Michael R Jackson BS RRT-NPS CPFT

- Instructor Neonatal & Pediatric Northeastern University 1996-2006
- Presidente MSRC 1999
- Webmaster MSRC & surfneon.com
- Delegar a National AARC* Câmara dos Delegados
- Presidente de Assuntos Governamentais

* Massachusetts Society for Respiratory Care (http://www.msrc.org)
* American Association for Respiratory Care (http://www.aarc.org)

Respiratory Therapy

Credenciados pelo National Board (nbrc.org)
Licenciado pelo Estado (Massachusetts)

- A maioria das RTs são hospitalar baseado
- Credenciamento Especialidade inclui: Neonatal - Pediátrica, Adulto Intensiva
- Associate Degree mínima com Bacharelado preferenciais
- 120.000 trabalhando nos EUA 2012 mediana 56.000 dólares / ano.
(Neonatal $ 64K/yr).
- Praticar principalmente no Canadá, Taiwan, América Central, a Arábia Saudita
- Profissão crescimento projetado 2012-2022 inclui proliferação na Mexico, China e Índia

Respiratory Therapy

Este é um grupo de médicos, fisioterapeutas, enfermeiros e respiratory terapeutas do Massachusetts General Hospital Trauma Team. Eles estavam tratando vítimas da Maratona 2013 bombardeio. Muitas vidas foram salvas pela resposta rápida.

Minha filha, Bonnie Royce RRT, é o terceiro a partir da esquerda.

Beth Israel Hospital Boston Respiratory Care

Forrest Bird

Forrest Bird é um aviador e inventor. Ele nasceu em Massachusetts em 1921. Ele associado com Orville Wright & Howard Hughes. Ventilador de Forrest foi o primeiro construído a partir de uma lata de morangoes. Forrest projetou o pássaro Ventilador do bebê e apresentou-o em 1971. Ele é muito ativo ainda na Associação Americana para Respiratory Care.
(http://www.cbsnews.com/news/forrest-bird-the-birdman-of-idaho/)

Os Kennedys foram as férias em Cape Cod, em Massachusetts. A força aérea construída uma maternidade na base da força aérea nas proximidades. Políticos rivais acusou a administração Kennedy de desvio de fundos. O presidente dos EUA tinha envergonhado o aparelho desmontado.

Jackie Kennedy tinha um histórico de complicações maternas. O bebê nasceu com 34 semanas de gestação e mostrou sinais de RDS. Bebê foi levado para o Hospital Infantil de Boston. Últimas tentativas desesperadas de cuidados incluíram o uso de uma câmara hiperbárica.

http://www.nytimes.com/2013/07/30/health/a-kennedy-babys-life-and-death.html?_r=0&adxnnl=1&pagewanted=all&adxnnlx=1382274213-Lh6zybYS3gdBVXvMhLhOKQ

GUIDE TO FEATURES

The Boston Globe

MORNING EDITION

COLD STANDARD

THURSDAY, AUGUST 8, 1963

41 PAGES—10c

BABY SPED TO BOSTON

Has Trouble Breathing; Kennedy Stands by Here

By DOUGLAS S. CROCKET

Patrick Bouvier Kennedy—the first child born to a United States President in office in 63 years—fought a potentially serious respiratory ailment in Children's Medical Center this morning.

Reports of the infant's condition, and progress in his fight, were sparse, but shortly before midnight White House Press Secretary Pierre Salinger said the baby was not in critical condition.

That was the last report given out as of 4 a.m.

President Kennedy, flown here by helicopter, spent an anxious night at the Rice Cottage. The President, who visited his third child briefly at Children's Medical Center, retired for the night at 11:30.

He planned to return at 7:45 a.m. today to Otis Air Force Base to visit Mrs. Kennedy, reported distressed over her baby's ailment but otherwise in "excellent condition."

The President plans to return to Boston to see the baby again tonight.

Mrs. Kennedy's mother, Mrs. Hugh D. Auchincloss, visited the base hospital shortly before midnight and told reporters she had found her daughter "remarkably well" and "in good spirits."

Mrs. Auchincloss, smartly dressed in a black suit with a double strand of pearls, spent about 20 minutes in the hospital room. She had been shopping in New York with another daughter, Janet, when she learned of the birth.

Mrs. Auchincloss and Janet spent the night at the Officers' Club at Otis.

Salinger said that the baby will be in the Boston hospital for at least four days.

"It takes that long for the conditions to develop to a point where doctors can make a final diagnosis," he said.

Salinger was asked if the baby was on the danger list.

"I would not say that," he replied.

Salinger then was asked, "Would anybody else?"

"Well, nobody that I talked to has," he answered.

Children's Medical Center said it was forbidden to give out information as the baby's condition because it had been told all such information must come from Salinger.

The baby was rushed the 65 miles from the base in an Isolette—an improved incubator.

Attending him during the police escorted trip was Dr. James E. Strohsnijer of Brookline, a specialist in children's respiratory diseases.

THIRD CHILD Page 2

MRS. KENNEDY
Confines resident

After Visiting Baby

President leaves Children's Hospital

Infant Arrives at Children's Medical Center

Isolette, a portable incubator, is taken from ambulance. (UPI Photo)

Whole World Taken By Littlest Kennedy

By GLORIA NIGRI

He is only 4 pounds 10½ ounces, but Wednesday he held the heartstrings of the world in his little red fists.

In Washington, Bonn, Square Island, Hyannis Port, Rome, Paris and in the Kremlin, heads of state waited upon his every move along with the peasant in the field and the man on the street.

He set in motion a series of events within a matter of minutes that would take even a king at least a day. He caused the President of the United States to drop everything in Washington and fly to a leisurely, green barnacles on Cape Cod to be there to receive him.

He caused, through circumstances beyond his control, the mobilization of some of the country's most skilled medical men. And, for the same reason, he caused some people who seldom pray to ask the Lord to be good to this little fellow who had just arrived through His grace.

With a name like Patrick Bouvier Kennedy he couldn't have done less.

The littlest Kennedy of them all chose a fine Summer day to arrive on Cape Cod. His timing was bad though, because his overheated mother, Jacqueline Bouvier Kennedy, wasn't expecting him for another five-and-one-half weeks.

So, it was logical that she should take her two other children, Caroline, 5½, and John Jr., 2½, out to a stable in Centerville on Cape Cod to look at the horses.

It was there, at 11 in the morning, that Mrs. Kennedy realized her child's birth was imminent. Twenty-eight minutes later, Mrs. Kennedy was in a helicopter with Dr. John Walsh and flown to a specially-equipped building at Otis Air Force Base in Falmouth.

PATRICK Page 4

They Helped —And Hoped

The contributions of Children's Hospital to receive the President's son. Page 6.

The quiet parties pulse in court which led the Otis Air Force Base ambulance to Boston. Page 6.

The story of Brooklyn-born Dr. John M. Walsh, who now has delivered two Kennedy sons. Page 6.

The Rice Cottage Motel buzzed with excitement yesterday the arrival of the President. Page 3.

The Brookline couple who is charged with abducting the Kennedy baby. Page 8.

The landslide of events from the birth of the boy through the drama which accompanied the baby and his mother home to Boston. Page 6.

'He's a Kennedy --He'll Make It'

King Names FBI Agent

Powers to Head N.H. Sweeps

By EDWARD G. McGRATH

EXETER, N.H.—New Hampshire endowed its centuries-old state lottery with a protective cloak of integrity Wednesday by naming FBI veteran Edward J. Powers as investigation czar.

Gov. John W. King and his three-man special investigation commission critized the appointment of the Boston office from his government position to the role of executive director of the New Hampshire Investigation Commission.

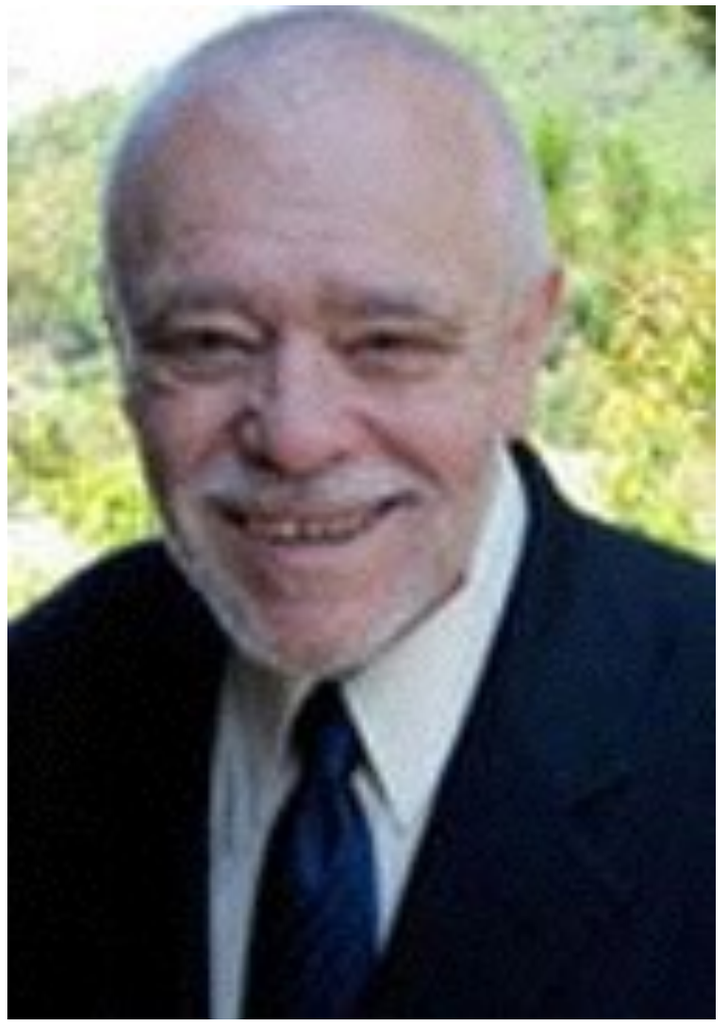
And Wednesday in his executive council at Hyde Park-Howard Hotel, the anti-

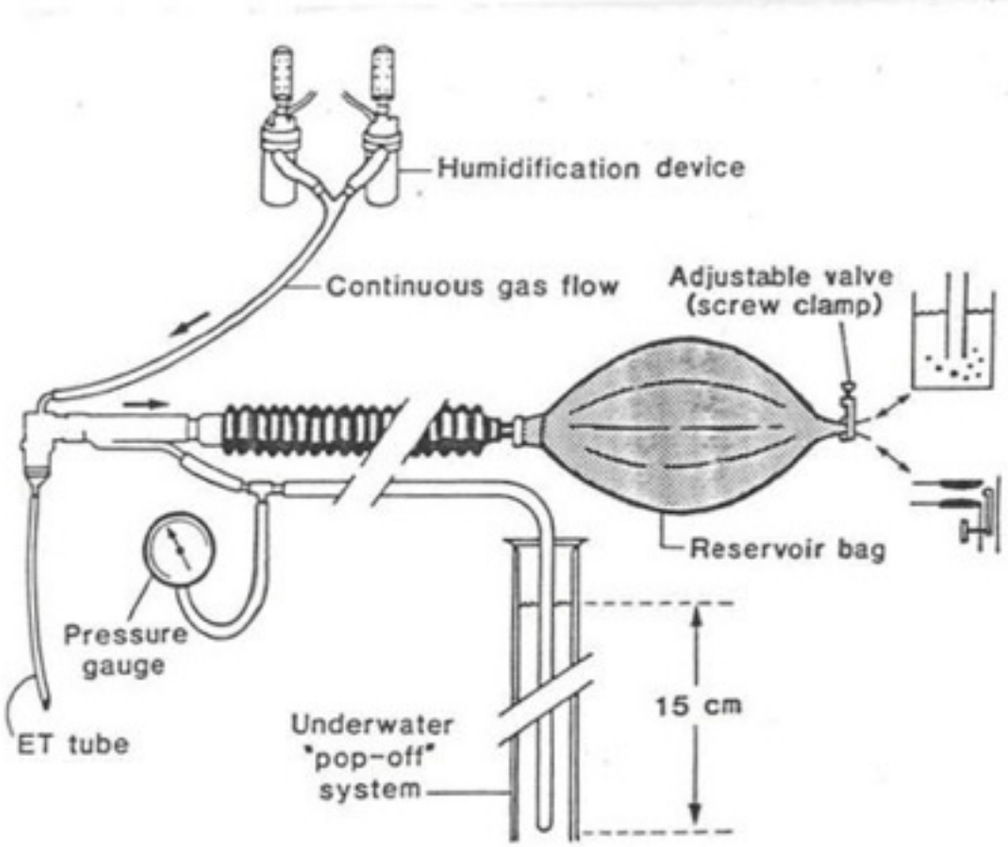
Boston leva Neonatal muito a sério. Tivemos uma perda em 1963.
A onda de perseguição científica humano paralelo a corrida para a lua.

http://www.nytimes.com/2013/07/30/health/a-kennedy-babys-life-and-death.html?_r=0&adxnnl=1&pagewanted=all&adxnnlx=1382274213-Lh6zybYS3gdBVXvMhLhOKQ

Mary Ellen Avery, M.D. (1927-2011)

Primeira mulher a ser nomeada physician-in-chief at Children's Hospital Boston, Massachusetts; primeira mulher a chefiar um departamento clínico em Harvard Medical School; primeira pediatra chefiar American Association for the Advancement of Science,





George Gregory, M.D.

Professor Emeritus San Francisco

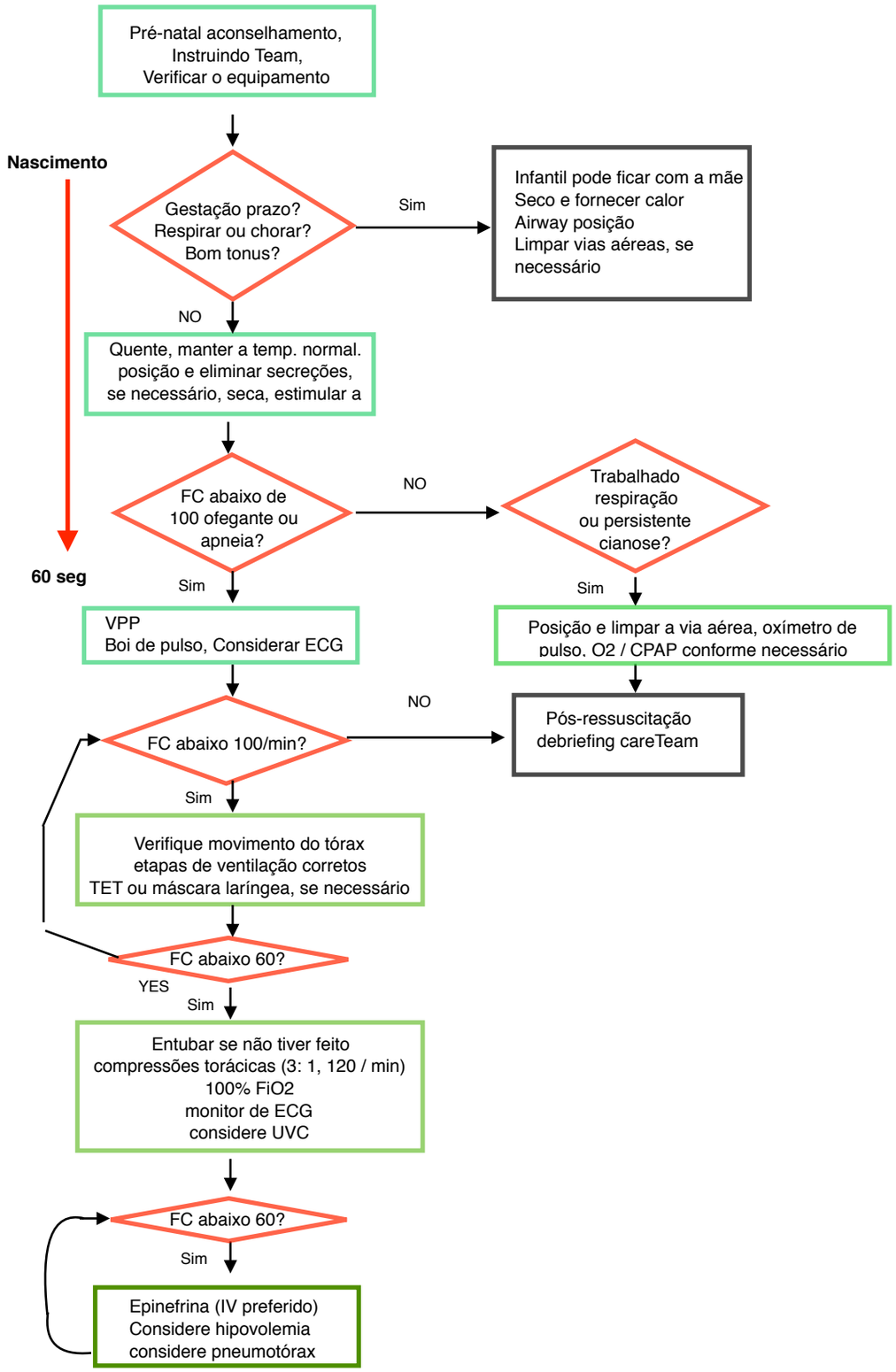
Gregory GA, Kitterman JA, Phibbs RH, Tooley WH, Hamilton WK. Treatment of the idiopathic respiratory-distress syndrome with continuous positive airway pressure. *N Engl J Med.* 1971 Jun 17;284(24):1333–1340.

‘Oro Hora’

Estratégia Protetora Pulmonar de Nascimento

- Pressões adequado no DR
- FiO_2 adequada no DR (misturado)
- Surfactante na DR
- CPAP no DR
- CPAP Consistente na NICU
- Redução SIMV na NICU

Golden Hour



Targeted Pre-ductal SPO2 After Birth

1 min	60-65%
2 min	65-70%
3 min	70-75%
4 min	75-80%
5 min	80-85%
10 min	85-95%

	Corrective Steps
M	Máscara ajuste
R	Reposicionar vias aéreas
S	Sucção boca & nariz
O	Orificio boca
P	Pressão aumento
A	Alternativa das vias aéreas

GA <32 semanas usar 30% de O2; usar t pedaço ressuscitador; usar 100% se não responder aos PPV ou compressões.

