



Its Tough to be an NICU Graduate

**Bronchopulmonary Dysplasia
Retinopathy of Prematurity**

Its Tough to be an NICU Graduate

Bronchopulmonary Dysplasia Retinopathy of Prematurity

- Objectives
 - Understand the disease processes of Bronchopulmonary Dysplasia and Retinopathy of Prematurity
 - Know the course of the diseases
 - Know the duration of the diseases
 - Have sufficient information to guide caregivers
 - To follow up on care after discharge from the hospital
 - To seek the appropriate medical specialists
 - Provide recommendations for supportive services



Why Are Infants in the NICU

Anemia (low number of red blood cells)

Bleeding disorders

Bone disorders

Osteogenesis imperfecta

Born with deformities that threaten life

Brain problems

Gastro-Intestinal problems

Heart problems

Lung problems

Breathing Problems

Broncho Pulmonary Dysplasia

Apnea

Drug Addiction

Hypothermia (low temperature)

Immune system problems

Infection

Jaundice (yellow skin color)

Metabolic problems

Prematurity: Born too soon

Swallowing problems



August 2022 Grand Rounds

Preterm Infants: Prematurity and the First Year of Life

Defined:

Prematurity

Early term

Late preterm.

Moderate preterm.

Very preterm.

Extremely preterm

Corrected Gestational Age

Patterns of Premature Growth

AGA

SGA

LGA

Short-Term and Long-Term
Problems in the 1st Year of Life

Transitioning from the NICU to
Home

Developmental Milestones

Corrected Gestational Age



Why Are Infants in the NICU

Information on 2 of the More Common problems:

BRONCHO PULMONARY DYSPLASIA

RETINOPATHY OF PREMATURITY



Its Tough to be an NICU Graduate

BRONCHO PULMONARY DYSPLASIA



BRONCHO PULMONARY DYSPLASIA

- A form of chronic lung disease that affects newborns.
- Most infants who develop BPD
 - born prematurely
 - need oxygen.
- Most infants recover from BPD,
- Some may have long-term breathing difficulties.



BRONCHO PULMONARY DYSPLASIA

- Babies are not born with BPD
- Caused by damage to the lungs
 - Usually caused respirator use
 - Long-term use of oxygen.
- 10,000 to 15,000 newborns per year develop BPD in the United States
- Severity varies from infant to infant.
- The more premature the newborn, the greater the risk



BRONCHO PULMONARY DYSPLASIA

- BPD can occur when:
 - newborn's lungs are undeveloped
 - require a ventilator and oxygen
- newborns lungs vulnerable to
 - high amounts of oxygen
 - pressure

