

Preeclampsia and Eclampsia

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Disclosures

- No financial conflicts



Outline

- Impact of preeclampsia
- Classification – definitions
- Pathophysiology
- Evaluation and management of preeclampsia
- Eclampsia
- Later life impact

Hypertensive disorders of pregnancy

- Hypertensive disorders of pregnancy
 - 10% of all pregnancies
- Major cause of maternal and fetus/newborn morbidity and mortality worldwide
- Preeclampsia affects one in 12 pregnancies
 - Eclampsia = “sudden flashing” or “lightning” (Greek)
 - Described more than 2000 years BCE
 - Cure remains delivery

Preeclampsia

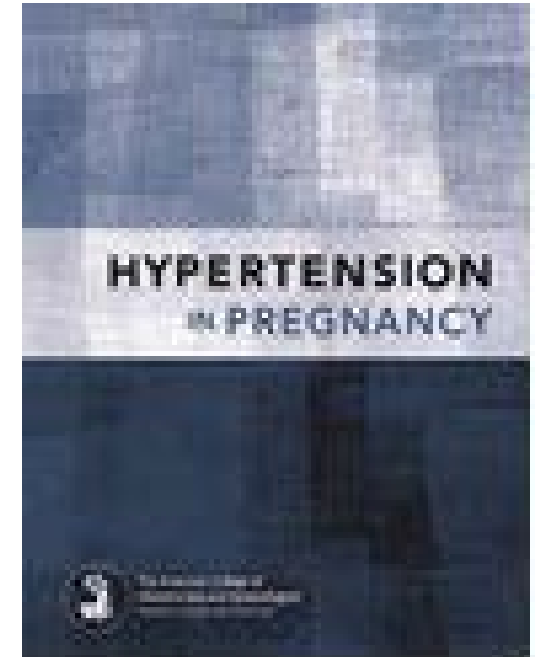
- Globally, 76,000 maternal deaths and over 500,000 infant deaths annually
- Maternal mortality less common in developed countries but morbidity remains high
- Fetal/neonatal:
 - Stillbirth/neonatal death
 - Fetal growth restriction
 - Indicated preterm delivery⇒ short and long term consequences of prematurity



Definitions and diagnostic criteria

Hypertensive disorders during pregnancy: Pre-eclampsia

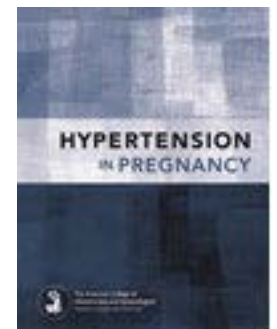
NICE Guidelines Issued: Aug 2010 last modified: Jan 2011



The classification, diagnosis and management of the hypertensive disorders of pregnancy: A revised statement from the ISSHP

Classification - ACOG

- Gestational HTN
- Preeclampsia (with or without severe features)
- Eclampsia
- HELLP syndrome
- Pre-gestational HTN (chronic HTN)
- Superimposed preeclampsia



Classification

- Gestational HTN –
 - new onset of elevated blood pressure after 20 weeks' in the absence of proteinuria
- Chronic HTN –
 - HTN prior to pregnancy or newly diagnosed prior to 20 weeks'

TABLE E-1. Diagnostic Criteria for Preeclampsia

Blood pressure	<ul style="list-style-type: none">• Greater than or equal to 140 mm Hg systolic or greater than or equal to 90 mm Hg diastolic on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure• Greater than or equal to 160 mm Hg systolic or greater than or equal to 110 mm Hg diastolic, hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy
and	
Proteinuria	<ul style="list-style-type: none">• Greater than or equal to 300 mg per 24-hour urine collection (or this amount extrapolated from a timed collection)or• Protein/creatinine ratio greater than or equal to 0.3*• Dipstick reading of 1+ (used only if other quantitative methods not available)
Or in the absence of proteinuria, new-onset hypertension with the new onset of any of the following:	
Thrombocytopenia	<ul style="list-style-type: none">• Platelet count less than 100,000/microliter
Renal insufficiency	<ul style="list-style-type: none">• Serum creatinine concentrations greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease
Impaired liver function	<ul style="list-style-type: none">• Elevated blood concentrations of liver transaminases to twice normal concentration
Pulmonary edema	
Cerebral or visual symptoms	

* Each measured as mg/dL.

Severe features of preeclampsia

- Systolic blood pressure of ≥ 160 mm Hg, or diastolic BP of ≥ 110 mm Hg on two occasions at least 4 hours apart while on bed rest (unless antihypertensive therapy is initiated before this time)
- Thrombocytopenia ($< 100,000/\mu\text{L}$)
- Progressive renal insufficiency (serum Cr > 1.1 mg/dL or a doubling of serum creatinine in the absence of other renal disease)
- Impaired liver function (elevated liver transaminases to 2x normal concentration), severe persistent RUQ or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both
- Pulmonary edema
- New onset cerebral or visual symptoms

Eclampsia and HELLP syndrome

- Eclampsia
 - **generalized seizures** occurring in a woman with preeclampsia that cannot be attributed to other causes
- HELLP syndrome
 - presence of **h**emolysis, **e**levated **l**iver transaminases, and **l**ow **p**latelets.
 - Generally considered a severe variant of preeclampsia
 - May occur in the absence of HTN or proteinuria

Superimposed preeclampsia on chronic HTN

- **Diagnosis often challenging** because BP and proteinuria increase towards the end of pregnancy
- Sudden and sustained increase in BP with or without substantial increase in proteinuria
- Severe features include:
 - Thrombocytopenia
 - Elevated liver transaminases
 - Rapid decline of renal function
 - Pulmonary edema
 - New onset neurologic symptoms

Notable differences from prior classification scheme(s)

- Edema (non-dependent)
- Hyperreflexia
- Change in systolic BP of 30mm Hg or change in diastolic BP of 15 mm Hg

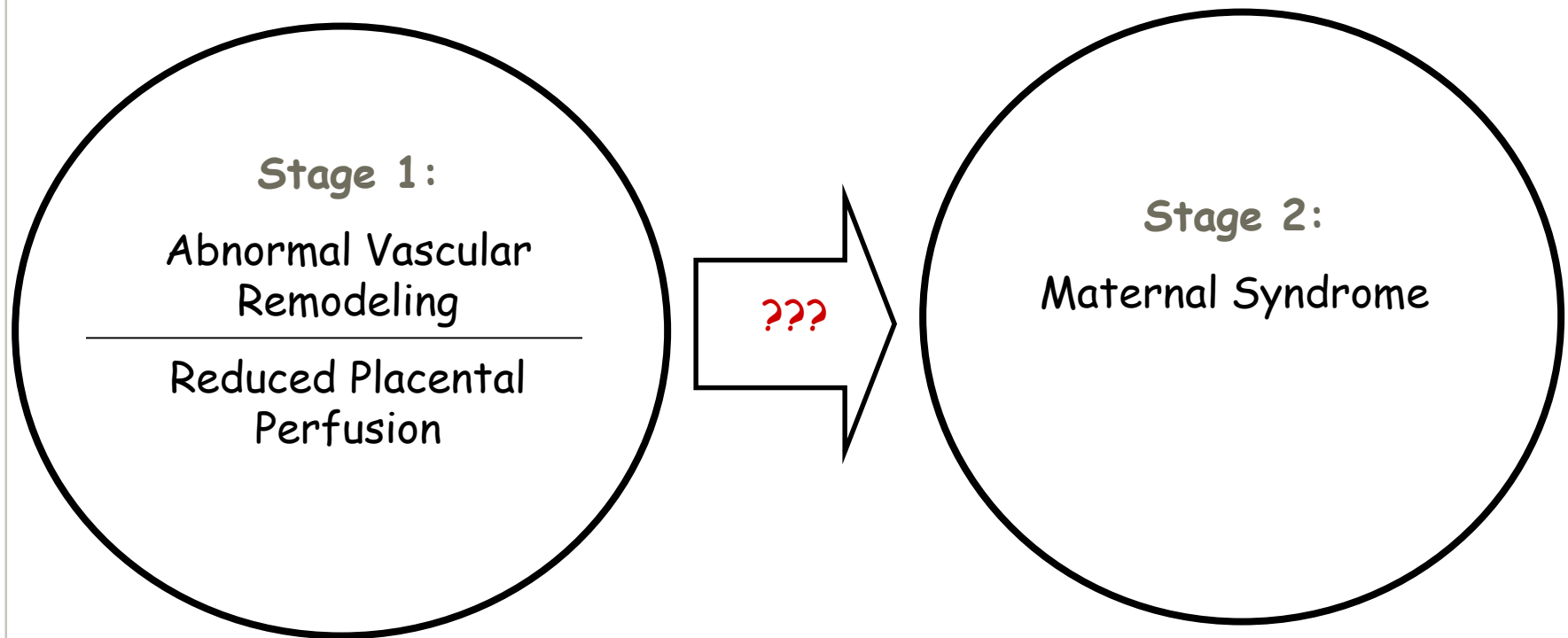


Notable differences from prior classification scheme(s)