Neo-Puff no DR

- ventilação manual de bebês <32 semanas gest.
- Usado para todos os transportes
- ventilação para todos os bebês

Beth Israel Deaconess Medical Center (BIDMC) Neonatal ICU (NICU)

Respiratory RAM Cannula Guidelines October 2013

Delivery-Room (DR) Continuous Positive Airway Pressure (CPAP) Guideline

INDICATION

CPAP determined to be necessary will be delivered continuously in the DR. The RAM cannula is the interface connected to a CPAP generator. The application is designed to:

- facilitate visiting the mother in the DR
- sustain CPAP during:
  - DR stabilization,
  - transport to NICU
  - initial NICU stabilization/transition

APPLY DR CPAP FOR

- all non-intubated infants of ≤ 32 wk. gestation
- infant requiring CPAP as determined clinically

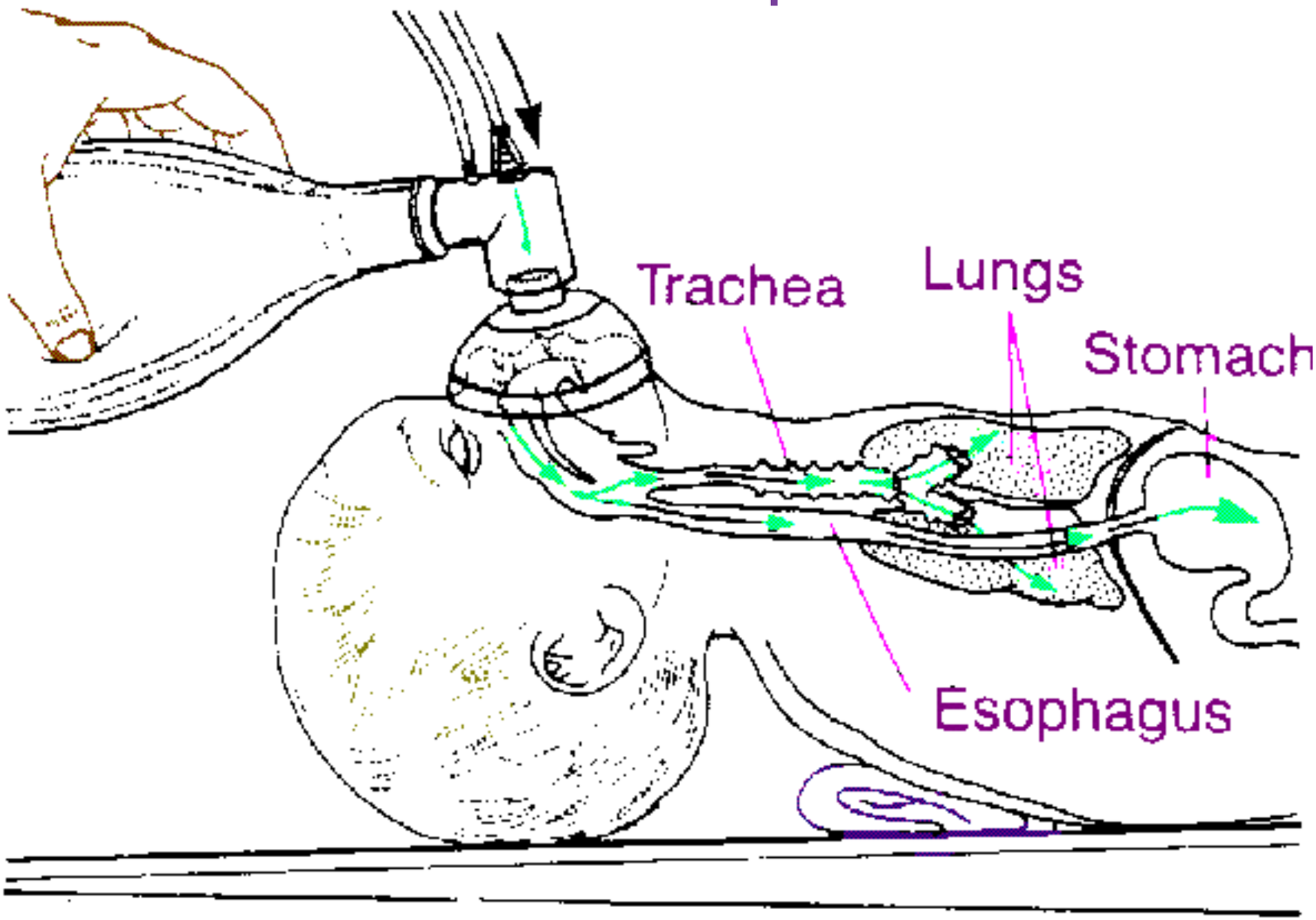
APPLY DR CPAP VIA

- RAM cannula
- Gauze hat
  - run cannula tubing through the open hat-top
- extension hose with one of two CPAP generators:
  1. flow-inflating resuscitator & pressure manometer
  2. Neo-Puff

UPON NICU ADMISSION

- Hudson prongs will be the interface of choice in the first three post natal days.
- RAM cannula may be sustained from birth for infants > 32 weeks gestation.

Compressão



Rates of Intubation Success

Residents	Success Rate at intubation
1st year	33%
2nd or 3rd year	40%
Fellows	68%
Rate for those with experience <20	37%
Rate for those with experience >20	49%

Preferred number of experiences to achieve competency is 45. Opportunities have diminished since we stopped intubating active meconium babies.

Leone TA, Rich W, Finer NN, Neonatal Intubation Success of Pediatric Trainees, J Pediatr 2005;146:638-641

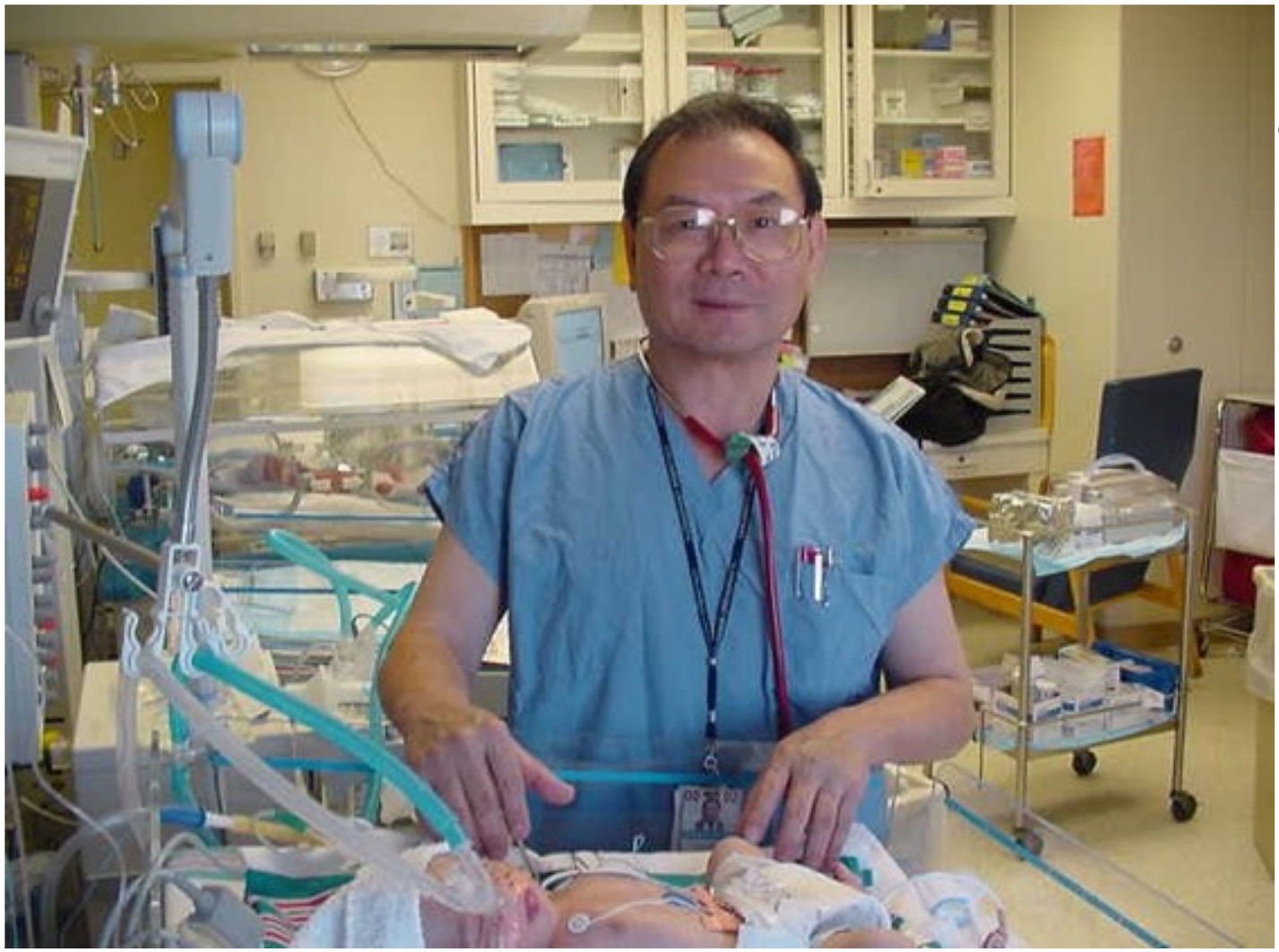
CPAP Recém-nascido suporte respiratório

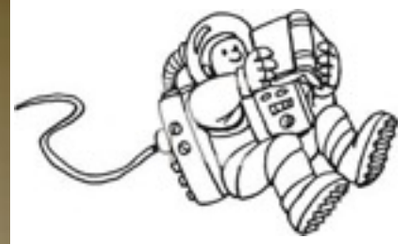
Simples Prático Frugal

Non-Invasive Ventilation Neonatal – Interfaces

- High-Flow Cannula
- NP Tube
- Prongs
  - Long prong
  - Bi-Nasal Prongs
    - Hudson
    - Fisher Paykel
- Nasal Mask
- RAM Cannula

Instrução: Limpar o nariz do bebê - SIM - NÃO





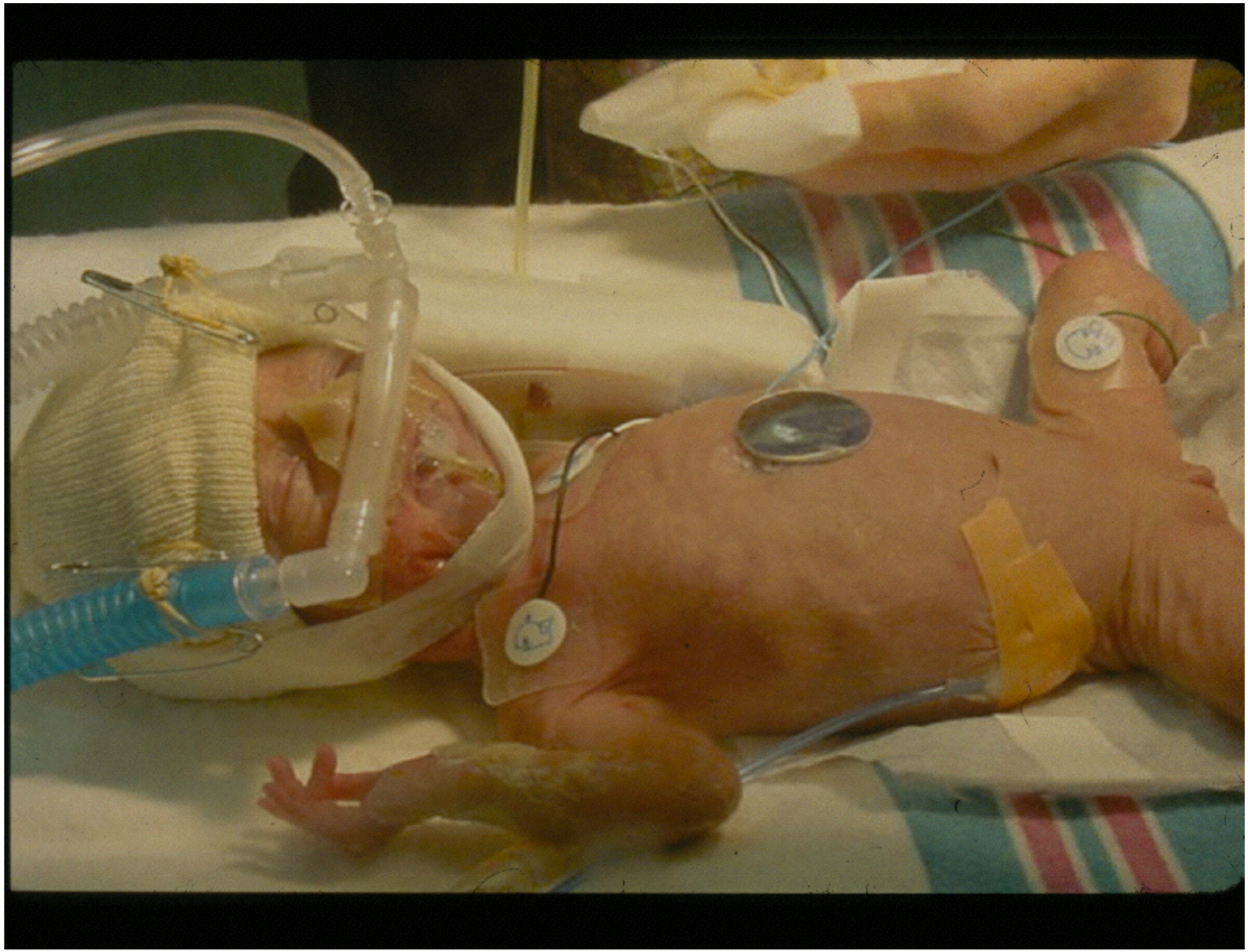
Jen Wung, M.D.

Columbia University College of Physicians & Surgeons

New York, New York University

17

CPAP at Colombia Presbeterian NY



CPAP

Effects

- Aumenta a pressão trans-pulmonar
- Aumenta da capacidade residual funcional (FRC)
- Previne o colapso alveolar,
- diminui intrapulmonar shunt
- melhora da complacência pulmonar
- conserva surfactante
- Evita colapso pharangeal
- Estabiliza a parede torácica
- Aumenta o diâmetro das vias aéreas e talas nas vias aéreas
- Talas o diafragma
- Estimula o crescimento do pulmão
- Bolha CPAP pode ter de alta freqüência (HFOV) efeito

CPAP

Indications

- Doenças com baixo FRC,
  por exemplo, RDS, TTN, CPIP, PDA, edema pulmonar
- Apnéia e bradicardia da prematuridade
- Síndrome de aspiração de mecônio (SAM)
- Doença encerramento das vias aéreas,
  por exemplo bronquiolite, BPD traqueomalacia
- Paralisia parcial de diafragma
- Suporte respiratório pós-extubação

