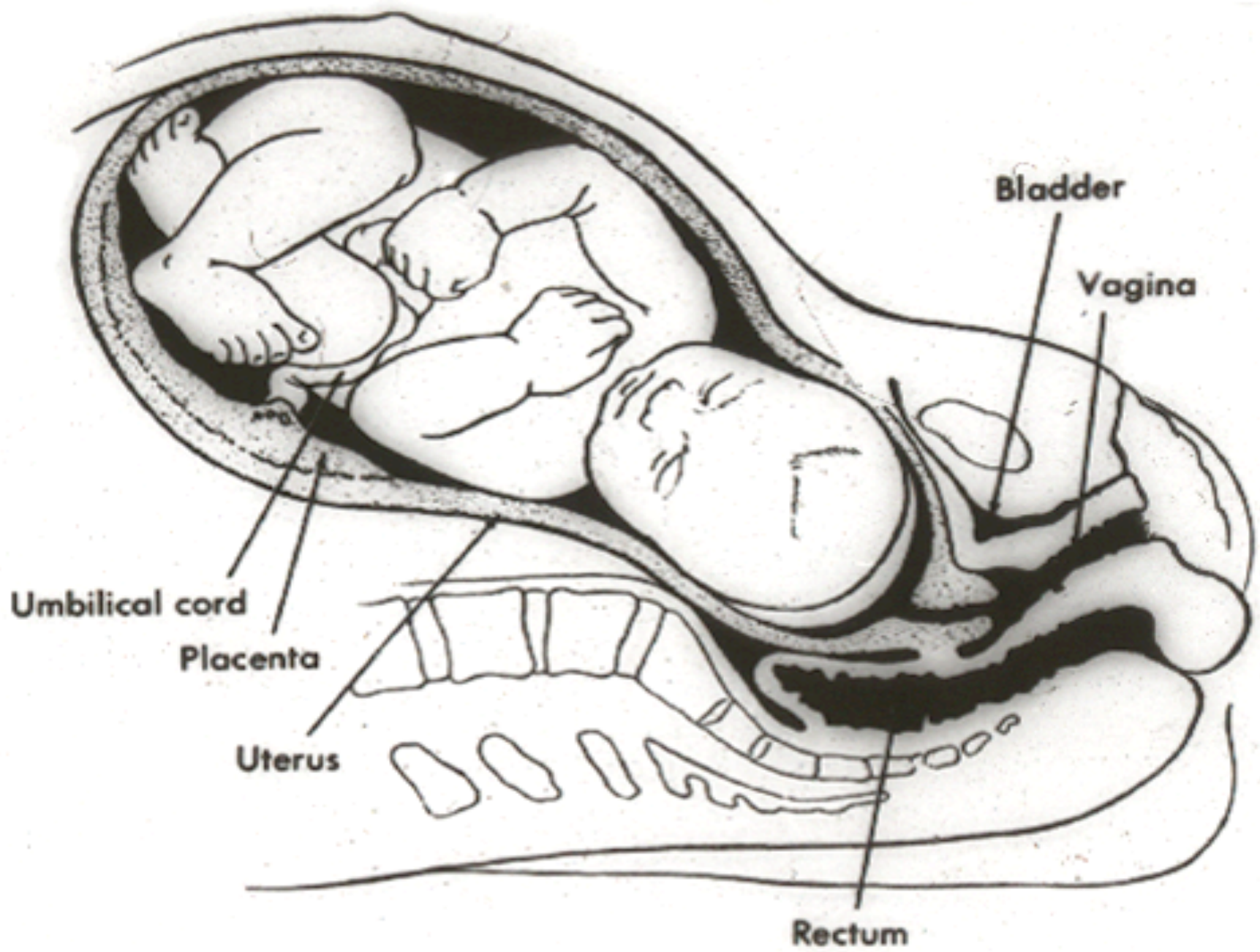


The Preterm Neonate

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The Preterm Neonate

- Gestational age less than or equal to:
37 weeks
- Usual birth weight of less than:
2500 grams
- Definition by birth weight
 - LBW 1000-1500 grams
 - VLBW 750-1000 grams
 - ELBW 500-750 grams

The Preterm Neonate

- Has unique problems not usually seen in term neonates, although disorders seen in term neonates may also occur in neonates born prematurely
- Problems usually are related to gestational age; more frequent and severe at the earlier gestational ages

The Preterm Neonate

- Some disorders/diseases of prematurity are:
 - Hypothermia and/or hypoglycemia*
 - Hyponatremia and/or hyperkalemia*
 - Respiratory distress syndrome (RDS)*
 - Bacterial sepsis*
 - Periventricular leukomalacia* (PVL)
 - Intracranial hemorrhage* (IVH)
 - Necrotizing enterocolitis* (NEC)
 - Patent ductus arteriosus* (PDA)
 - Retinopathy of prematurity* (ROP)
 - Hyperbilirubinemia*

* Not uncommon



The Preterm Neonate - Infection

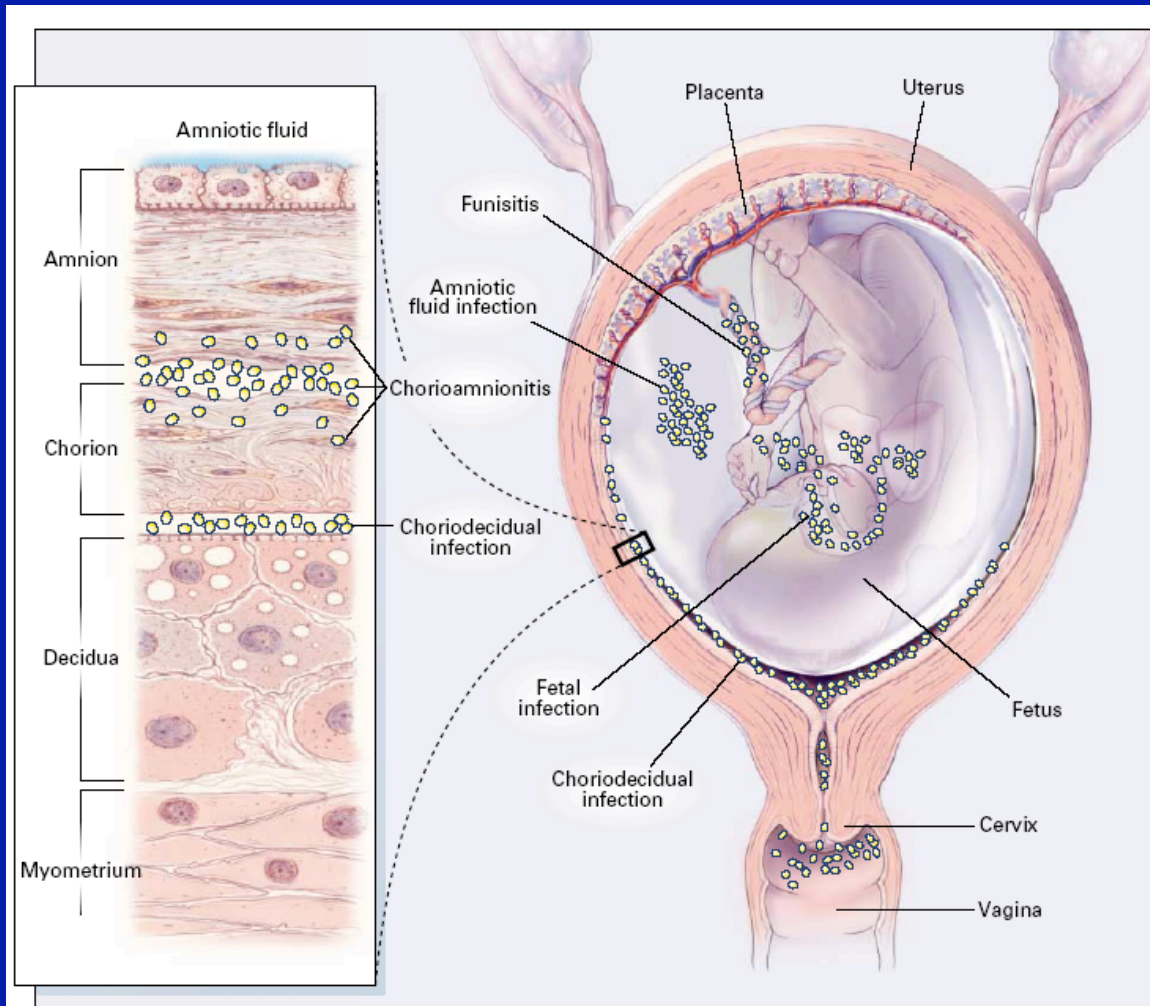
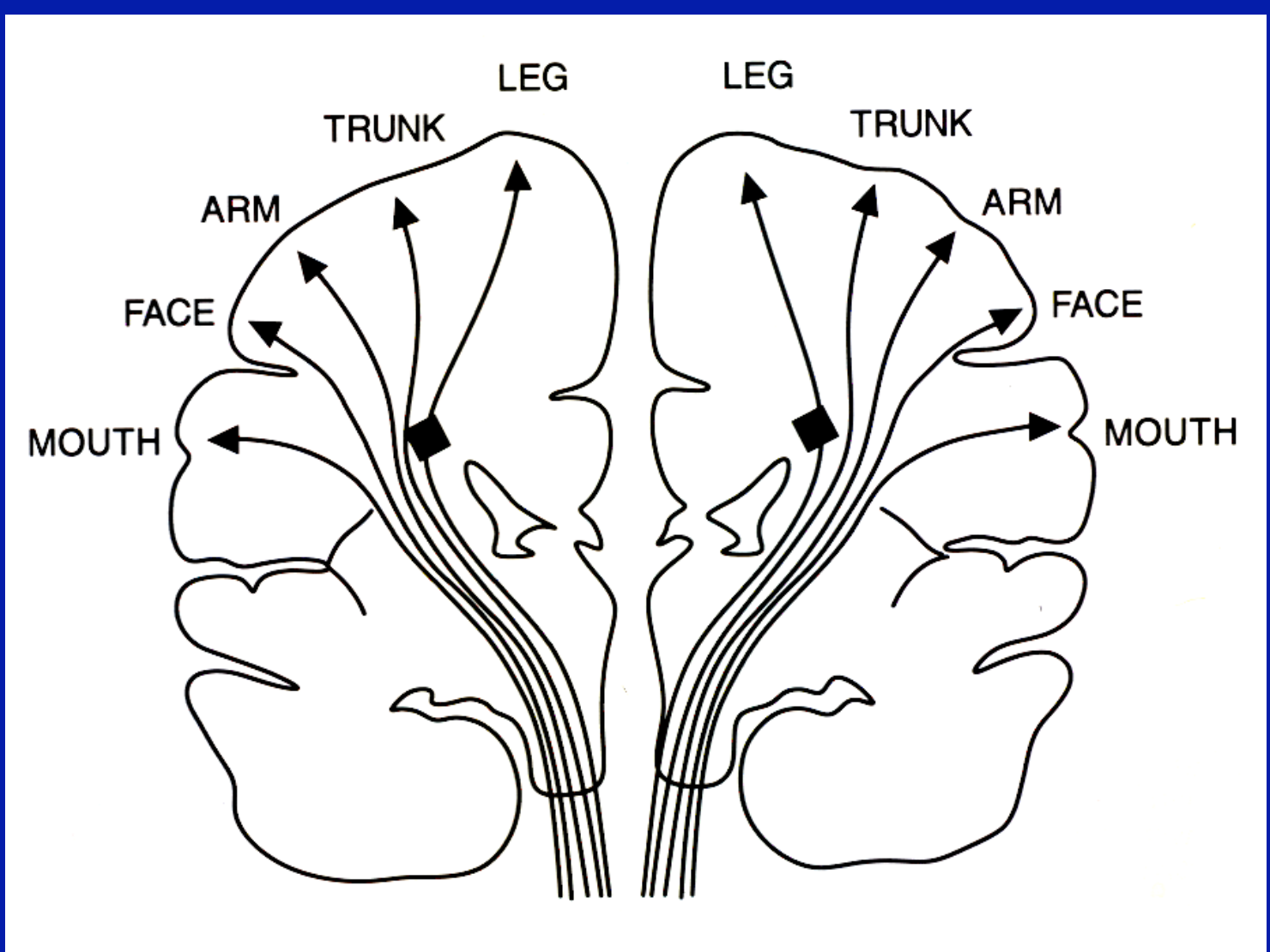


Figure 1. Potential Sites of Bacterial Infection within the Uterus.