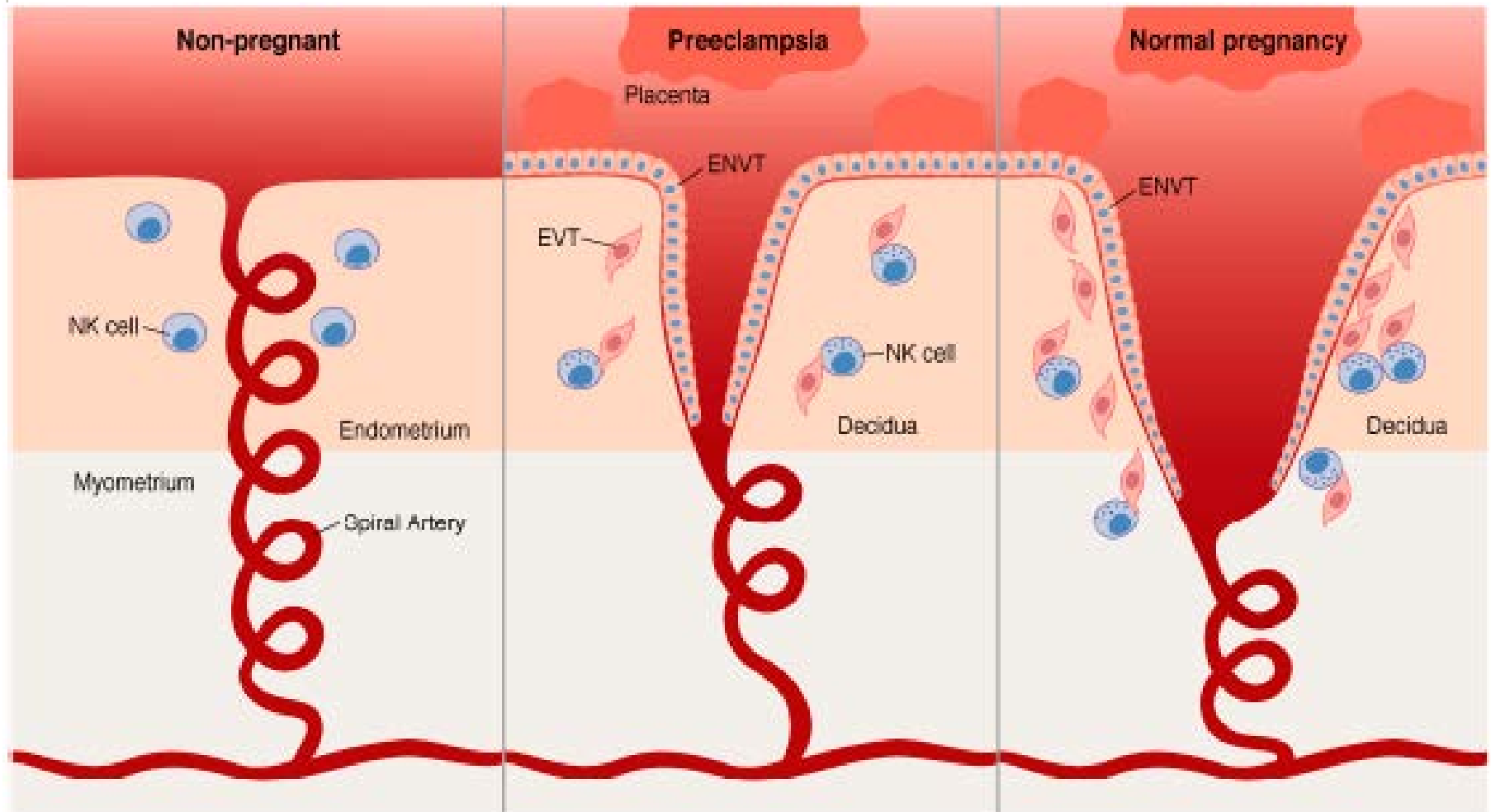
- No “mild” preeclampsia
- Proteinuria is no longer necessary for the diagnosis of preeclampsia
- Oliguria eliminated – but progressive renal insufficiency remains a severe feature
- Fetal growth restriction, oligohydramnios, abruption – not part of the ACOG diagnostic criteria, but included in ISSHP AND important in management