RDS

TTN

Pneumonia

Pulm Edema

Atelectasis

Severe BPD

PIE

Grainy

Streaky

Patchy

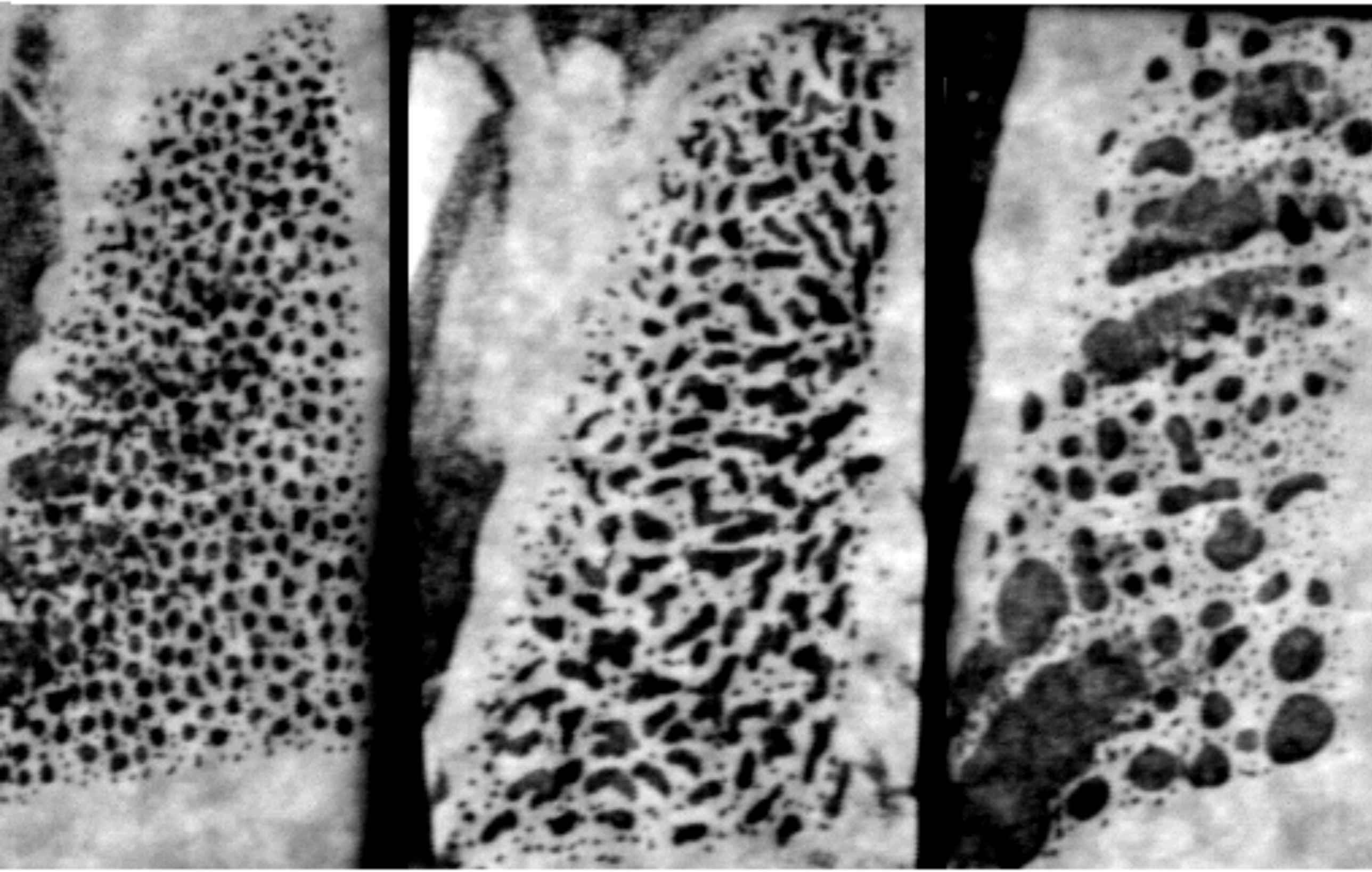
Fluffy

Hazy

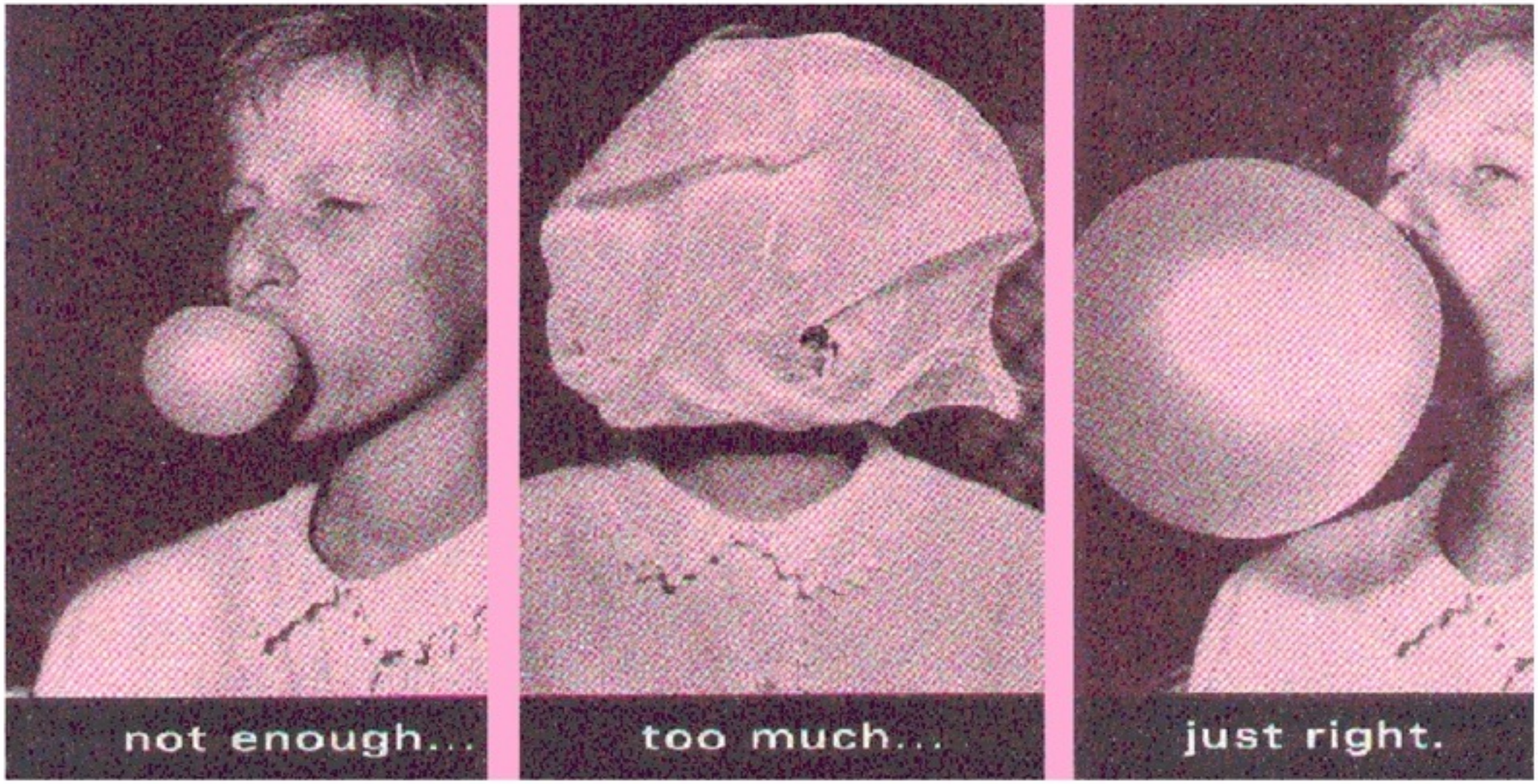
Bubbly

Dotty

SD PIE BPD



Instrução: Limpar o nariz do bebê - SIM - NÃO


not enough...
too much...
just right.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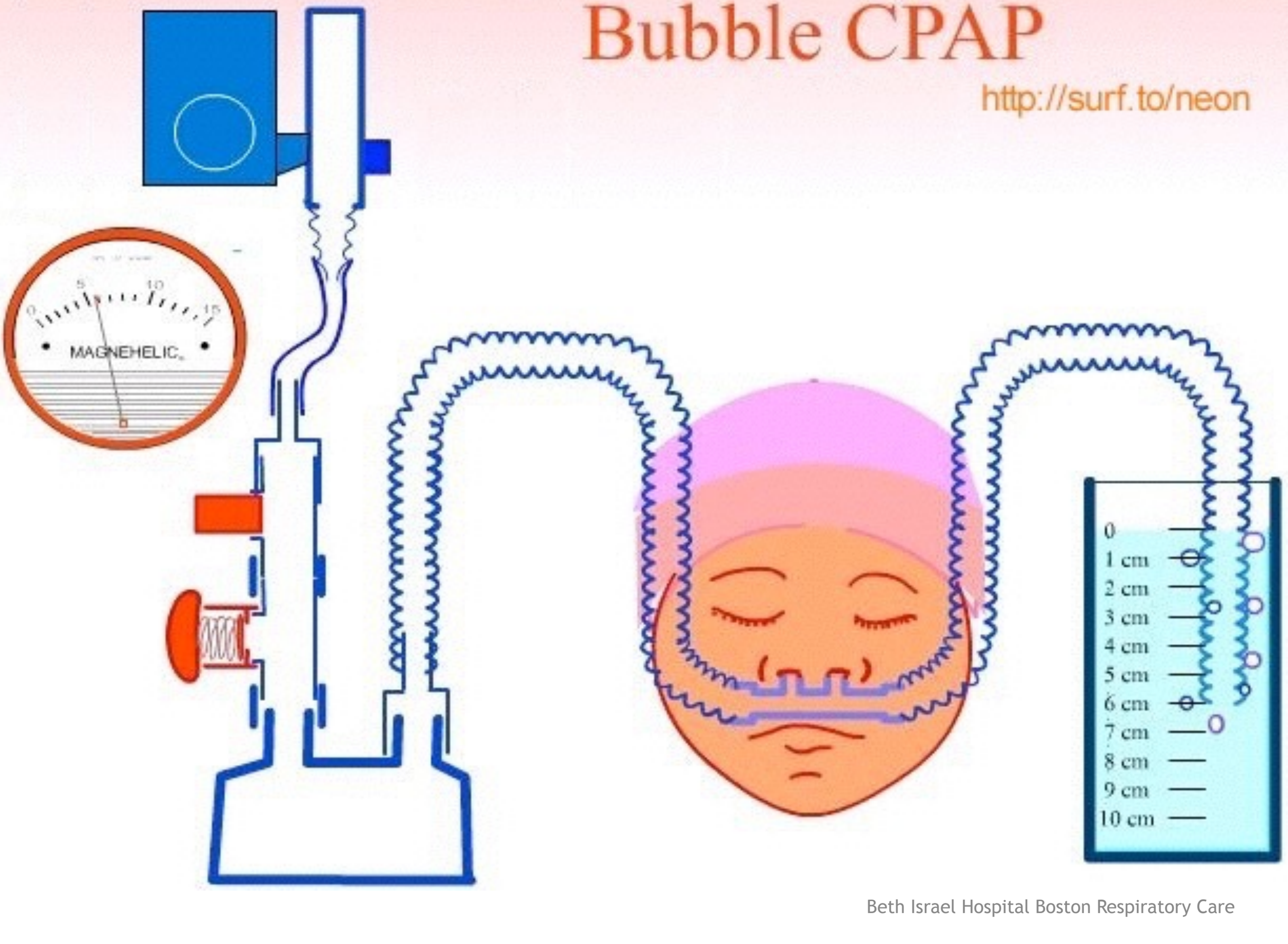
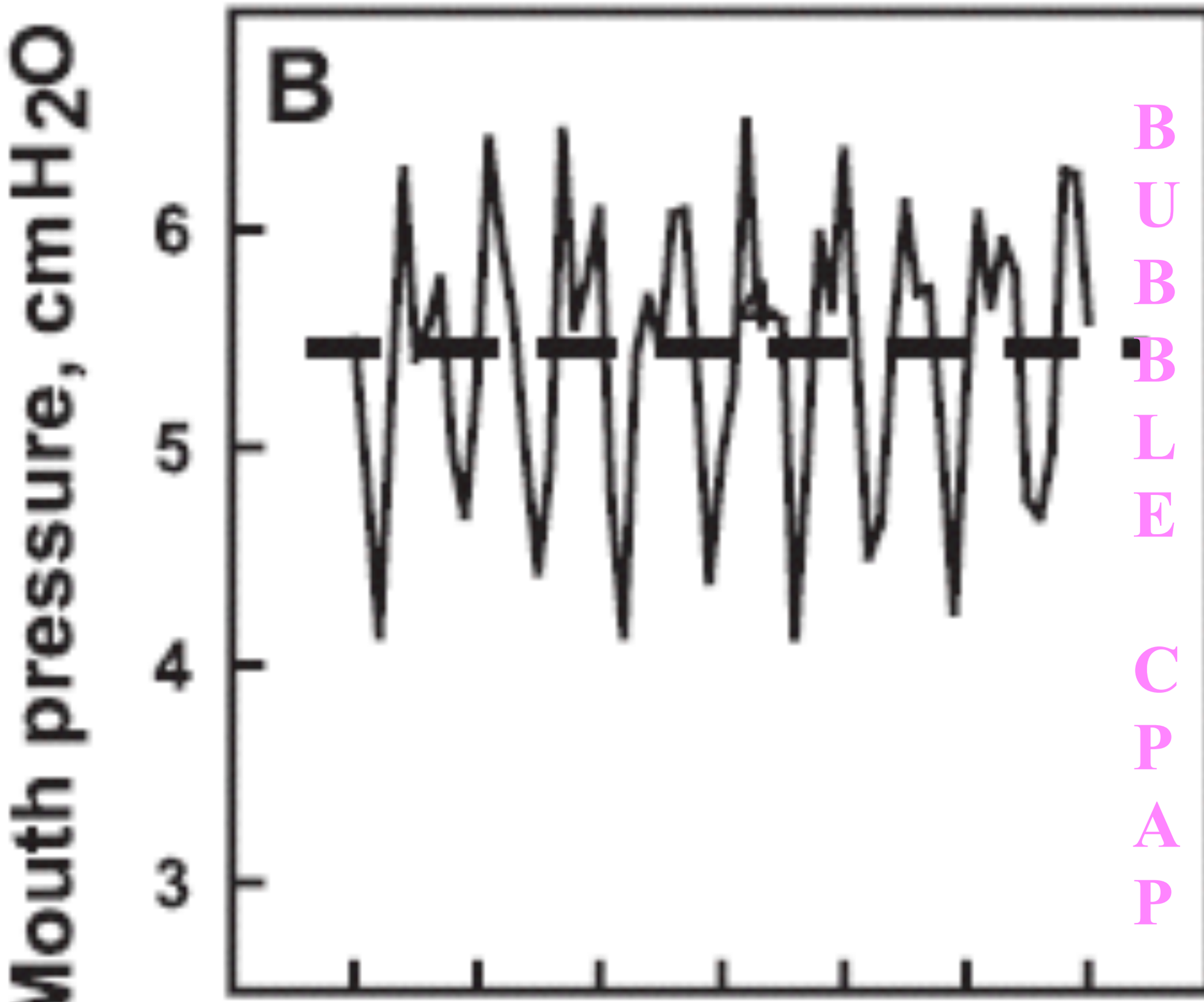
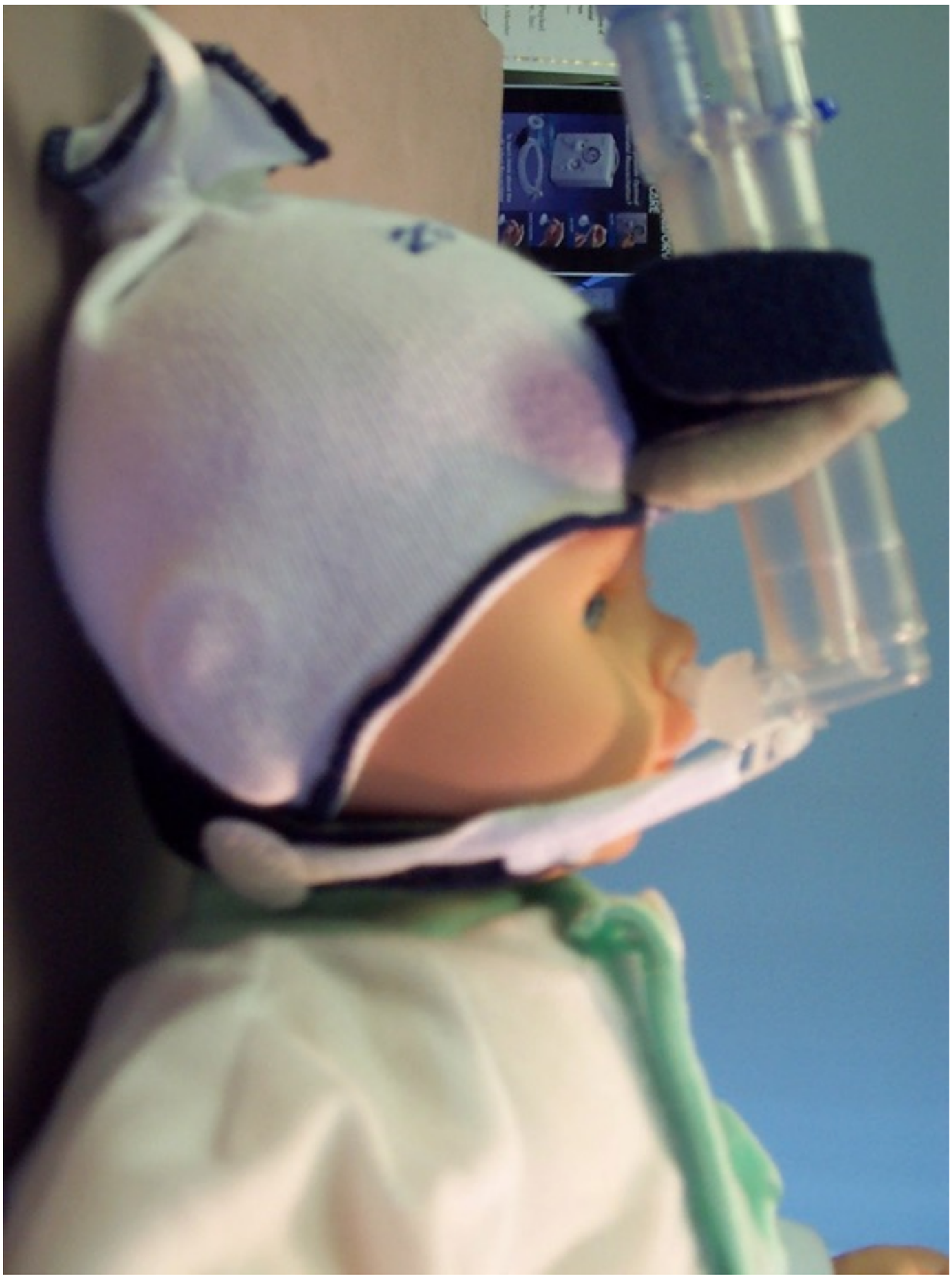
- http://www.surfneon.com/FLASH/bubble_CPAP.swf



Beth Israel Hospital Boston Respiratory Care


B
6
5
4
3
Mouth pressure, cm H2O
Time, s
BUBBLE CPAP

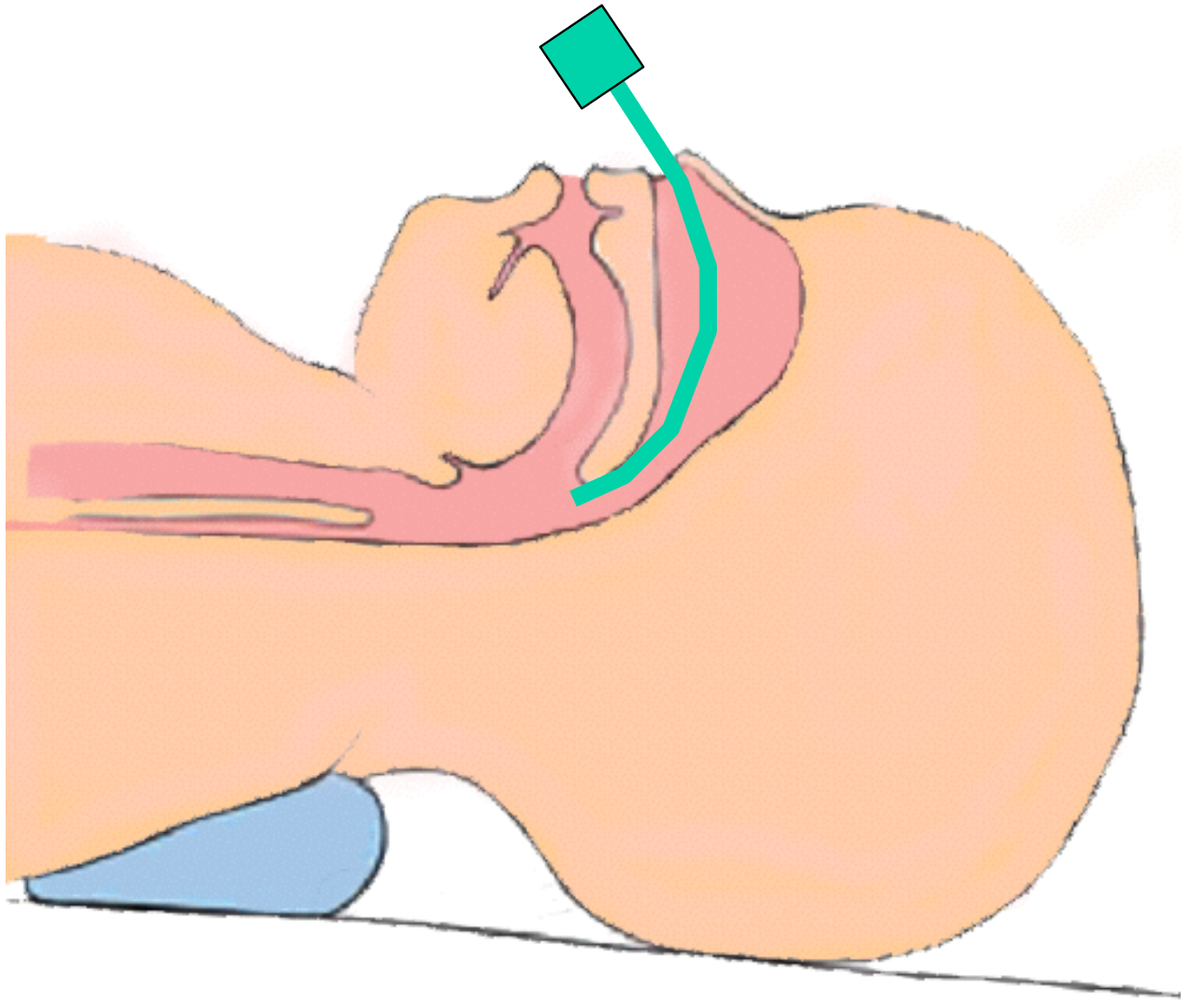



Dräger

Nasopharangeal Tube for CPAP

Nasal tubes

- **more easily secured in position than oral tube**
- **Are associated with nasopharangeal irritation, swelling, mucous plugging**
- **Greater movement in airway with head motion than oral tubes**
- **Require greater (~1cm) insertion depth than oral tube**



