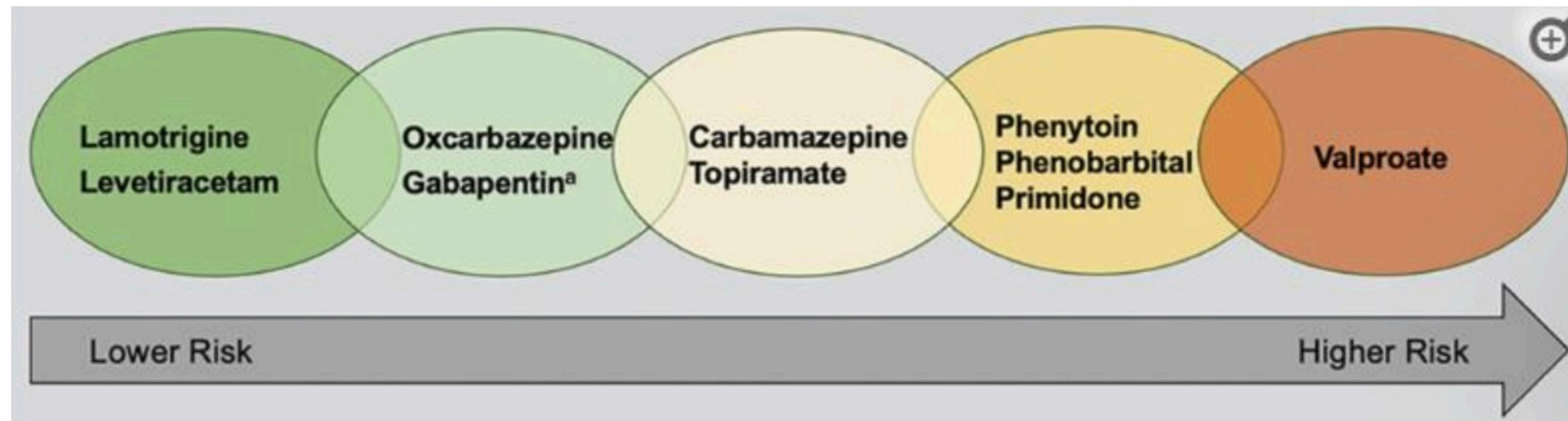
Major congenital malformations and their risk factors

- Types of malformations: the most common major malformations associated with ASMs are neural tube, congenital heart, and urinary tract defects, skeletal abnormalities, and oral clefts.

-Different ASMs have different risks:

AEDs with low teratogenic risk: lamotrigine and levetiracetam

AEDs with high teratogenic risk: valproate (highest risk), phenobarbital, topiramate, and phenytoin



-Polytherapy: the risk is probably more dependent upon the specific ASMs used as polytherapy rather than just the number of ASMs.

-Timing and dose of ASM: the gestational timing of the exposure and the dose of the ASM used are also likely to be important.

-History of malformation: A previous ASM-exposed pregnancy resulting in major malformations is associated with an increased risk in subsequent pregnancies

-Other risk factors:

- A family history of congenital anomalies
- a low maternal level of education.
- Low folate levels

-What effect does pregnancy have on seizure risk?

At least half of women with epilepsy will have no alteration of their seizure pattern during pregnancy, but some women experience seizure worsening compared with their baseline.

Predictors of seizure worsening

- The main risk factor for seizures during pregnancy is **baseline seizure frequency before pregnancy**; women who are seizure-free in the nine months prior to pregnancy are less likely to have seizure worsening.
- Other reported predictors are **ASM type, polytherapy, patient adherence, and the use of therapeutic drug monitoring**.
- Some women who experience increased seizure frequency are **sleep-deprived** or nonadherent with their medications because of concerns about the effects of the medication on the developing fetus

Risks with specific ASMs

1-Valproate:

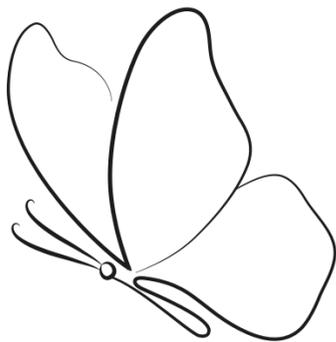
-Valproate should be avoided in pregnancy if possible.

-Valproate exposure in utero is associated with the development of **neural tube-like defects (eg, spina bifida aperta, open lumbosacral myelocele)**.

-Additional patterns of major malformations associated with **first-trimester valproate exposure include oral clefts, as well as cardiovascular and urogenital malformations and multiple malformations.**

-The effect of VPA on malformation risk is dose-dependent, but the lowest safe dose has not been established.

-Rare cases of **neonatal coagulopathy** due to **VPA-induced hypofibrinogenemia** have been reported



2-Phenytoin:

- **Orofacial clefts, cardiac malformations, and genitourinary defects** are the major malformations described with phenytoin.
 - About one-third of children whose mothers are taking this drug during pregnancy typically have **fetal hydantoin syndrome**.
- Fetal hydantoin syndrome is a characteristic pattern of mental and physical birth defects that results from maternal use of phenytoin (Dilantin) during pregnancy. The range and severity of associated abnormalities will vary greatly from one infant to another.
 - The characteristics of fetal hydantoin syndrome include **IUGR with small head circumference, dysmorphic facies, orofacial clefts, cardiac defects, and distal digital hypoplasia with small nails** .

The characteristics of fetal hydantoin syndrome include :

P

Cleft **P**alate , Cleft li**P** (orofacial cleft)

