STATUS EPILEPTICUS IN WOMEN WITH EPILEPSY

There is convincing evidence for an increase in clearance of certain ASM during pregnancy which can be associated with poor seizure control.

Registry data showed that women with epilepsy on lamotrigine monotherapy 58.2% of patients ($p < 0.0001$); experienced more GTCS, in 21.1% ($p < 0.0001$); had a greater likelihood of deterioration in seizure control from first to second or third trimesters, 19.9% ($p < 0.01$), and were more likely to require an increase in ASM dose, 47.7% ($p < 0.0001$). Similar findings were shown for levetiracetam, oxcarbazepine, and topiramate, but not for Phenytoin and valproic acid

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STATUS EPILEPTICUS IN WOMEN WITH EPILEPSY

Decreasing ASM levels can also be caused by decreased ASM adherence including self-discontinuation. Of 489 patients with newly diagnosed and treated epilepsy, 78 patients (16.0%) self-discontinued ASM therapy after a median treatment duration of 1.4 years. Twelve percent of the 78 patients discontinued because of a pregnancy.

Hormone levels may play a role in seizure control during pregnancy. Lower levels of allopregnanolone were found in 28/83 WWE with an increase in seizure frequency during pregnancy as compared to those without.

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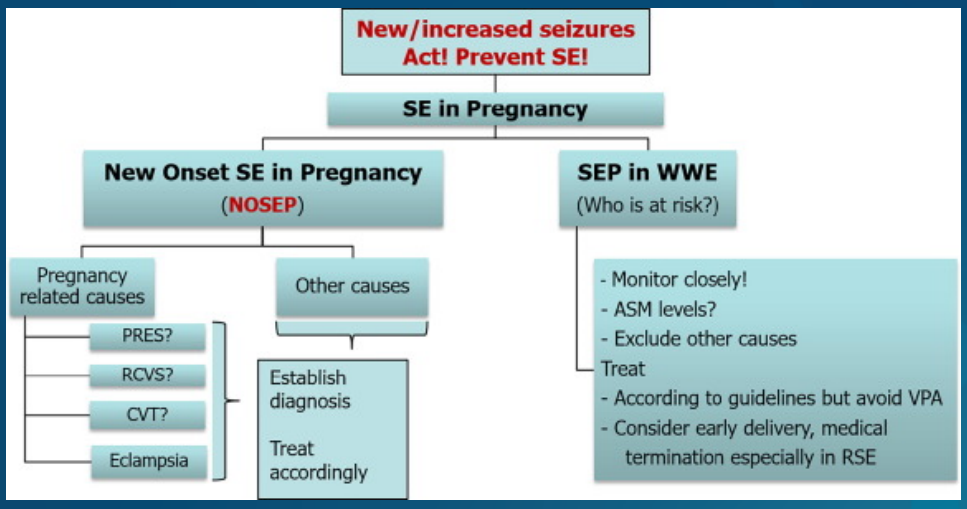

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CASE #3

21-yo female with no significant past medical history presented to an outside hospital following two witnessed generalized tonic-clonic seizures.

Patient administered 2mg IV lorazepam with seizure control. Patient became obtunded and required intubation for airway protection.

POC ultrasound revealed a previously unknown pregnancy of 32–35 weeks gestation.

Initial laboratory evaluation demonstrated a mildly elevated serum creatinine and no other abnormalities.

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PATIENT TRANSFERRED TO TERTIARY MEDICAL CENTER

Vitals: HR 129, BP 229/158 mm Hg, Temp 37.6, RR 14, O2Sat 98% on 100% FiO2

General: Unresponsive gravid female, intubated and mechanically ventilated.

HEENT: pupils dilated and non-reactive and absent corneal reflexes with doll's eyes

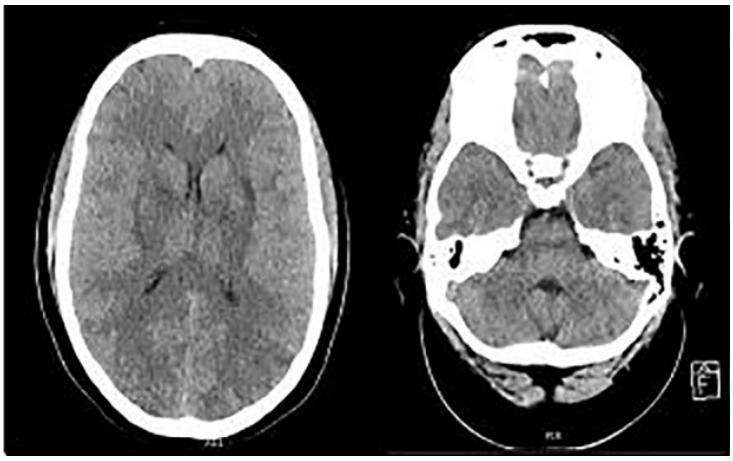
Resp: coarse throughout

CVS: Hyperdynamic

Abdomen: Gravid

LE: Pitting edema

Neuro: absence of a gag reflex, no response to deep stim



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COURSE

- Immediate hypertensive management with a continuous intravenous nicardipine infusion was initiated.
- Patient also received a concomitant magnesium infusion for seizure control.
- Laboratory analysis consistent with HELLP syndrome