The Preterm Neonate – Fluid Balance

- Fluid balance in the preterm neonate
 - *Invisible* water loss (cannot be measured easily)
 - Usual losses relate to: skin, GI or respiratory
 - Usual loss of about 35 ml/kg/day
 - Increased significantly for the first few postnatal days of life in ELBW neonates (skin losses); can approach 100-175 ml/kg/day
 - *Sensible* water loss (can be measured easily)
 - Usual losses relate to: urine output
 - Usual loss of about 65 ml/kg/day

The Preterm Neonate – Fluid Balance

- Maintenance fluid therapy
 - amount of water necessary to maintain balance (I/O)
 - IWL + SWL (usually 100-210 ml/kg/day)
- Complications caused by increased water needs of ELBW neonates
 - Hyponatremia and hyperosmolality if water needs not met (lose water in excess of sodium)
 - Hyperglycemia
 - PDA

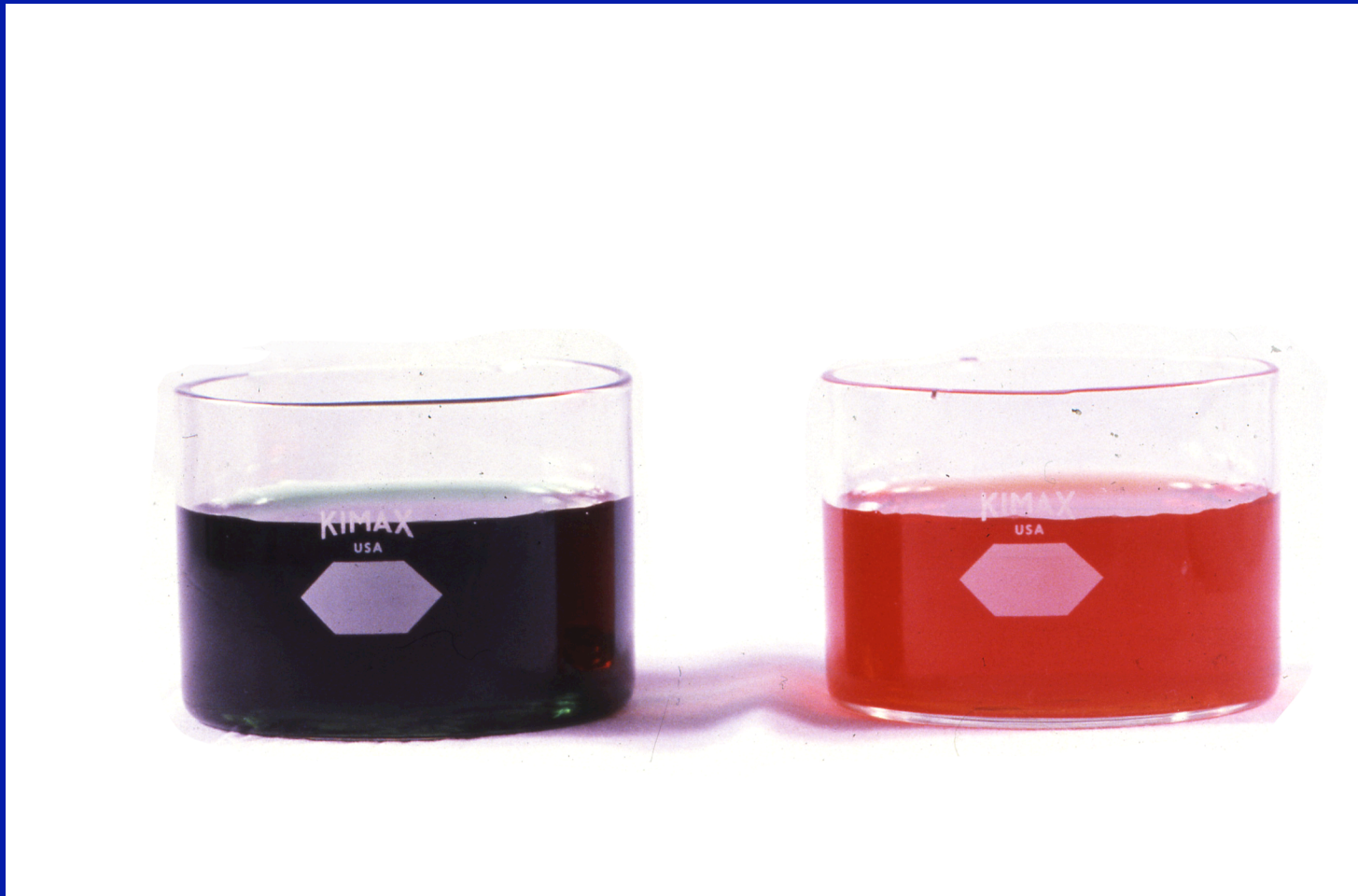




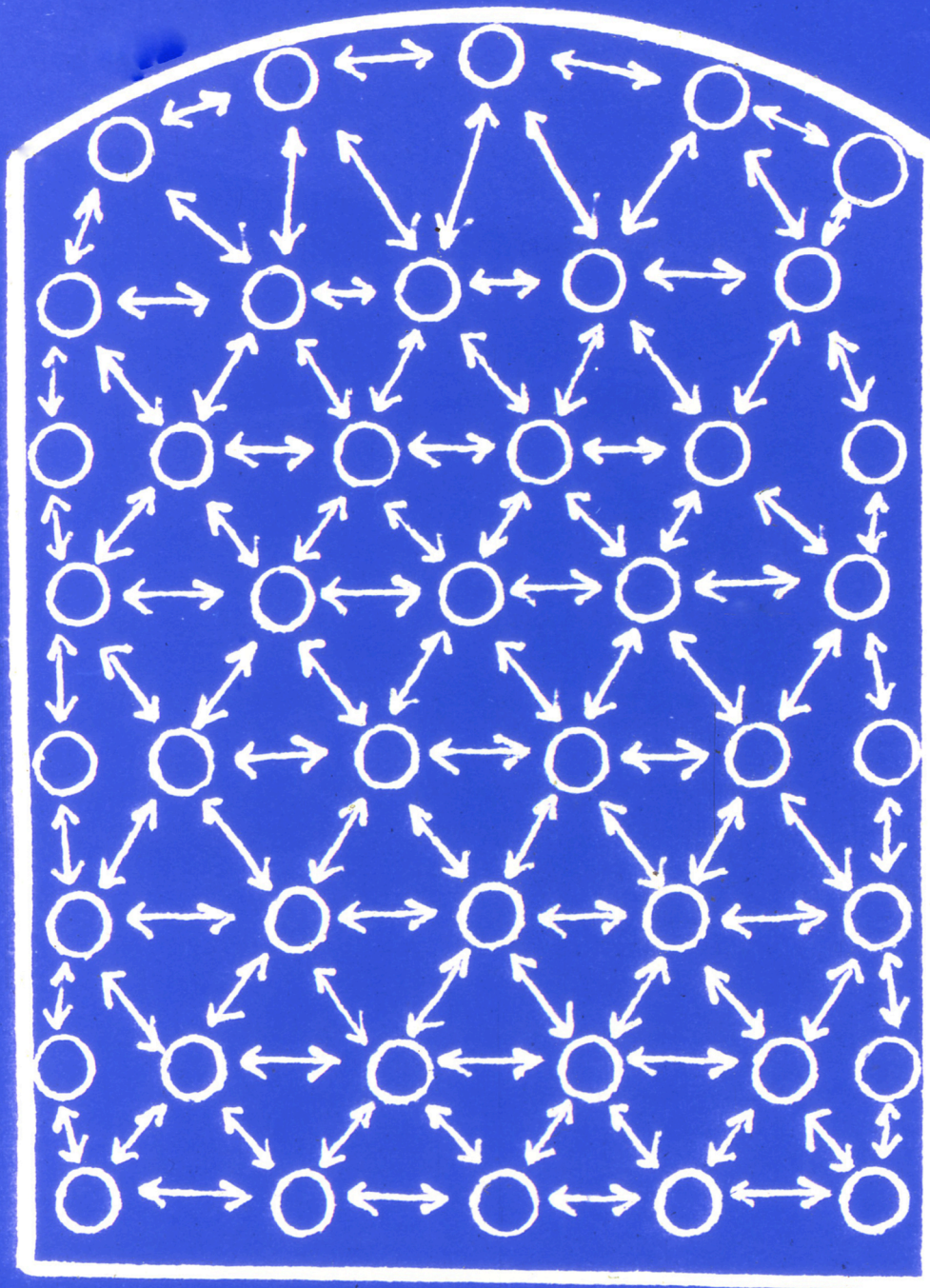
The Preterm Neonate

	Adult	Term	Preterm
	70 kg	3,000 grams	750 grams
Blood volume	5000 ml	270 ml	65 ml
C.O.	5000ml/min	450 ml/min	110 ml/min
Heart rate	70/min	160/min	160/min
S.V.	70 ml	2.8 ml	0.7 ml
B.P.	120/80	60/40	40/25

The Preterm Neonate – RDS













**Gets Your
Whole Wash
Clean!**

Wisk

**Heavy Duty
Laundry Detergent**

64 Fl. Oz. (2 Qts.)

CAUTION: EYE IRRITANT
See Caution on Box

187-408-871

e measured
pour a little
— rub in.
eded.



Put laundry and **remaining Wisk** into machine



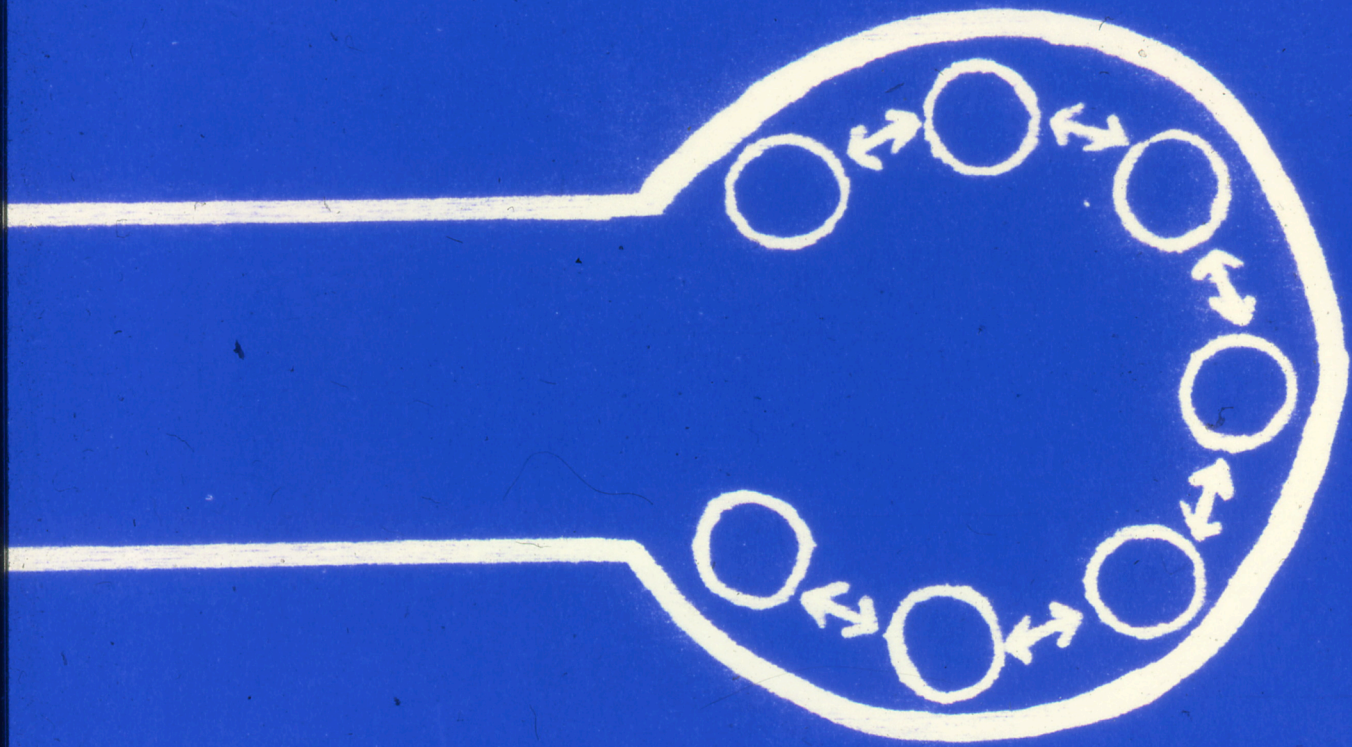
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Ingredients: Wisk contains anionic and nonionic surfactants (wetting agents to loosen soil); sodium citrate (softens water, improves cleaning); stabilizer (prevents product separation); buffering agent (improves cleaning) anti-redeposition agent (suspends soil); perfume, brightening agents, opacifier and colorants.