H

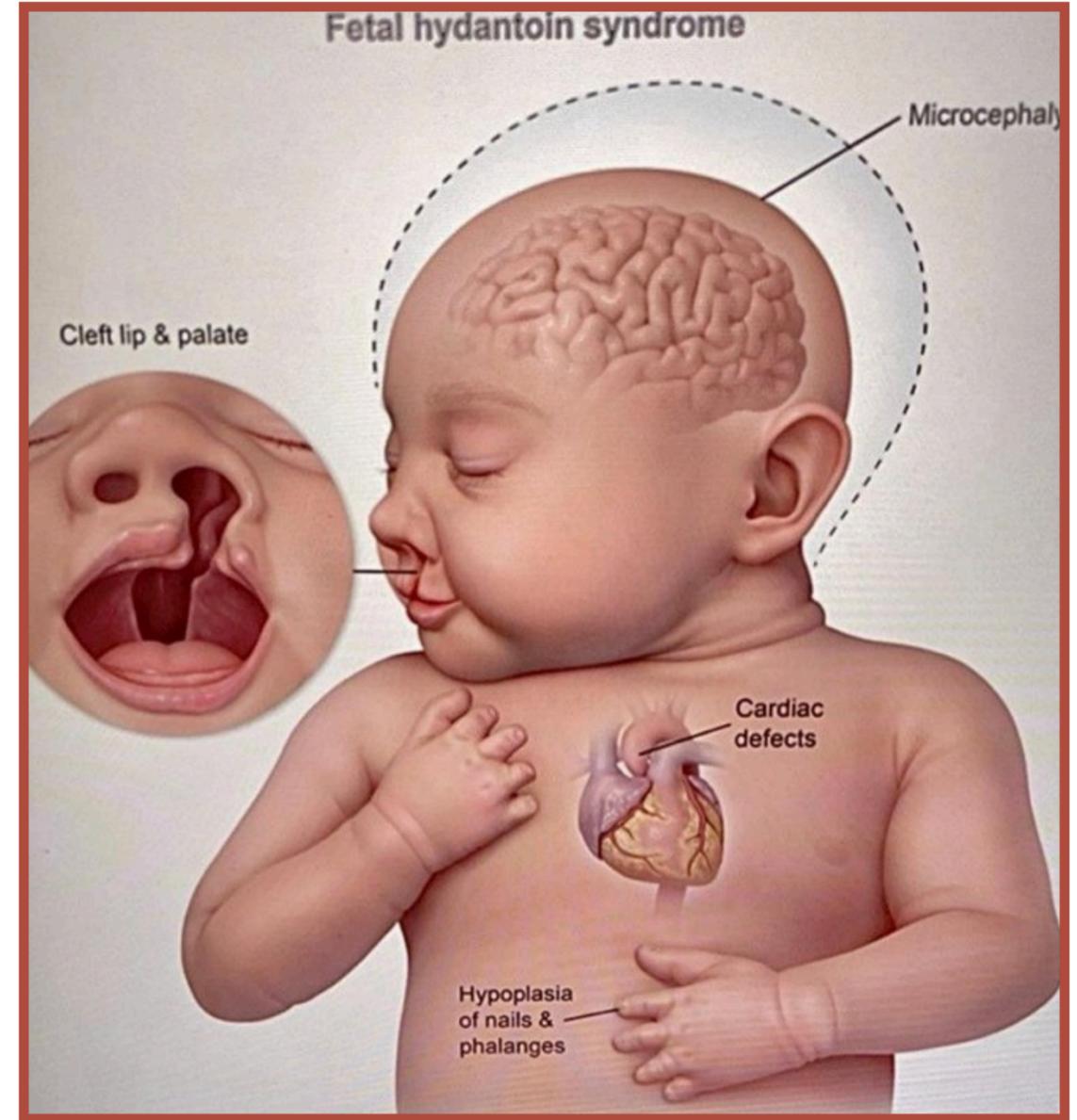
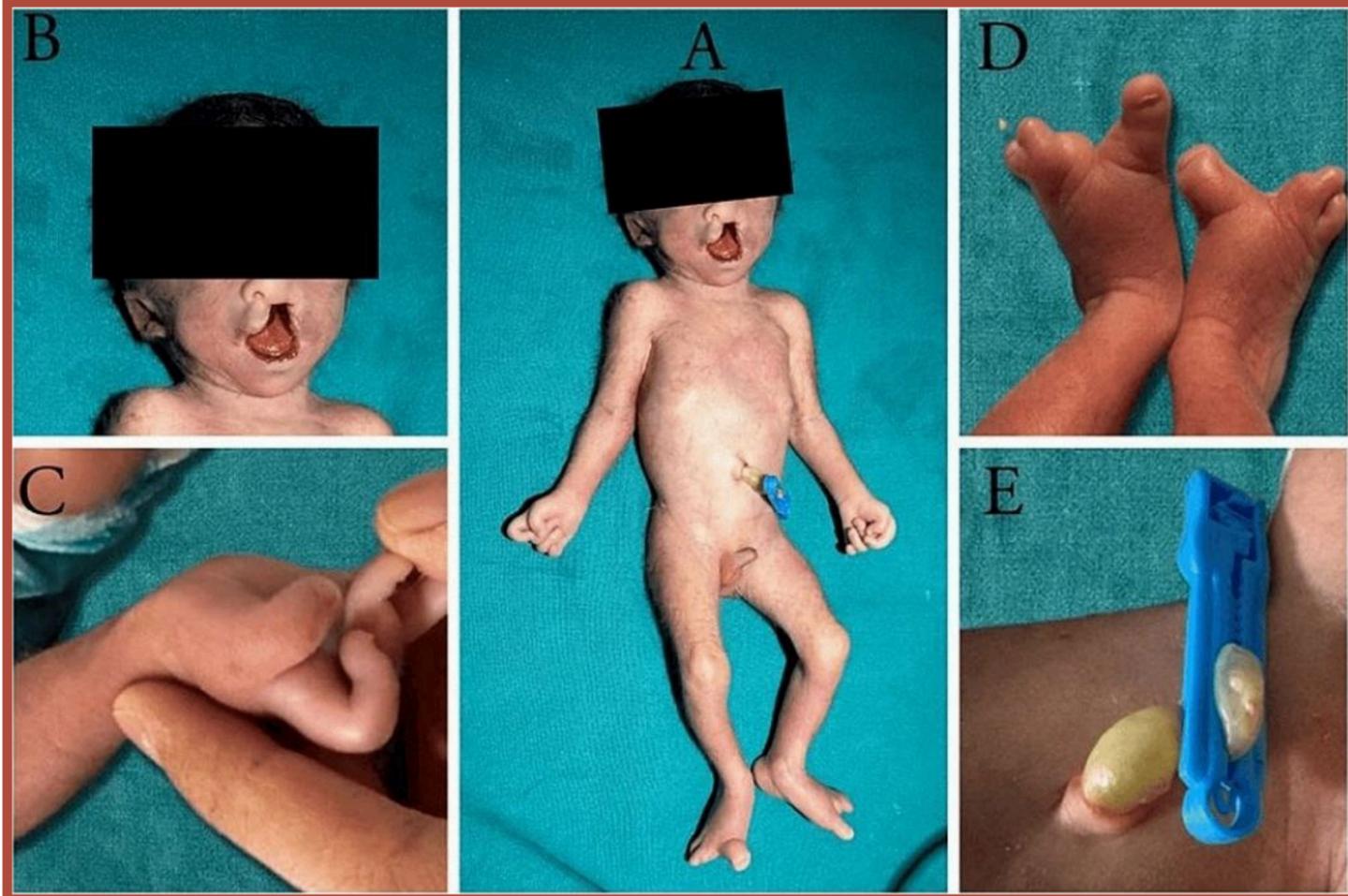
Small **H**ead circumference
Hypoplastic face (dysmorphic face)
Hirsutism
Hear defects

E

Embryopathy
Anti **E**pileptic use

N

Hypoplastic **N**ails and distal digital hypoplasia
Neurological defects
Neonatal growth restriction (IUGR)



3-Phenobarbital: Malformations of the **heart, orofacial, and urogenital structures** occur with increased frequency with phenobarbital.