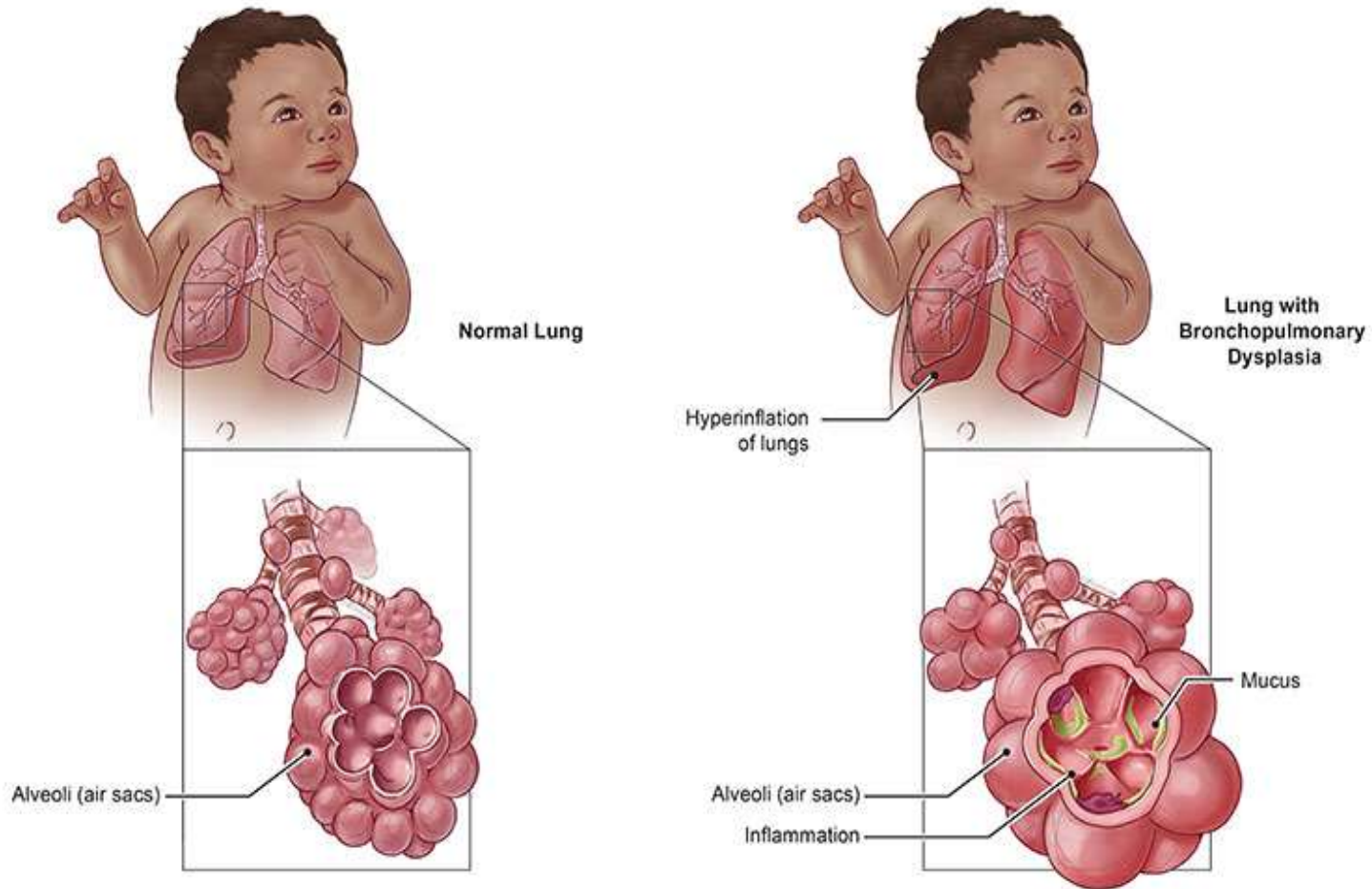


BRONCHO PULMONARY DYSPLASIA

- Pressure may overstretch the alveoli
 - causes inflammation
 - damage the lining of the airways
 - damage the lining of the alveoli
 - damage the blood vessels around them
- The premature lung is particularly susceptible to these insults



BRONCHO PULMONARY DYSPLASIA