Pathophysiology: Two stage hypothesis



Stage I: Abnormal implantation/vascular remodeling

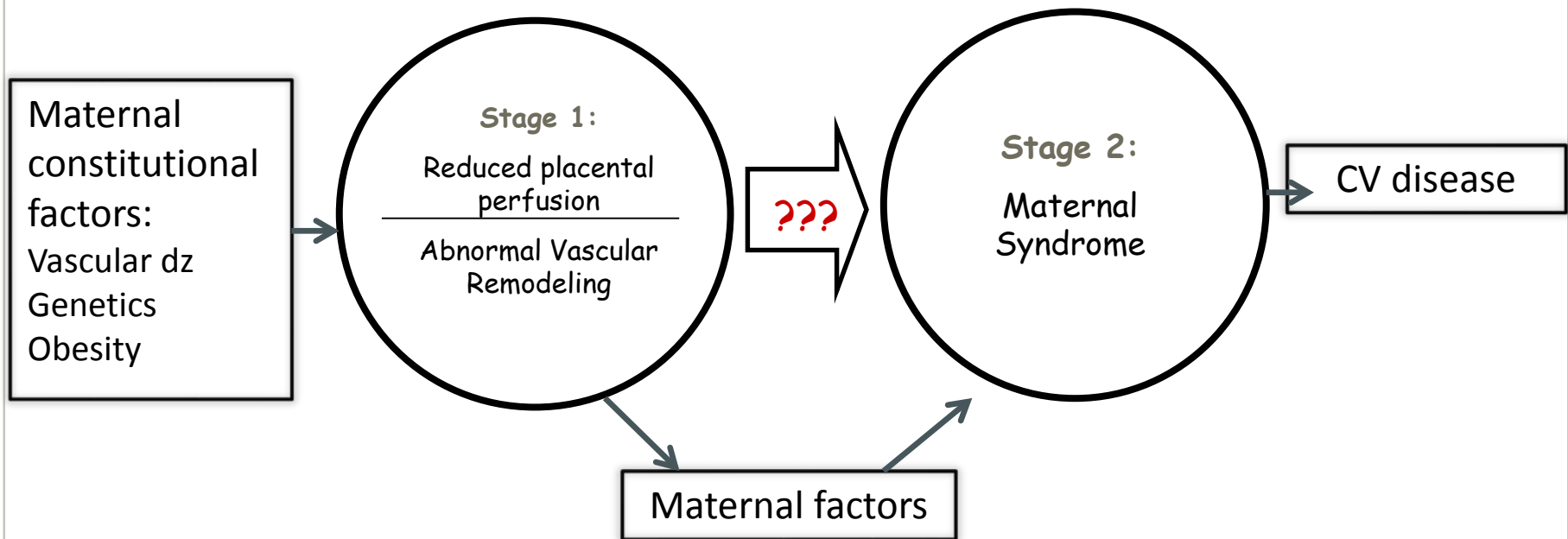


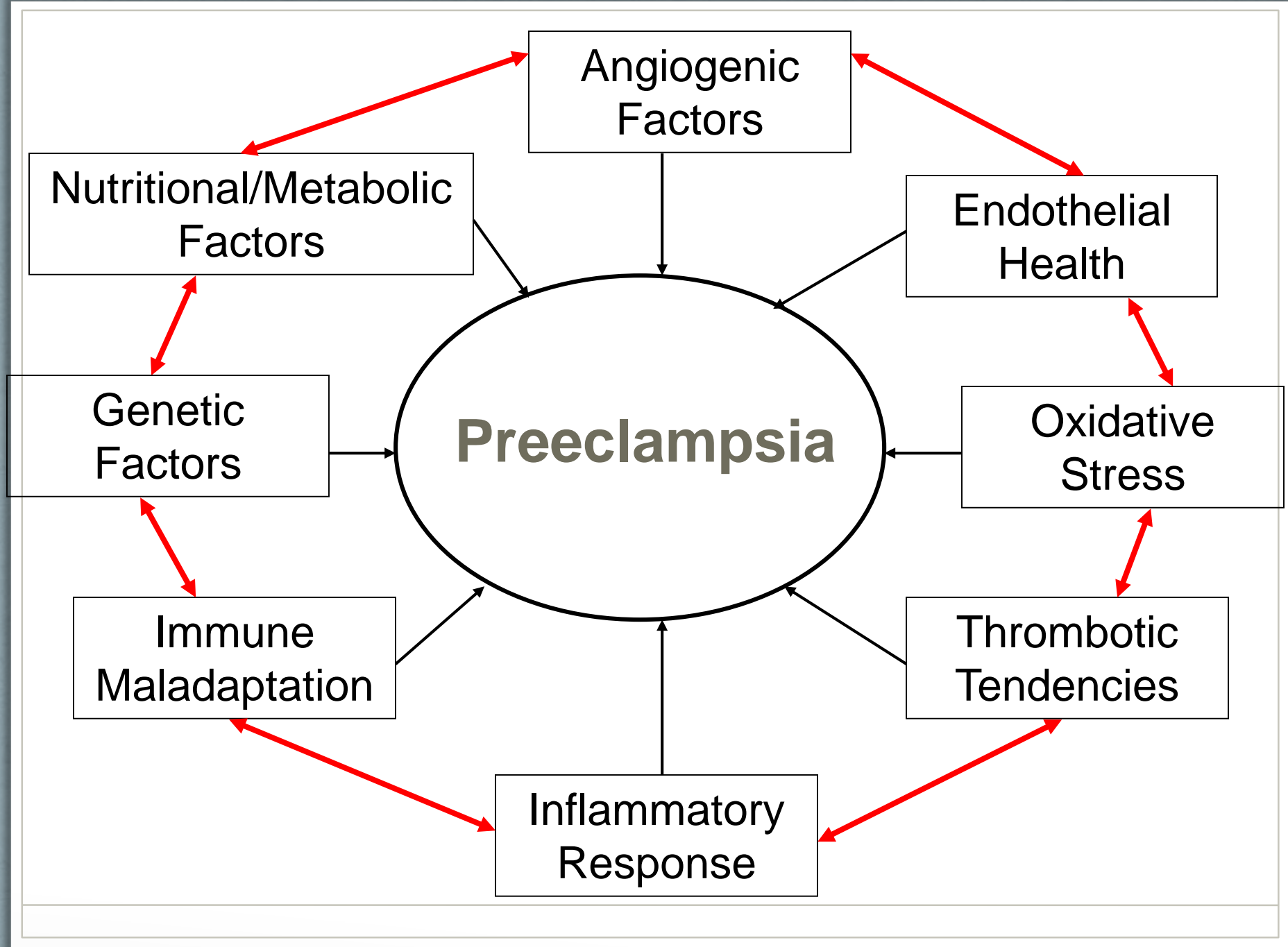
Stage 2: Maternal Syndrome

- **Systemic vascular dysfunction**
- ↑ Peripheral vascular resistance
- Endothelial dysfunction
- Vasospasm
- Activation of coagulation cascade, platelet aggregation
- Capillary leak
- Inflammation
- Ischemia and reduced perfusion

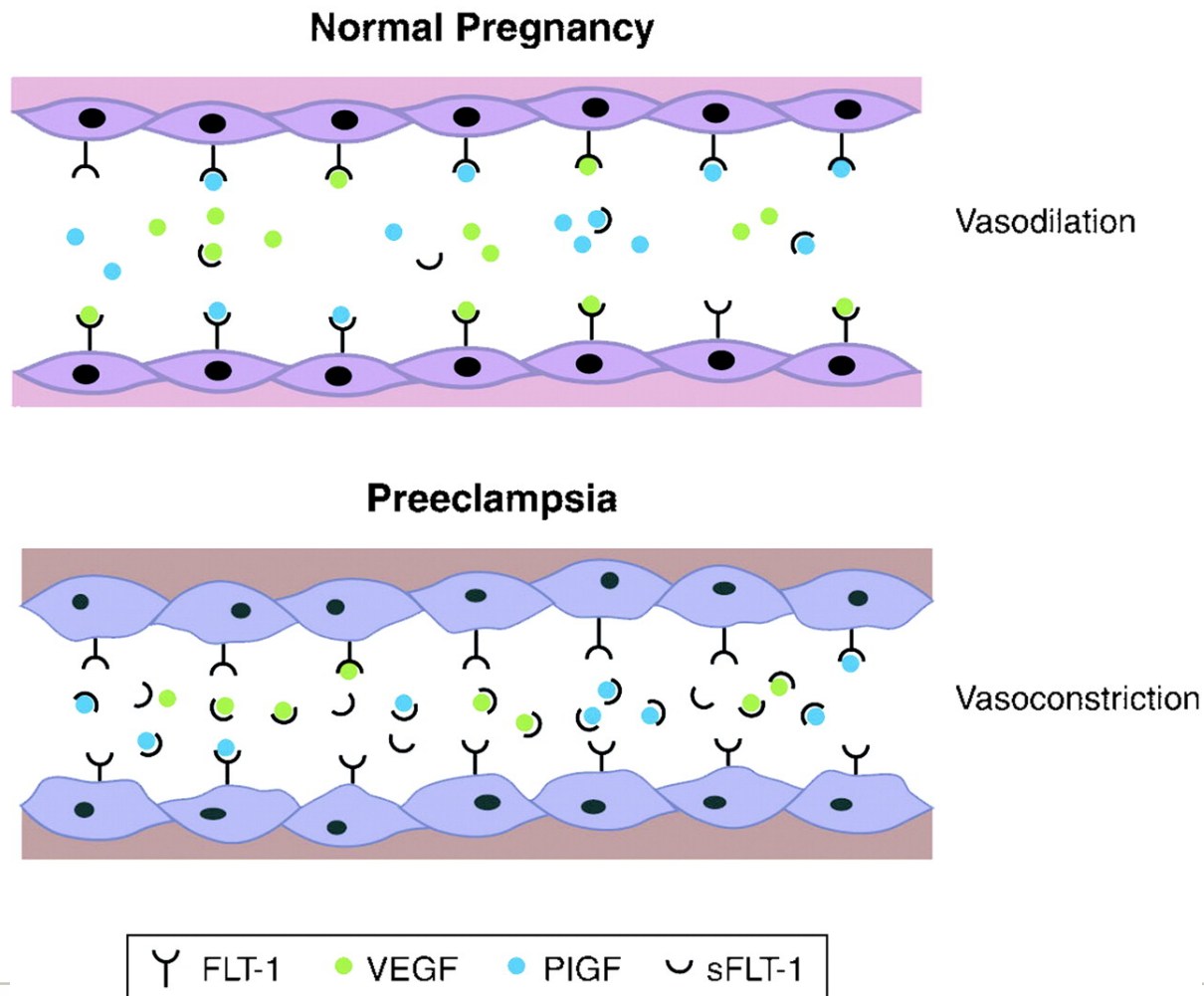
⇒ **Clinical manifestations of preeclampsia**

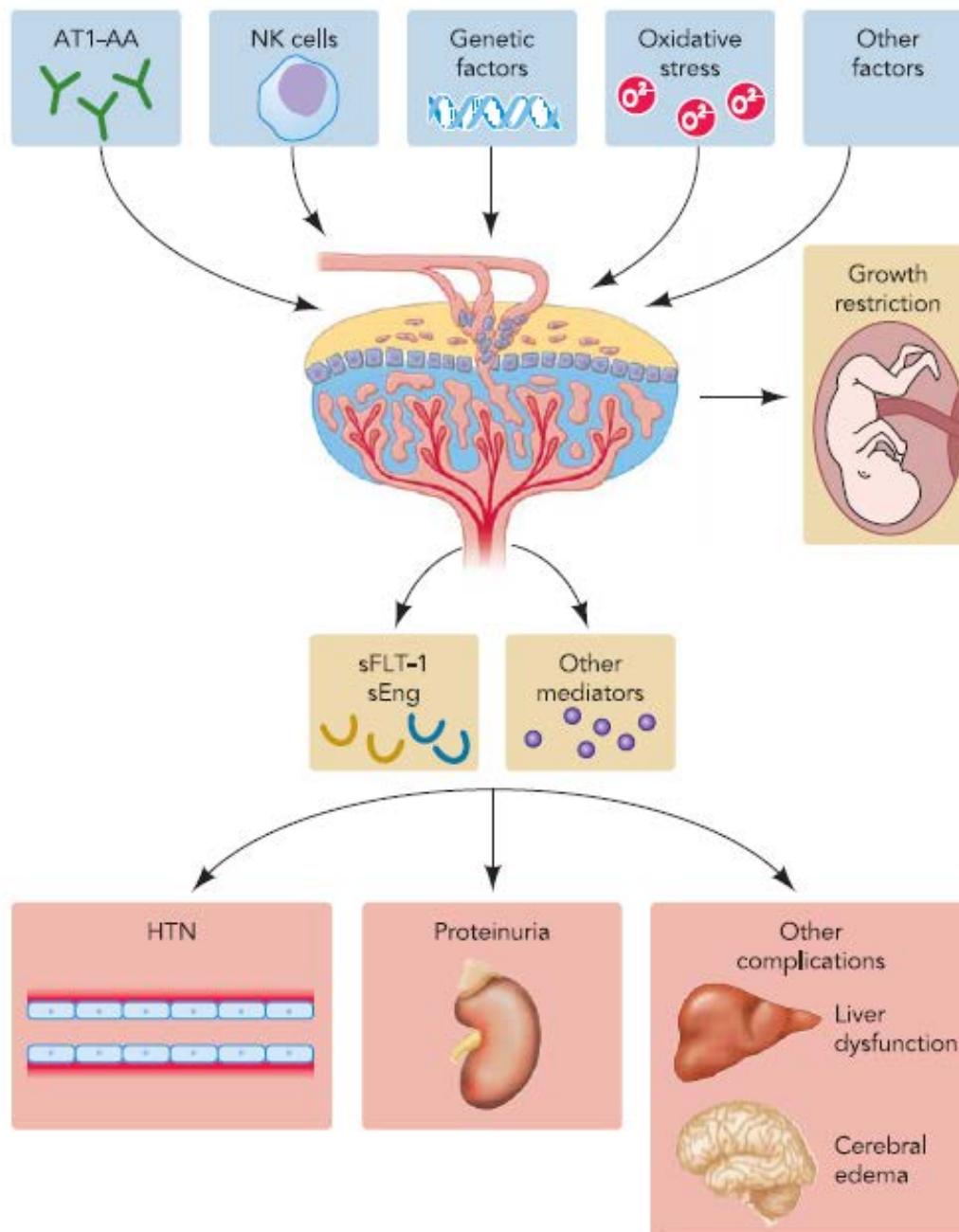
Two stage hypothesis?