4-Carbamazepine: is associated with a relatively **modest rate** of major malformations overall, but the increased rates include **neural tube defects**.

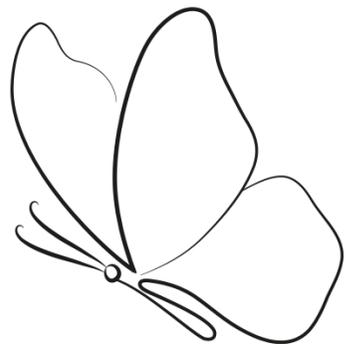
5-Topiramate: Topiramate use in pregnancy is associated with an increased risk for **fetal growth restriction and low birth weight**.

6-lamotrigine and levetiracetam: Data on lamotrigine exposure are **mostly reassuring** especially when using them as a monotherapy

Epilepsy management

Pre conceptual management of women with epilepsy includes the following:

- Attempt to decrease pharmacotherapy to monotherapy
- Taper dosages of AEDs to the lowest possible dose
- In women who have not had a seizure for 2-5 years, attempt complete withdrawal of pharmacotherapy
- Consider preconceptual genetic counseling
- Supplement the diet with folate at 4 mg/d



MANAGEMENT DURING PREGNANCY

1-Continued folic acid supplementation

2-Antiseizure medication monitoring and dose adjustment

3-Screening for malformations

-Ultrasound screening for morphologic anomalies in the fetus can be definitively undertaken at 17 to 20 weeks gestation.

-If additional reassurance is desired, measurement of the serum alpha-fetoprotein (AFP) concentration or amniocentesis for amniotic fluid AFP levels should be performed between at or after 16 weeks, especially in women treated with valproate and carbamazepine.

Increased level of AFP – neural tube defect

4-supplemental vitamin K (10 to 20 mg/day) is usually advised after 35 weeks' gestation to prevent neonatal hemorrhage ,Because some AEDs increase the rate of vitamin K degradation .

MANAGEMENT AT DELIVERY

Most women with epilepsy have a normal vaginal delivery . However, peripartum is a time of increased seizure risk. Antiseizure medication (ASM) doses must not be missed during the period of labor.

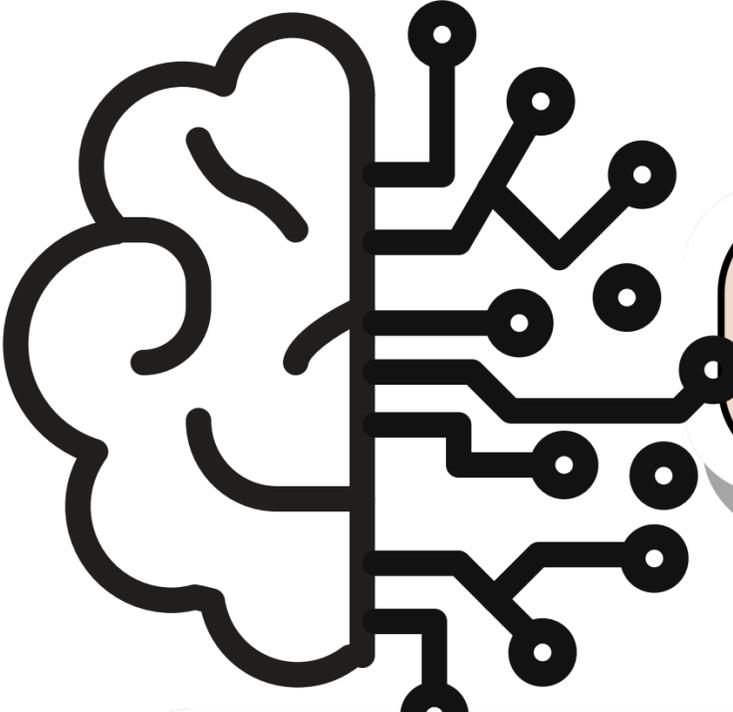
MANAGEMENT IN THE POSTPARTUM PERIOD

1-Postpartum antiseizure drug tapering – The rate of taper of ASMs back to prepregnancy dose or slightly above depends mainly on the primary route of elimination for each ASM

2-Avoiding sleep deprivation

3-Safety precautions – Common sense safety considerations must be discussed; these include not driving, not having the mother bathe the baby alone, and not co-sleeping with the baby.

4-Breastfeeding – taking ASMs does not contraindicate breastfeeding

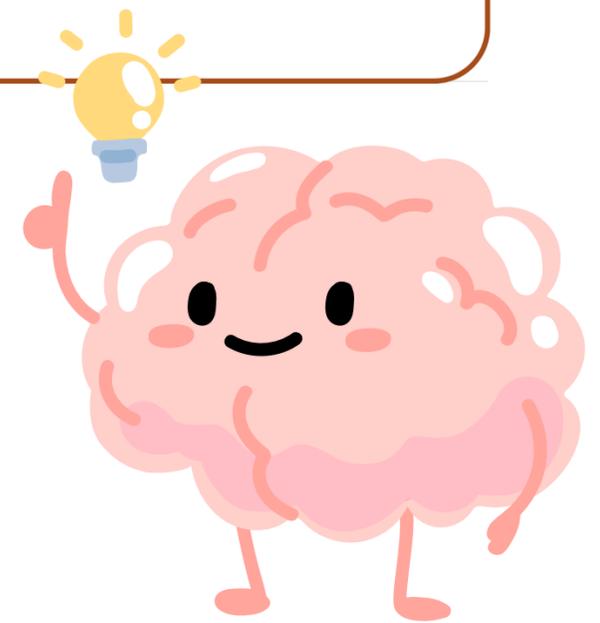


ECLAMPSIA

Occurrence of one or more generalized convulsions and/or coma in the absence of other neurological conditions

seizures preceded by frontal or occipital headache, visual disturbances, RUQ pain or epigastric pain