Nasal Tube for CPAP or SIMV

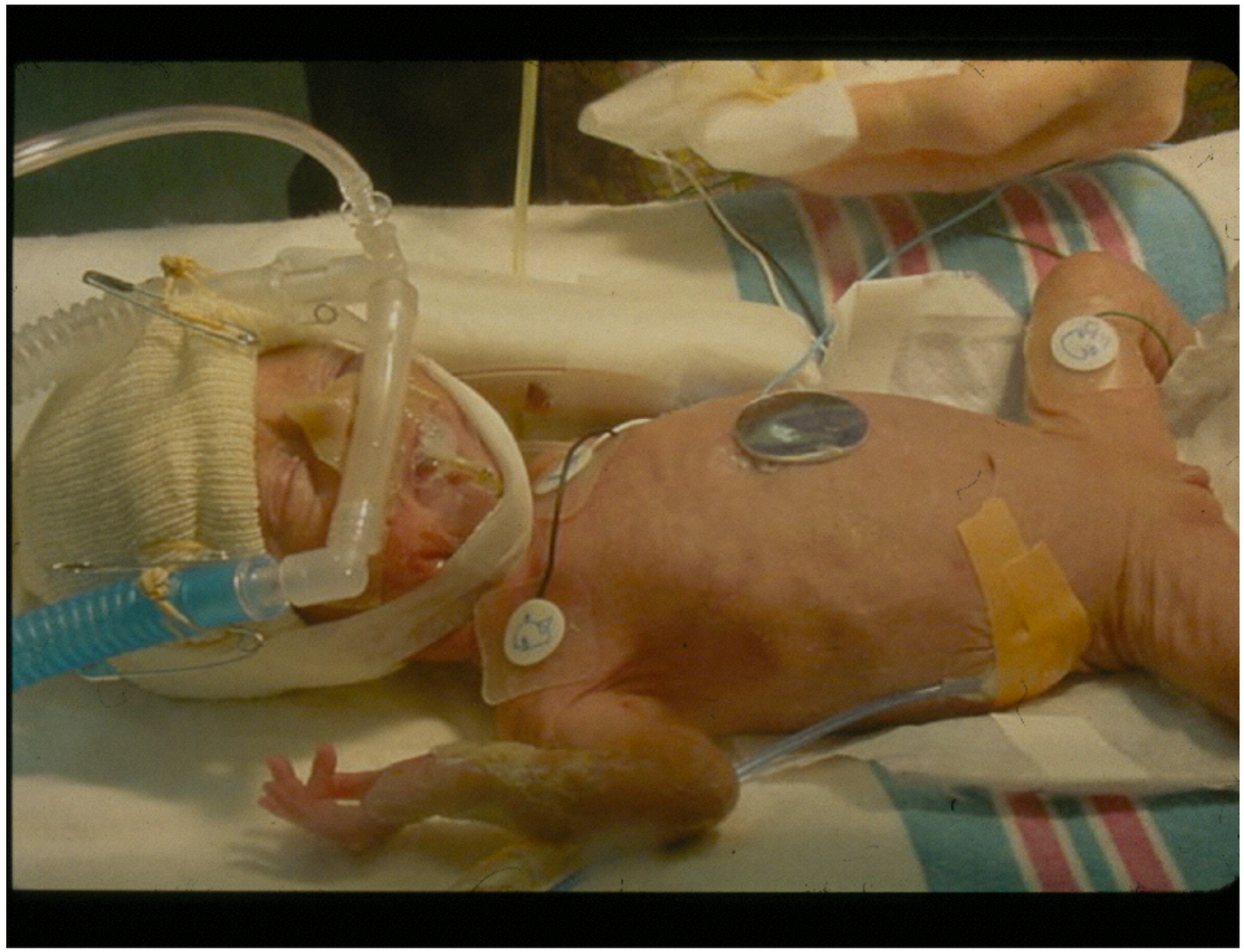
• more easily secured in position than oral tube

•Are associated with nasopharangeal irritation, swelling, mucous plugging

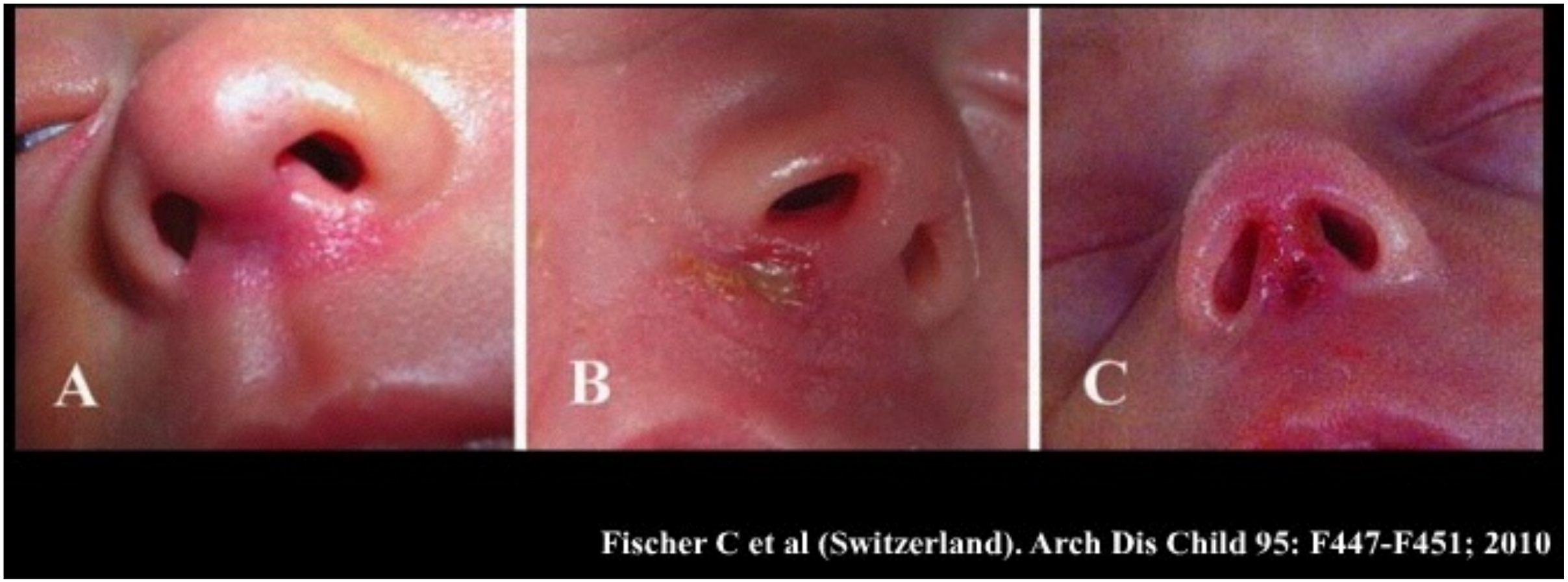
•Greater movement in airway with head motion than oral tubes

•Require greater (~1cm) insertion depth than oral tube

CPAP at Colombia Presbeterian NY

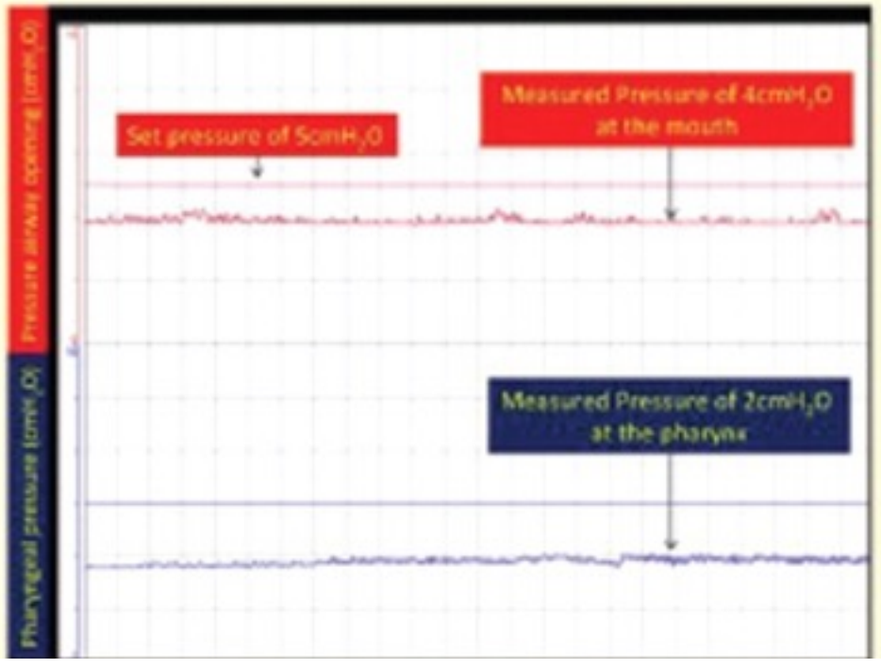


Non-Invasive Ventilation Neonatal



Case report Oral continuous positive airway pressure (CPAP) following nasal injury in a preterm infant, H R Carlisle, C O F Kamlin, L S Owen, P G Davis, C J Morley; Arch Dis Child Fetal Neonatal Ed 2010;95:F142F143 doi:10.1136/adc.2009.170084

Non-Invasive Ventilation Neonatal



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DuoDerm

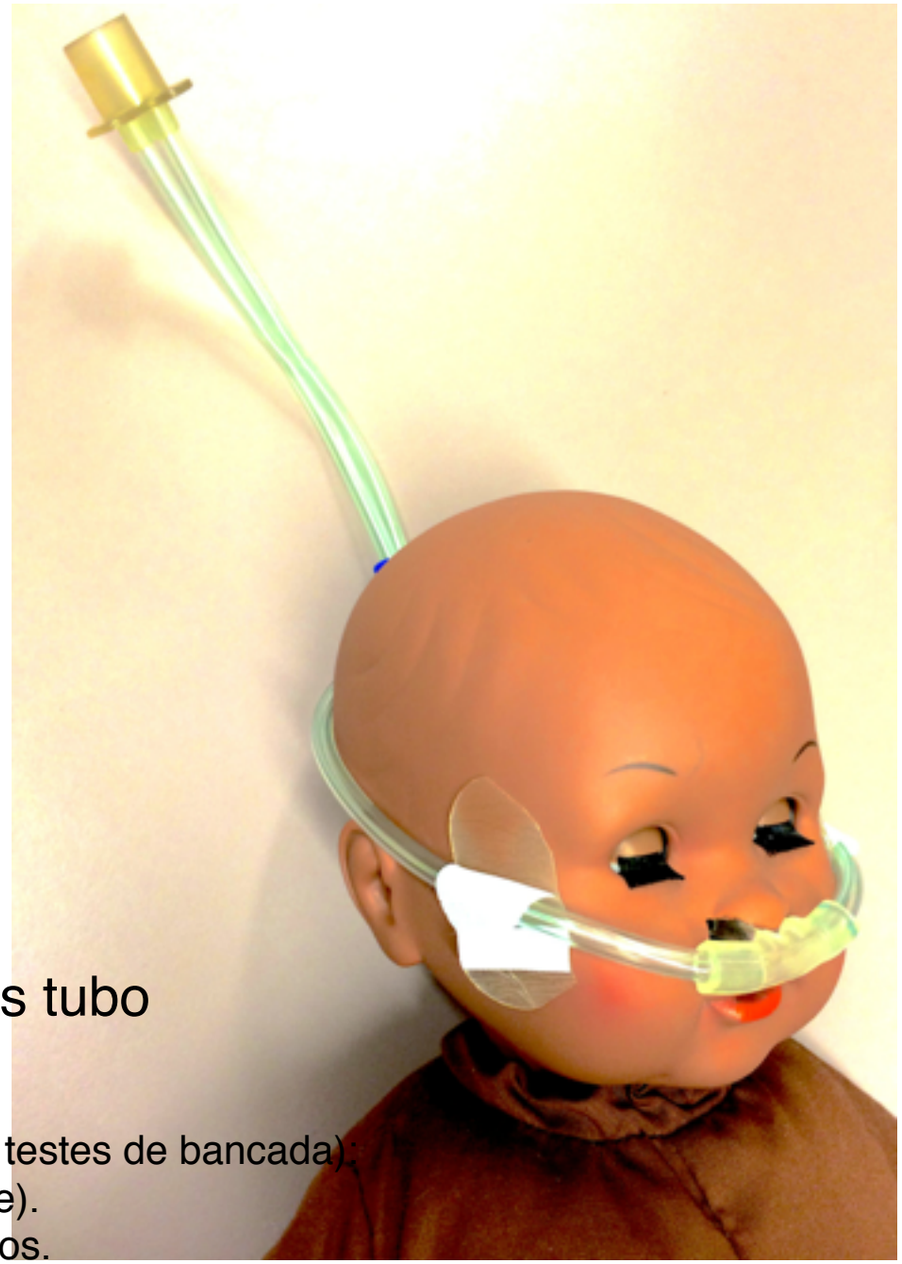
- Nare protection from CPAP prongs
- Nasal seal for CPAP prongs

Ramanathan, M.D. , FAAP

Professor Pediatrics University of Southern California. senior Division Chief of the Division of Neonatal Medicine LAC & USC Medical Center & Children’s Hospital of Los Angeles. Director of Respiratory Therapy.

BIDMC UTIN respiratórias Diretrizes RAM Cânula julho 2014

INDICAÇÃO
RAM cânula é para crianças que têm uma necessidade estabelecida por CPAP.
RAM maximiza a mobilidade infantil e tem um impacto mínimo nasal.



EQUIPAMENTOS

Prong Tamanhos
Prematura (anel verde),
Recém-nascido (anel azul),
Infantil (anel laranja) UTIN RAM

Geradores de CPAP:
Bolha CPAP
Ventilador

APLICAÇÕES
Alarmes
Definir ambos os alarmes de pressão alta e baixa
O sistema não pode alarme para deslocamento pinos ou dobras tubo

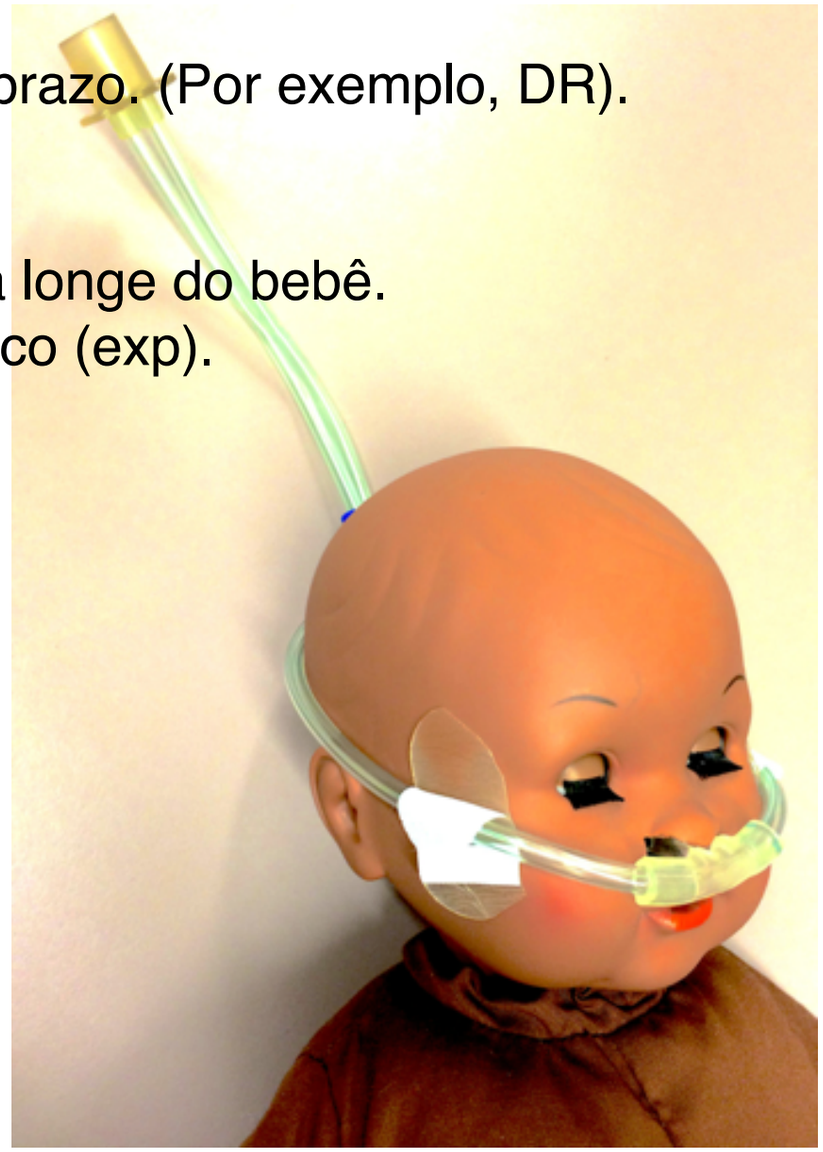
Fixação e estabilização da pressão
Pinos RAM deve sentar-se, no mínimo, 2/3 nas narinas para sustentar a pressão. (Por testes de bancada);
Não selar completamente o pino no nariz (por exemplo: evitar 'Pig-nariz "ou Cannulaide).
Considere o uso de steri-strip de cânula para ponte do nariz para manter a posição pinos.
Tubulação segura no alto das bochechas e perto do nariz, mas evitar a órbita do contato com os olhos

O sistema não pode alarme para deslocamento pinos ou dobras tubo

BIDMC UTIN respiratórias Diretrizes RAM Cânula julho 2014 (page 2)

- Fixação e estabilização da pressão
  - Pinos RAM deve sentar-se, no mínimo, 2/3 nas narinas para sustentar a pressão. (Por testes de bancada):
  - Não selar completamente o pino no nariz (por exemplo: evitar 'Pig-nariz "ou Cannulaide).
  - Considere o uso de steri-strip de cânula para ponte do nariz para manter a posição pinos.
  - Tubulação segura no alto das bochechas e perto do nariz, mas evitar a órbita do contato com os
  - Executar tubulação sobre as orelhas para trás 'entre occipital e coroa (para não nuca).
  - A taxa de utilização do fluxo de, pelo menos, 8-10 LPM.
  - Proteja RAM com banda de cabeça para aplicações de curto prazo. (Por exemplo, DR).
- Controles Condensado
  - Posição tubulação para otimizar gravidade drenagem da água longe do bebê.
  - Use 'Sky Blue' técnica Local azul (insp.) tubo superior ao branco (exp).