Angiogenic Factors in Preeclampsia





Model of preeclampsia pathogenesis

Angiogenic factor balance in preeclampsia



- \uparrow s-Flt-1 and \downarrow PlGF even weeks prior to clinical preeclampsia
- Biomarkers
- Therapeutics – apheresis, VEGF therapy

Challenges with preeclampsia

- “Disease of theories”
- Syndrome with multiple organ systems involved
- Precise cause unknown (requires a placenta)
- **Unpredictable & progressive**
- Preventive strategies are limited (low dose aspirin)
- Interventions are limited
- Lack of an ideal animal model
- Only known “cure” is delivery



Prenatal care - outpatient evaluation

- High degree of suspicion
- Frequent visits in third trimester
 - BP, urine dipstick for protein, symptoms/signs
 - Patient and provider education
- Neurologic symptoms (Headache, visual changes, scotomata)
- Epigastric or right upper quadrant abdominal pain
- Nausea/vomiting
- Decrease in urine output
- Decreased fetal movement
- Vaginal bleeding



Preeclampsia Risk actors

Pregnancy-specific factors

- Nulliparity
- New paternity, donor sperm
- ↓risk with prolonged co-habitation
- Hydatidiform mole
- Multi-fetal gestation
- Assisted reproductive technologies

Maternal risk factors

- Extremes of age
- Family history
- Prior preeclampsia, IUGR
- Chronic medical conditions
 - SLE, APLS
 - Renal dz
 - CHTN
 - Diabetes
- Obesity



Evaluation

- History
 - Presenting symptoms/signs
 - Medications
- Physical exam
 - BP, pulse, O₂ saturation
 - Cardiopulmonary exam
 - Neuro exam
- Laboratory studies
 - Proteinuria (24h urine or P/C)
 - CBC with platelets, LFTs, Cr, LDH
- Fetal assessment
 - Non-stress test or Biophysical profile
 - Fetal growth u/s with umbilical artery Dopplers (if indicated)

Management

- Stabilization = ABCs!!!
- Seizure prophylaxis/treatment
 - Magnesium sulfate
- BP treatment
- Antenatal steroids
- Other supportive care
 - Pulmonary edema – O₂, diuresis
- Timing of delivery

Simultaneous and multi-disciplinary

Evaluation

- History
 - Presenting symptoms/signs
 - Medications

Management

- Stabilization = ABCs!!!
- Seizure treatment/prophylaxis

***RECOGNITION OF THE PROBLEM IS
THE KEY TO TREATMENT***

- - Proteinuria
 - CBC with platelets, LFTs, Cr, LDH
- Fetal assessment
 - NST, BPP, fetal growth, umbilical artery Dopplers (if indicated)

Timing of delivery

- Other supportive care
 - Pulmonary edema – O₂, diuresis

Simultaneous and multi-disciplinary

Principles of management

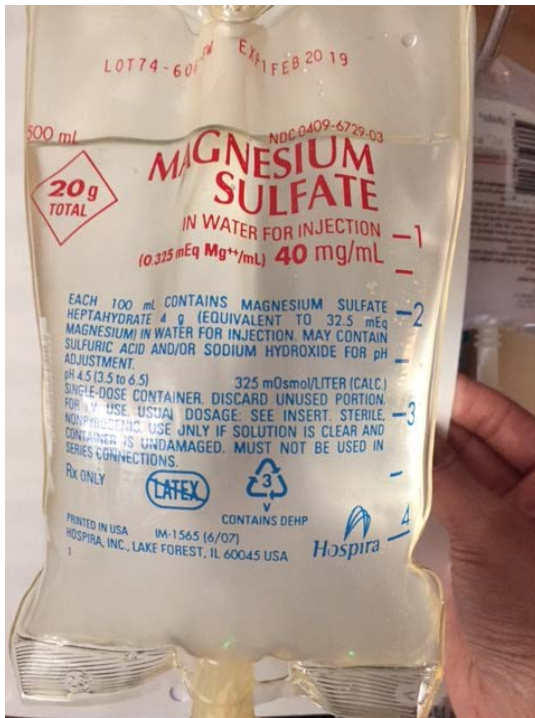
- Definitive treatment is delivery
- Delivery is beneficial for mother to prevent disease progression and end organ damage
- Preterm delivery may be harmful for baby
- Decision based on:
 - Gestational age
 - Severity of disease
 - Maternal/fetal well-being
 - Ability to care for mother/baby



Magnesium for seizure prevention

- Who:
 - Severe preeclampsia or
 - Neurologic symptoms or signs with preeclampsia or
 - Worsening clinical course
- When:
 - As soon as possible and ideally prior to transfer
 - During initial evaluation of severe preeclampsia -~24h
 - Intrapartum and 24 hours postpartum
- How:
 - Intravenous: Magnesium sulfate 4g IV bolus, then 2g per hour continuous infusion on a pump
 - IM magnesium 10g (5g in each buttock)

Magnesium for seizure prevention



Magnesium toxicity

Magnesium toxicity (approx levels)			
	Serum magnesium level		
	mmol/L	mEq/L	mg/dL
↓ patellar reflexes	4	8	10
Respiratory depression	6	12	14
Altered cardiac conduction	>7.5	>15	>18
Cardiac arrest	>12.5	>25	>30
Magnesium toxicity: Treat by stopping MgSO ₄ , give Calcium gluconate 1 g IV, maintain airway, intubation if needed. Can use diuretics to remove excess magnesium.			



Magnesium for seizure prevention

- In the setting of renal dysfunction, loading dose is given and then:
 - Reduce the infusion rate or
 - Intermittent boluses
 - Consider magnesium levels
- Poor maternal tolerance
 - Supportive care
 - Education

Magnesium for seizure prevention

- Magnesium superior to phenytoin in preventing eclamptic seizures
 - RCT of 2138 women
- Magnesium superior to:
 - No rx/placebo (RR 0.41, 95% CI 0.29-0.58, 6 trials, 11,444 women)
 - Phenytoin (RR 0.08, 95% CI 0.01-0.60, 3 trial, 2291 women)
 - Anti-HTN alone (RR 0.33, 95% CI 0.14-0.77, 1 trial, 1650 women)
- Preferred over diazepam, lytic cocktail
- ?Newer AEDs (e.g., Keppra – leviteracetam)
- Neonatal benefit prior to 32 weeks: neuroprotection, reduced cerebral palsy

Magnesium for seizure prevention

- Mechanism not clearly defined
 - ↑ sz threshold via NMDA receptor
 - Membrane stabilization in CNS via Ca channel blockade
 - ↓ acetylcholine transmission in motor nerve terminals
 - Vasodilation
- RUPP rat model – linked BBB dysfunction, neuroinflammation, and increased sz susceptibility
 - Magnesium restored sz threshold and prevented neuroinflammation