Cerebral vasospasm, leading to ischemia and cerebral edema



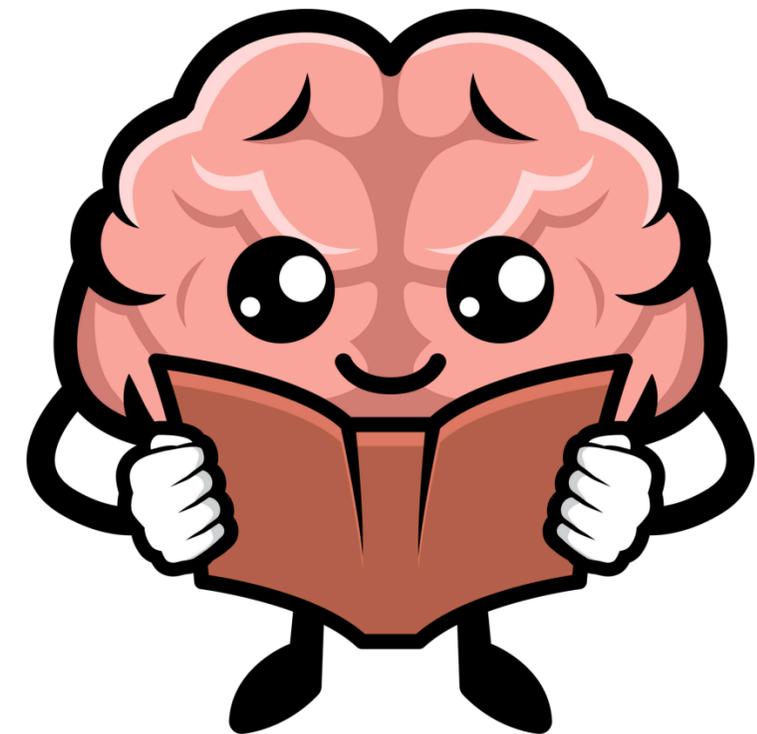
ECLAMPSIA MANAGEMENT:

- Airway :Maintenance of airway latency
- Breathing : supplemental oxygen 8-10L/min via face mask
- Circulation
- left lateral position
- Anticonvulsant:
 - Mg sulfate (loading dose 4-6g then maintenance 1g/hours)
 - Should continued at least 24H after last convulsion .
- Definitive treatment is delivery

Magnesium sulfate toxicity

- Patella reflex absent
- Decreased urine output
- Decrease respiration

Antidote calcium gluconate



ECLAMPSIA COMPLICATIONS:-

- Placental abruption
- Acute renal failure
- Cerebral Hg
- Hepatic rupture
- DIC
- Fetal growth restriction
- Prematurity
- RDS
- Intraventricular hg
- NEC

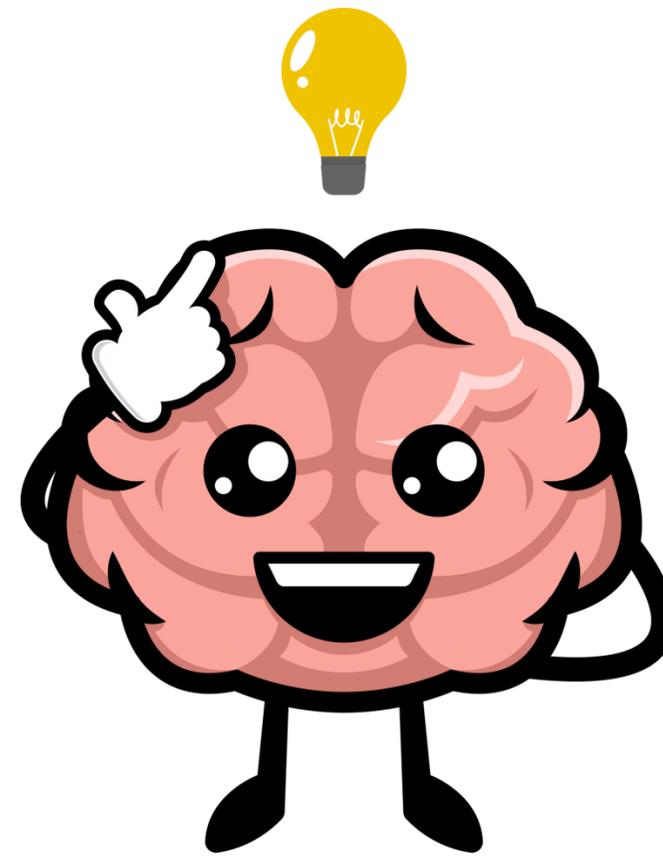
Eclampsia Prevention :-

Low dose
81mg/day

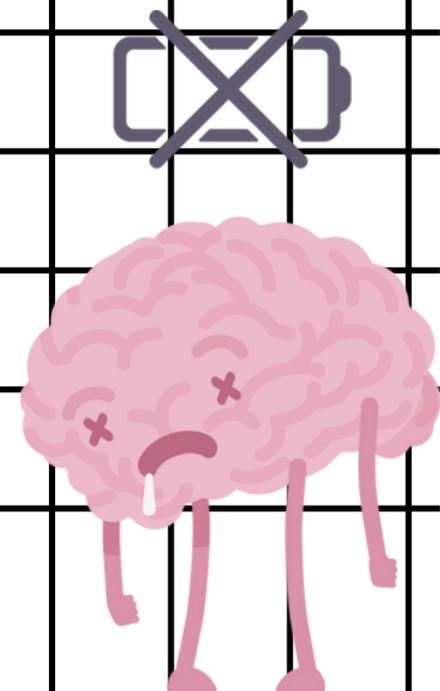
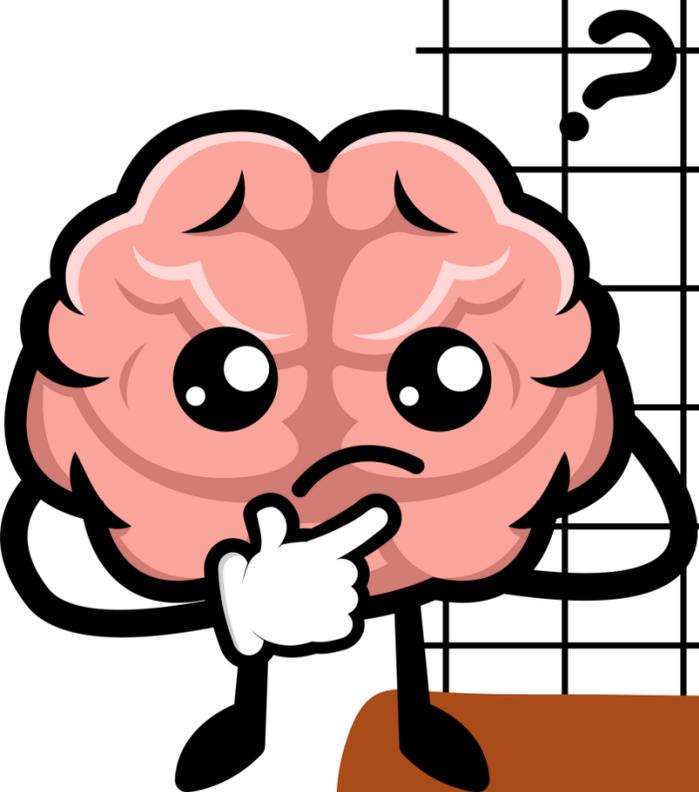
Begin at the end of 1st trimester