- Proteção tecido Nare
  - Prong não deve puxar para cima no septo.
  - Use tee de DuoDerm para proteger septo.



BIDMC UTIN Condensado

O condensado pode acumular-se no tubo de respiração umidificado. Minimizar explosões de condensado para a via aérea, aplicando estes princípios:

1. Blue Sky
   - Faça condensado fluxo longe do bebê.
     - Coloque o tubo azul (que flui para o bebê) superior ao tubo branco
   - O fluxo de gás, então, tendem a empurrar condensado longe do bebê.
2. Tubes não alta
   - Deixe a gravidade tomar condensado longe do bebê.
   - Minimizar a elevação da tubulação acima bebê. tubulação
   - Run através menor vigia.
   - Minimizar o loops de dependentes de tubos
   - Incline o conexão estrela longe do bebê
3. Temp em Wye?
   Local da sonda de temperatura.
   - Se o ambiente mais quente for> 34 graus
     usar mangueira de extensão para manter sonda de temperatura externa do mais quente.
   - Se o ambiente mais quente é <34 graus
     sonda lugar temporário dentro proximal mais quente para estrela.

NICU Respiratory Interface

prong inserts 1/3 - 1/2

tubing runs inferior to ears

no seal in nares

Deliver 20 - 500ml/min

prong inserts fully

tubing runs superior to ears

~80% seal in nares

Initiate DR < 32 wks. gest
CPAP pressure 6-7cm.
Sustain in transport to NICU
Use for nasal injury
Stere-Strip up over the nose
May not alarm for disconnect

prong inserts 1/3 - 2/3

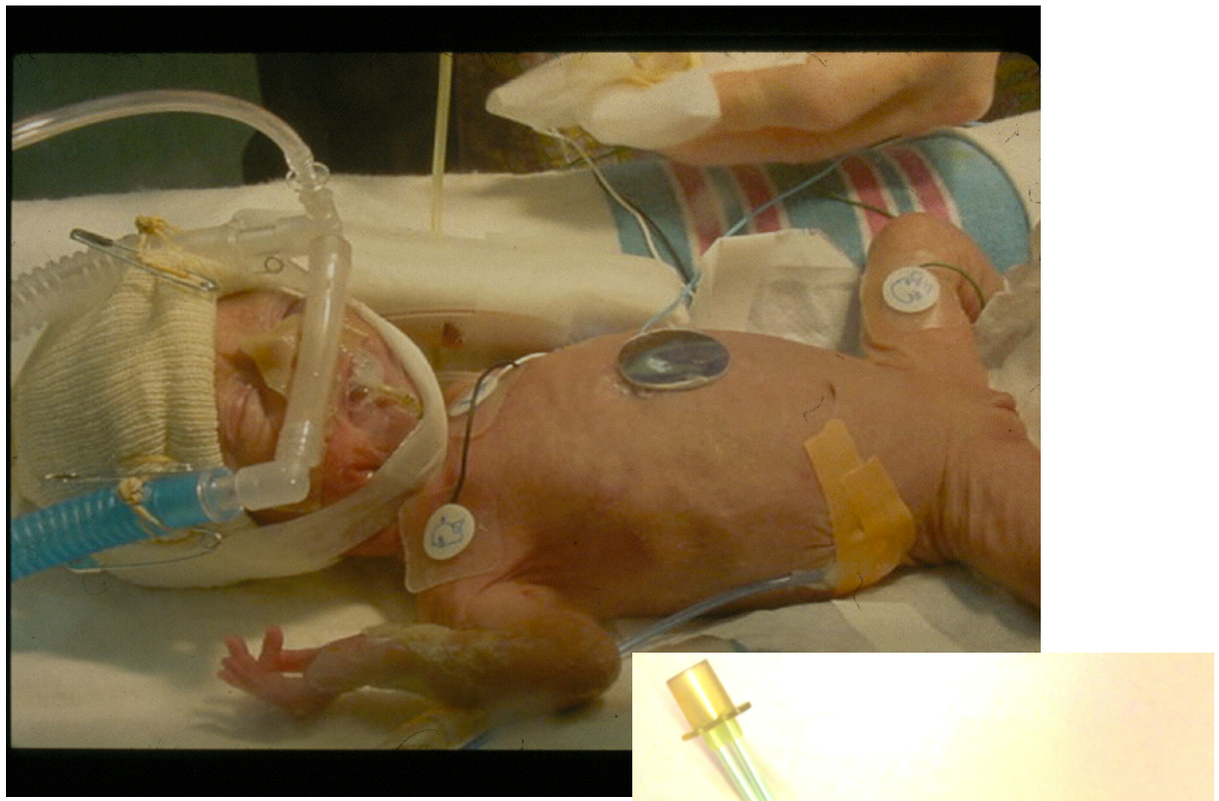
tubing runs superior to ears

full seal in nares

Initiate NICU <36 wks. gest
CPAP pressure 5-8cm.
May not alarm for disconnect

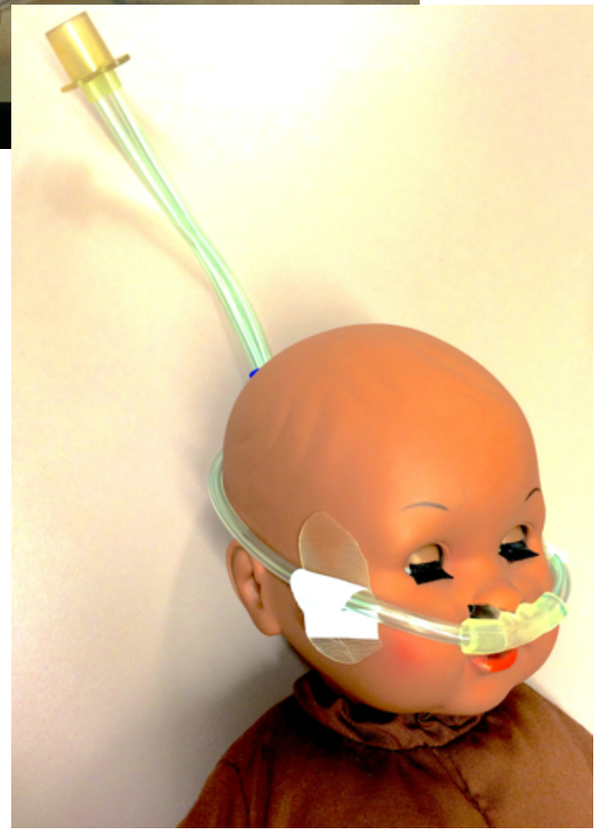
Teach family to alert staff for:

- Nasal breakdown
- Water in tubing
- No CPAP bubbling
- Prongs mis-placed in nose.



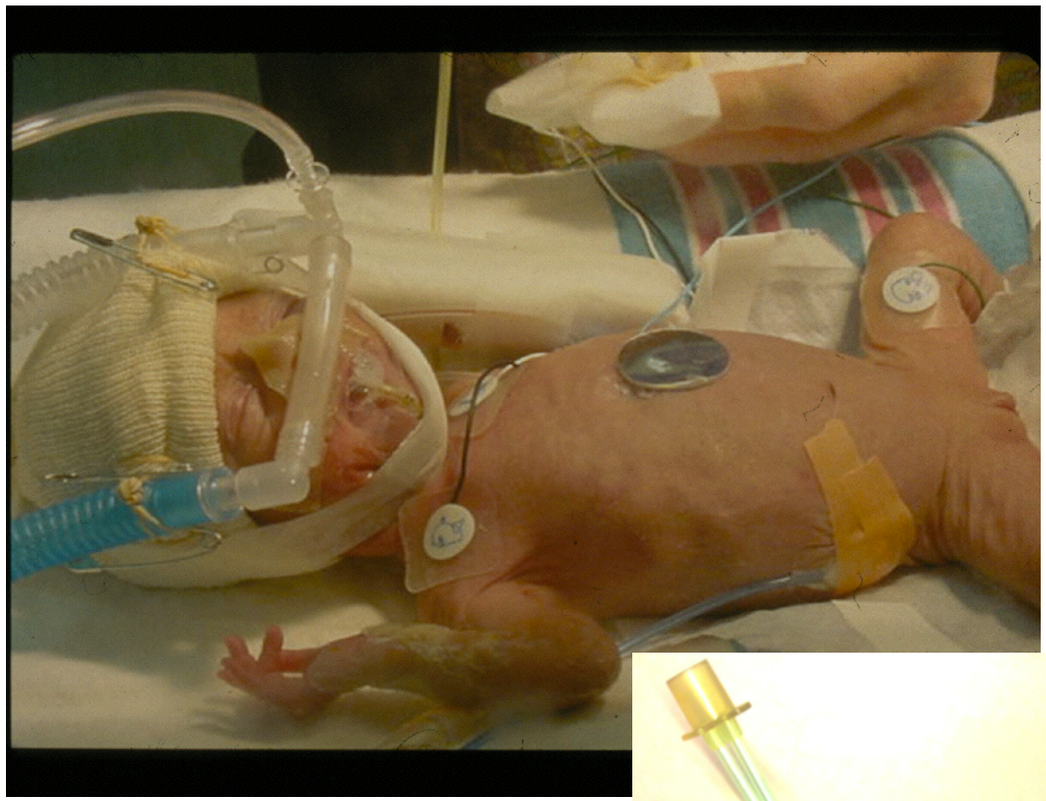
Troubleshoot

- Improper nose fit
- Nasal obstruction
- Neck malpositioned
- Gastric distention- G-tube
- over-handling of baby



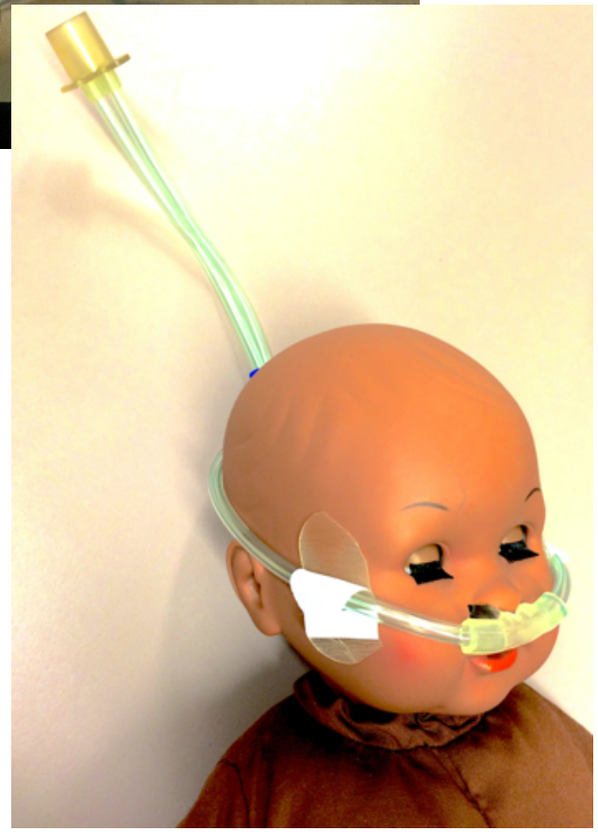
Trial off

- 32 wks PMA (or 34 wks IUGR, chorio., GA <25 wks)
- CPAP 5cm
- FiO2 21% 2 days
- RR <60 for 24 hrs
- low WOB
- apnea <2 /24 hrs



Replace

- increase WOB
- increase O2 requirement
- RR >70
- low increased WOB
- Frequent/severe A &/or B
- Wait 5 days until next trial



The NEW ENGLAND JOURNAL of MEDICINE

• ORIGINAL ARTICLE

High-Flow Nasal Cannulae in Very Preterm Infants after Extubation

Brett J. Manley, M.B., B.S., Louise S. Owen, M.D., Lex W. Doyle, M.D., Chad C. Andersen, M.B., B.S., David W. Cartwright, M.B., B.S., Margo A. Pritchard, Ph.D., Susan M. Donath, M.A., and Peter G. Davis, M.D.

N Engl J Med 2013; 369:1425-1433October 10, 2013DOI: 10.1056/NEJMoa1300071

BACKGROUND

The use of high-flow nasal cannulae is an increasingly popular alternative to nasal continuous positive airway pressure (CPAP) for noninvasive respiratory support of very preterm infants (gestational age, <32 weeks) after extubation. However, data on the efficacy or safety of such cannulae in this population are lacking.

METHODS

In this multicenter, randomized, noninferiority trial, we assigned 303 very preterm infants to receive treatment with either high-flow nasal cannulae (5 to 6 liters per minute) or nasal CPAP (7 cm of water) after extubation. The primary outcome was treatment failure within 7 days. Noninferiority was determined by calculating the absolute difference in the risk of the primary outcome; the margin of noninferiority was 20 percentage points. Infants in whom treatment with high-flow nasal cannulae failed could be treated with nasal CPAP; infants in whom nasal CPAP failed were reintubated.

RESULTS

The use of high-flow nasal cannulae was noninferior to the use of nasal CPAP, with treatment failure occurring in 52 of 152 infants (34.2%) in the nasal-cannulae group and in 39 of 151 infants (25.8%) in the CPAP group (risk difference, 8.4 percentage points; 95% confidence interval, −1.9 to 18.7). Almost half the infants in whom treatment with high-flow nasal cannulae failed were successfully treated with CPAP without reintubation. The incidence of nasal trauma was significantly lower in the nasal-cannulae group than in the CPAP group (P=0.01), but there were no significant differences in rates of serious adverse events or other complications.

CONCLUSIONS

Although the result for the primary outcome was close to the margin of noninferiority, the efficacy of high-flow nasal cannulae was similar to that of CPAP as respiratory support for very preterm infants after extubation. (Funded by the National Health and Medical Research Council; Australian New Zealand Clinical Trials Network number, ACTRN12610000166077.)

Heated, Humidified High-Flow Nasal Cannula Therapy: Yet Another Way to Deliver Continuous Positive Airway Pressure?

Zuzanna J. Kubicka, Joseph Limauro and Robert A. Darnall

Pediatrics 2008;121;82-88

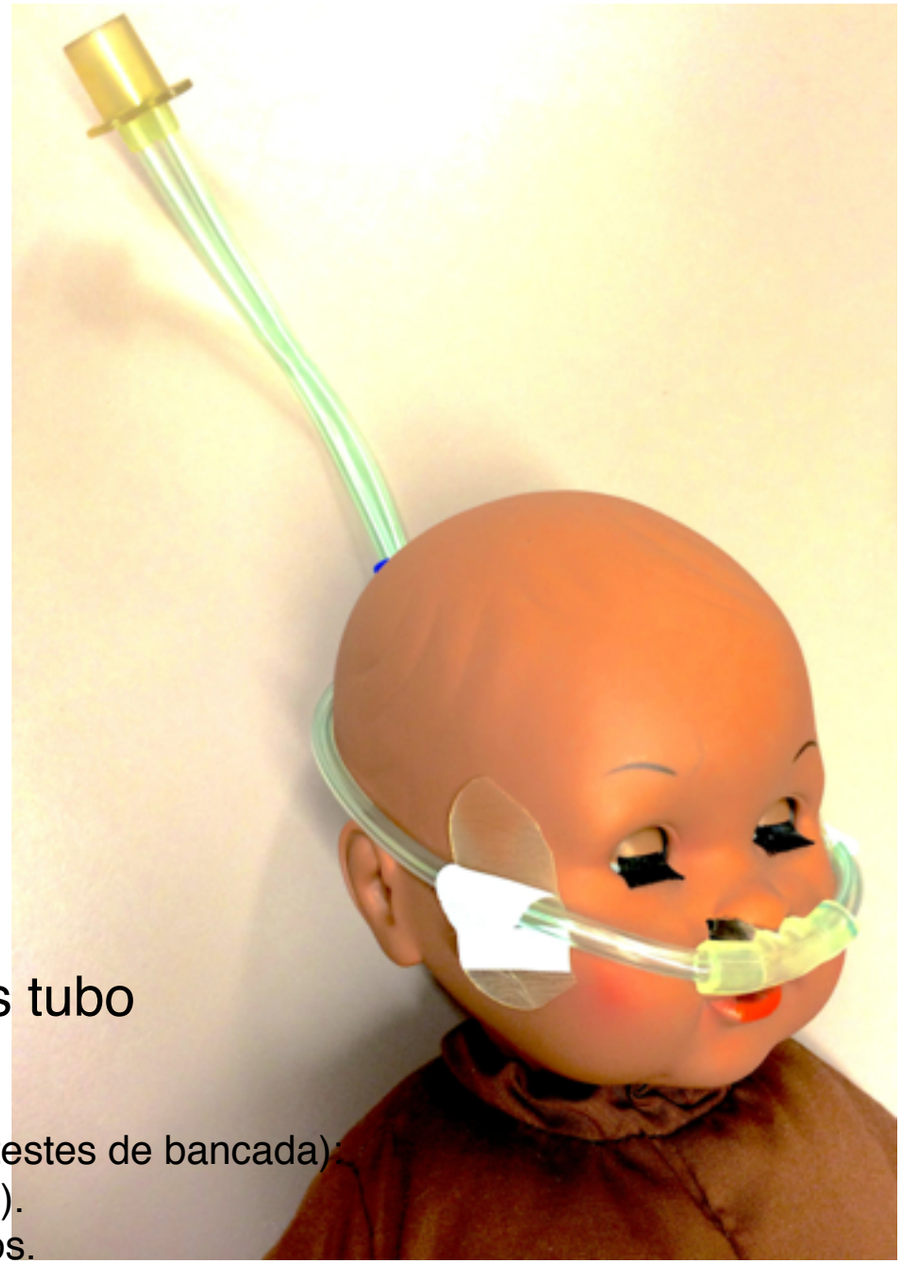
DOI: 10.1542/peds.2007-0957

"On the basis of our findings, we suggest that high-flow nasal cannula should not be used as a routine replacement for CPAP therapy

"Com base em nossos resultados, sugerimos que nasal de alto fluxo cânula não deve ser utilizado como um substituição de rotina para o tratamento com CPAP.