Anti-hypertensive therapy in severe PE

- Goal:
 - Prevent cerebro-vascular accidents, coronary events
 - Treat if severe: SBP ≥ 160 or DBP ≥ 110 (NICE 150/100)
 - Not much lower than 140/90
- Avoid rapid lowering of BP
 - Fetal risks – decelerations on fetal heart tracing, distress, demise
 - Maternal risk – ischemic stroke or cardiac events

Drugs for the **acute management** of hypertension[†]

Drug (FDA Category)	Mechanism of Action	Dose	Onset of Action	Comments [†]
Labetalol (C)	α - and β -adrenergic antagonist	10-20mg IV, then 20-80 mg every 20-30 minutes to a maximum dose of 300mg OR continuous infusion 1-2mg/min IV*	5-10 min	Considered a first line agent during pregnancy. Less tachycardia and fewer side effects. Avoid in patients with asthma or congestive heart failure.
Hydralazine (C)	Arteriolar vasodilator, smooth muscle relaxant	5mg IV or IM, then 5-10 mg IV every 20-40 minutes OR continuous infusion 0.5 – 10 mg/hour	10-20 min	Higher or frequent dosing associated with maternal hypotension, headaches and fetal distress – may be more common than other agents.
Nifedipine (C)	Calcium channel blocker	10-20 mg orally, repeat in 30 minutes if needed; then 10-20mg every 2-6 hours	10-20 min	May observe reflex tachycardia, headaches.
Nicardipine drip (C)		ICU level management	Within seconds	Use in the setting of uncontrolled, severe HTN

* Continuous IV infusions should be used only in an ICU setting

† All agents are associated with headache, flushing, nausea, and tachycardia (likely due to hypotension and reflex sympathetic activation), these side effects are less with labetalol

Anti-hypertensive therapy in severe PE

- Providers should know what anti-hypertensive agents are available to them
- Providers should use anti-hypertensive agent with which they are familiar (dosing, frequency, onset of action, side effects)
- Situation-dependent protocols
 - If no IV, may need rapid acting oral agent such as immediate release nifedipine (not sublingual)



Oral antihypertensive drugs used for the management of hypertension

Drug (FDA Category)	Mechanism of Action	Dose	Maximum Dose	Comments
Labetalol (C)	α - and β -adrenergic antagonist	200-2400 mg/day orally in 2-3 divided doses	2400 mg/day	Well-tolerated. Potential bronchoconstrictive effects.
Nifedipine (C)	Calcium channel blocker	30-120 mg/day orally of a slow release preparation	120 mg/day	Do not use sublingual form. Side effects include headache, flushing, tachycardia; once a day dosing may improve compliance.
Methyldopa (B)	Centrally acting α_2 -receptor agonist	0.5-3g/day orally in 2-3 divided doses	3 g/day	Childhood safety data up to 7 years. May not be as effective in control of severe hypertension. Side effect profile includes lethargy.
Hydrochlorothiazide (C)	Thiazide diuretic	12.5-50 mg/day orally	50 mg/day	Not used as a primary agent in pregnancy and considered an adjunctive agent; theoretical concerns of reduced intravascular volume and decreased uterine blood flow in pregnancy; electrolytes should be monitored.
Hydralazine (C)	Vasodilation, smooth muscle relaxant	50-300 mg per day orally in 2-4 divided doses	300 mg/day	Not used as a primary agent in pregnancy and considered an adjunctive agent; may be used in combination with a sympatholytic agent (e.g., methyldopa or labetalol) to prevent tachycardia.
Angiotensin converting enzyme inhibitors/angiotensin receptor blockers		Associated with anomalies		CONTRAINDICATED IN PREGNANCY AND PRECONCEPTION PERIOD – However, captopril and enalapril are compatible with breast feeding

Antenatal steroids for fetal benefit

- ↓ respiratory distress syndrome
- ↓ intraventricular hemorrhage
- ↓ necrotizing enterocolitis
- ↓ neonatal death
- No major maternal contraindications – be careful with type 1 diabetes – risk of ketoacidosis

If <34 weeks and at risk for preterm birth, then recommendation is to administer betamethasone

Antenatal steroids for fetal benefit

- Betamethasone 12mg IM – 2 doses 24 hours apart
- Dexamethasone 6mg q 12 hours (IV or IM) x 4 doses
 - If significant coagulopathy or concern for IM administration

Fluid management with severe preeclampsia

- Beware of iatrogenic fluid overload
 - 3rd space fluid loss due to endothelial damage
 - Pulmonary edema
- Strict intake and output monitoring
- Bladder catheter not necessary but may be helpful in some cases
- Total IV fluids no more than 80cc/h (1 cc/kg/hour) - crystalloid
- Gentle fluid boluses only if indicated
- May need CVP line to guide fluid management

Hypertensive Emergency Checklist

HYPERTENSIVE EMERGENCY:

- Two severe BP values ($\geq 160/110$) taken 15-60 minutes apart. Values do not need to be consecutive.
- May treat within 15 minutes if clinically indicated

- ☐ Call for Assistance
- ☐ Designate:
 - ☐ Team leader
 - ☐ Checklist reader/recorder
 - ☐ Primary RN
- ☐ Ensure side rails up
- ☐ Ensure medications appropriate given patient history
- ☐ Administer seizure prophylaxis (magnesium sulfate first line agent, unless contraindicated)
- ☐ Antihypertensive therapy within 1 hour for persistent severe range BP
- ☐ Place IV; Draw preeclampsia labs
- ☐ Antenatal corticosteroids (if <34 weeks of gestation)
- ☐ Re-address VTE prophylaxis requirement
- ☐ Place indwelling urinary catheter
- ☐ Brain imaging if unremitting headache or neurological symptoms
- ☐ Debrief patient, family, and obstetric team

* "Active asthma" is defined as:

- Ⓐ symptoms at least once a week, or
- Ⓑ use of an inhaler, corticosteroids for asthma during the pregnancy, or
- Ⓒ any history of intubation or hospitalization for asthma.

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MAGNESIUM SULFATE

Contraindications: Myasthenia gravis; avoid with pulmonary edema, use caution with renal failure

IV access:

- ☐ Load 4-6 grams 10% magnesium sulfate in 100 mL solution over 20 min
- ☐ Label magnesium sulfate; Connect to labeled infusion pump
- ☐ Magnesium sulfate maintenance 1-2 grams/hour

No IV access:

- ☐ 10 grams of 50% solution IM (5 g in each buttock)

ANTIHYPERTENSIVE MEDICATIONS

For SBP ≥ 160 or DBP ≥ 110

(See SMI algorithms for complete management when necessary to move to another agent after 2 doses.)

- ☐ Labetalol (initial dose: 20mg); **Avoid parenteral labetalol with active asthma, heart disease, or congestive heart failure; use with caution with history of asthma**
- ☐ Hydralazine (5-10 mg IV* over 2 min); **May increase risk of maternal hypotension**
- ☐ Oral Nifedipine (10 mg capsules); Capsules should be administered orally, not punctured or otherwise administered sublingually

* Maximum cumulative IV-administered doses should not exceed 220 mg labetalol or 25 mg hydralazine in 24 hours

Note: If first line agents unsuccessful, emergency consult with specialist (MFM, internal medicine, OB anesthesiology, critical care) is recommended

ANTICONVULSANT MEDICATIONS

For recurrent seizures or when magnesium sulfate contraindicated

- ☐ Lorazepam (Ativan): 2-4 mg IV x 1, may repeat once after 10-15 min
- ☐ Diazepam (Valium): 5-10 mg IV q 5-10 min to maximum dose 30 mg

EXAMPLE

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- ✓ Call for assistance
- ✓ Designate team leader, checklist reader, primary RN
- ✓ Ensure side rails are up
- ✓ Administer seizure prophylaxis
- ✓ Antihypertensive therapy within 1 hr for persistent severe range BP
- ✓ Place IV; Draw PEC labs
- ✓ Antenatal corticosteroids is <34 wks gestation
- ✓ Re-address VTE prophylaxis requirement
- ✓ Place indwelling urinary catheter
- ✓ Brain imaging if unremitting headache or neurological symptoms
- ✓ Debrief patient, family, OB team

Delivery timing with preeclampsia

- No severe features – 37 weeks
- With severe features - 34 weeks
- If unstable maternal/fetal condition, delivery soon after maternal stabilization
- Expectant management of severe preeclampsia should occur at a tertiary facility