Aspirin

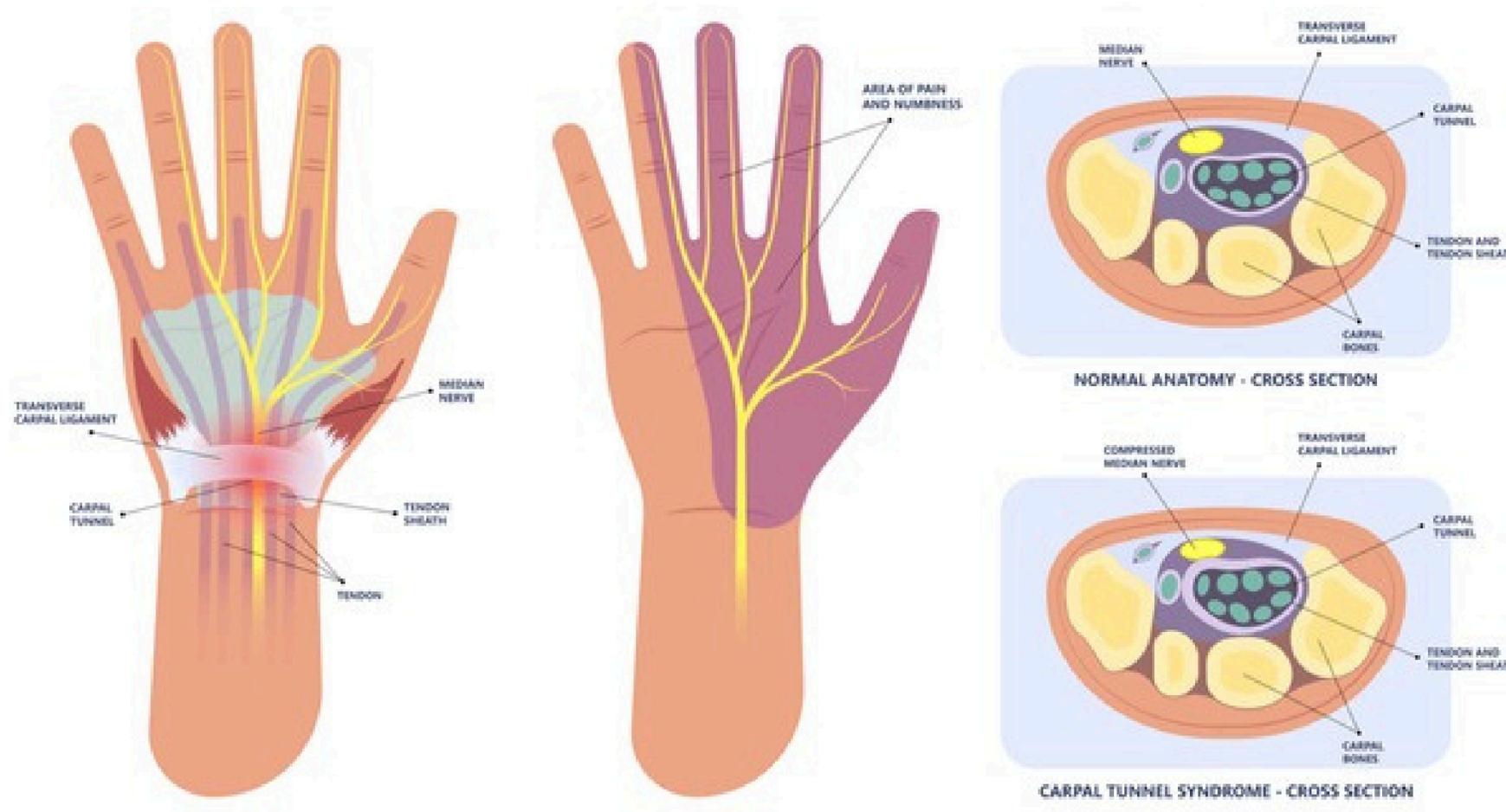
Calcium



CARPEL TUNNEL SYNDROME



The carpal tunnel is a passage in the wrist that contains tendons and a nerve, called the median nerve, that run through the base of the hand. The carpal tunnel can swell and press against this sensitive nerve, causing pain.



Carpal tunnel syndrome is a condition that occurs as a result of swelling around the nerves of the wrist. It can cause numbness, tingling or pain in one or both of the hands.