Nationwide Children's Hospital



BRONCHO PULMONARY DYSPLASIA

- Tests and Studies

- Chest X-ray, CT scan or MRI

- Blood test for oxygen and carbon dioxide levels in the blood

- Blood tests to look for infection

- Echocardiogram (echo) –

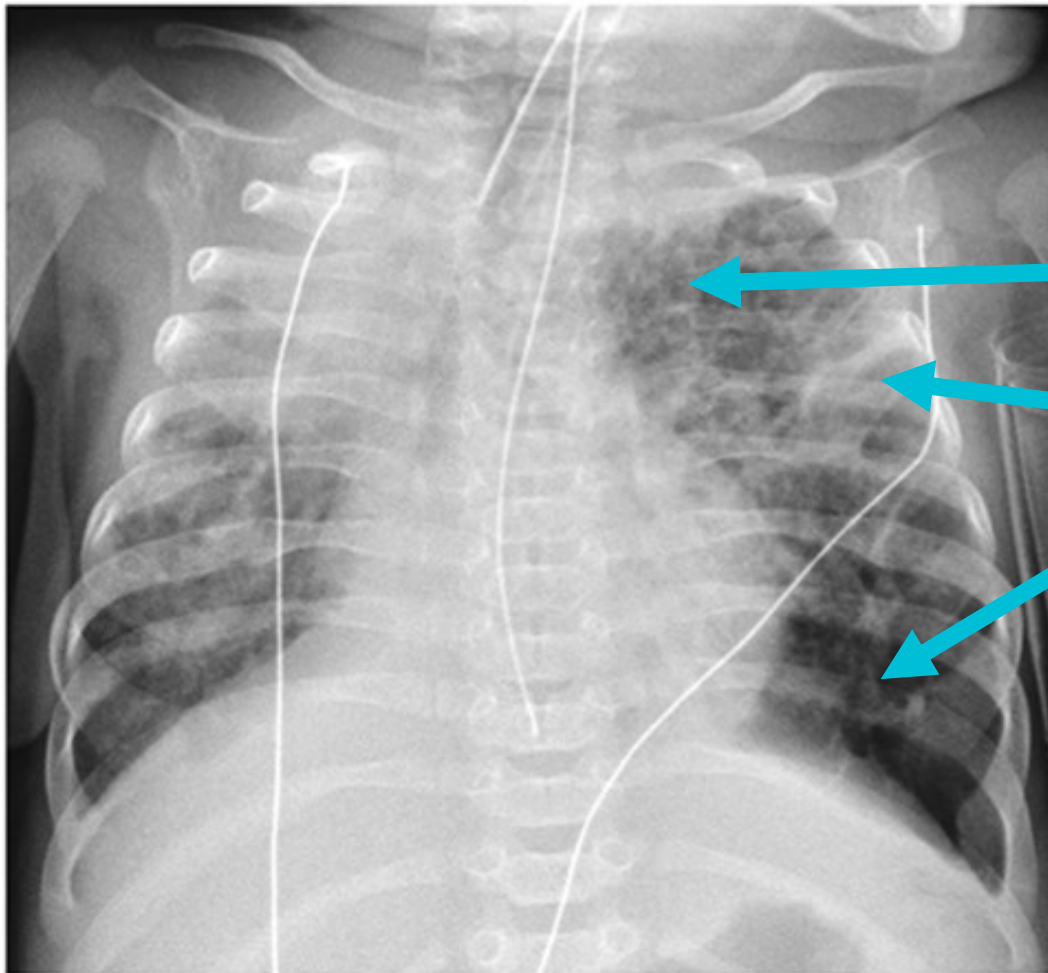
- An ultrasound test to rule out heart disease