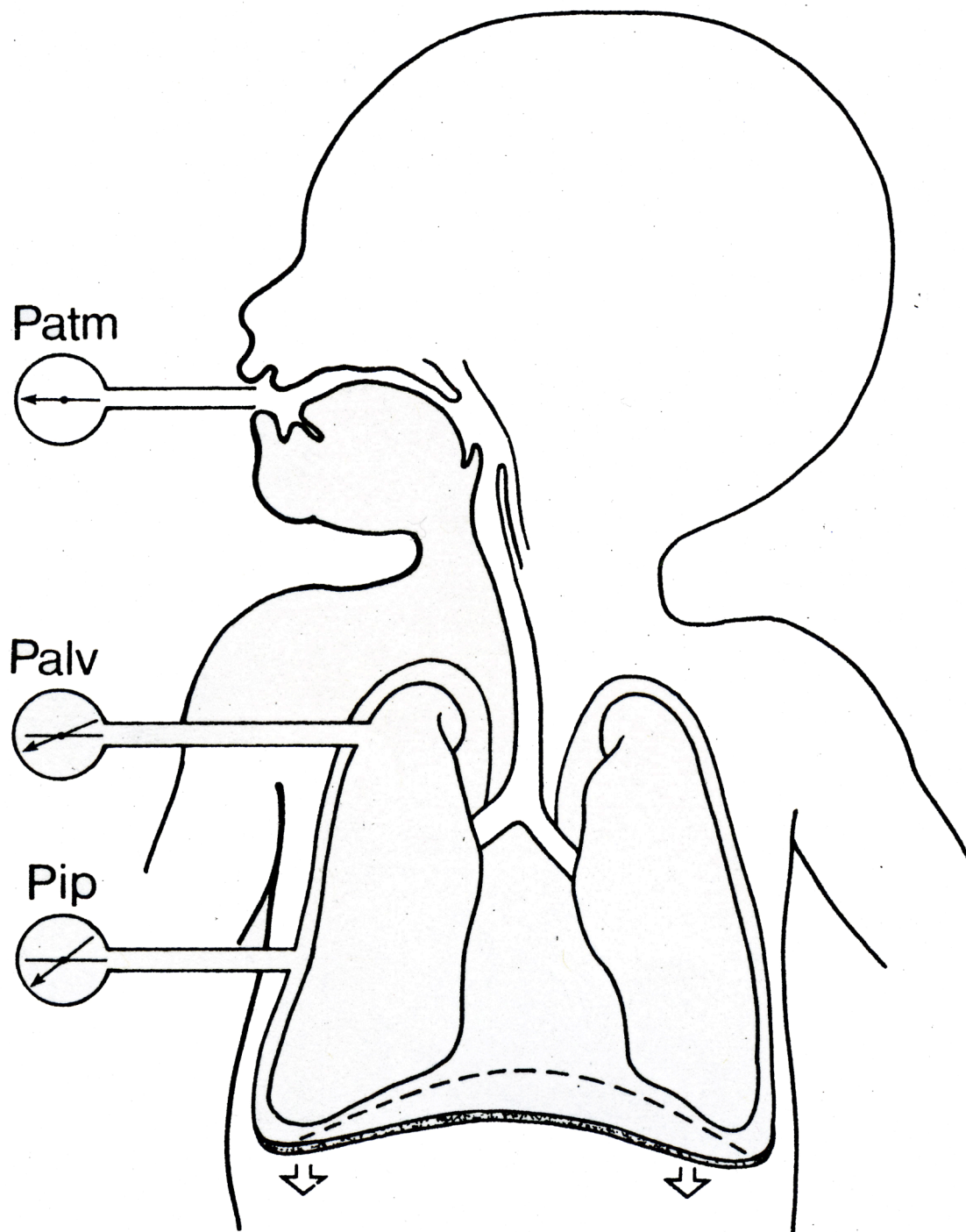
Made in U.S.A.
U.S. Patent No. 3,707,503.

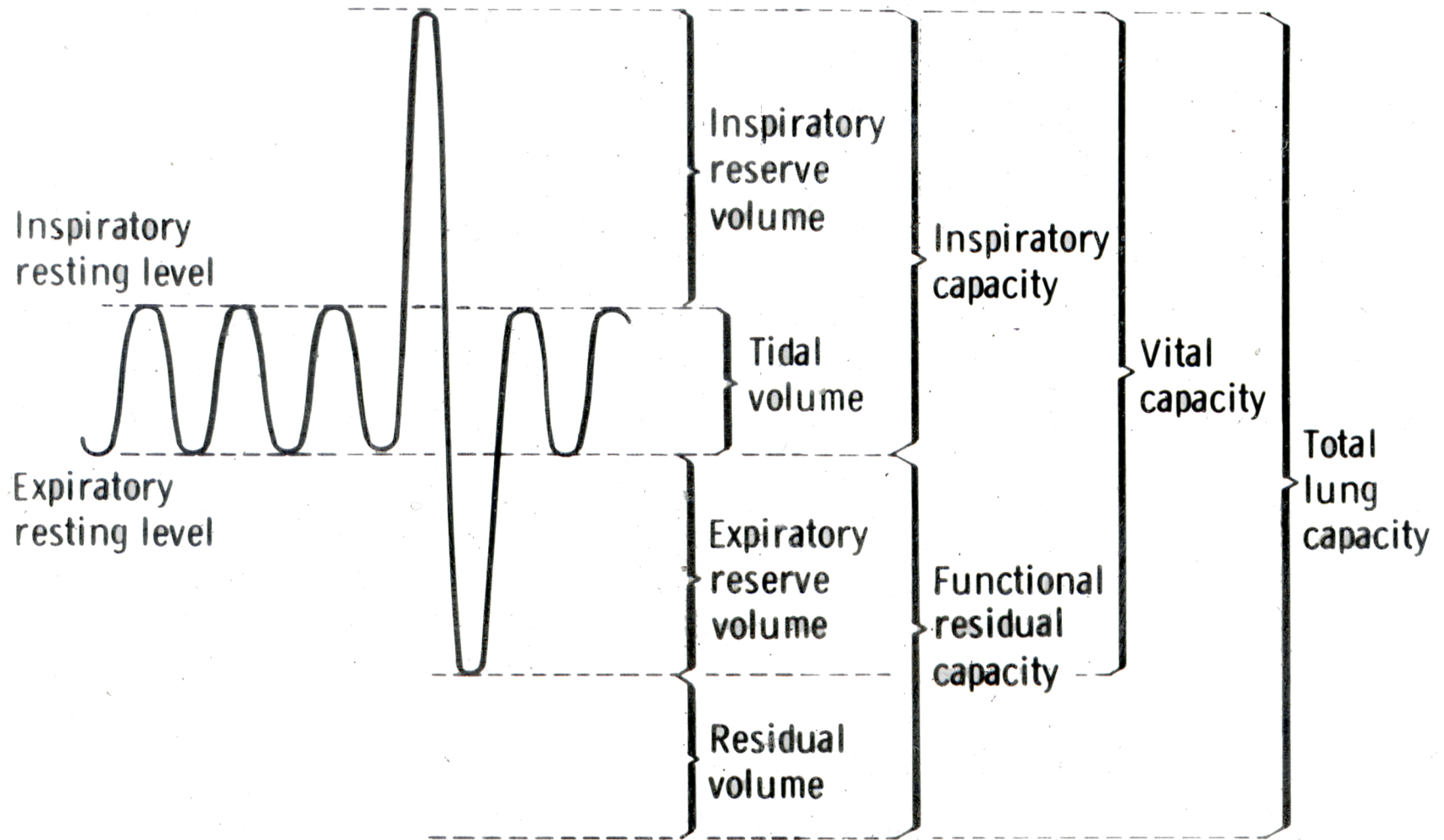
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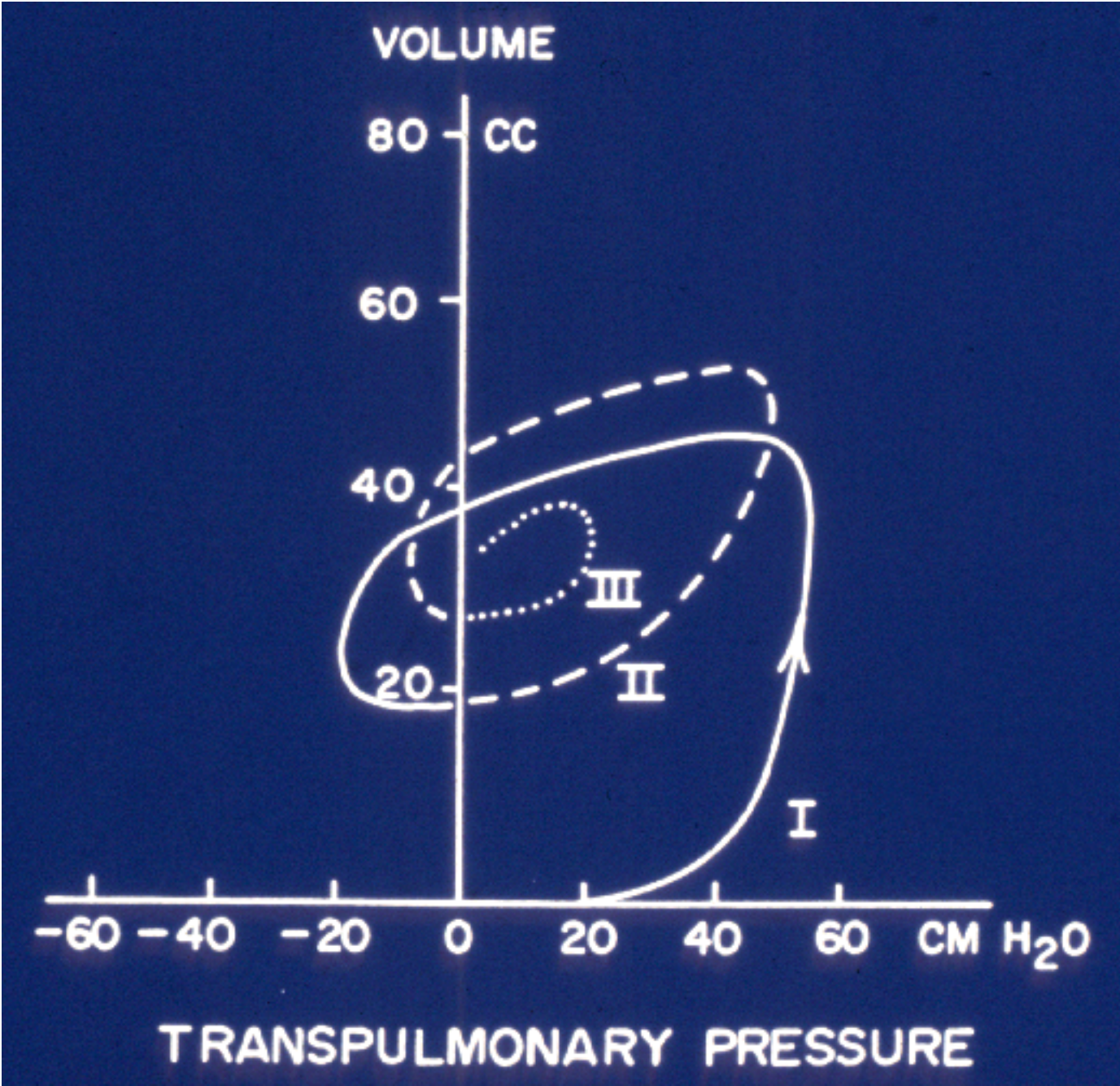