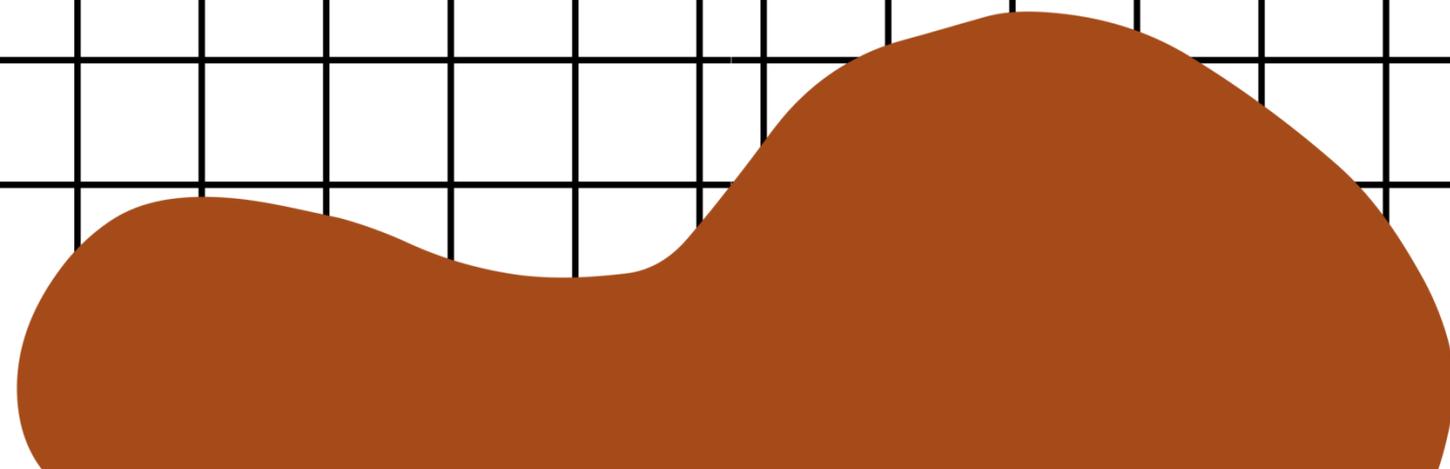
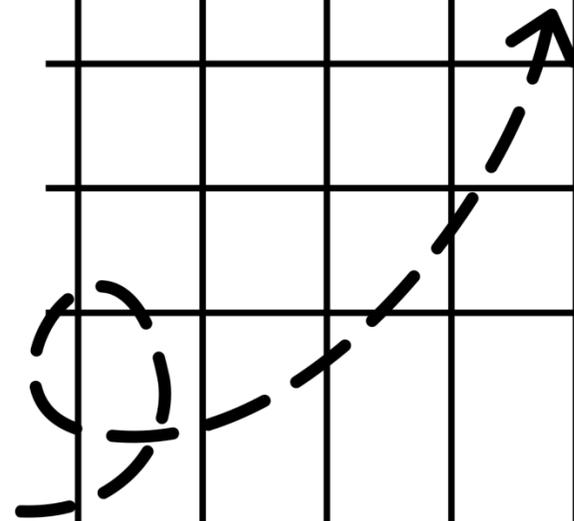
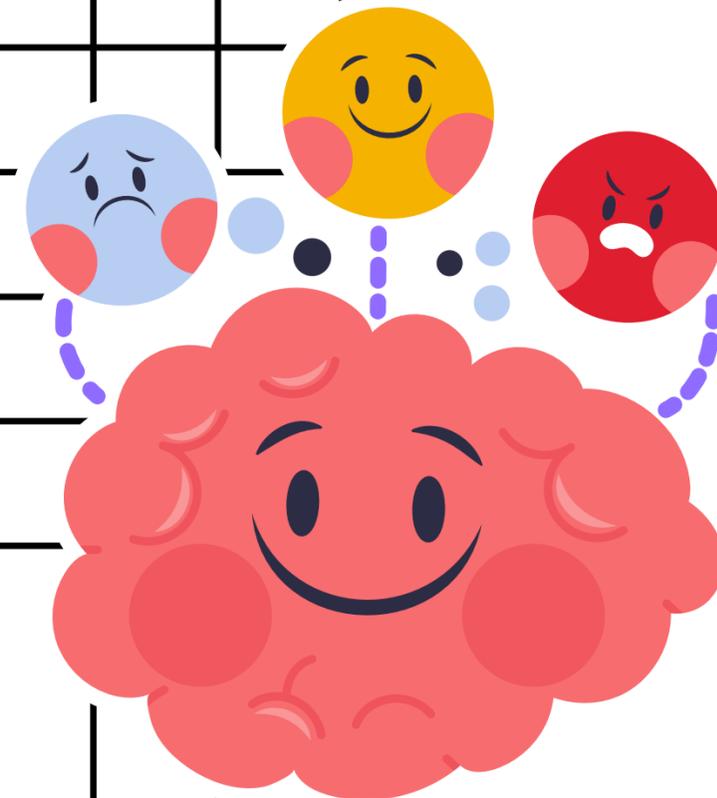


SYMPTOMS



- pain, numbness, tingling, or weakness of your hand
- difficulty with hand coordination
- pain spreading to your arm or shoulder
- Patient will feel the symptoms in thumb, index finger and middle finger.

Symptoms can get worse at night.



MANAGEMENT

- **Keep your hands elevated as much as you can.**
- **Keep your wrists in a neutral position (not bent forwards or backwards), as much as you can.**
- **Sleep on the side of your less affected hand.**
- **Put an ice pack on your wrist or run cold water over your hand.**
- **Wear a wrist splint, especially at night, to keep your wrist neutral.**
- **Perform regular fluid drainage massage and gentle exercises**



CTS IN BREASTFEEDING

inPractice

Carpal Tunnel Syndrome



Coping During Pregnancy and Breastfeeding

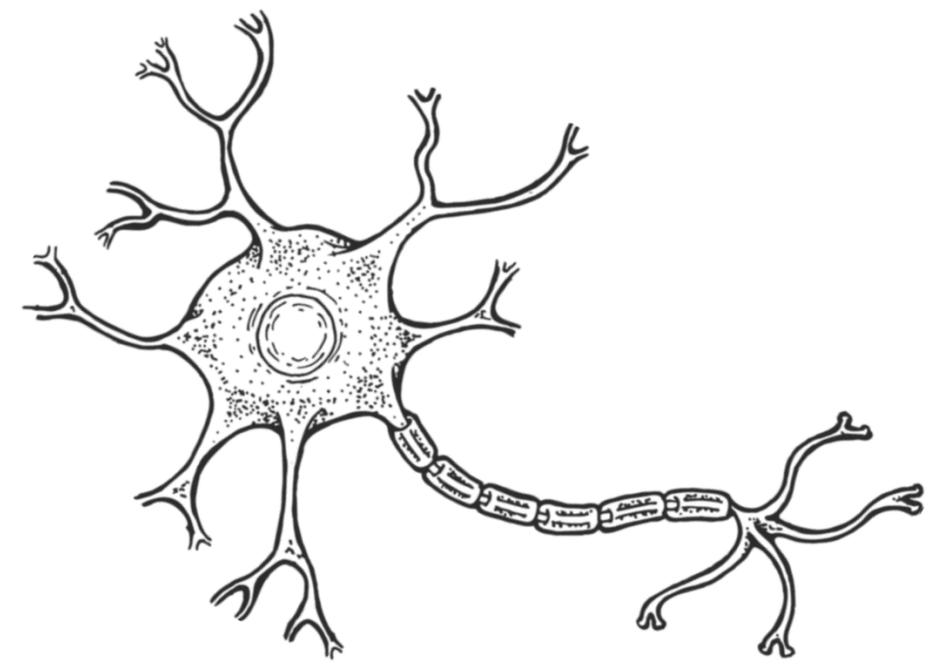
MaryJane O'Donnell,
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Ruth Elio, RN, BS, IBCLC
Debra Day, RNC-MNN,
IBCLC

About CTS

CTS is the number-one entrapment neuropathy referred to electrodiagnosticians for evaluation (Bahrami, Rayegani, Fereidouni, & Baghbani,

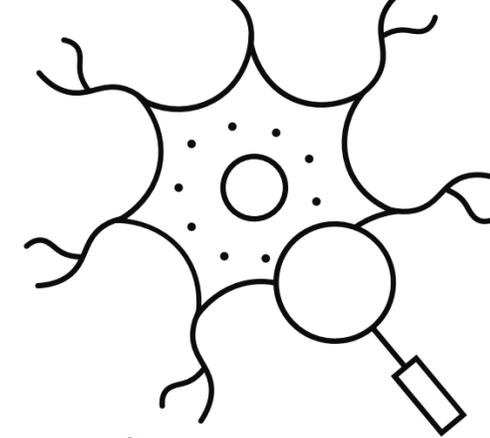
- Some women will continue to have symptoms after giving birth or may even develop them after giving birth.
- So we advise her while breastfeeding sit up straight in a supportive chair and have a pillow underneath baby to support them. Once baby is attached to your breast support their head with your forearm rather than with your hand.