AST 569 IU/L

ALT 159 IU/L

Platelets 43,000/ml

Hb 9.7 g/dl

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- The patient underwent emergent cesarean section with delivery of a live female infant.
- Repeat head CT:

1. Small lateral ventricles and diffuse cerebral swelling
2. Low-density areas in the parieto-occipital region as well as indistinct areas of the basal ganglia, putamen and thalamus
3. Suggestive of either anoxic brain injury or atypical posterior reversible encephalopathy syndrome.

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- Following delivery, the patient's blood pressure continued to improve and the nicardipine infusion was discontinued.
- Levetiracetam 1000mg BID was initiated
- Magnesium infusion was gradually tapered.
- Patient's brainstem reflexes returned; six hours post-delivery pupils reactive
- MAEs, follows some commands
- Performed well on SBT and was extubated successfully

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POST PARTUM

- Patient's subsequent neurological examination revealed no cognitive or reflexive deficits
- Patient was able to ambulate and communicate appropriately
- Patients AST, ALT, and platelets improved
- Blood, urine and sputum cultures negative.
- She was transferred to the postpartum unit the following day where she continued to recover.
- On hospital day six, the patient was discharged with a healthy baby girl.

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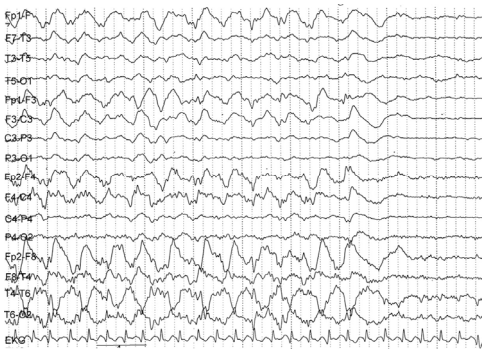
ECLAMPSIA



The occurrence of one or more generalized tonic–clonic seizures unrelated to other medical conditions in women with hypertensive disorders of pregnancy

Convulsions may be preceded by clinical manifestations such as persistent frontal or occipital headache, blurred vision, photophobia, epigastric pain and altered consciousness.

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ECLAMPSIA

In approximately 1/3 of cases, hypertension and proteinuria are not reported before the crisis.

Occurs in 0.8% of women with hypertensive disorders. About 90% of eclampsia cases occur at or after 28 weeks of gestation.

Just over one-third of eclamptic seizures occur at term and may develop intrapartum or within 48 h of delivery.

Postpartum eclampsia begins more than 48 h after delivery.

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ECLAMPSIA

Factors associated with an increased risk of developing eclampsia:

1. Black and Hispanic race
2. Older mother
3. Nulliparity
4. Mother aged ≤20
5. Multifetal pregnancy
6. Preterm delivery <32 weeks
7. Lack of adequate prenatal care.

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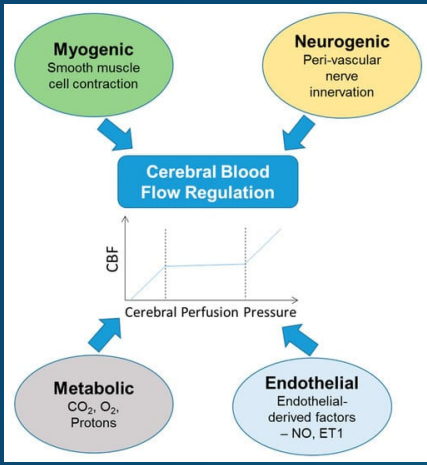
Eclamptic seizures: Hypotheses



- Impaired cerebral vascular autoregulation in response to arterial hypertension could lead to arterial vasospasm and subsequent ischemia with cytotoxic edema.
- Loss of autoregulation in response to arterial hypertension leading to endothelial dysfunction, increasing capillary permeability with vasogenic edema.