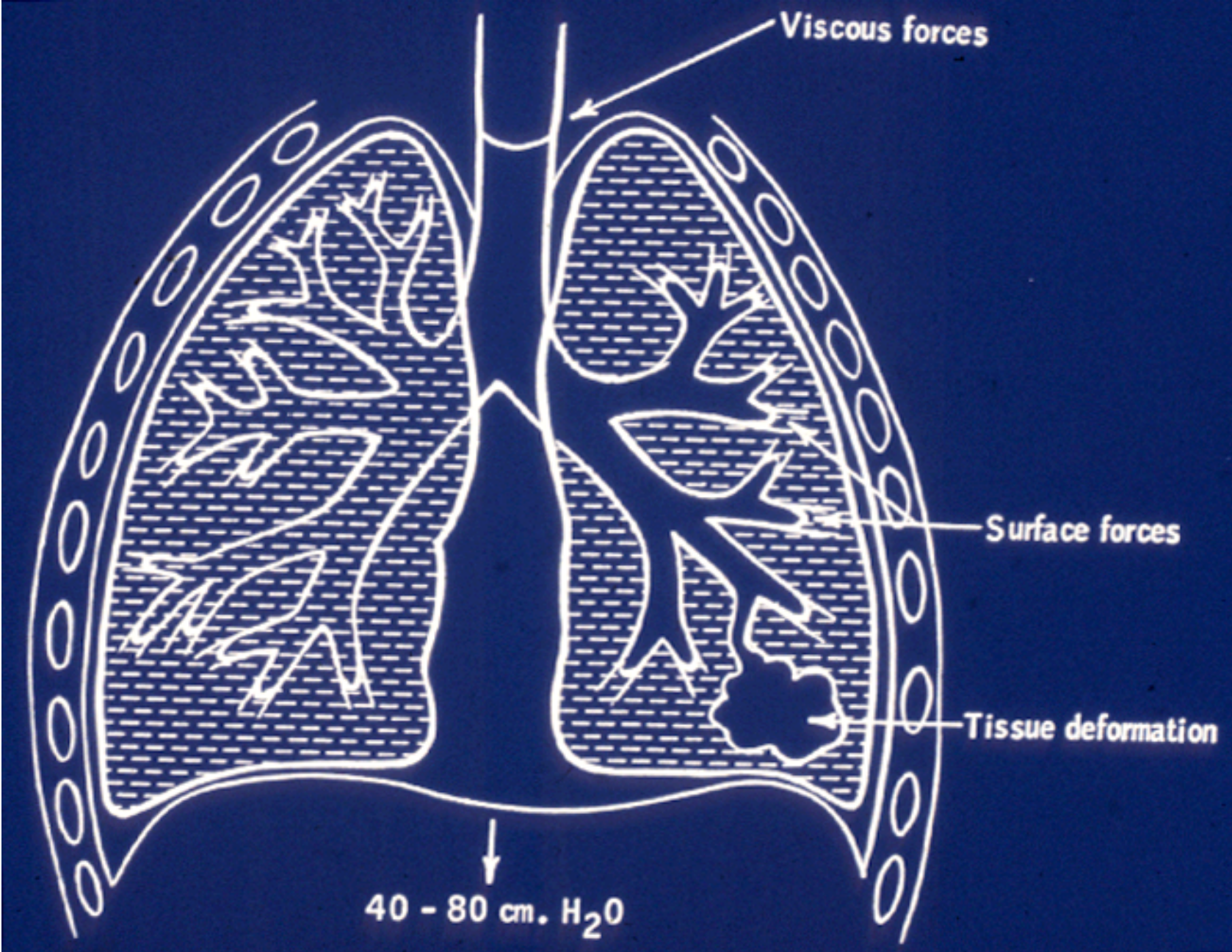
LaPlace's Relationship

$$\text{Pressure} = \frac{2 \times \text{Surface Tension}}{\text{Radius}}$$









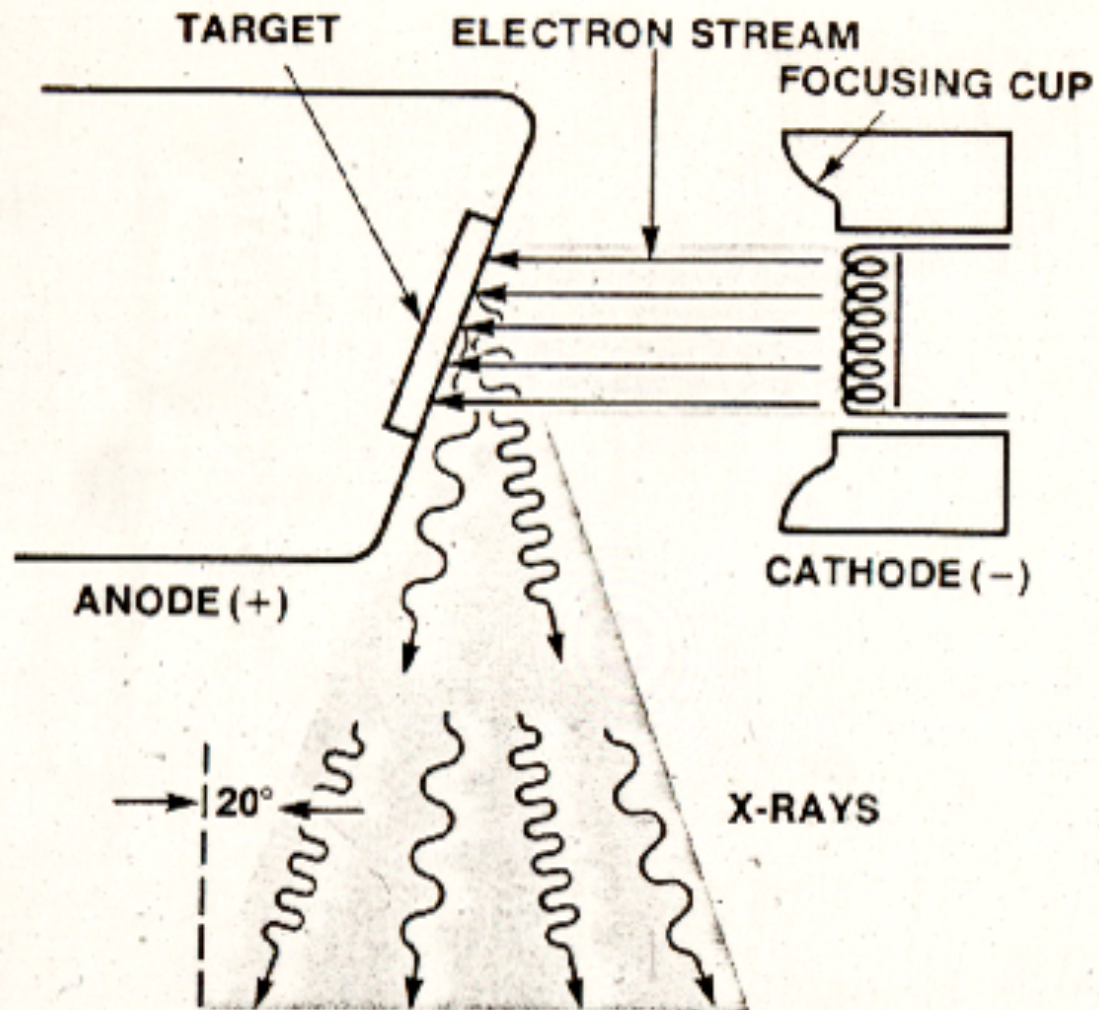
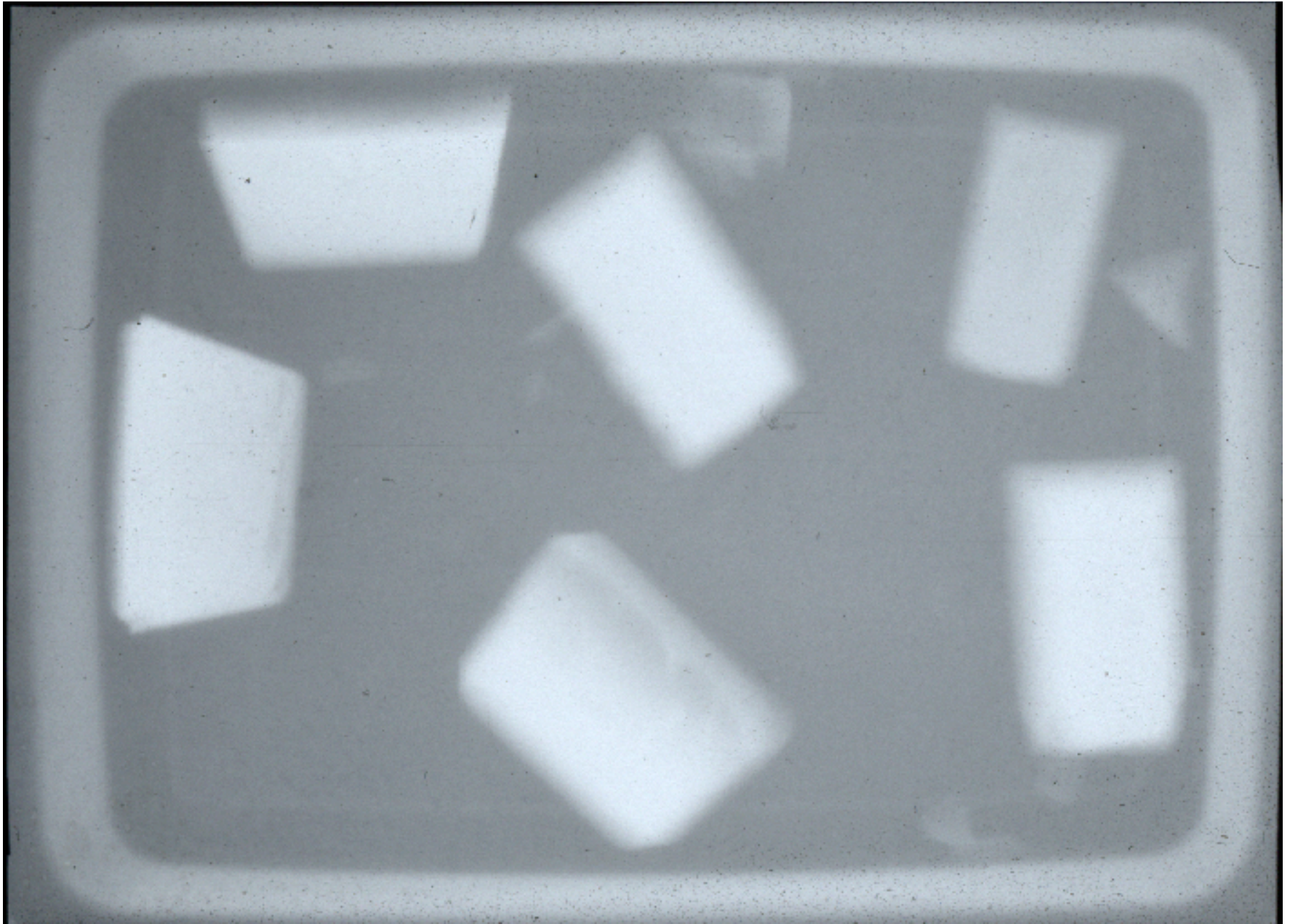