When a woman finds out she is going to have a baby, she dreams of holding, cuddling and feeding her baby. If her choice is to breastfeed, she may also envision that positioning her baby at the breast will be simple and comforting. Many women are able to breastfeed easily without setbacks, but there are some who must cope with the pain and frustration of carpal tunnel syndrome (CTS), which can arise during or after a pregnancy. CTS can interfere with a woman's ability to perform everyday activities with her hands, including breastfeeding. It's important to look at how CTS affects women who are pregnant or breastfeeding and to explore techniques and treatments to help alleviate the pain and discomfort it can cause.



MYASTHENIA

GRAVIS



• Myasthenia gravis is an autoimmune neuromuscular disease characterized by weakness and fatigue of the skeletal muscles of the face and extremities.

- It affects people of both sexes and all ages, but twice as many female patients are affected as male patients. •

Myasthenia gravis usually strikes in women in their third decade of life, but the elderly are increasingly affected. •

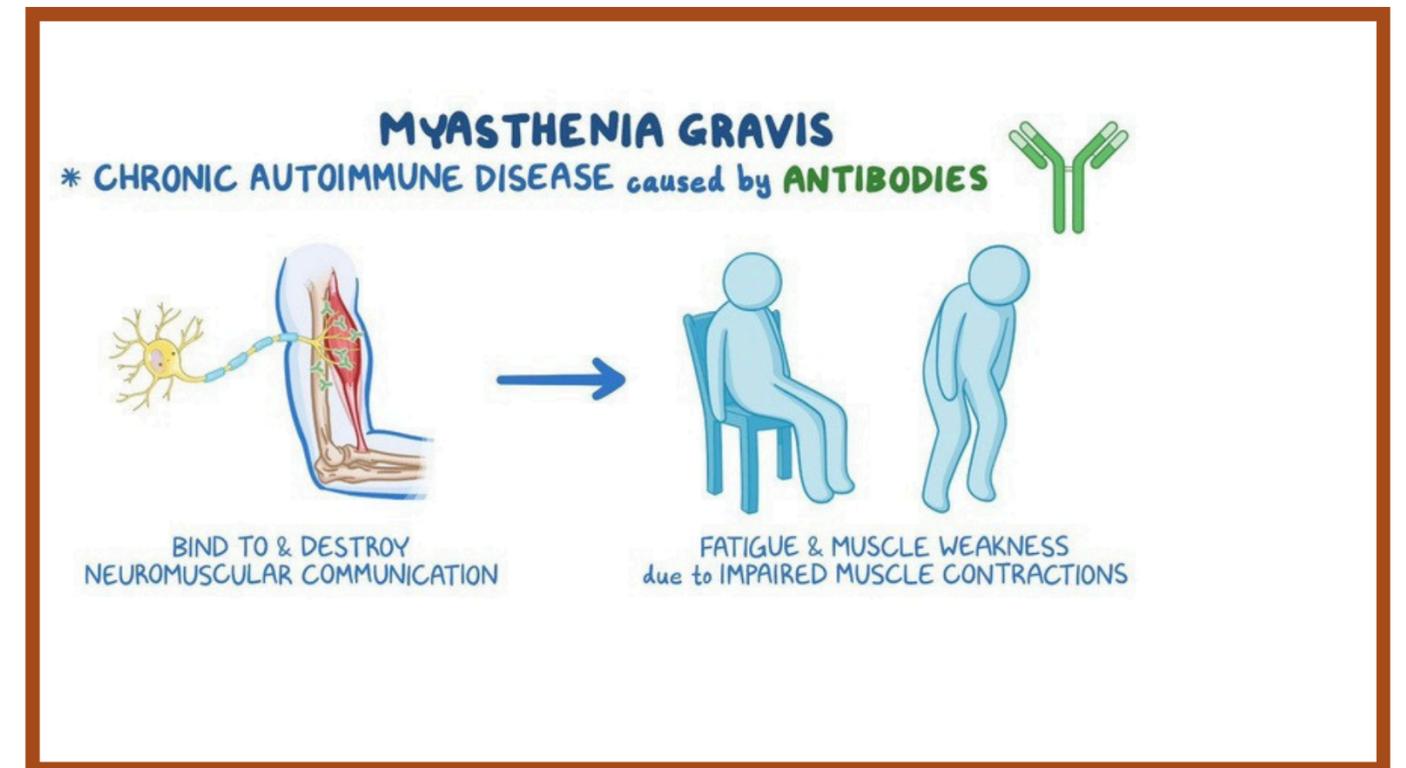
Although the disease course is variable, pregnant patients face risks of exacerbation, respiratory failure, adverse drug response, crisis, and death. •

The course of myasthenia gravis during pregnancy is hard to predict

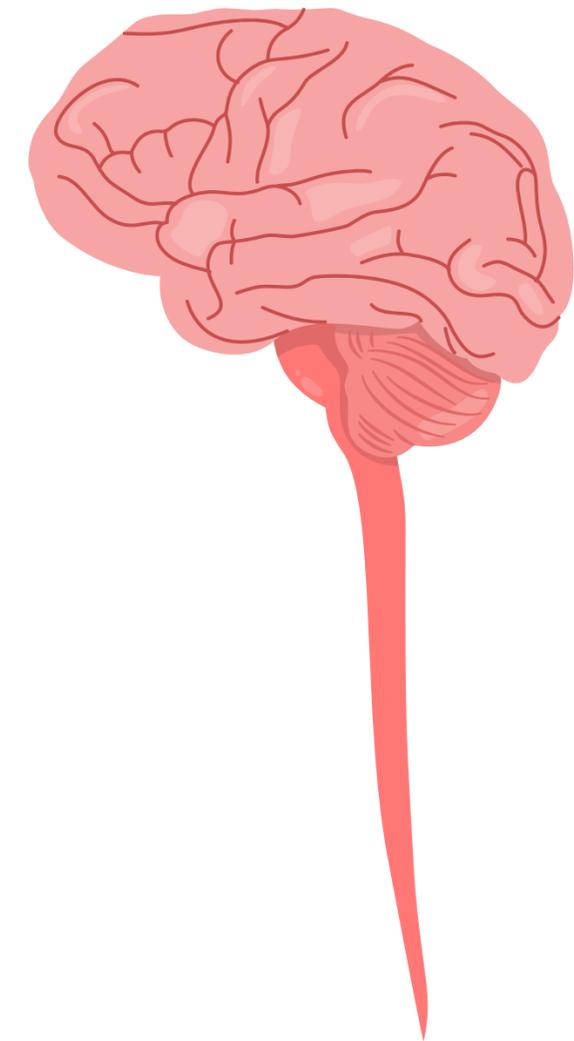
Because the severity of symptoms, as well as maternal mortality, is highest in the first 2 years following onset of myasthenia gravis, it is advisable for women to delay pregnancy for at least 2 years following diagnosis.