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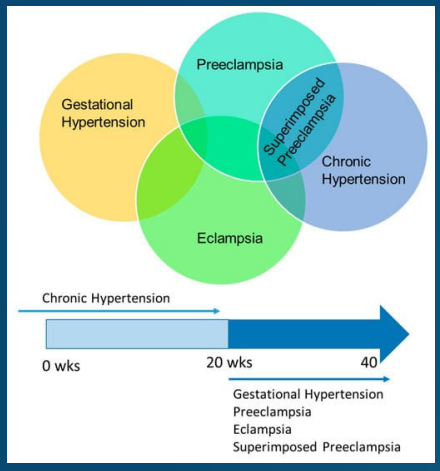
Eclamptic seizures: Hypotheses



- Vasculopathy may also cause PRES or regions of cerebral ischemia and hemorrhage.
- Focal vasogenic edema is characteristic of eclampsia, up to a quarter of patients have areas of persistent cytotoxic edema corresponding to focal ischemia or hemorrhage. Therefore, areas of ischemia or hemorrhage in PRES and RCVS may contribute to eclamptic seizures.

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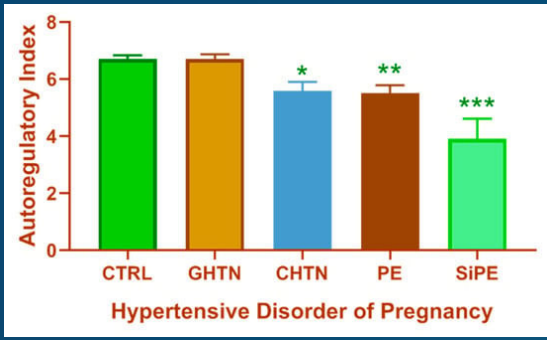
Diagnosis of eclampsia



- Generalized edema
- Hypertension
- Proteinuria
- Convulsions
- Wide spectrum of signs, ranging from severe hypertension, severe proteinuria and generalized edema to absent or minimal hypertension, no proteinuria and no edema.

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Eclampsia: Hypertension is the hallmark of diagnosis

- Severe (at least 160 mm Hg systolic and/or at least 110 mm Hg diastolic) in 20–54% of cases
- Mild (systolic blood pressure between 140 and 160 mm Hg or diastolic blood pressure between 90 and 110 mm Hg) in 30–60% of cases.
- Hypertension may be absent in up to16% of the cases

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POST PARTUM ECLAMPSIA

- Patients with postpartum eclampsia, particularly those with focal neurological deficits, persistent visual disturbances and symptoms refractory to magnesium and antihypertensive treatment, should undergo a comprehensive diagnostic evaluation, preferably including MRI.

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Treatment Priorities

- Stabilize the arterial pressure
- Control seizures
- Loading dose of magnesium, 6 g in 15–20 min, then 2 g every hour as a continuous IV solution
- Initiate fetal monitoring
- Protect patient's airway and use supplemental oxygen for optimal oxygen saturation
- 10% of women develop a second seizure after receiving magnesium sulfate, in this case a second bolus of 2 g of magnesium sulfate be given IV over 3 to 5 min.

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ECLAMPSIA TREATMENT

- Magnesium sulfate infusion can lead to both respiratory depression and cardiac arrest due to smooth muscle relaxation.
- Deep tendon reflexes are lost at a serum magnesium level of 9 mg/dL (7 mEq/L),
- Respiratory depression occurs at 12 mg/dL (10 mEq/L)
- Cardiac arrest occurs at 30 mg/dL (25 mEq/L).
- Emergency correction for respiratory failure with 10% calcium gluconate solution (10 mL IV over 3 min).

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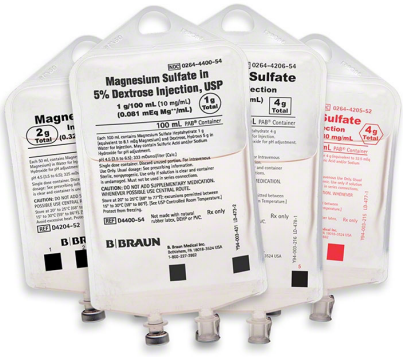
Eclampsia treatment

- Fishel Bartal (2020) recommends the need to monitor magnesium levels every 4–6 h
  1. women with renal dysfunction (creatinine > 1.2 mg/dL or urine output that has been <30 mL/h for more than 4 h)
  2. women with signs of magnesium toxicity.
- If the serum level exceeds 9.6 mg/dL (8 mEq/L), discontinue the infusion and serum magnesium levels should be determined at 2-hour intervals.