Management of severe preeclampsia at less than 34 weeks of gestation

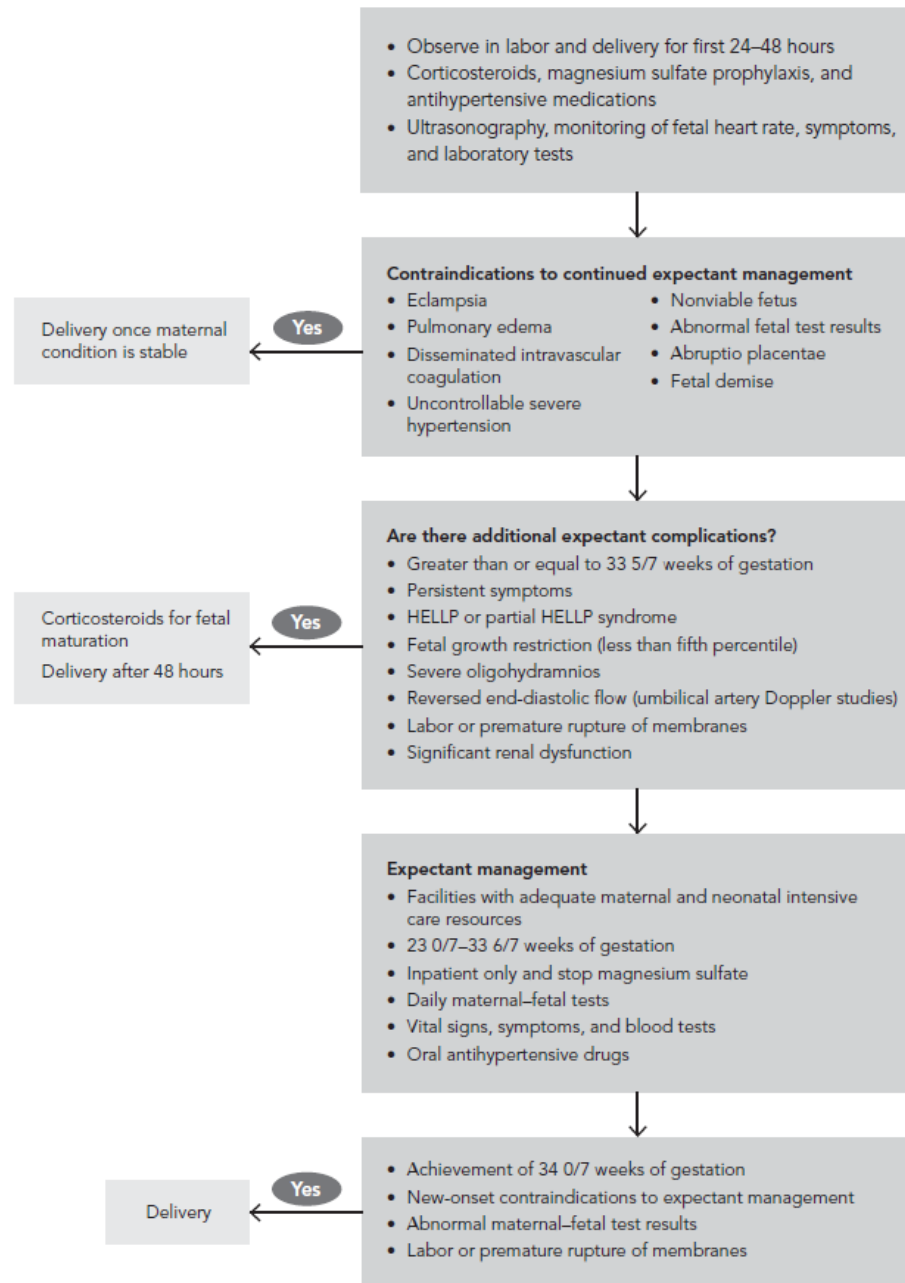
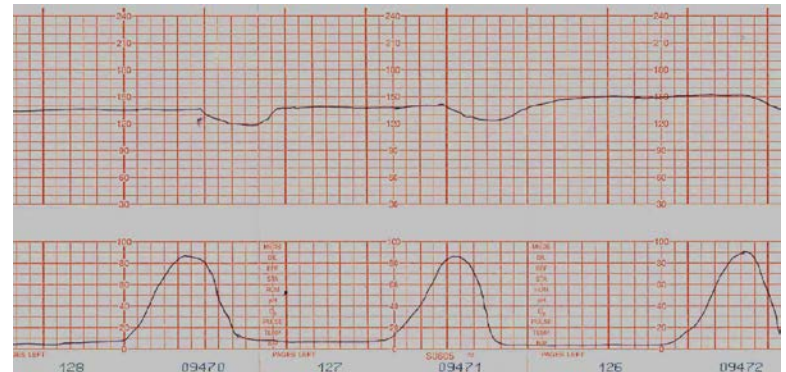


FIGURE 5-2. Management of severe preeclampsia at less than 34 weeks of gestation.

Abbreviation: HELLP, hemolysis, elevated liver enzymes, and low platelet count.

Delivery planning

- Vaginal delivery is preferred with cesarean delivery reserved for the usual obstetric indications
 - Specifically,
 - Rapidly worsening maternal disease
 - Non-reassuring fetal status
- Neuraxial analgesia preferred



Post-delivery management

- Magnesium sulfate continuous infusion for 24h postpartum
- Close monitoring of BPs and titration of anti-HTN meds
- Decrease in BP with subsequent increase 3-5d PP
- Need to ensure ongoing BP management
 - Home monitoring
 - Office visit
 - Ongoing care

Case : Eclampsia

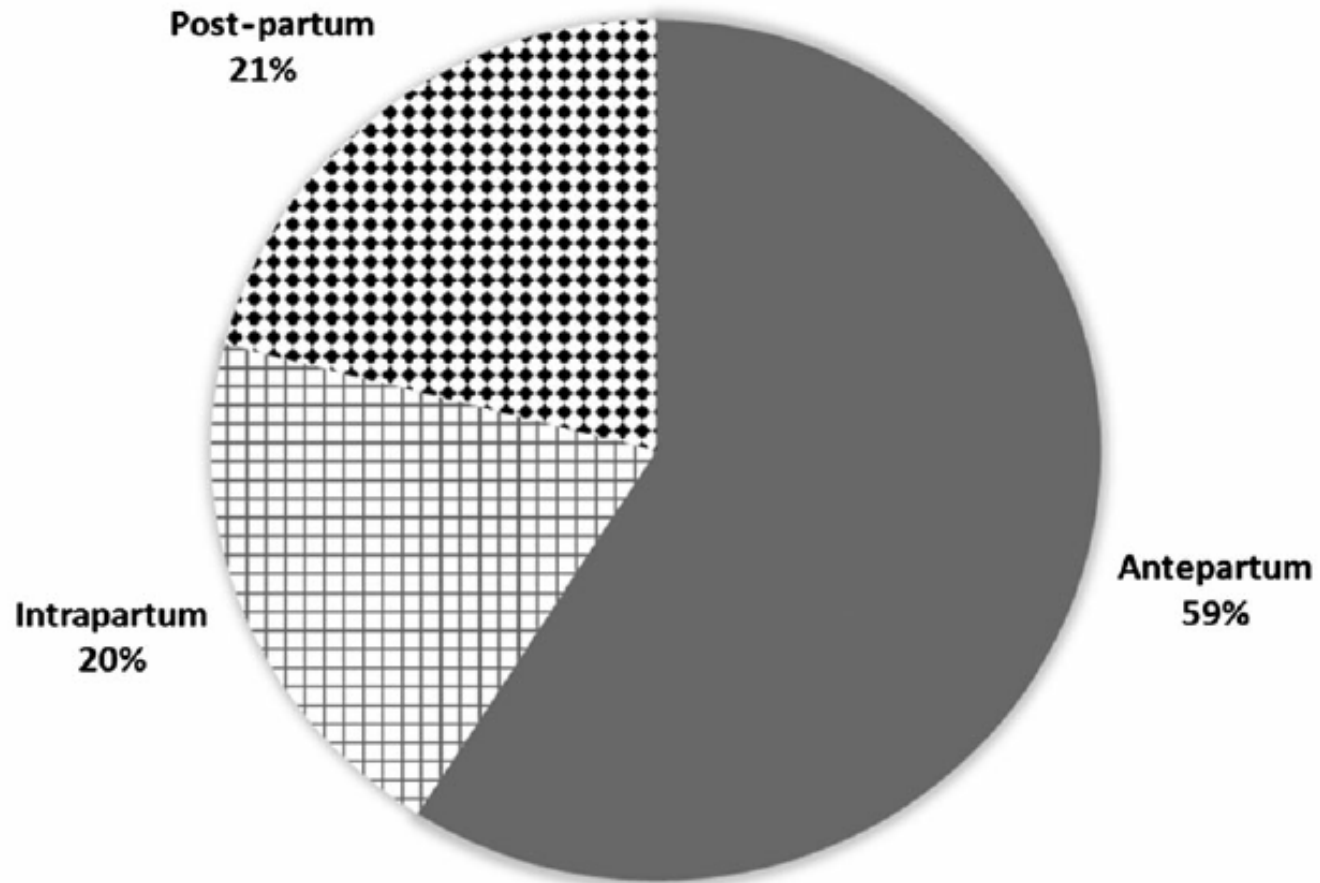
- 28yo gravida 1 at 32 weeks
- Presented to local clinic with severe headache and mildly elevated BP
- She was sent home with some acetaminophen and told to rest and return the next day
- Next day, headache persisted and BP 170/110
- Repeat BP on left side 140/95
- Told to go to hospital with OB services as soon as possible
- In personal car, she had a seizure – brought in to hospital