- Severity of symptoms and risk of maternal mortality is lowest 7 years after onset of the disease.

Hypoventilation is a risk during pregnancy, because respiratory muscles are weakened from myasthenia gravis. Also, the lungs do not become fully inflated, because the diaphragm is elevated during pregnancy. Approximately 20% of patients experience respiratory crises that require mechanical ventilation. This is one of most severe complications



- **Infections due to decreased immunity play a very important role in the exacerbation of myasthenia gravis during pregnancy.**
- **Labor may be complicated. Although smooth muscle is not affected by autoantibodies and the uterus is not compromised, the second stage of labor involves striated muscle. The patient may become exhausted during labor and may require assistance. Operative vaginal delivery has been recommended.**





FETAL EFFECTS



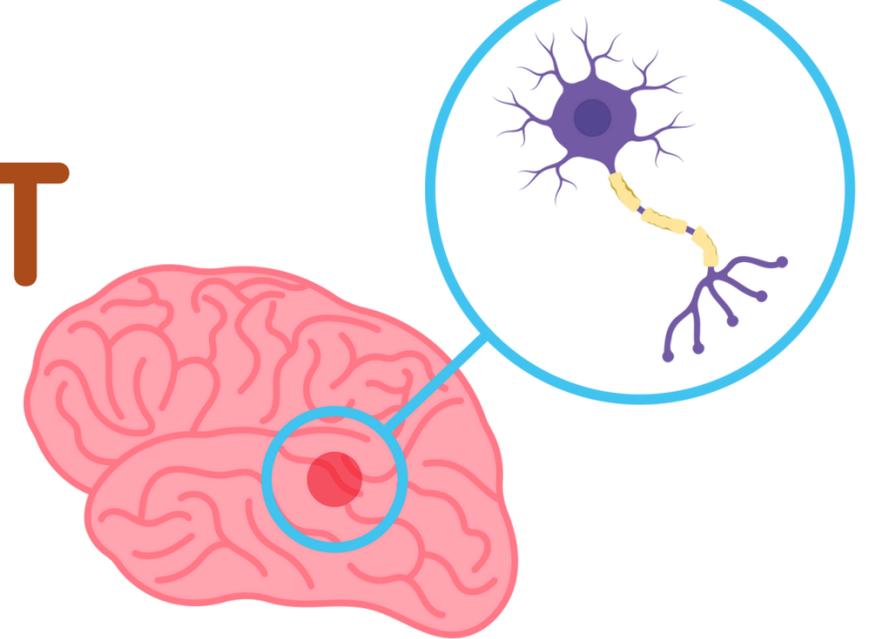
• Neonatal MG may result from passive transplacental transfer of antibodies to the nicotinic acetylcholine receptor from the myasthenic mother to the fetus. However, not all infants with detectable levels of antibodies to acetylcholine receptor develop neonatal MG. •

The severity of symptoms varies, ranging from mild hypotonia to respiratory distress. Clinical symptoms develop in the first few hours after birth and usually resolve within 2–3 weeks. •

Children of mothers with MG require careful observation in the first few days after birth, and symptoms may respond to anticholinesterase medication.

Women with MG should deliver in a facility with a neonatal ICU

MANAGEMENT



• An international consensus guidance for the management of myasthenia gravis included the following recommendations for myasthenia gravis in pregnancy :

• Planning for pregnancy should be instituted well in advance to allow time for optimization of myasthenic clinical status and to minimize risks to the fetus. •

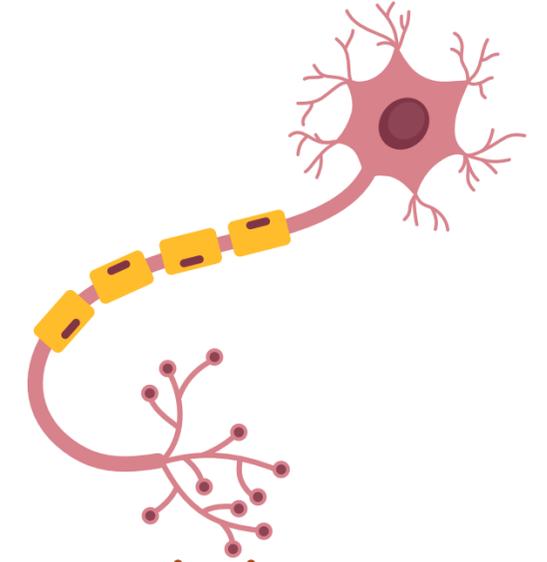
Multidisciplinary communication among relevant specialists should occur throughout pregnancy, during delivery, and in the postpartum period. •

Provided that their myasthenia is under good control before pregnancy, the majority of women can be reassured that they will remain stable throughout pregnancy.

If worsening occurs, it may be more likely during the first few months after delivery. • Oral pyridostigmine is the first-line treatment during pregnancy.

IV cholinesterase inhibitors may produce uterine contractions and should not be used during pregnancy. •

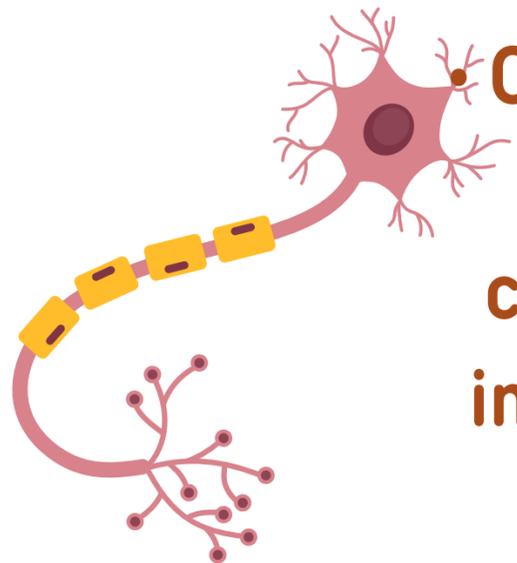
Anticholinesterase inhibitors (pyridostigmine and neostigmine)



- several studies have shown that pyridostigmine is safe during pregnancy in recommended doses (30–60 mg every 4–8 h). This drug crosses placenta freely and achieves good concentrations in amniotic fluid. Dose and frequency of administration often need to be changed during pregnancy due to changes in blood volume and renal clearance and should be adjusted according to the clinical status of MG.

- Prednisone is the IS agent of choice during pregnancy

- Current information indicates that azathioprine and cyclosporine are relatively safe in expectant mothers who are not satisfactorily controlled with or cannot tolerate corticosteroids. Current evidence indicates that mycophenolate mofetil and methotrexate increase the risk of teratogenicity and are contraindicated during pregnancy.



THANK YOU