- Pulse-oximetry-

- Measure oxygen levels in the blood



BRONCHO PULMONARY DYSPLASIA



Chest radiograph typical of bronchopulmonary dysplasia

widespread coarse interstitial markings

atelectasis

regions of hyper-expansion

<https://www.frontiersin.org/journals/medicine>



BRONCHO PULMONARY DYSPLASIA

- Other factors:
 - Respiratory Distress Syndrome of the newborn (RDS)
 - Genetics
 - Healing response
 - Congenital Heart Disease
 - Patent Ductus Arteriosus and ventilator use
 - Infection of the newborn



BRONCHO PULMONARY DYSPLASIA

- Infection during the pregnancy
 - Fetus
 - Mother
 - Placenta (chorioamnionitis)
- Preeclampsia
- Smoking
- Drug use



BRONCHO PULMONARY DYSPLASIA

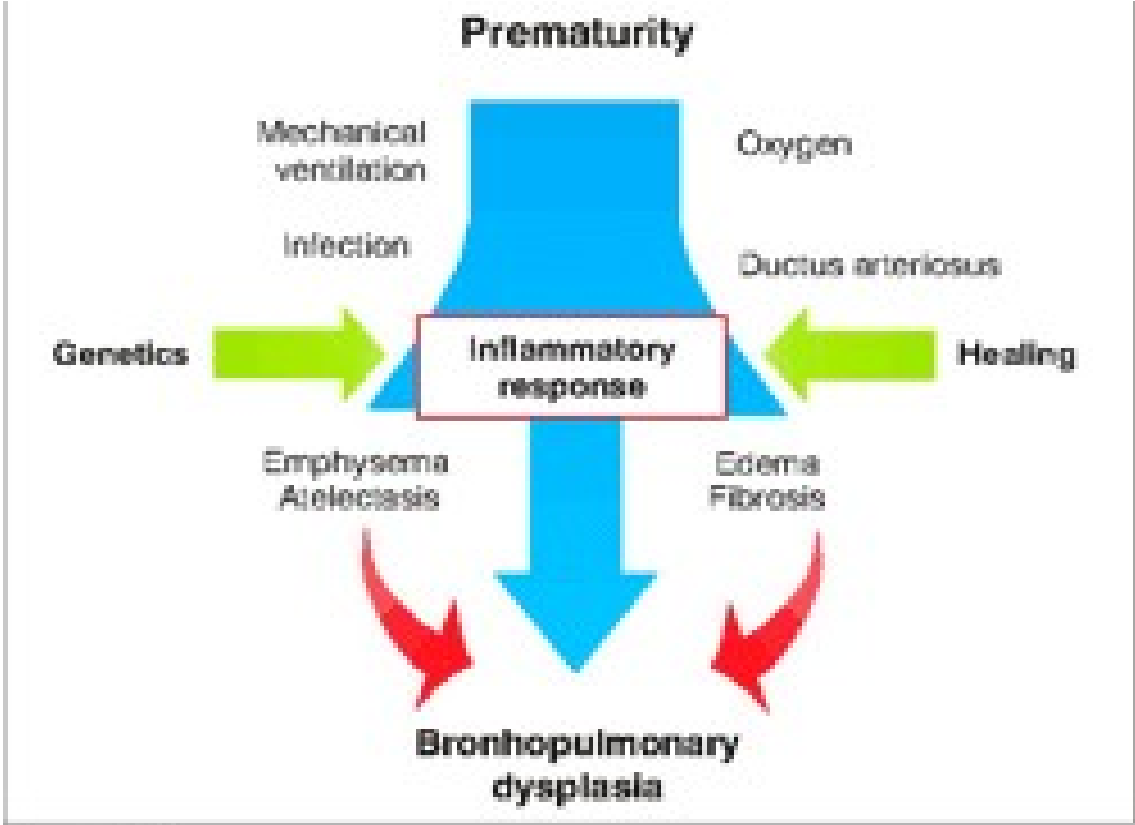


Figure 1 [49].



BRONCHO PULMONARY DYSPLASIA

- Infants at greatest risk have:
 - Birth more than 2 months early
 - A birth weight less than 2.2 pounds
 - Respiratory distress syndrome
 - A history of pneumonia or other infections
 - Infection during the pregnancy or other maternal factors



BRONCHO PULMONARY DYSPLASIA

- Treatment

- Goals:

- minimize further lung damage
 - provide support for the infant's lungs,
 - allow them to heal and grow

- Use of Medications



BRONCHO PULMONARY DYSPLASIA

- Medications

- Diuretics:

- Decrease the amount of fluid in and around the alveoli (the lungs)



BRONCHO PULMONARY DYSPLASIA

- Medications

- Bronchodilators:

- Relax the smooth muscles around the air passages
 - makes breathing easier by widening the airway



BRONCHO PULMONARY DYSPLASIA

- Medications

- Corticosteroids:

- Reduce and/or prevent inflammation
 - Reduce swelling in the windpipe
 - Decrease the amount of mucus

- Additional Treatments

- Nutrition therapy

- Developmental therapies – Speech, physical and occupational therapies



BRONCHO PULMONARY DYSPLASIA

- Treatment

- Patients with more severe disease

- Oxygen for several months.

- Nasal continuous positive airway pressure (NCPAP) or bilevel positive airway pressure (BiPAP).

- Some with very severe disease may need to stay on a ventilator

- Long term ventilator use will require a tracheostomy (a breathing tube inserted into the lungs through the neck).



BRONCHO PULMONARY DYSPLASIA

- Long-Term Outlook for Infants with Bronchopulmonary Dysplasia
 - Babies with this disorder heal and grow at different rates.
 - They usually get better over time
 - NICU durations vary from weeks to months



BRONCHO PULMONARY DYSPLASIA

- Problems may continue into adulthood
 - Asthma/Reactive Airway Disease
 - Exercise intolerance
 - More susceptible to infections
 - More hospitalizations
- Less able to fight off or recover from respiratory illness