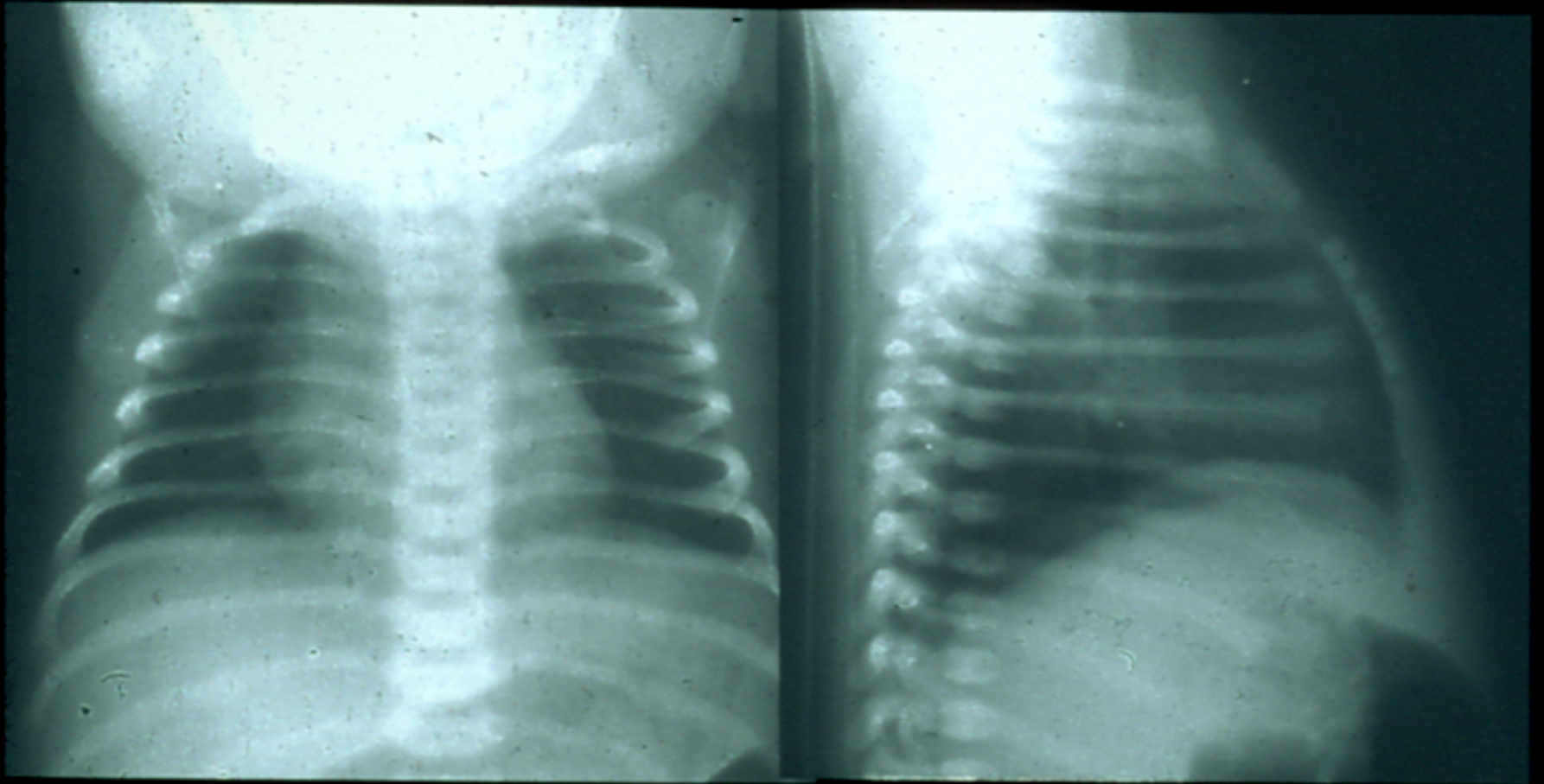
Figure 5 Emission of electrons from the heated filament of the cathode. The electrons strike the stationary target of the anode and x-rays are produced at the actual focal spot of the anode. Rays of different wavelengths and penetrating power are shown schematically.

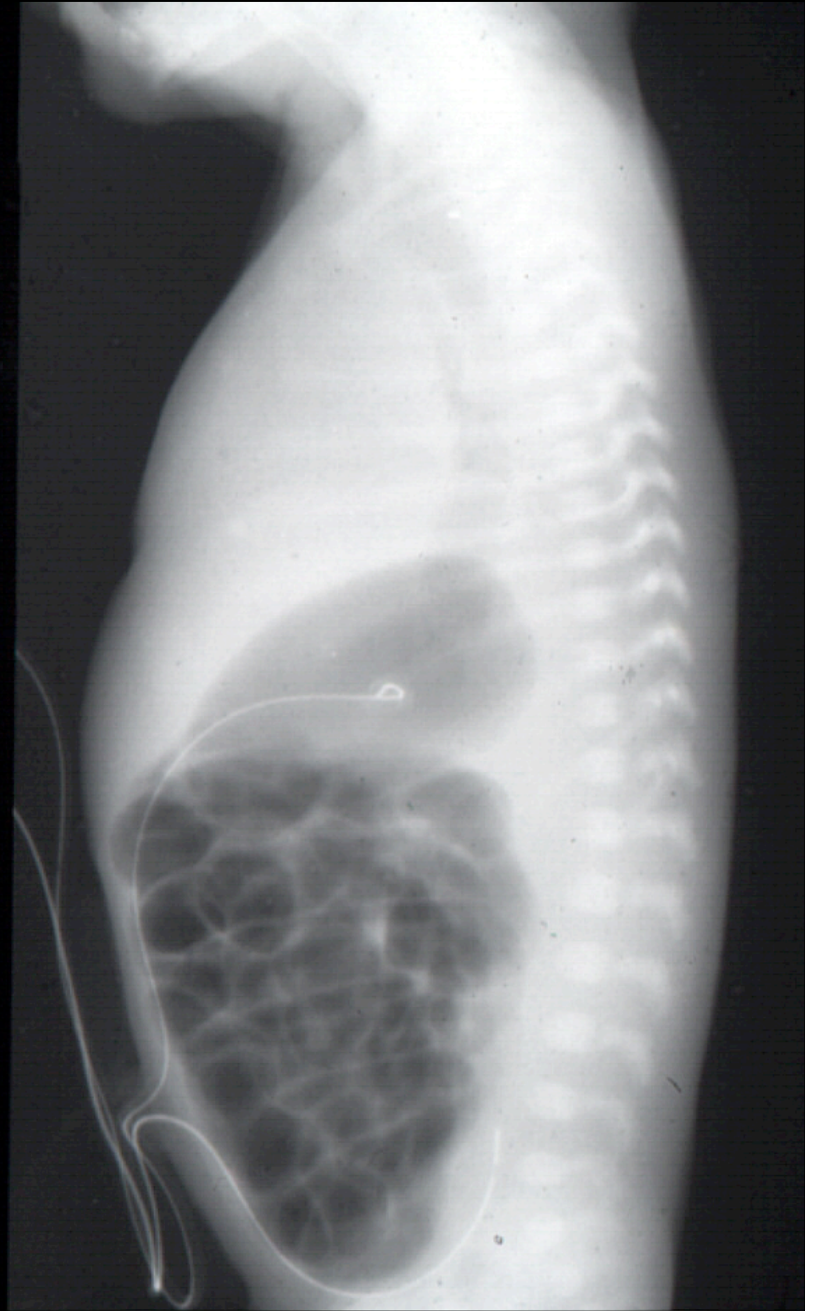
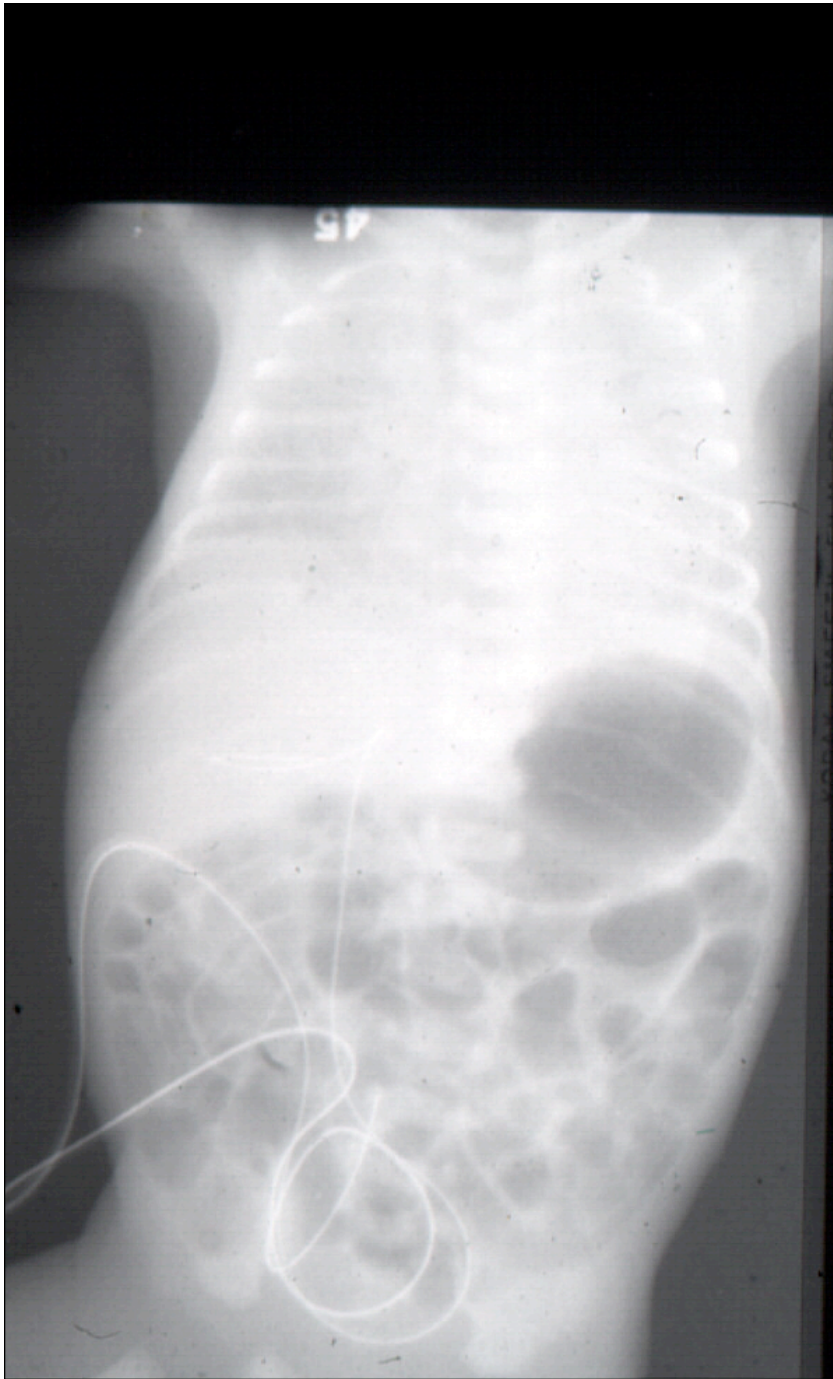