BIDMC UTIN respiratórias Diretrizes RAM Cânula julho 2014

INDICAÇÃO
RAM cânula é para crianças que têm uma necessidade estabelecida por CPAP.
RAM maximiza a mobilidade infantil e tem um impacto mínimo nasal.



EQUIPAMENTOS

Prong Tamanhos
Prematura (anel verde),
Recém-nascido (anel azul),
Infantil (anel laranja) UTIN RAM

Geradores de CPAP:
Bolha CPAP
Ventilador

APLICAÇÕES
Alarmes
Definir ambos os alarmes de pressão alta e baixa
O sistema não pode alarme para deslocamento pinos ou dobras tubo

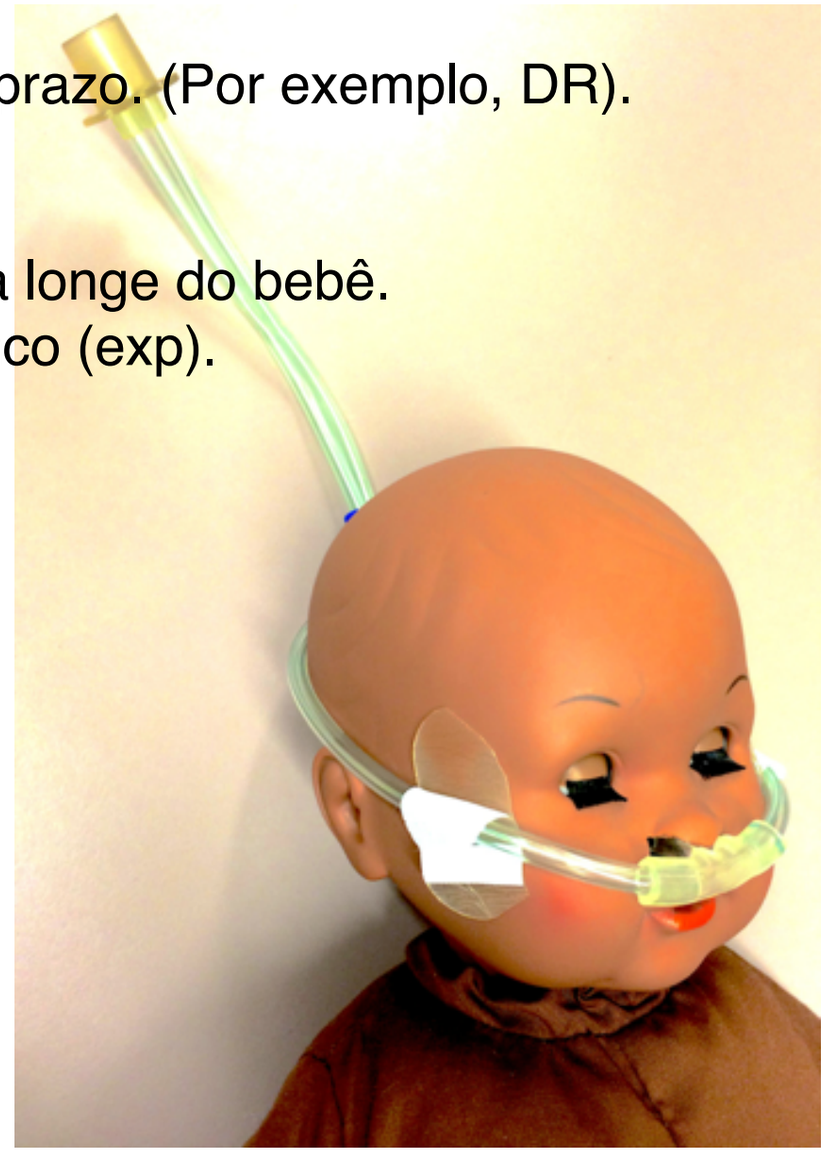
Fixação e estabilização da pressão
Pinos RAM deve sentar-se, no mínimo, 2/3 nas narinas para sustentar a pressão. (Por testes de bancada):
Não selar completamente o pino no nariz (por exemplo: evitar 'Pig-nariz "ou Cannulaide).
Considere o uso de steri-strip de cânula para ponte do nariz para manter a posição pinos.
Tubulação segura no alto das bochechas e perto do nariz, mas evitar a órbita do contato com os olhos

O sistema não pode alarme para deslocamento pinos ou dobras tubo

BIDMC UTIN respiratórias Diretrizes RAM Cânula julho 2014 (page 2)

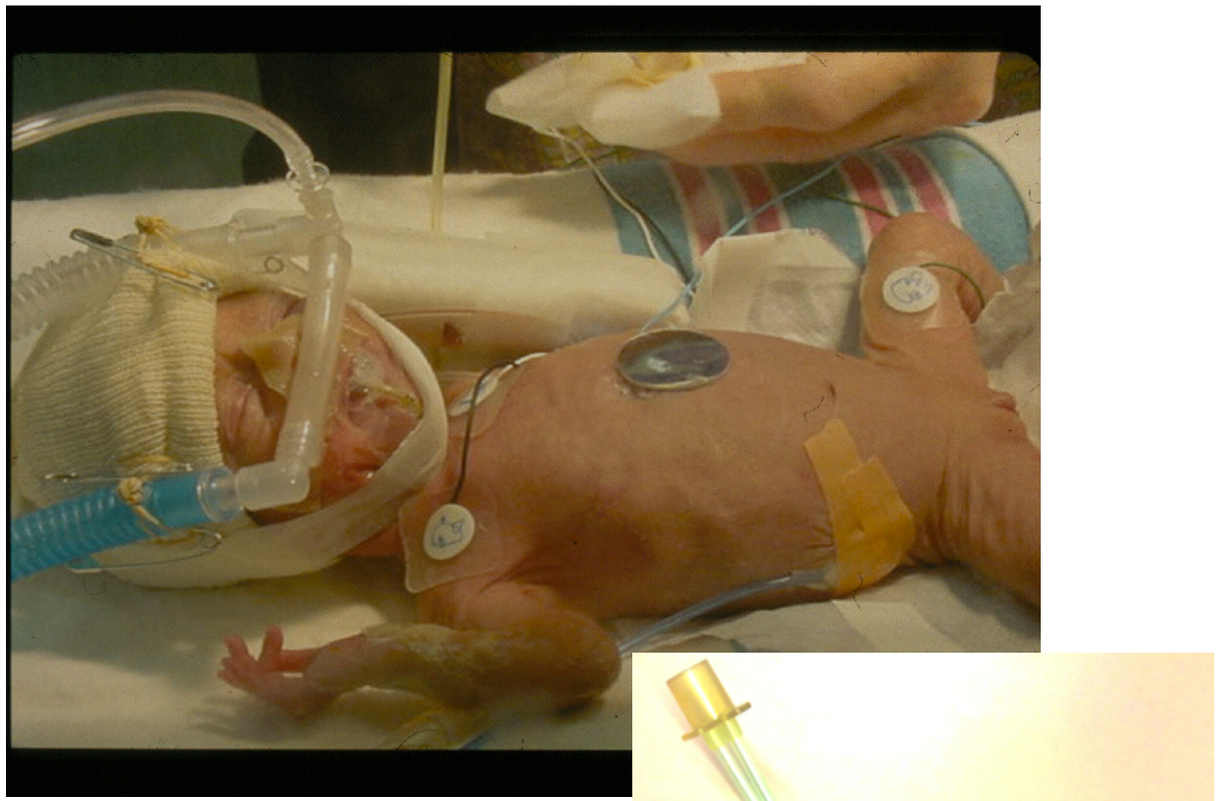
- Fixação e estabilização da pressão
  - Pinos RAM deve sentar-se, no mínimo, 2/3 nas narinas para sustentar a pressão. (Por testes de bancada):
  - Não selar completamente o pino no nariz (por exemplo: evitar 'Pig-nariz "ou Cannulaide).
  - Considere o uso de steri-strip de cânula para ponte do nariz para manter a posição pinos.
  - Tubulação segura no alto das bochechas e perto do nariz, mas evitar a órbita do contato com os
  - Executar tubulação sobre as orelhas para trás 'entre occipital e coroa (para não nuca).
  - A taxa de utilização do fluxo de, pelo menos, 8-10 LPM.
  - Proteja RAM com banda de cabeça para aplicações de curto prazo. (Por exemplo, DR).
- Controles Condensado
  - Posição tubulação para otimizar gravidade drenagem da água longe do bebê.
  - Use 'Sky Blue' técnica Local azul (insp.) tubo superior ao branco (exp).

- Proteção tecido Nare
  - Prong não deve puxar para cima no septo.
  - Use tee de DuoDerm para proteger septo.



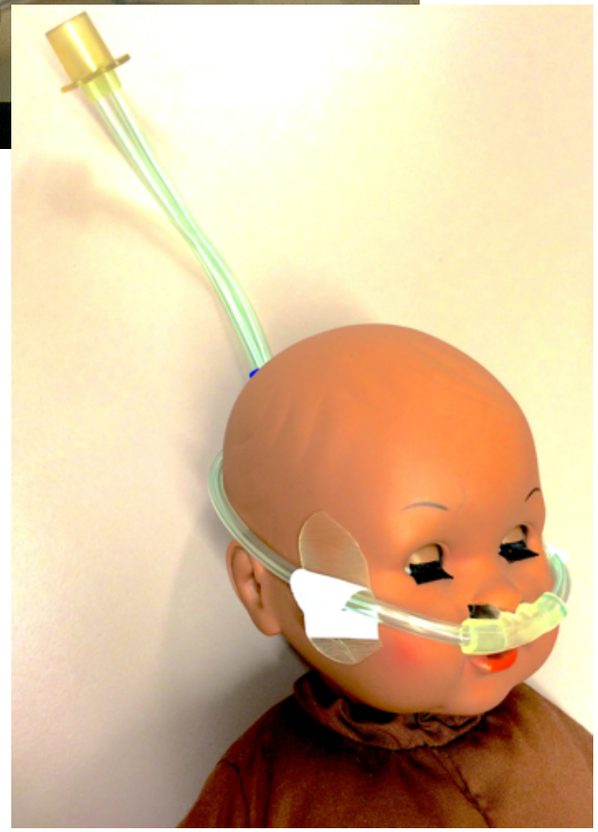
Teach family to alert staff for:

- Nasal breakdown
- Water in tubing
- No CPAP bubbling
- Prongs mis-placed in nose.



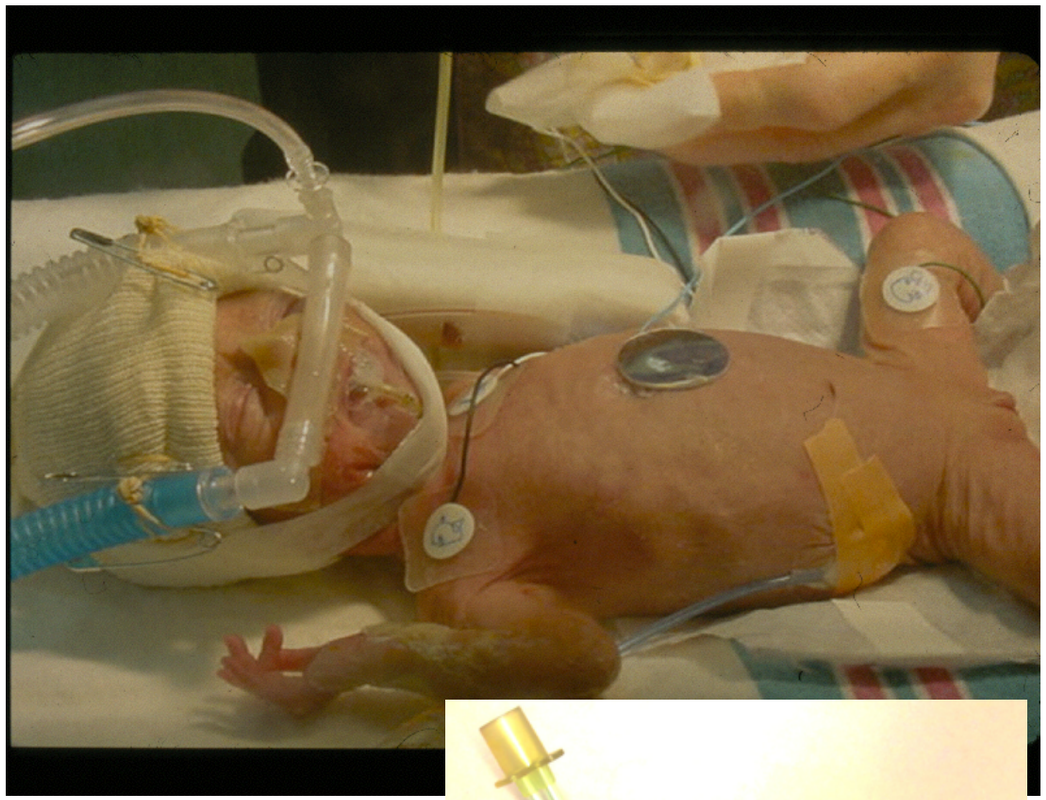
Troubleshoot

- Improper nose fit
- Nasal obstruction
- Neck malpositioned
- Gastric distention- G-tube
- over-handling of baby



Julgamento Descontinuar Ventilação Mecânica

- 32-34 wks PMA (chorioamnionitis, GA <25 semanas)
- 5 cm CPAP
- FiO2 21% X 2 dias
- RR <60 X 24 horas
- baixo WOB
- apneia <2/24 horas



Julgamento Renovar Ventilação

- aumentar WOB
- aumento da necessidade de O2
- RR> 70
- baixos aumentos WOB
- Frequent / A grave e / ou B
- Aguarde 5 dias até ao próximo ensaio

Figure 1. Blue Sky with RAM cannula.


Figure 2. “Blue Sky” with tubes draining to gravity & temperature probe outside of the warmer.

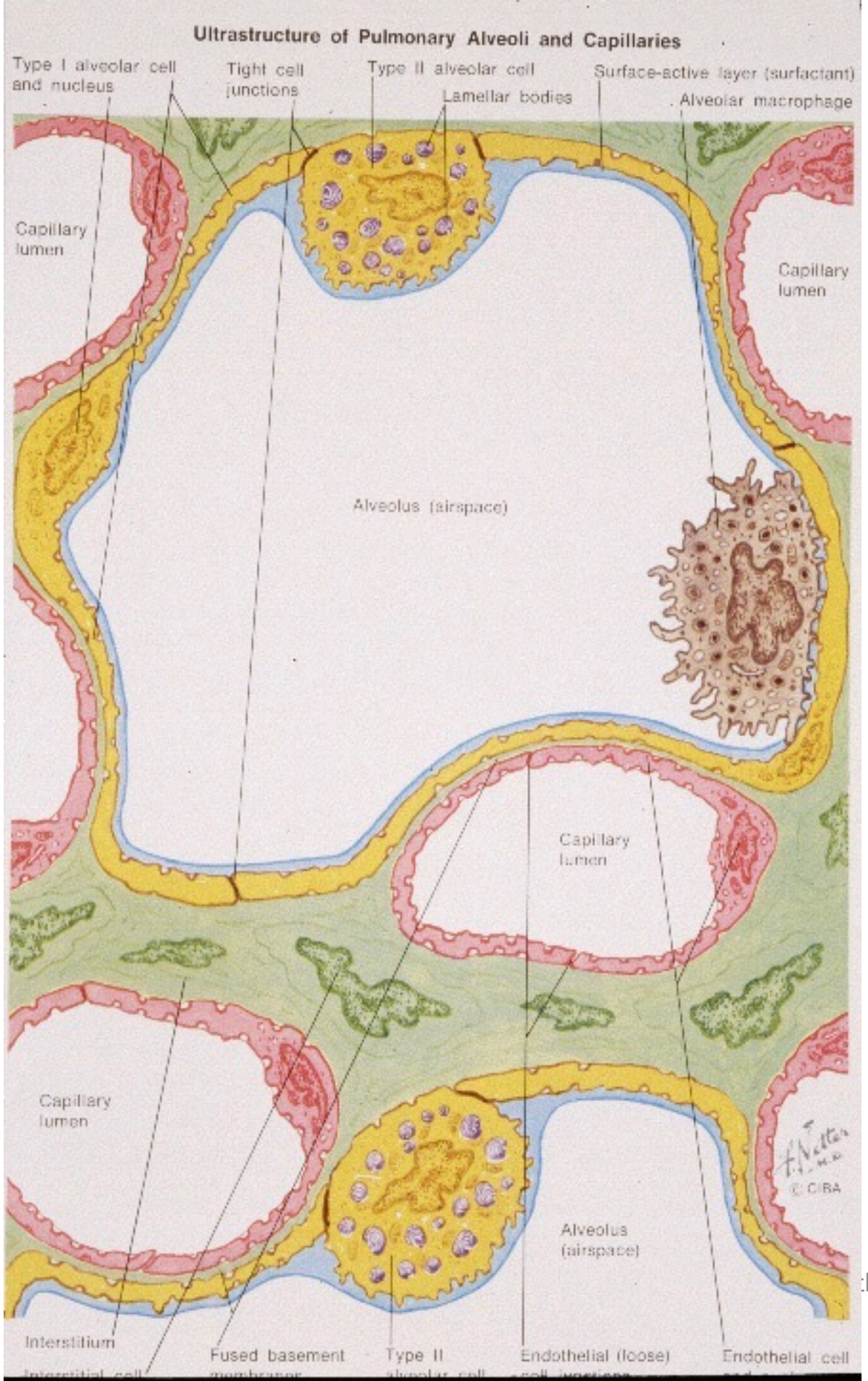

Figure 3. “Blue Sky” with the temperature probe inside the crib at the wye.