Its Tough to be an NICU Graduate

RETINOPATHY OF PREMATURITY

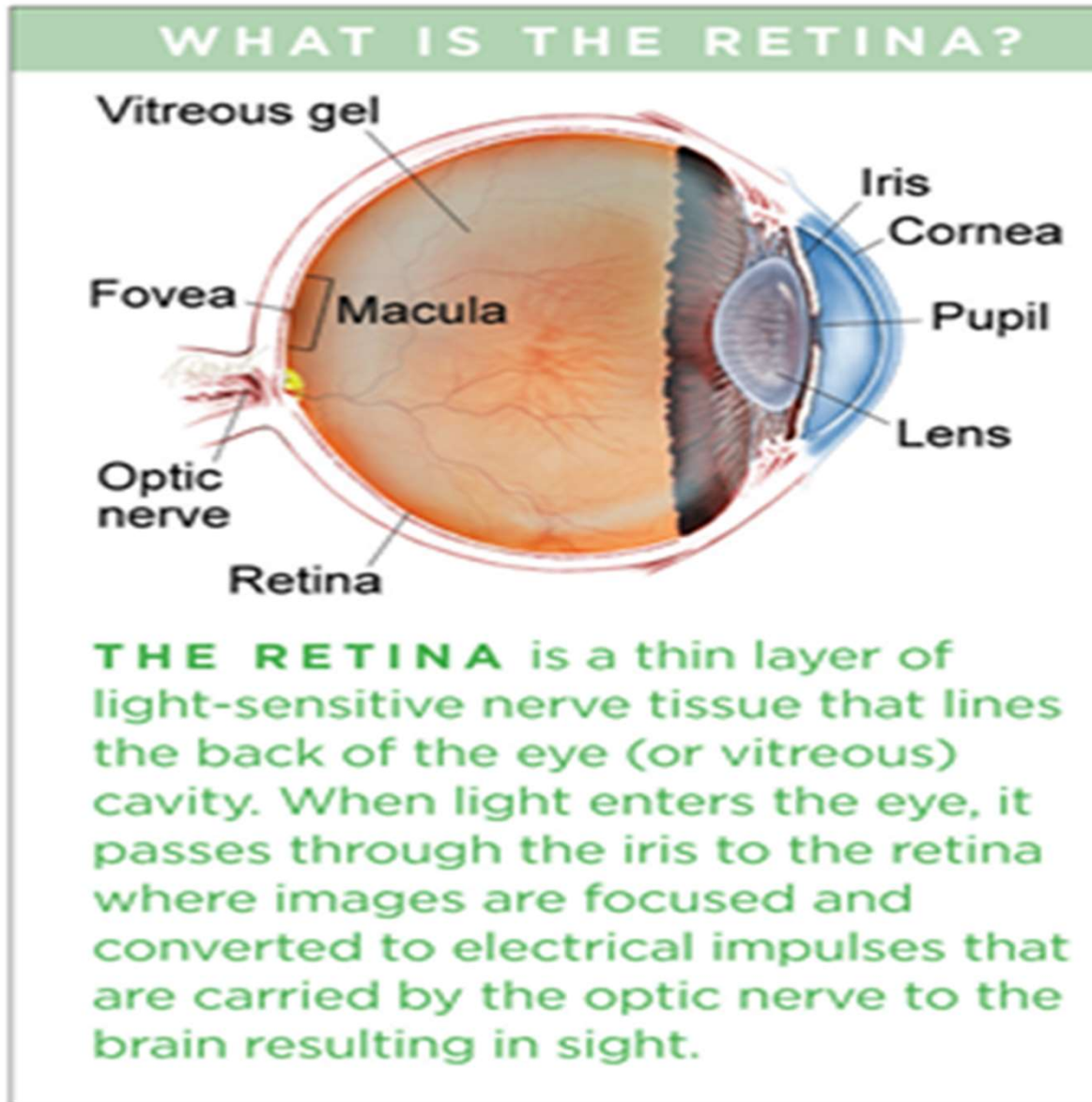


Retinopathy of Prematurity

- Retinopathy of prematurity (ROP)
 - Abnormal blood vessels grow in the retina of the eye
 - A condition affecting premature infants
 - Low birthweight (BW); less than 3 lbs.
 - Young gestational age (GA)