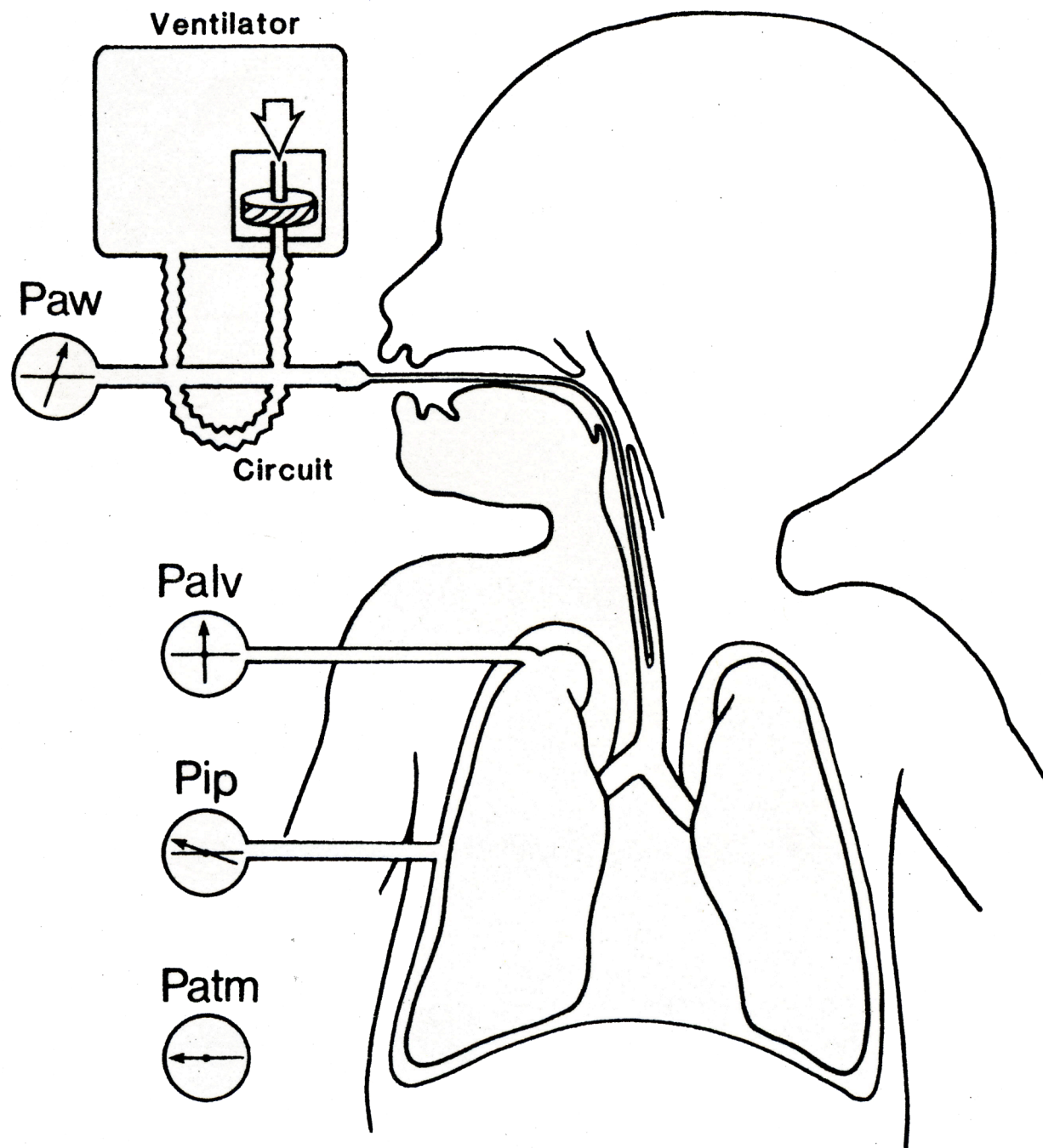




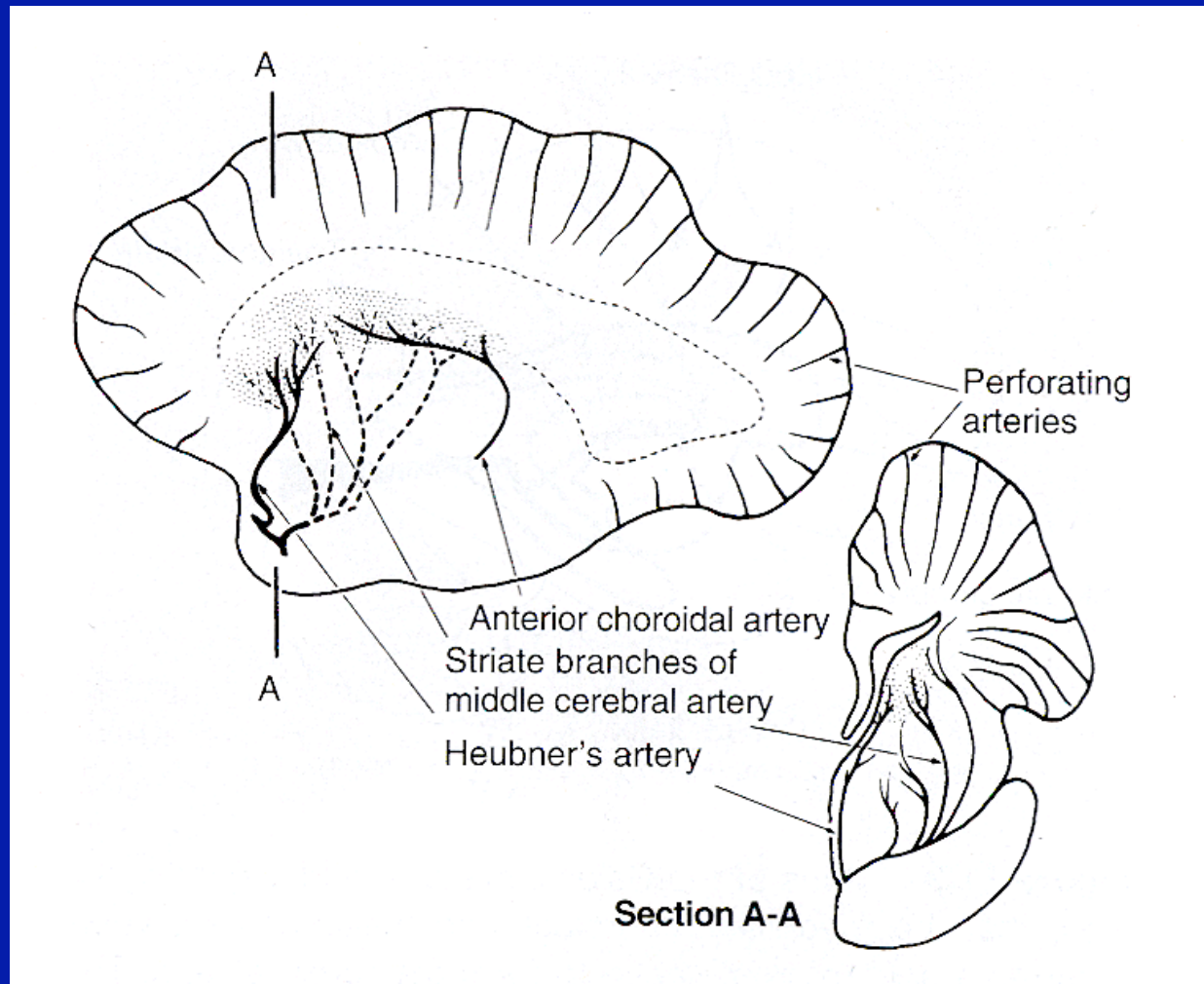






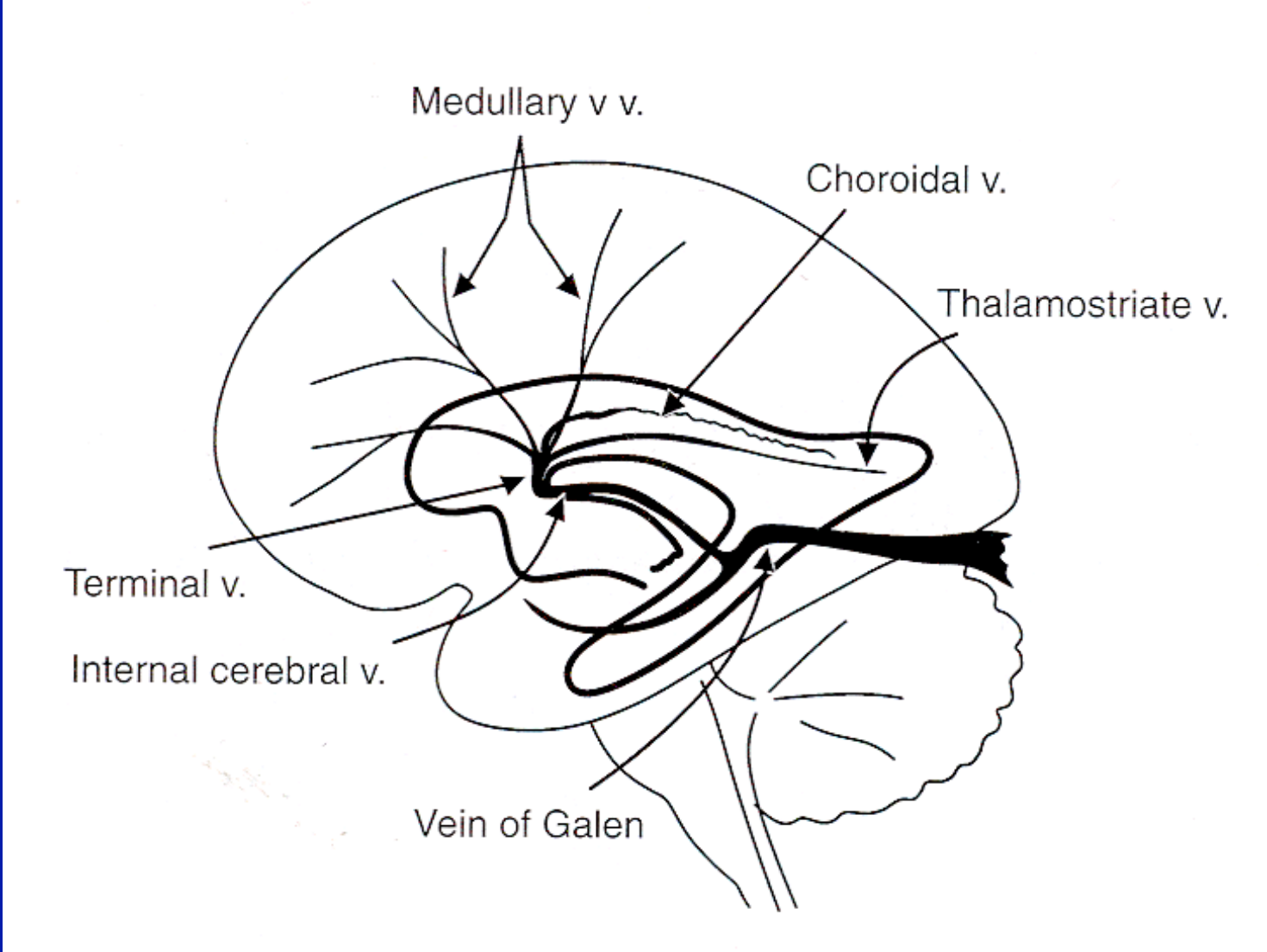


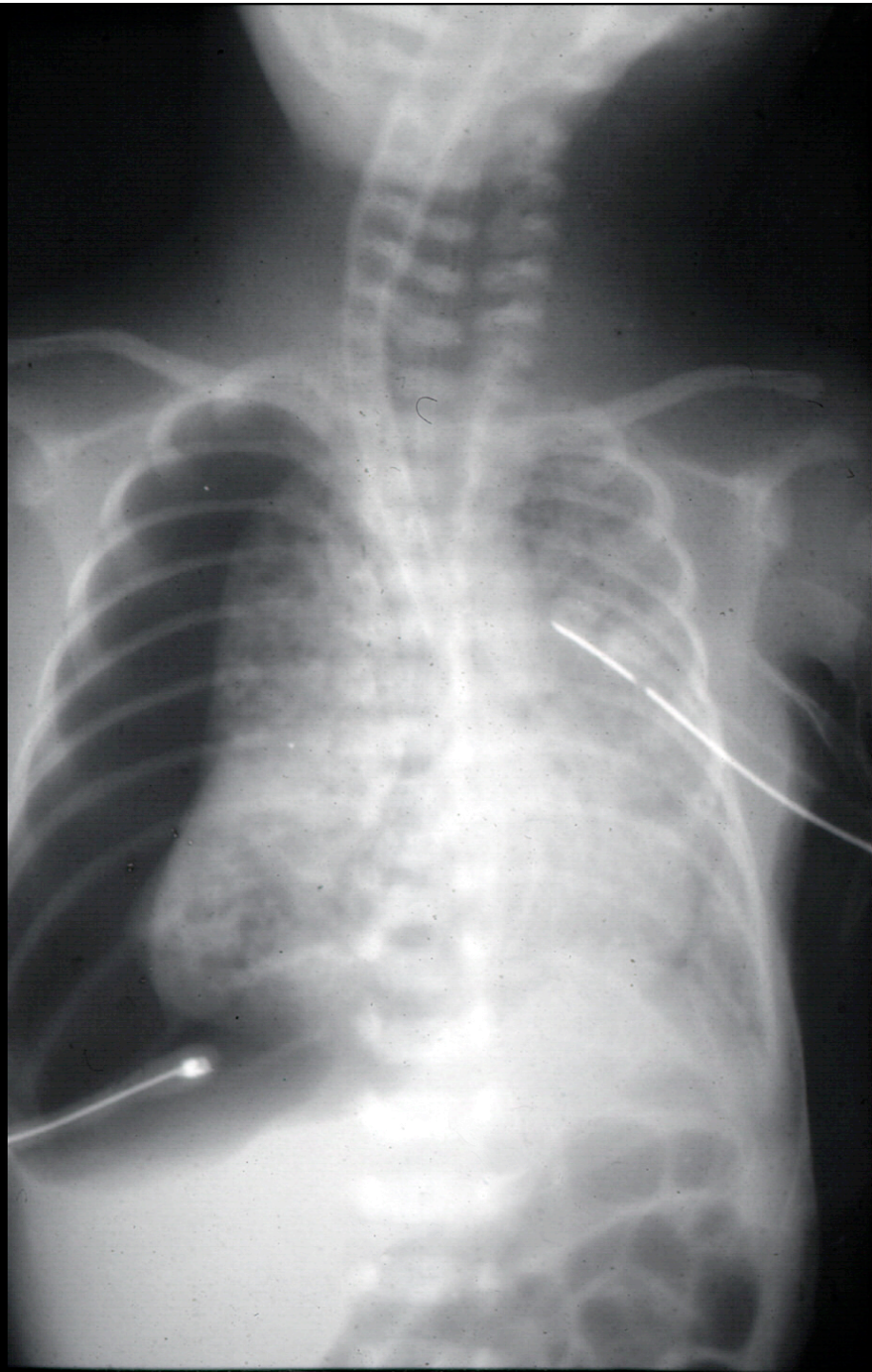
The Preterm Neonate – IVH



Cerebral Blood Flow

- Increases with:
 - Hypoxia (cerebral vasodilator)
 - Hypercarbia (cerebral vasodilator)
 - Hypertension (not autoregulated)
- Decreases with:
 - Hyperoxia (cerebral vasoconstrictor)
 - Hypocarbia (cerebral vasoconstrictor)