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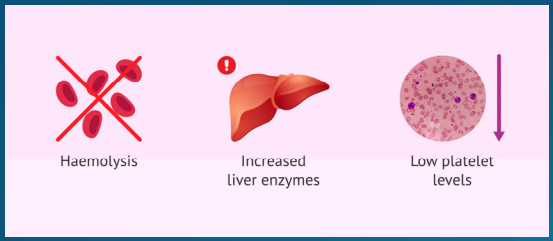
HELLP Syndrome

- A form of pre-eclampsia which can develop in the third trimester of pregnancy and/or in the first postpartum weeks
- In 11% of the patients, the syndrome starts to manifest in the 27th week of gestation



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HELLP SYNDROME

- Often presents in association with pre-eclampsia, incidence ranging from 0.2 to 0.6% in pregnant women without hypertension
- HELLP occurs in 20% of patients presenting with pre-eclampsia or eclampsia
- Postpartum onset occurring within 48 h up to 7 days after delivery, even after a pregnancy that has not presented any apparent complications.

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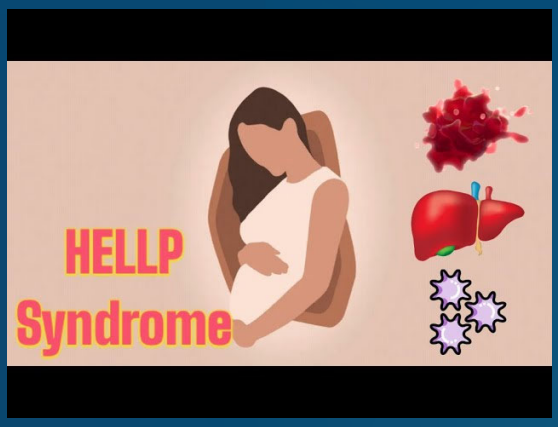
HELLP Syndrome



- 90% of patients have general malaise, 65% have epigastric pain, 30% have nausea and vomiting and 31% have headaches. Other onsets are scotomas, dyspnea, jaundice, hypertension and proteinuria.
- Diagnosis and evaluation are based on laboratory tests.
- Arterial blood pressure is one of the main criteria in the diagnosis and treatment of pre-eclampsia, it is not as informative in the case of the HELLP syndrome and should not be used to predict its progression

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There is not a current treatment for HELLP

Maternal stabilization and timely delivery

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- Corticosteroids have been studied
- Mao et al. (2015), through a meta-analysis, found that corticosteroid administration to HELLP patients improves platelet count and serum levels of LDH and ALT.
- Also reduces hospital/ICU stays and lowers blood transfusion rates.
- Not significantly associated with improved maternal mortality and overall morbidity.

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- Lokki et al. described a successful case of postpartum HELLP syndrome treated with the complement C5 inhibitor Eculizumab (900 mg IV) after the failure to respond to the best supportive care (plasma exchange treatment on the first and second postpartum days, as well as hemodialysis three times over the course of the treatment. Hypertension was treated with Amlodipine 10 mg twice a day and Labetalol 200 mg three times a day).

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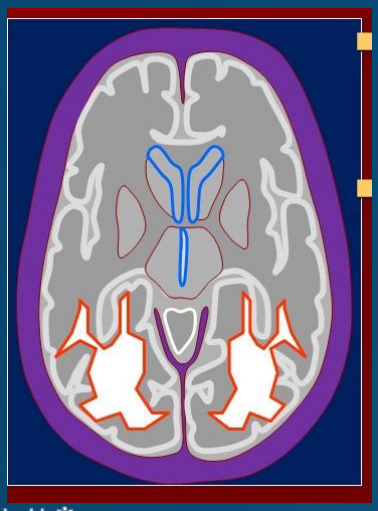
Posterior Reversible *Encephalopathy* Syndrome (PRES)



- A syndrome characterized by headache, seizures, encephalopathy and visual disorders due to reversible vasogenic edema seen on CT or MRI of the brain.
- Patients suspicious for PRES:

1. acute arterial hypertension
2. pre-eclampsia or eclampsia
3. renal disease
4. Sepsis
5. subjects treated with immunosuppressants.

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PRES

- Symptoms develop rapidly within 12–48 h.
- 90% of patients present with seizure, often preceded by vision changes with bilateral visual blurring or non-distorting headache.
- Vasogenic edema is mainly located in the occipital lobe, and in fact, about 40% of patients present visual symptoms such as visual hallucinations, blurred vision, scotomas and diplopia.
- 1–15% of patients have transient cortical blindness, where the retinal and pupillary components do not show anomalies.
- Patients are confused and have memory deficits.