Eclampsia

- New-onset, generalized, tonic-clonic seizures or coma in a woman with preeclampsia that cannot be attributed to other causes
 - Low and middle income countries 6-157/10,000 deliveries
 - High income countries 1.5-10/10,000 deliveries
- 2-3% of PE with severe features and 0.6% without severe features not receiving anti-seizure prophylaxis



Eclampsia – Systematic review



59 studies including 21,149 eclamptic women from 26 countries

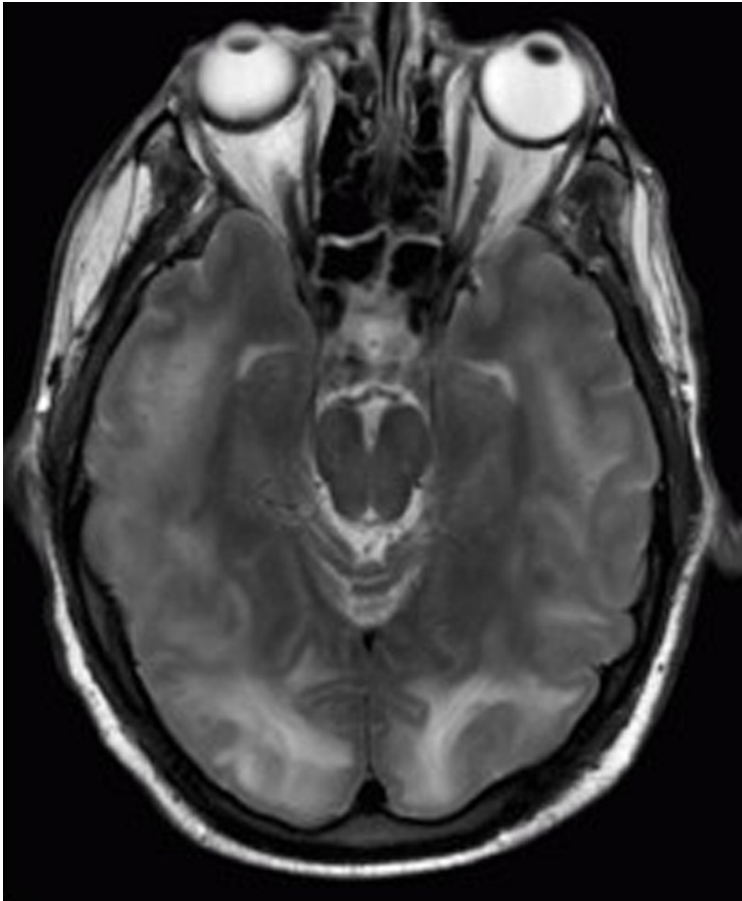
Eclampsia – Clinical presentation

- HTN (75%)
- Headache (66%)
- Visual disturbances (27%)
- Right upper quadrant or epigastric pain (25%)
- Asymptomatic (25%)

Mechanism(s) for neurologic findings in preeclampsia

- ↓ CV resistance - ↑ Cerebral perfusion pressure – BBB disruption and edema formation
- Even if cerebral blood flow (autoregulation) maintained
- Supported by
 - Animal models
 - Ex vivo studies
 - Some human studies limited
- Role of angiogenic balance (VEGF) in BBB permeability

Posterior reversible encephalopathy syndrome (PRES)



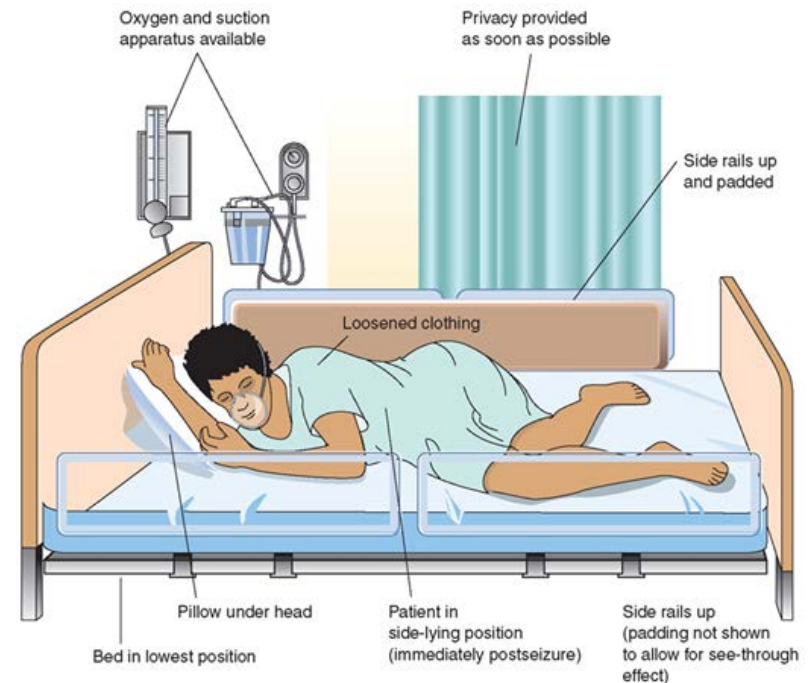
- Sudden elevations in BP exceed normal cerebrovascular autoregulatory capacity → regions of forced vasoconstriction and vasodilation especially in arterial boundary zones
- Disruption of end capillary pressure → ↑hydrostatic pressure, hyperperfusion, extravasation of plasma/RBC → vasogenic edema
- As high as 98% of eclamptics

Eclamptic seizure

- Loss of consciousness
- Tonic phase – stiff muscles, cyanosis
- Clonic - jerking and twitching of muscles
- Post-ictal phase – poor responsiveness, headache
- Seizure usually not more than 1-2 minutes, may take 20 minutes for full recovery
- Fetal bradycardia not uncommon during and 3-5 min after seizure

Management of eclampsia

- Call for HELP – “Condition O” – Crash cart
- ABC (airway, breathing, circulation) – vital signs
- Maintain airway – oral airway
- Minimize aspiration – turn to side, suction
- Maintain oxygenation – pulse ox, facemask O₂
- Avoid injury – guard rails up, padding, fall risk



Management of eclampsia

- Initiate magnesium sulfate
 - IV placement
 - Standardized protocol
- Control BP
- Fetal monitoring- antenatal steroids if less than 34 weeks
- Labs
- Stabilize and Deliver – Vaginal delivery generally preferable

Magnesium for eclampsia treatment

- Intravenous: Magnesium sulfate 4-6g IV bolus over 20 minutes, then 2g per hour continuous infusion ideally on a pump OR
- If unable to obtain timely IV access:
 - IM magnesium 10g (5g in each buttock)
- Consistent regimen is key

Eclampsia Checklist

- ☐ Call for Assistance
- ☐ Designate
 - ☐ Team leader
 - ☐ Checklist reader/recorder
 - ☐ Primary RN
- ☐ Ensure side rails up
- ☐ Protect airway and improve oxygenation:
 - ☐ Maternal pulse oximetry
 - ☐ Supplemental oxygen (100% non-rebreather)
 - ☐ Lateral decubitus position
 - ☐ Bag-mask ventilation available
 - ☐ Suction available
- ☐ Continuous fetal monitoring
- ☐ Place IV; Draw preeclampsia labs
- ☐ Ensure medications appropriate given patient history
- ☐ Administer magnesium sulfate
- ☐ Administer antihypertensive therapy if appropriate
- ☐ Develop delivery plan, if appropriate
- ☐ Debrief patient, family, and obstetric team

* "Active asthma" is defined as:

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IV access:

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- ☐ Label magnesium sulfate; Connect to labeled infusion pump
- ☐ Magnesium sulfate maintenance 1-2 grams/hour

No IV access:

- ☐ 10 grams of 50% solution IM (5 g in each buttock)

ANTIHYPERTENSIVE MEDICATIONS

For SBP ≥ 160 or DBP ≥ 110
(See SMI algorithms for complete management when necessary to move to another agent after 2 doses.)