Retinopathy of Prematurity

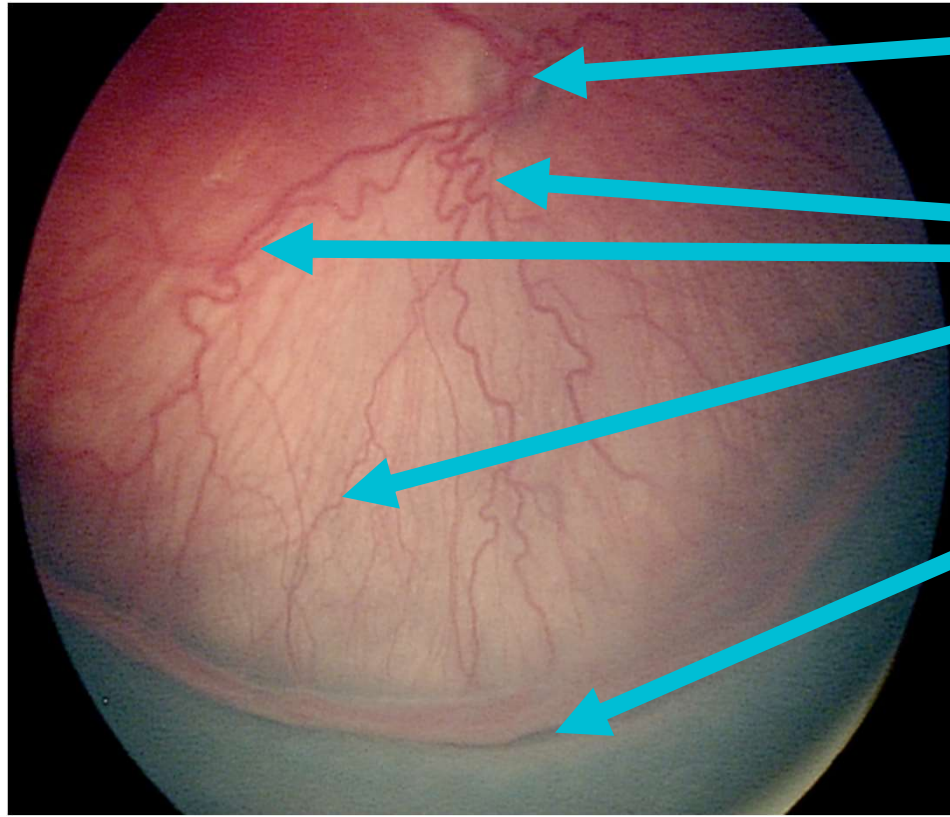


The Foundation;
American Society of
Retina Specialists



Retinopathy of Prematurity

- Retina showing the ridge that results from abnormal blood vessel growth



Optic Disc

Blood Vessels

Edge of Retina



Retinopathy of Prematurity

- 5 Stages of ROP

- Stages range from stage 1 (mild) to stage 5 (severe)



Retinopathy of Prematurity

- Stages 1 and 2 —
- These stages usually get better without treatment
- Have healthy vision as they grow
- These infants are closely monitored with repeat ophthalmologist evaluations



Retinopathy of Prematurity

- Stage 3

- Some babies who develop stage 3 get better with no treatment
- Others need treatment** to stop abnormal blood vessels from damaging the retina
- Causing retinal detachment and vision loss