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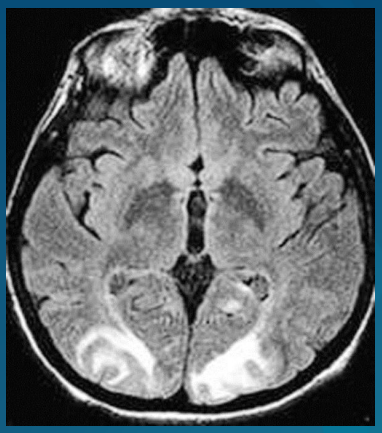
- CT shows edema in 50–60% of patients, brain MRI should always be performed when PRES is suspected.
- MRI reveals focal edema, most frequently in the parieto-occipital lobes.
- Visual symptoms often resolve completely within hours or days.
- Eclampsia and PRES can occur independently Rarely, pregnant or postpartum women develop PRES for other reasons (such as drug use or RCVS) and not as a result of eclampsia.



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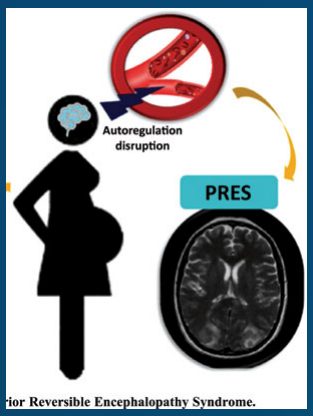
PRES



ior Reversible Encephalopathy Syndrome.

- The incidence of posterior reversible encephalopathy syndrome is high in eclamptic patients 16%
- Also, nearly 20% of pre-eclamptic patients with neurological symptoms develop posterior reversible encephalopathy syndrome.
- Eclampsia on presentation, recurrent seizures, postpartum eclampsia, cesarean delivery and labetalol use are associated with an increased risk of PRES development.

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Treatment= Blood Pressure Control

- If pre-eclampsia, PRES or eclampsia, are suspected, immediate initiation of magnesium therapy is advised, which is therapeutic for both hypertension and seizures.
- Initiation of antihypertensive medications with goal blood pressure of 140–155 mmHg for systolic and 90–105 mmHg for diastolic.
- Higher levels are associated with incomplete resolution of the edema.
- IV Calcium-channel blockers, labetalol PO or IV, or nifedipine PO are the mainstays of therapy.
- Vasodilators are NOT used because they cause a worsening of the clinical picture that we observe in PRES
- Mannitol can also be used for reducing intracranial pressure.

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THE END

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REFERENCES

- Malaiyandi D, James E, Peglar L, Karim N, Henkel N, Guilliams K. Neurocritical Care of the Pregnant Patient. Curr Treat Options Neurol. 2021;23(7):22. doi: 10.1007/s11940-021-00676-2. Epub 2021 Jun 21. PMID: 34177249; PMCID: PMC8214980.
- **Neurological Complications in Pregnancy and the Puerperium: Methodology for a Clinical Diagnosis**
- *J. Clin. Med.* **2023**, *12*(8), 2994; **https://doi.org/10.3390/jcm12082994**
- J Clin Diagn Res. 2016 Dec; 10(12): QC06–QC09.
- Published online 2016 Dec 1. doi: 10.7860/JCDR/2016/19839.8955
- PMCID: PMC5296513
- PMID: 28208940
- **Neurological Disorders Complicating Pregnancy - Focus on Obstetric Outcome**
- Oi Y, Inoue Y, Taniyama I, Shirato M, Houri T. A Case of Aneurysmal Subarachnoid Hemorrhage with Middle Cerebral Artery Aplasia at 30 Weeks of Pregnancy. J Neuroendovasc Ther. 2022;16(7):376-380. doi: 10.5797/jnet.cr.2021-0079. Epub 2021 Oct 9. PMID: 37502343; PMCID: PMC10370917.

70

- Ueda T, Kiura Y, Isobe N, Nishimoto T. A Patient with Subarachnoid Hemorrhage Related to a Ruptured Aneurysm in Week 8 of Pregnancy: Usefulness of Coil Embolization of Intracranial Aneurysms as a Treatment Option before Delivery. J Neuroendovasc Ther. 2020;14(1):30-35. doi: 10.5797/jnet.cr.2019-0056. Epub 2019 Dec 11. PMID: 37502384; PMCID: PMC10370814.
- Rosenow F, Mann C. Status epilepticus in pregnancy. Epilepsy Behav. 2023 Jan;138:109034. doi: 10.1016/j.yebeh.2022.109034. Epub 2022 Dec 14. PMID: 36525922.

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