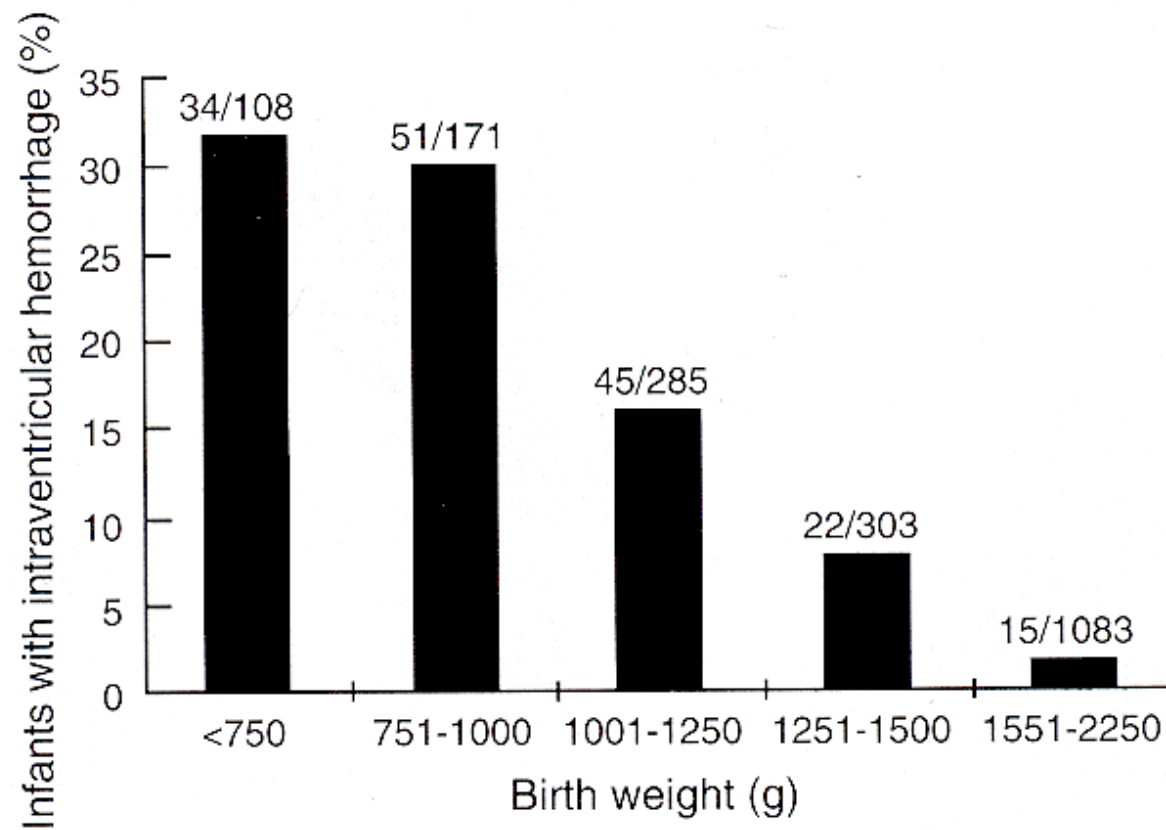
Intracranial Hemorrhage in Preterm Neonates

- Grading of hemorrhage
 - I limited to germinal matrix
 - II into ventricles, no enlargement
 - III into ventricles, with enlargement
 - IV into parenchyma and white matter

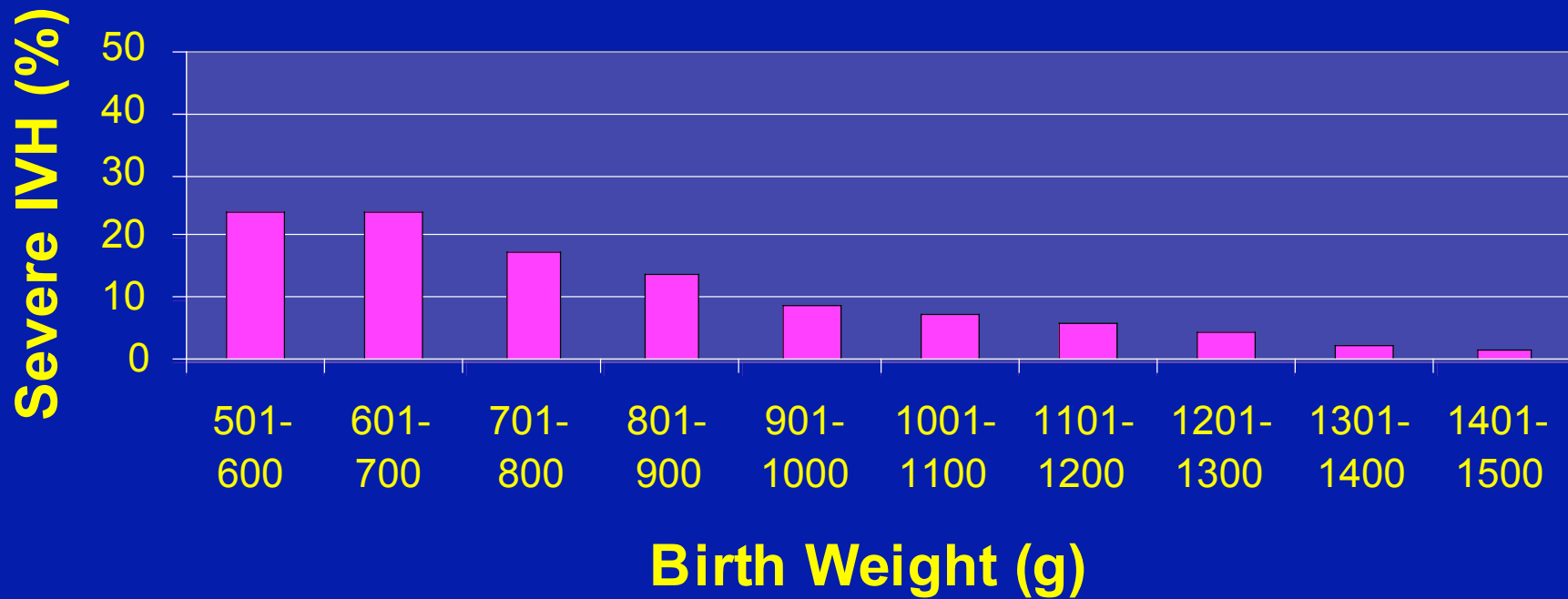
PVL periventricular leukomalacia

Papille et al

The Preterm Neonate – IVH and BW



Severe IVH by Birth Weight Vermont Oxford 2002



Neurodevelopmental Outcomes in Preterm Neonates (500-1500g)

- Intelligence quotient (IQ)
 - 4,000 preterm c/w 1570 term neonates
 - LBW: 5-7 IQ points lower
 - VLBW: 4-9 IQ points lower
 - ELBW: 12-17 IQ points lower

Neurodevelopmental Outcomes in Preterm Neonates (500-1500g)

IQ less than 70

odds ratio

birth weight < 750

9.54

birth weight 750-1500

2.15

SES has little impact upon IQ in ELBW

Neurodevelopmental Outcomes in Preterm Neonates (500-1500g)

- Contribute disproportionately to M&M
- Account for less than 1% of all deliveries
- 25% incidence of disability in survivors
- Highest incidence in most immature neonates
- Low severity cerebral dysfunction on the rise
- < 4% incidence of disability in term neonates

OUTCOME of EXTREME PREMATUREITY

gestational age	death¹	Survival with disability²	Survival w/o disability
22 weeks	100 %	?	?
23 weeks	52 %	18 %	30 %
24 weeks	33 %	21 %	46 %
25 weeks	24 %	20 %	56 %
26 weeks	19 %	17 %	64 %

¹ MSCHONY 2004-2006

² 11 reports from tertiary perinatal centers in Canada, USA, & Australia from 1977-1995

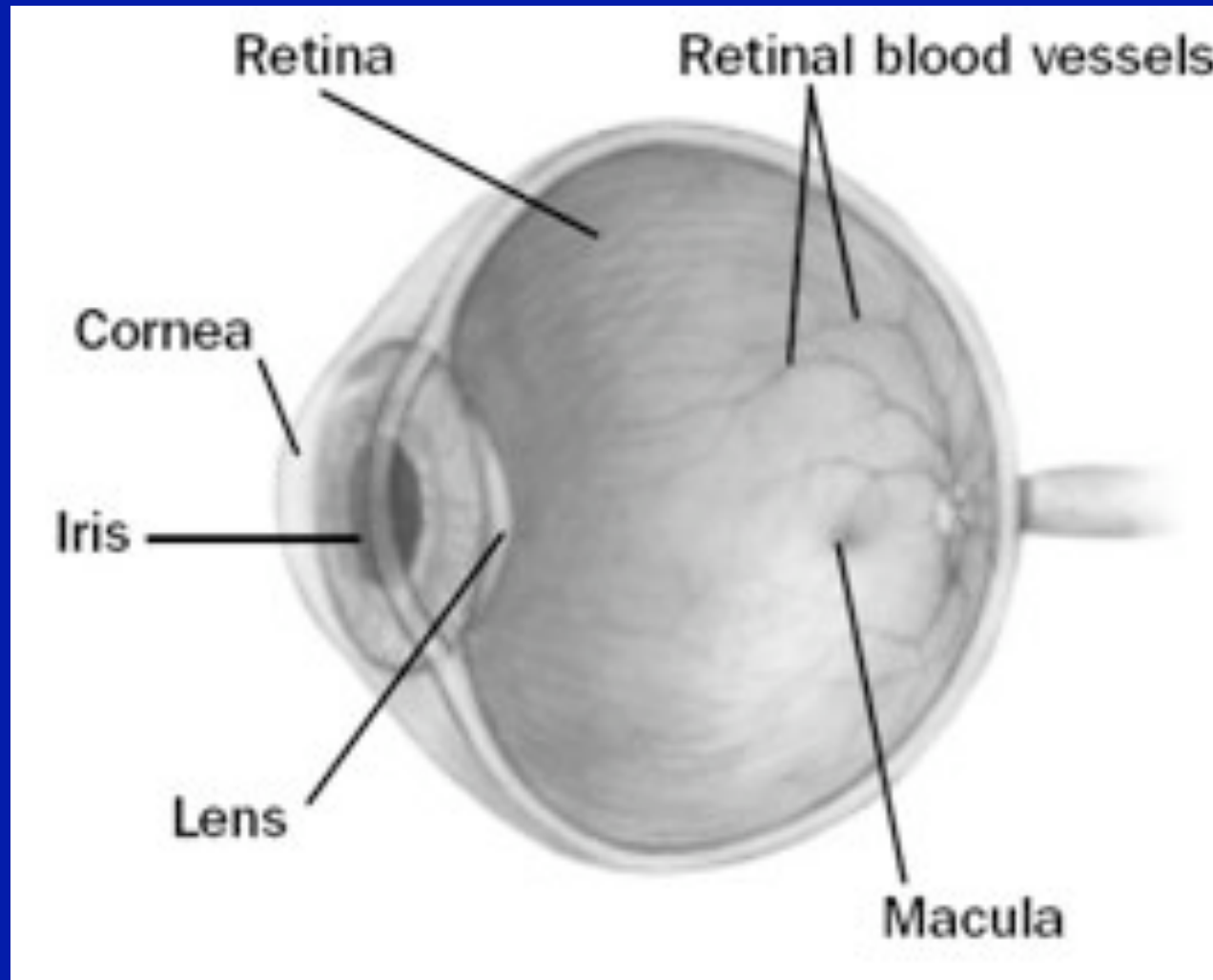
OUTCOME of EXTREME PREMATUREITY

gestational age	Survival¹	% of survivors w/disability²	% of survivors w/o disability
22 weeks	0 %	?	?
23 weeks	48 %	37 %	63 %
24 weeks	67 %	32 %	68 %
25 weeks	76 %	26 %	74 %
26 weeks	81 %	21 %	79 %