1. **Céu Azul** *Faça fluxo condensado longe do bebê.*

   Coloque tubo azul (que flui para o bebê) superior ao tubo branco.
2. **Tubos não é alto** *Deixe a gravidade tomar condensado longe do bebê.*

   Minimizar a elevação da tubulação acima do bebê.
   Tubing executado através menor vigia.
   Minimizar laços dependentes de tubos.
   Tilt conexão estrela longe de bebé
3. **Temp em Wye?** *Otimizar a temperatura local da sonda.*

   Se a configuração mais quente é> 34 graus usar mangueira de extensão para manter a sonda de temperatura exterior do aquecedor. (Fig. 2)
   Se a configuração mais quente é <34 graus colocar sensor de temperatura no interior proximal mais quente para estrela. (Fig. 3)



Type II cell

Surfactant

Type I cell

Macrophage

Capillary

Interstitium

Assessment

- Chest x-ray AP
- 8 rib conventional
- 9-10 rib Hi-Fi
- Rise & fall of chest (slight per NRP)
- Listen to breath sounds
- Vt 5-7 ml/kg (3-5 spont.)
- follow ABGs

RDS

TTN

Pneumonia

Pulm Edema

Atelectasis

Severe BPD

PIE

Grainy

Streaky

Patchy

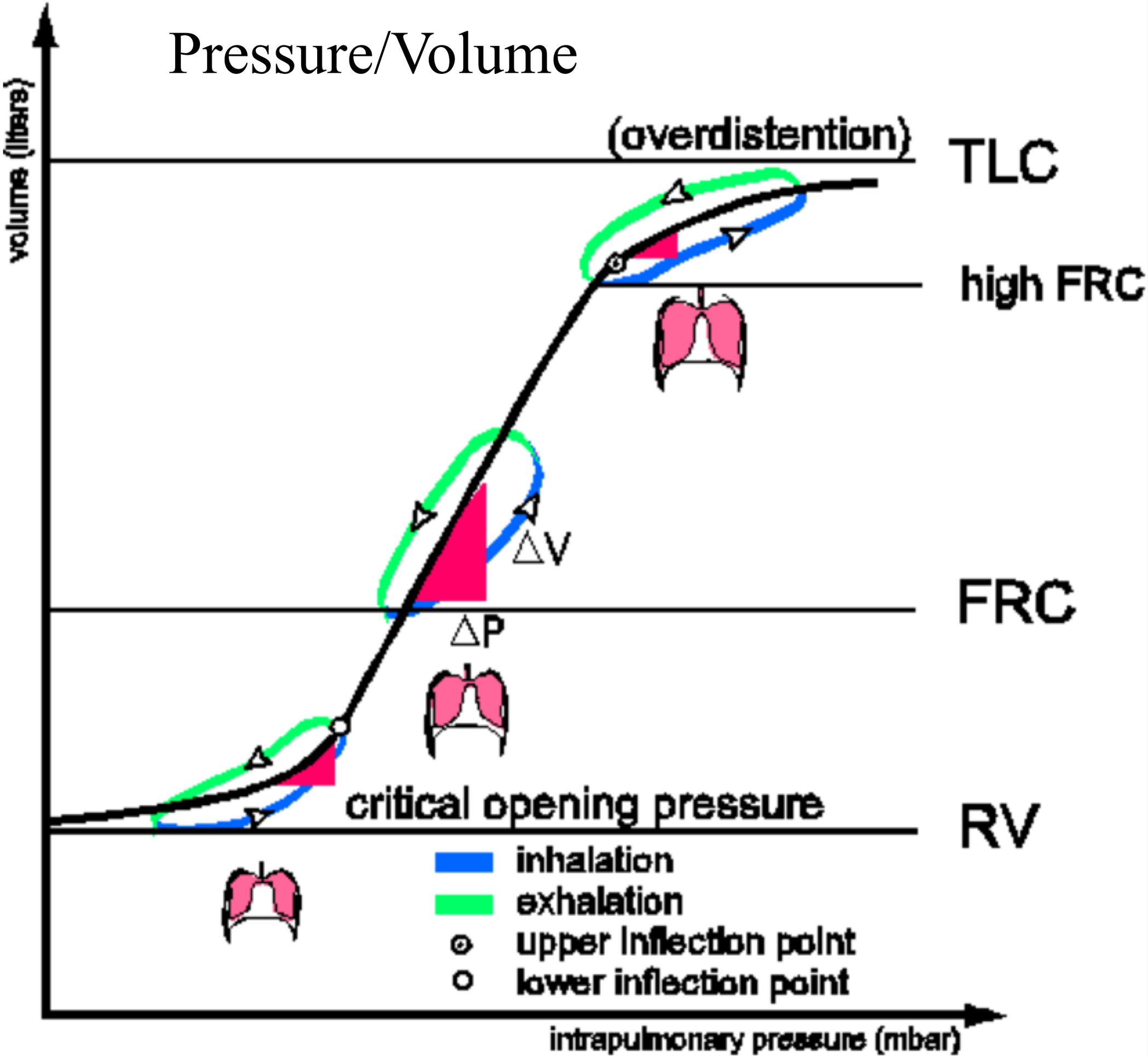
Fluffy

Hazy

Bubbly

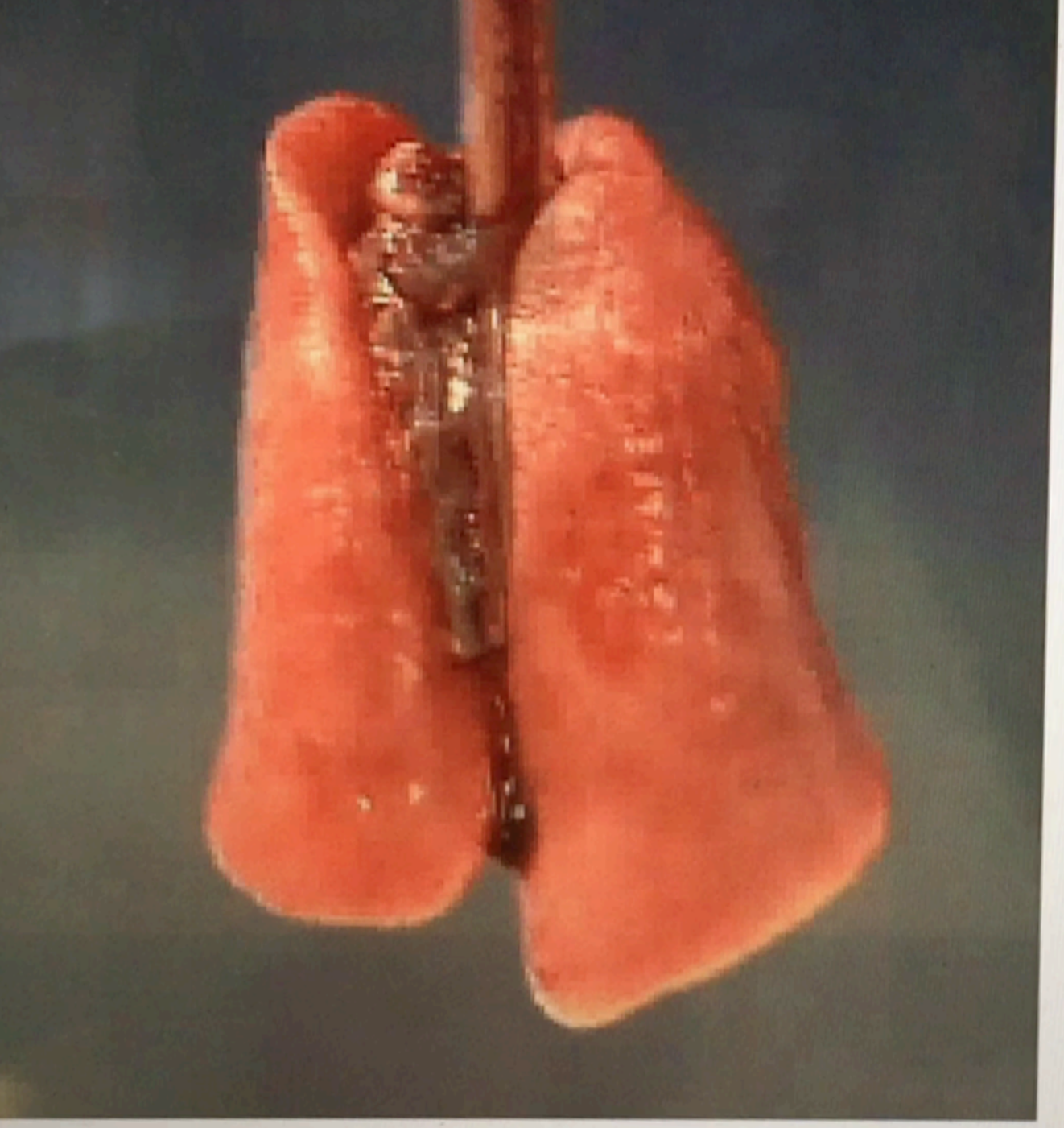
Dotty

Pressure/Volume



http://www.brighamandwomens.org/respiratorytherapy/Images/ratlung.swf

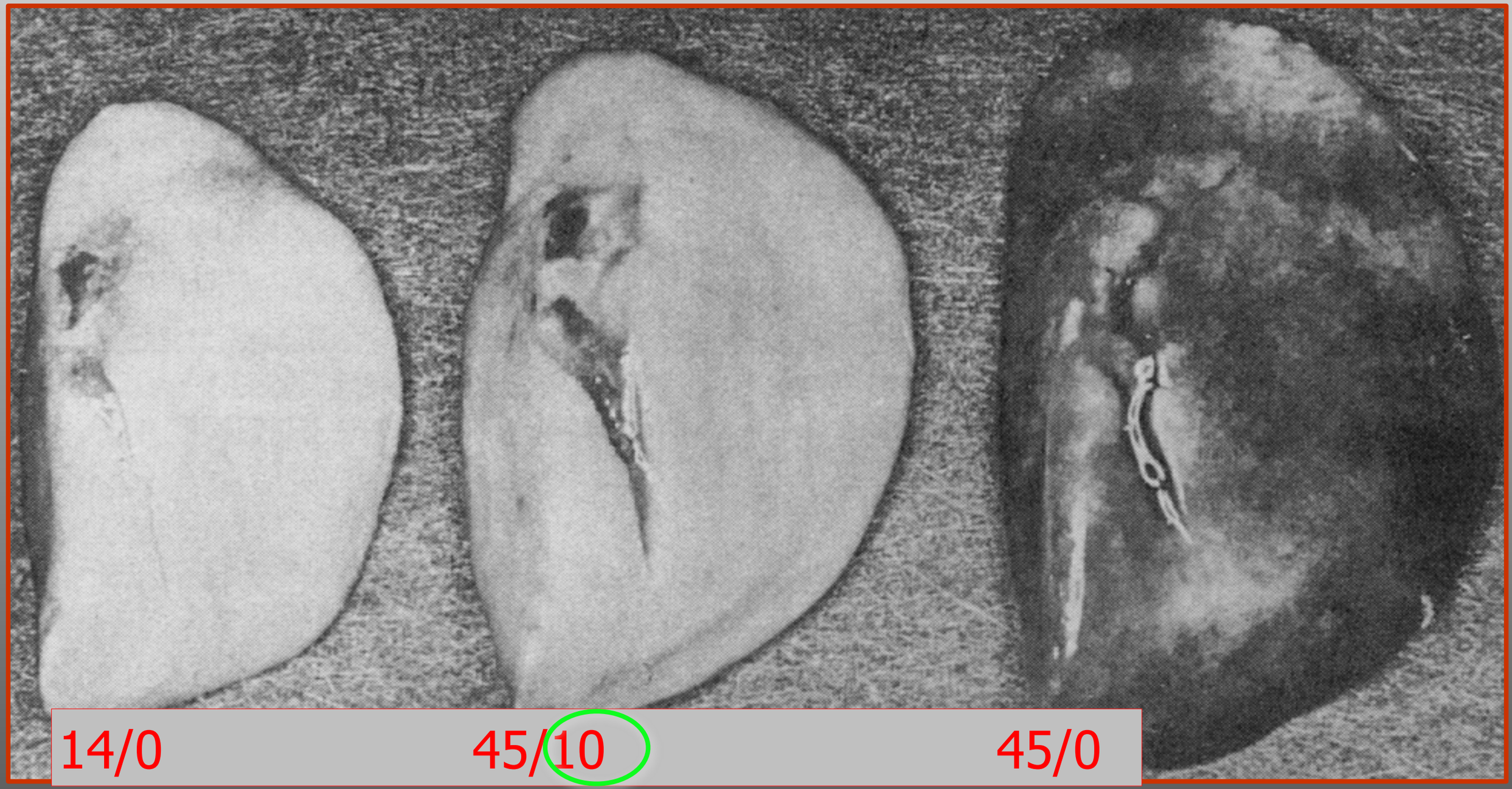
ratlung



http://www.surfneon.com/FLASH/ratlung.swf

Pressure/Volume

PEEP O

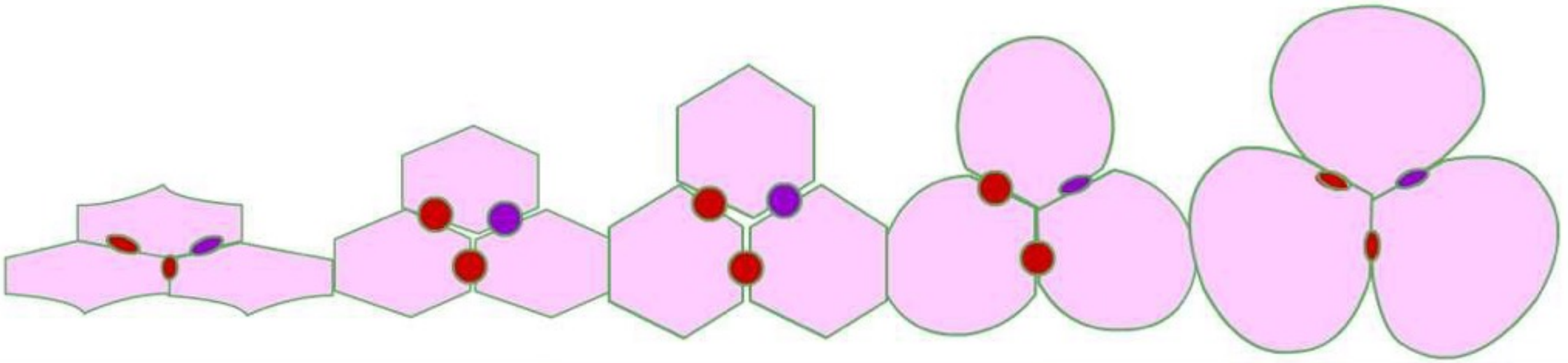


Webb and Tierney, Am Rev Respir Dis 1974; 110:556-565

Alveolar Distention & Pulmonary Blood Flow

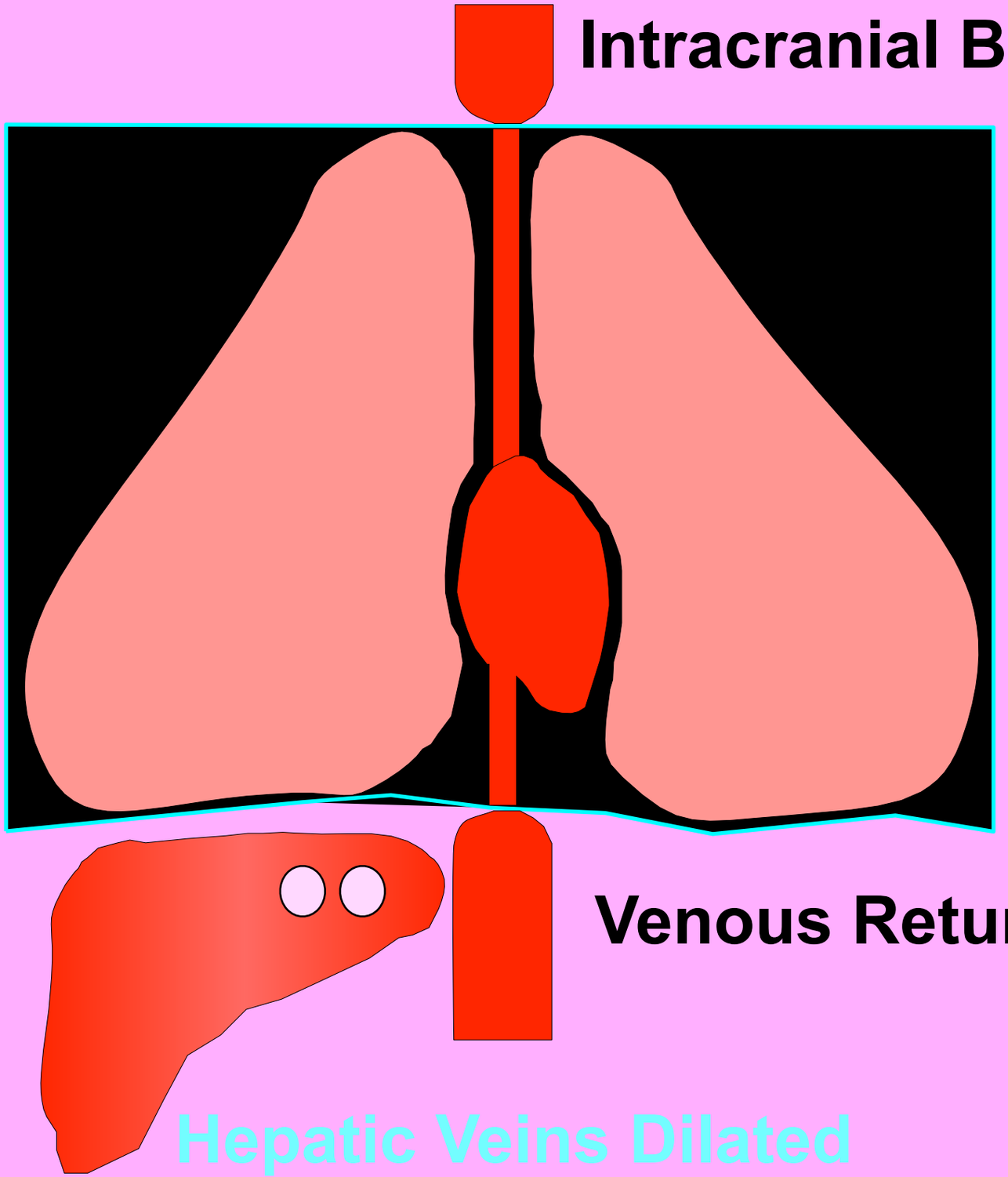
John B. West's Lung Zones

IV III II I



http://www.youtube.com/watch?v=eXRb0WG1lLw

Intracranial Blood Pressure Elevated



Elevated Intrathoracic Pressure

(High PEEP & $\overline{P}aw$)