Retinopathy of Prematurity

- Stage 4

- Have partially detached retinas

- need treatment to prevent progression and blindness**



Retinopathy of Prematurity

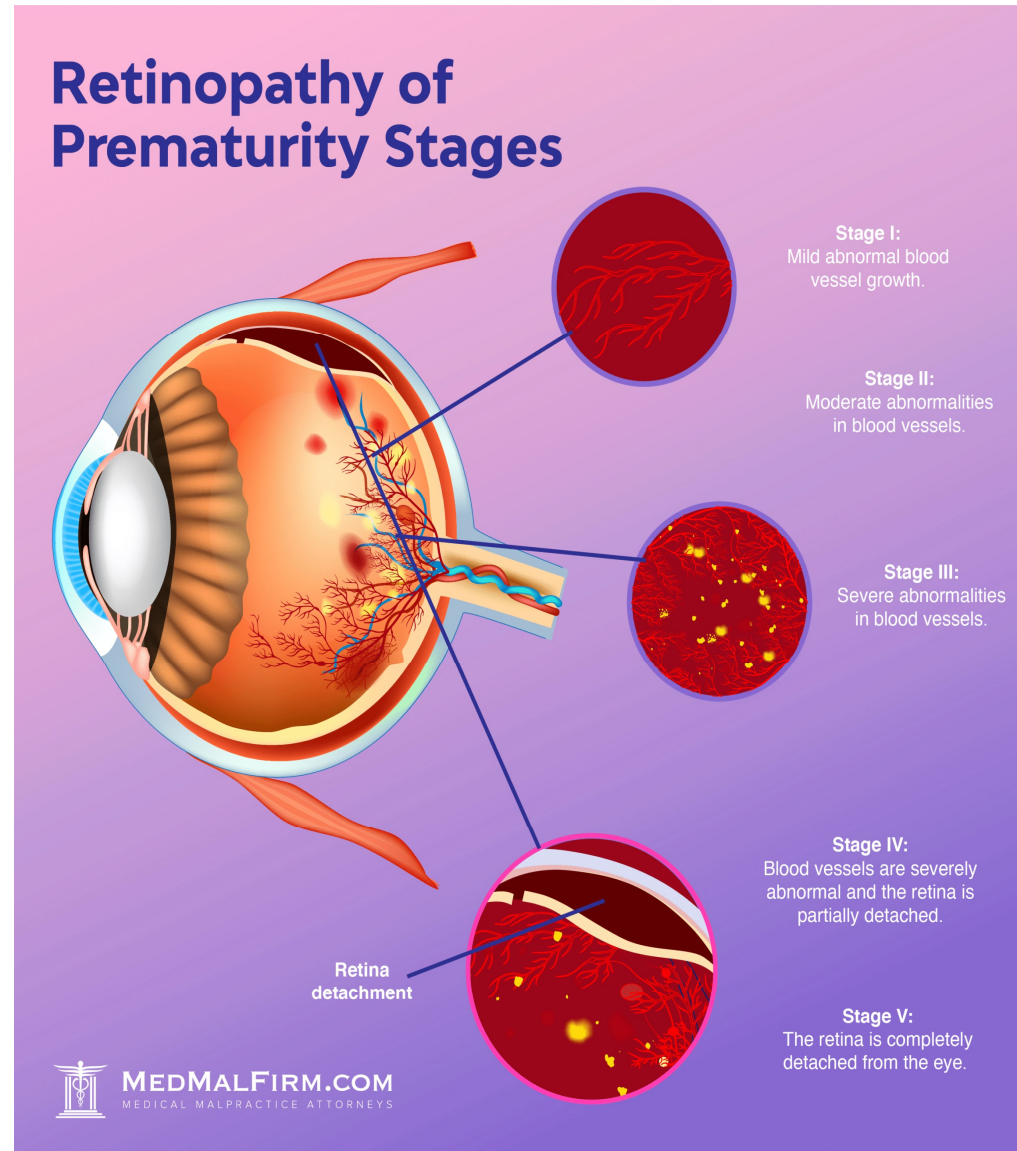
- Stage 5

- The retina detaches completely

- Even with treatment, babies in stage 5 may have **vision loss** or **blindness**



Retinopathy of Prematurity



Retinopathy of Prematurity

- Both stages 4 and 5 are very serious.
 - Babies in these stages need surgery
 - Even with treatment, they may have vision loss.
- ROP progresses through the stages sequentially
- Therefore, usually start treatment in stage 3.



Retinopathy of Prematurity

- Babies in any stage can get worse quickly and need treatment.
- **Follow-up exams** as scheduled are **critical**.
- Finding and **treating ROP early** is the best way to decrease risk of serious problems.



Retinopathy of Prematurity

- Symptoms of ROP (Stage 1-3)
- NONE**
- The earliest sign of ROP may be visual problems



Retinopathy of Prematurity

- Symptoms of Visual Problems
 - Amblyopia (Lazy eye)
 - Eyes wander
 - Nystagmus
 - Eyes shake, or make other unusual movements
 - Their eyes don't follow objects



Retinopathy of Prematurity

- Symptoms of Visual Problems
 - Leukocoria-the pupil(s) look white
 - Cataracts
 - Retinoblastoma
 - Coats disease (excess blood vessel growth)
 - Toxoplasmosis
 - Retinal detachment**
 - They have trouble recognizing faces



Retinopathy of Prematurity

Leukocoria



Retinopathy of Prematurity

- Infants at risk of ROP
 - ROP is prevalent worldwide
 - Born before 30 weeks of pregnancy
 - Weigh less than 3 pounds at birth.
 - Breathing problems (get oxygen to treat breathing problems)
 - Infections, congenital heart disease, lung problems, or brain problems
 - Decreased incidence of progression to threshold disease in black infants



Retinopathy of Prematurity

- Why does ROP happen?
 - Blood vessels of the retina develop in the fourth month of pregnancy
 - Finish developing around the due date; 9 months of pregnancy
 - If a baby is born very early, these blood vessels may stop developing normally
 - New retinal blood vessels develop that are abnormal.
 - Retinal neovascularization