- ☐ **Labetalol** (initial dose: 20mg); *Avoid parenteral labetalol with active asthma, heart disease, or congestive heart failure; use with caution with history of asthma*
- ☐ **Hydralazine** (5-10 mg IV* over 2 min); *May increase risk of maternal hypotension*
- ☐ **Oral Nifedipine** (10 mg capsules); Capsules should be administered orally, not punctured or otherwise administered sublingually

* Maximum cumulative IV-administered doses should not exceed 220 mg labetalol or 25 mg hydralazine in 24 hours

Note: If persistent seizures, consider anticonvulsant medications and additional workup

ANTICONVULSANT MEDICATIONS

For recurrent seizures or when magnesium sulfate contraindicated

- ☐ **Lorazepam (Ativan)**: 2-4 mg IV x 1, may repeat once after 10-15 min
- ☐ **Diazepam (Valium)**: 5-10 mg IV q 5-10 min to maximum dose 30 mg

FOR PERSISTENT SEIZURES

- ☐ Neuromuscular block and intubate
- ☐ Obtain radiographic imaging
- ☐ ICU admission
- ☐ Consider anticonvulsant medications

- ✓ Call for assistance
- ✓ Designate team leader, checklist reader, primary RN
- ✓ Ensure side rails are up
- ✓ Protect airway + improve oxygenation
- ✓ Continuous fetal monitoring
- ✓ Place IV; Draw PEC labs
- ✓ Administer antihypertensive therapy if appropriate
- ✓ Develop delivery plan
- ✓ Debrief patient, family, OB team

Key points

- Recognition
- Call for Help
- Escalation of care
- Clear protocols
- Drills
- Education
- Multi-disciplinary team approach to care



Recurrent eclamptic seizure

- Additional magnesium bolus of 2g IV
- Benzodiazepines
 - Lorazepam
- Other agents
 - Phenytoin
 - Requires cardiac monitoring
 - Keppra
- Rarely intubation is required
- Neuro-imaging

Other causes of seizures

- Known seizure disorder
 - Non-compliance, Sub-therapeutic drug levels
- Eclampsia, until proven otherwise in third trimester
- Brain lesions
- Metabolic causes
- Infection
- Trauma
- Bleeding
- Drugs

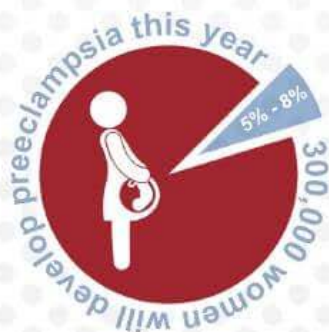


Preeclampsia may lead to heart disease, stroke and high blood pressure



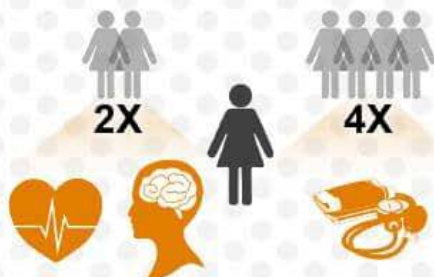
5% to 8%

Preeclampsia (including eclampsia and HELLP syndrome) impacts 5% to 8% of all pregnancies – that's up to one in every 12 pregnancies



2x to 4x

Preeclampsia doubles your risk of heart disease and stroke, and quadruples your risk of high blood pressure later in life



At higher risk

Women who had preeclampsia and:

- ✓ delivered pre-term
- ✓ had low-birth weight babies
- ✓ suffered from severe preeclampsia more than once

2 out of 3

women who experienced preeclampsia will die from cardiovascular disease



Take heart – lower your risk

A history of preeclampsia doesn't mean you'll definitely develop cardiovascular problems, especially if you take the higher risk to heart and make changes today for a healthier tomorrow



Every year

- ✓ If you have a history of preeclampsia, talk to your healthcare provider within one year after delivery about taking extra care to monitor the health of your heart and blood vessels
- ✓ You should be regularly evaluated and treated for cardiovascular risk factors such as high blood pressure, blood sugar and cholesterol, obesity, and smoking

Adopt a heart-healthy lifestyle

- ♥ Get adequate physical activity
- ♥ Eat a heart-healthy diet
- ♥ Stay at a healthy weight
- ♥ If you smoke, stop!
- ♥ Talk to your doctor about taking low-dose aspirin
- ♥ Know your family health history
- ♥ Know your numbers for blood pressure, blood sugar, and cholesterol



Now that you know

Take heart and do your part to stay healthy!



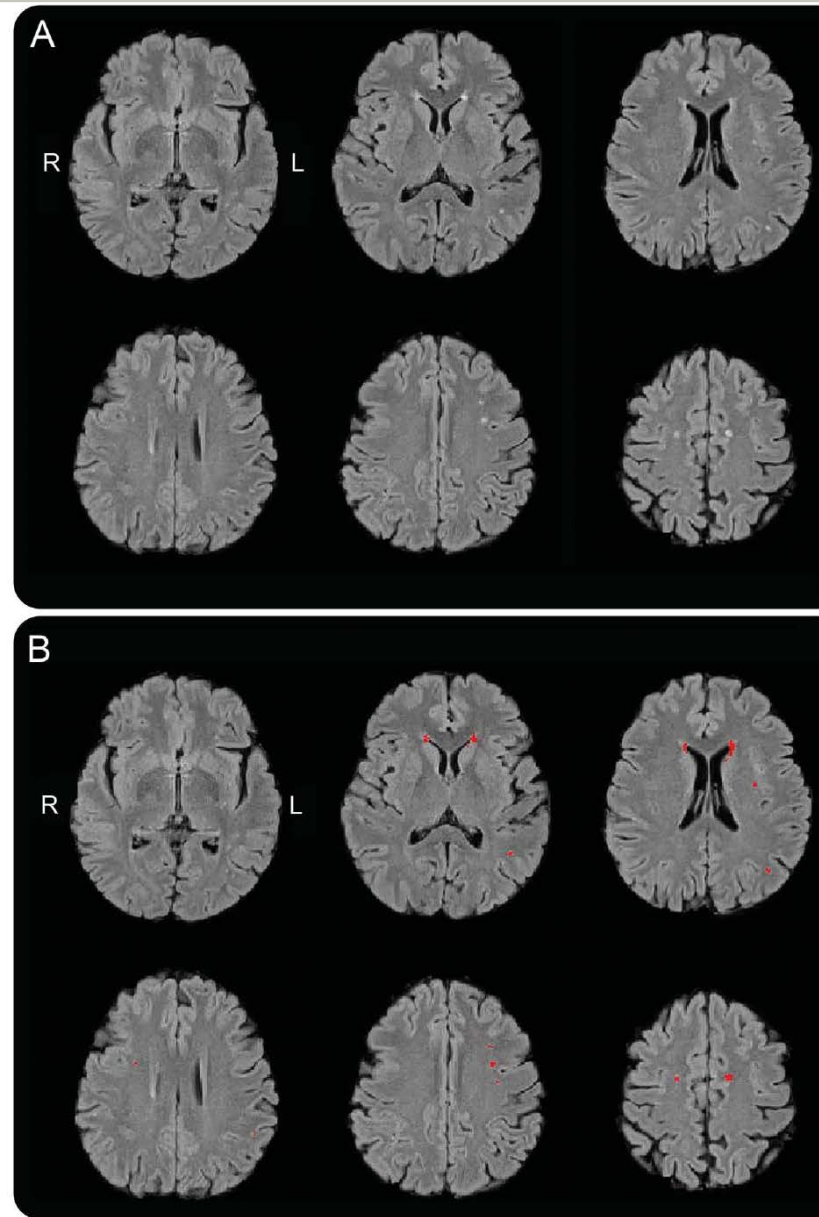
For more information, go to www.preeclampsia.org

Long term findings

Persistence of White matter lesions

- Result of small vessel disease & associated with cognitive dysfunction
- Preeclampsia (34-37%) vs eclampsia (41%) vs normal (17-21%)
- More frequent with early-onset preeclampsia
- Precise implications in PE unclear
- Possible reduced cortical volume in recent study

Aukes A et al. BJOG 2012; Aukes et al. AJOG 2009; Siepmann T et al. Neurology 2017.



Voxel-based segmentation in a woman with a history of preeclampsia with burden of lesions that is representative of our cohort. Transversal T2 FLAIR images (A) before and (B) after voxel-based segmentation using voxel-based segmentation software. Detected lesions are highlighted in red.

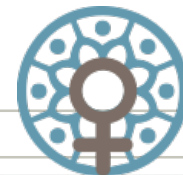
Long term – cognitive effects

- Self-reported perception of cognitive, emotional, and mood changes
 - Impaired concentration
 - ↓ Memory
 - ↓ Ability to tend to task
 - ↓ QOL
- Objective data are limited
 - Postma et al. –No evidence after preeclampsia/eclampsia
 - Brusse et al – No impaired executive function after PE but impaired auditory-verbal memory, with less word learning and recall



Goal :

Healthy Mom &
Healthy Baby



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Questions



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