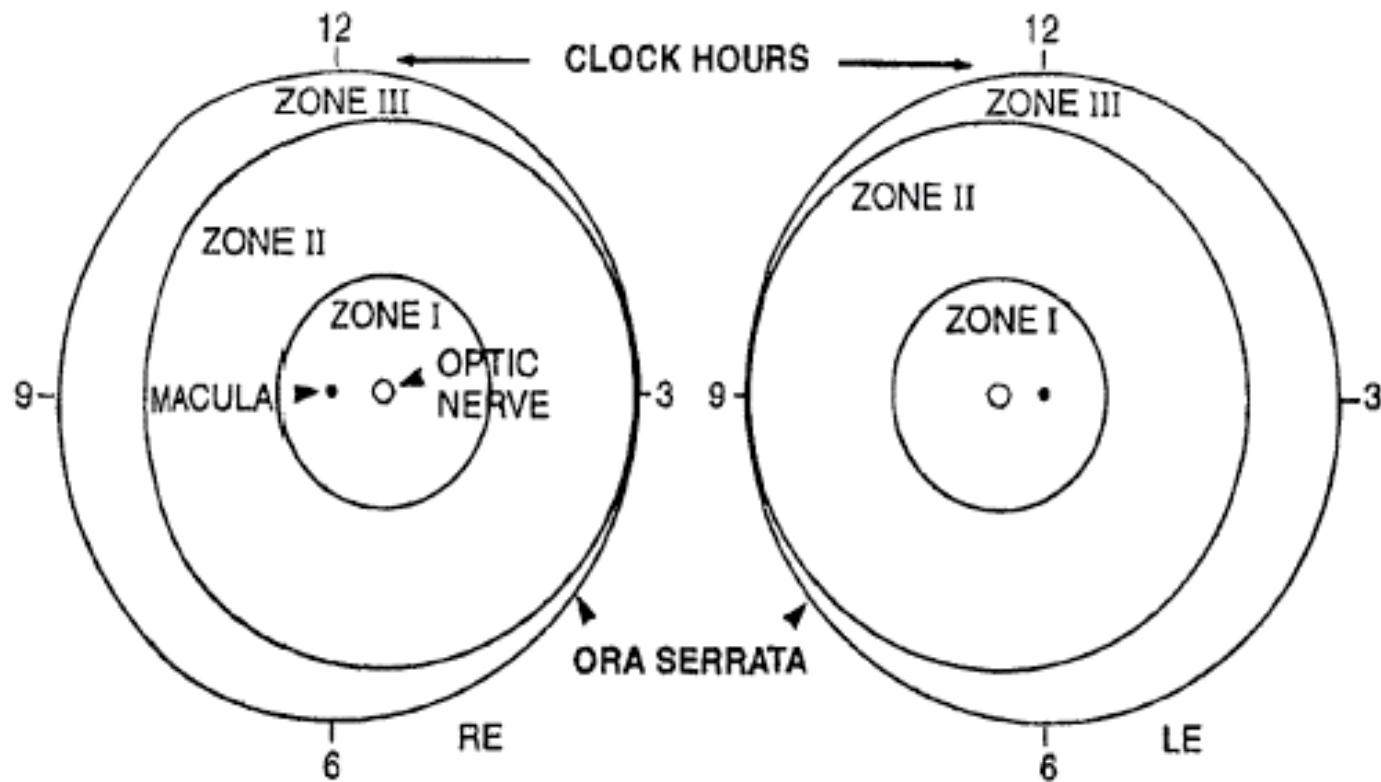
¹ MSCHONY 2004-2006

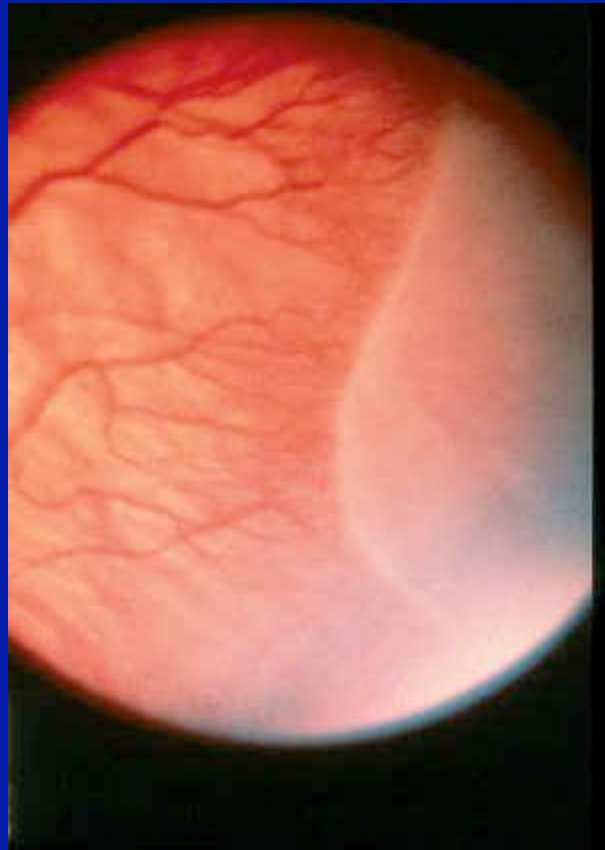
² 11 reports from tertiary perinatal centers in Canada, USA, & Australia from 1977-1995

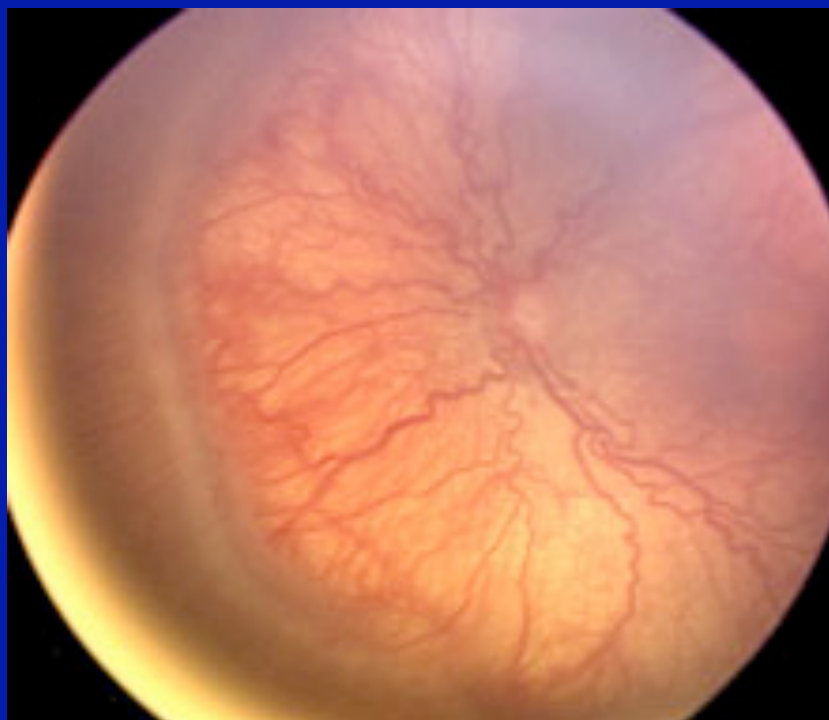
The Preterm Neonate – ROP



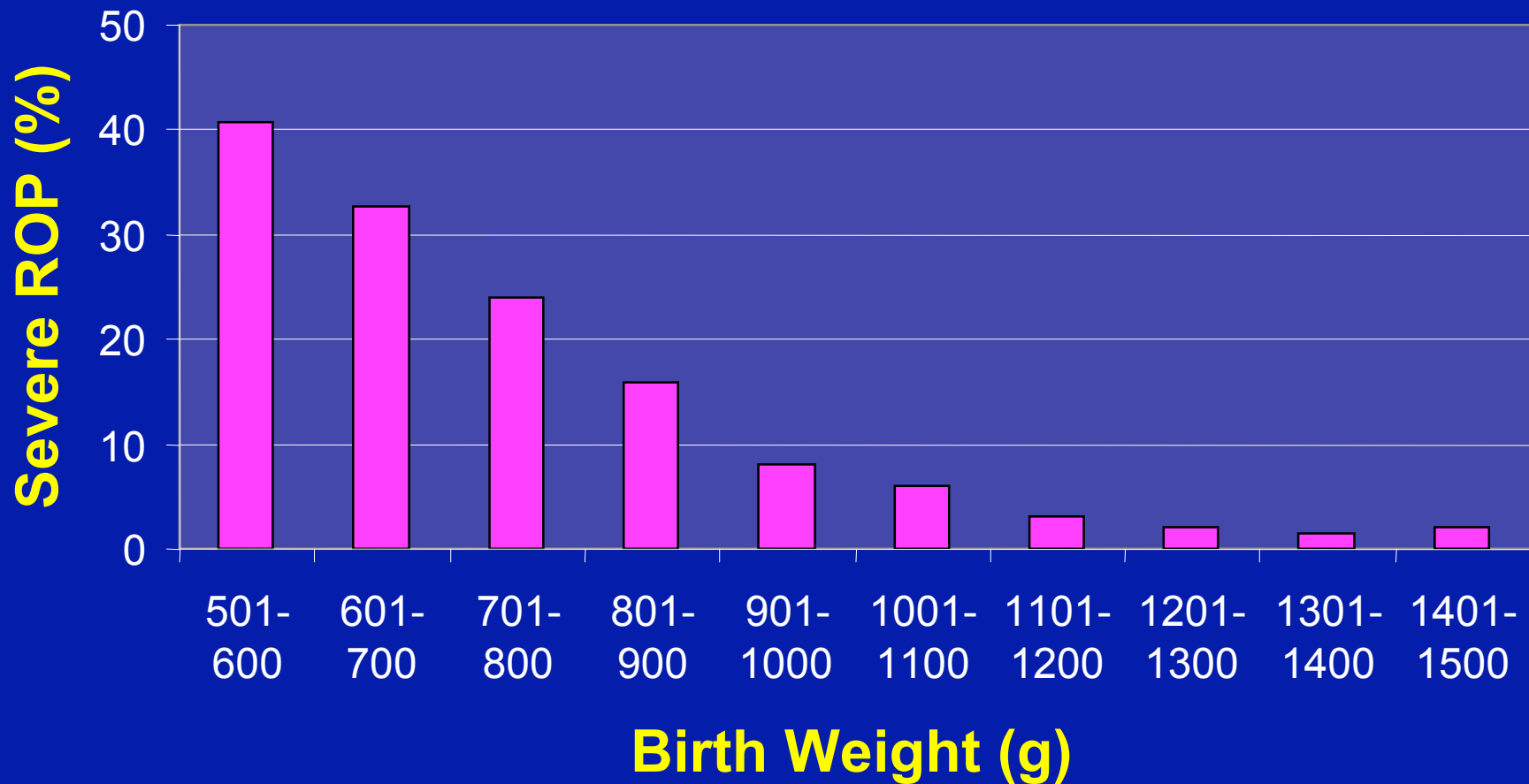
CLASSIFYING RETINOPATHY OF PREMATURITY







Severe ROP by Birth Weight Vermont Oxford 2002









WARNING



DO NOT allow
rear-facing
child seat on
front seat
with air bag
DEATH OR SERIOUS INJURY
can occur.
The back seat is the safest
place for children's car
seats.

IMPACT PROTECTED
Peg-Perego