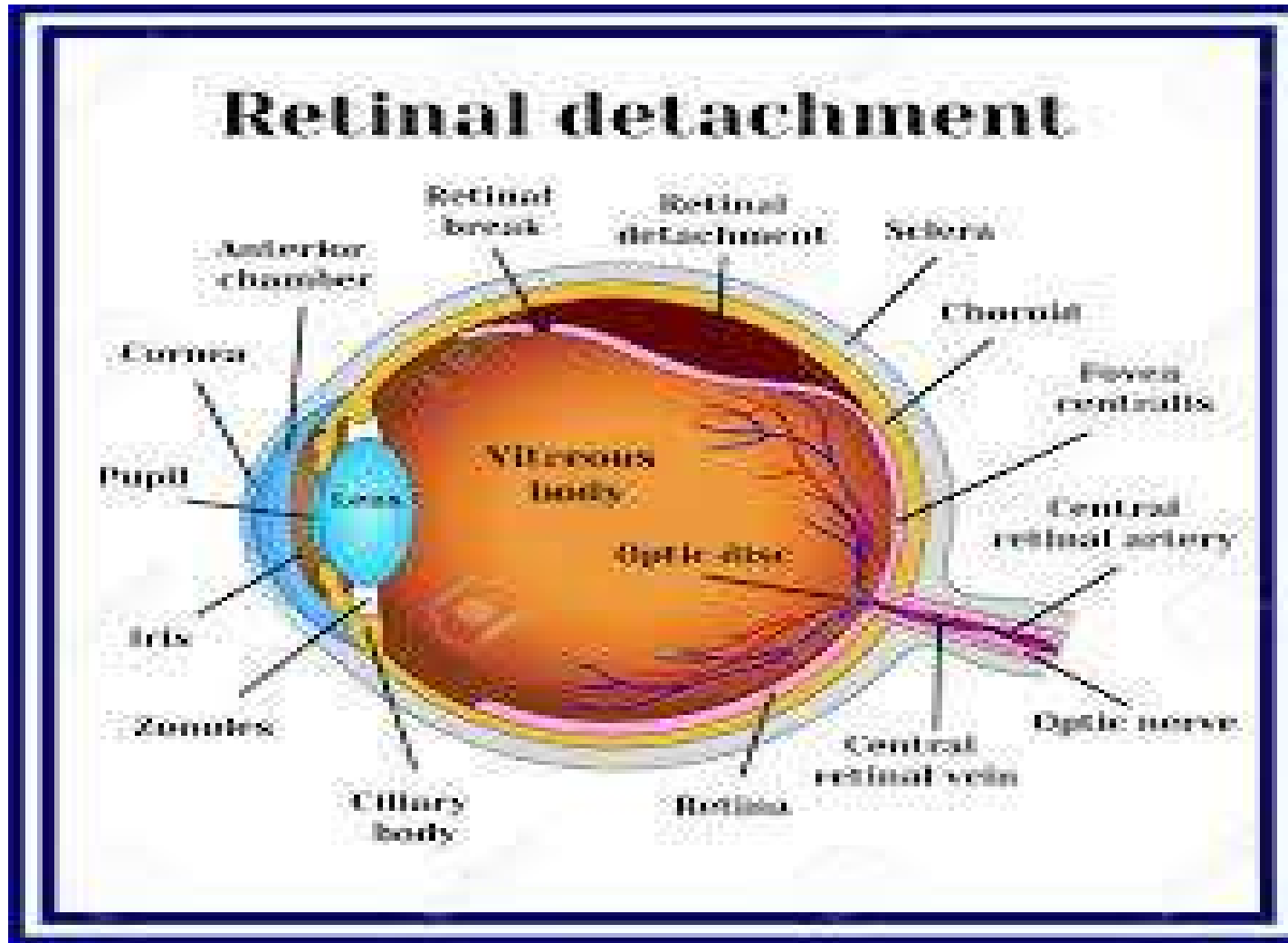
Retinopathy of Prematurity

- Why does ROP happen?
 - Abnormal blood vessels can grow in the wrong direction
 - The blood vessels are attached to the retina
 - They can pull the retina off the back of the eye.
 - This causes retinal detachment.



Retinopathy of Prematurity

Retinal Detachment



AMERICA'S BEST
CONTACTS & EYEGLASSES



Retinopathy of Prematurity

- Treatment of ROP
- Laser treatment.
 - Advanced ROP may need laser treatment on the sides of the retina
 - Prevent progression
 - Protect the child's vision.



Retinopathy of Prematurity

- Treatment of ROP
- Injections
 - Inject medicines called anti-VEGF drugs into the eye.
 - Vascular endothelial growth factor (VEGF)
 - A protein produced by the body.
 - VEGF causes new blood vessels to grow
 - These medicines work by blocking the growth of blood vessels



Retinopathy of Prematurity

- Treatment of ROP
 - Eye surgery
 - The goal of ROP surgery
 - Prevent ROP from progressing
 - Prevent blindness



Retinopathy of Prematurity

- Treatment of ROP
- There are 2 types of retina surgery for stages 4 or 5 ROP
 - Scleral buckle surgery.
 - Vitrectomy.
- Even with surgery, some babies with ROP will still have vision loss or blindness.



Retinopathy of Prematurity

Treatment of ROP

This is a developing area of treatment

The child's vision after these procedures were in the ranges of:

- 20/60 to 20/300 for 15% of eyes
- 20/60 to 20/800 for 30% of eyes
- 20/60 to 20/1900 for 48% of eyes (ambulatory vision)
- light perception for 72% of eyes



Retinopathy of Prematurity

- Treatment of ROP
- **Ambulatory vision** is defined as being able to see objects and move around a room without stumbling or bumping into obstacles.
- Unfortunately, 28% of children even with appropriate management and vitreous surgery end up with no light perception.
- Children with a **visual acuity of 20/200**, which would be **classified as legally blind**, very often function at a level much better than that when they are observed performing their daily tasks.



Why Are Infants in the NICU

BRONCHO PULMONARY DYSPLASIA and RETINOPATHY OF PREMATURITY

These are 2 problems following NICU care for which caregivers will be seeking assistance

Having knowledge about these problems will enable you to provide direction and support.



BPD and ROP

QUESTIONS?



References

BPD

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ROP

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