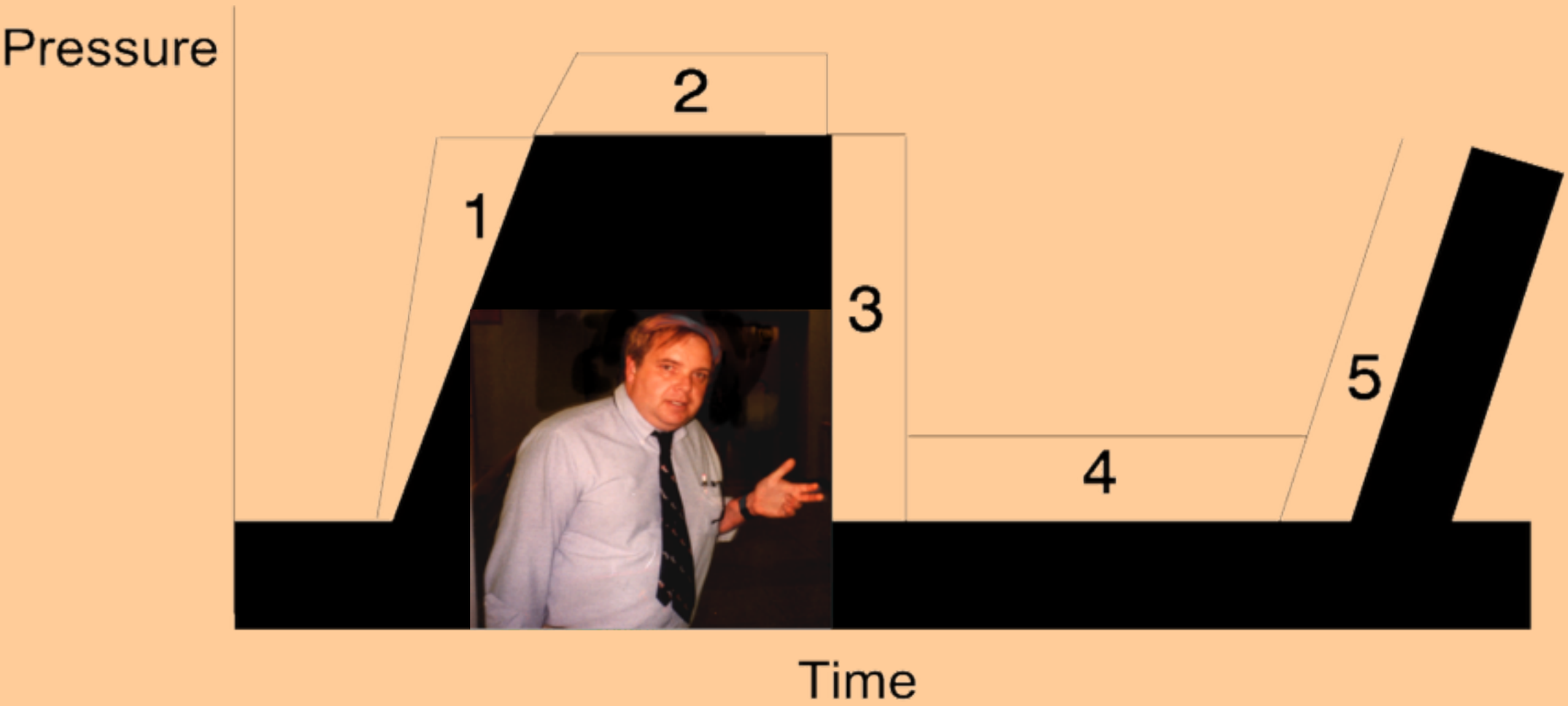
Venous Return Impeded

Hepatic Veins Dilated

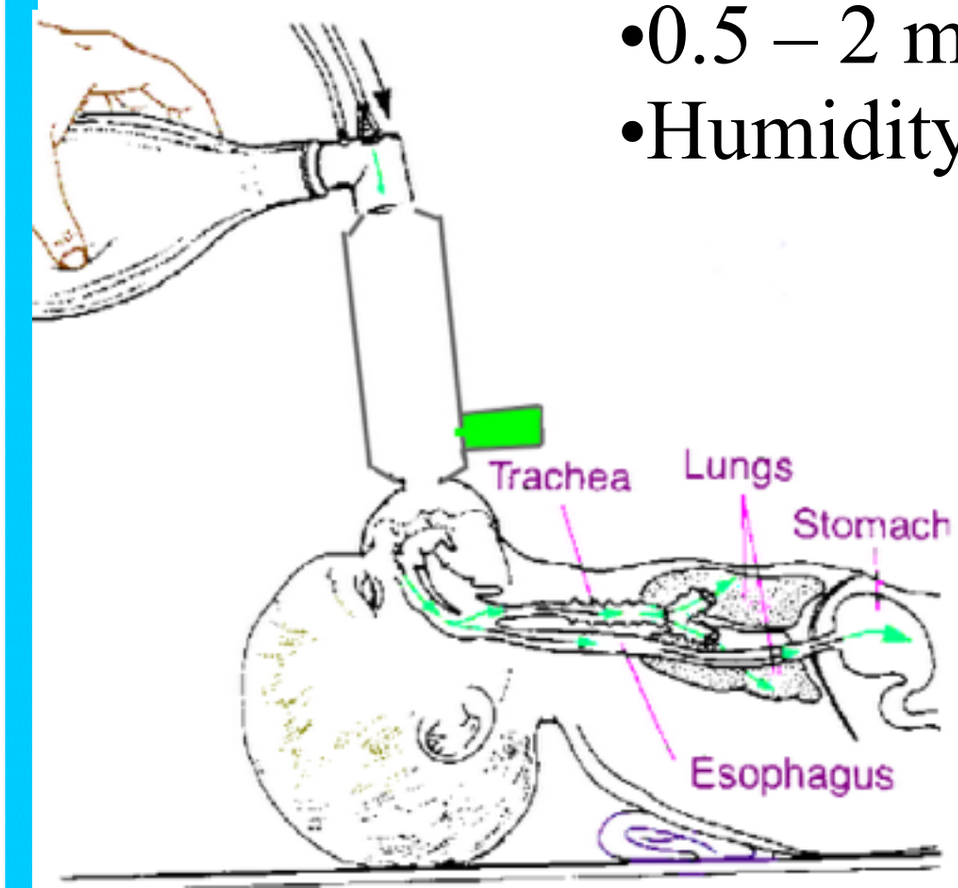
To Increase Mean Airway Pressure

1. **Increase flow**
2. **Increase peak pressure**
3. **Lengthen inspiratory time**
4. **Increase PEEP**
5. **Increase Rate**

Pressure Wave



- Concentration of aerosol
  - Timing with inspiration
- Resistance to distribution of aerosol
  - ETT & airway diameter
  - Inertial impaction of large particles
- Landing patterns of aerosol
  - Lung surface area
  - Inspiratory time –gravitation small particles are exhaled
- Particle size
  - 0.5 – 2 microns make it into the lung
  - Humidity grows particles

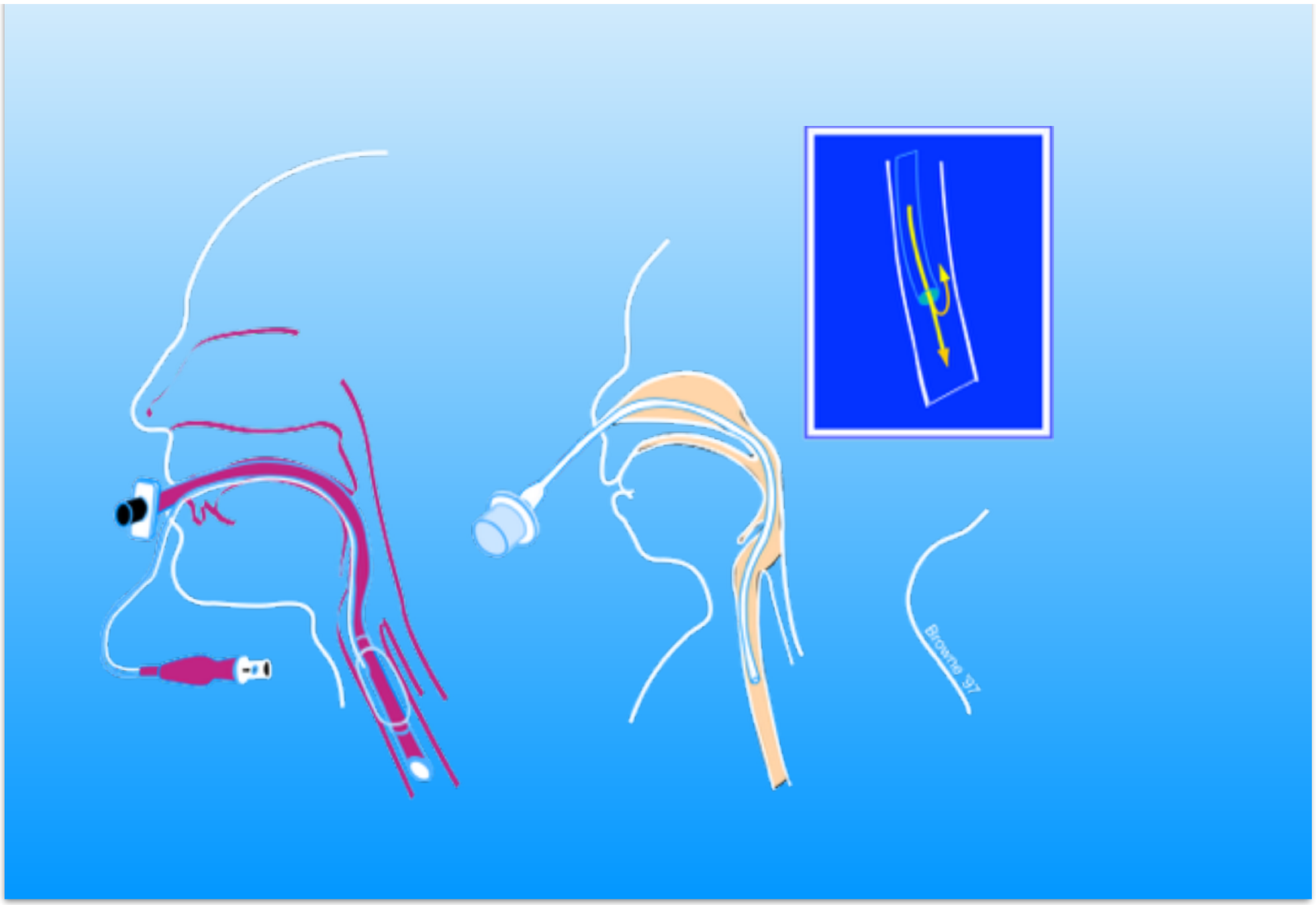


- False positive
  - tube in esophagus
  - technical error.
- False negative

(tube in trachea CO_2 reading low)

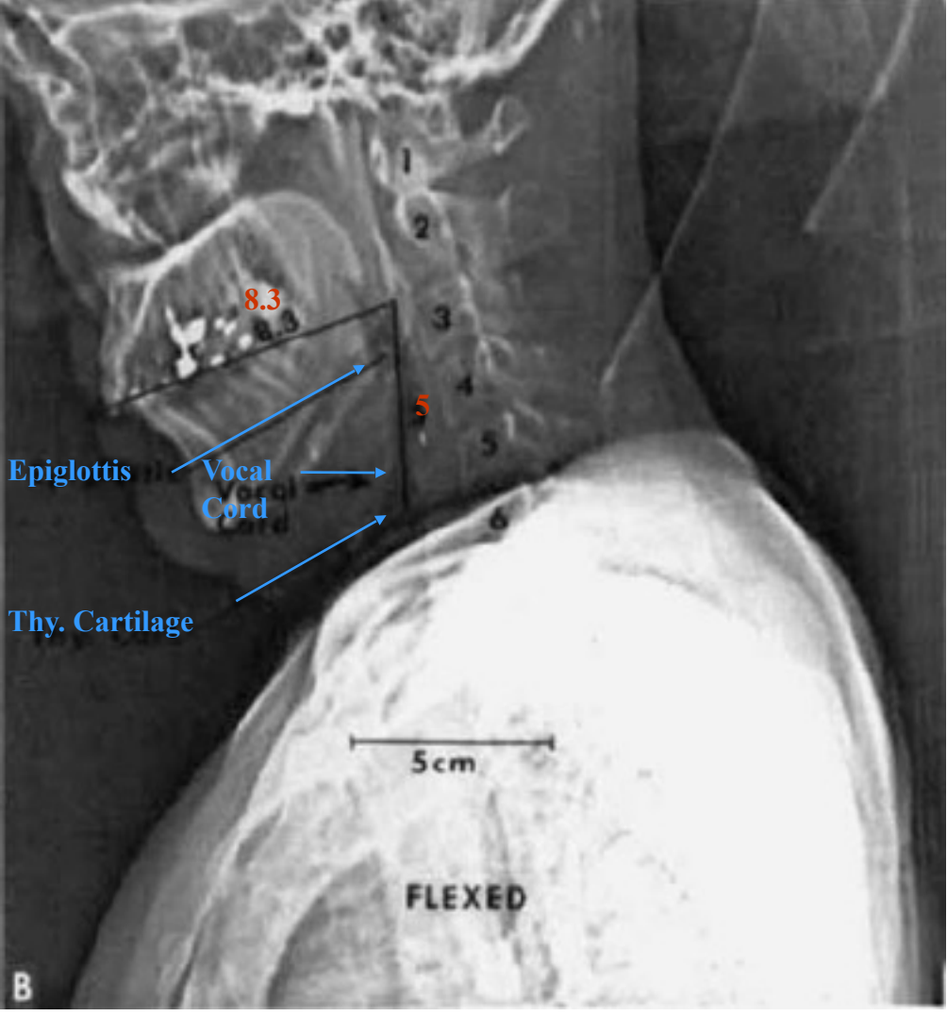
  - severe bronchospasm,
  - hyperventilation,
  - technical error,
  - huge leak around ett,
  - cardiopulmonary arrest.

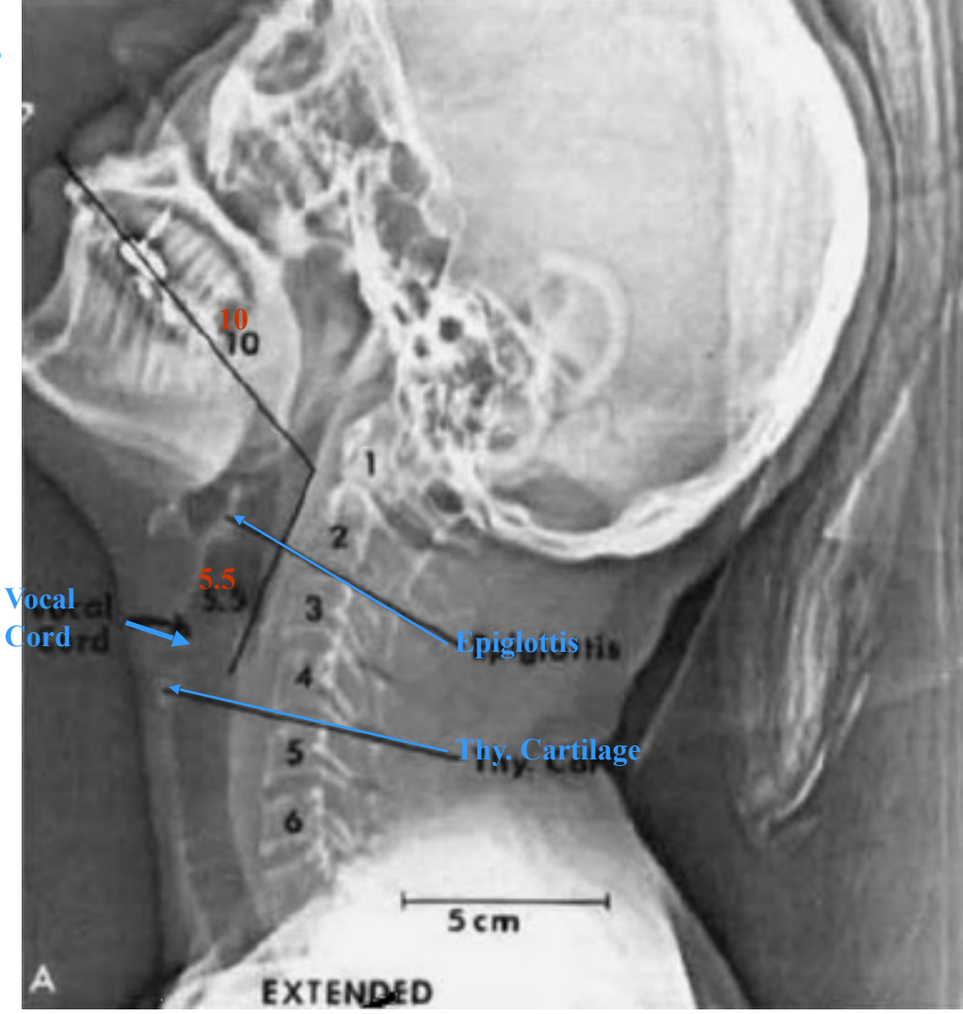
Endotracheal Tube Leak

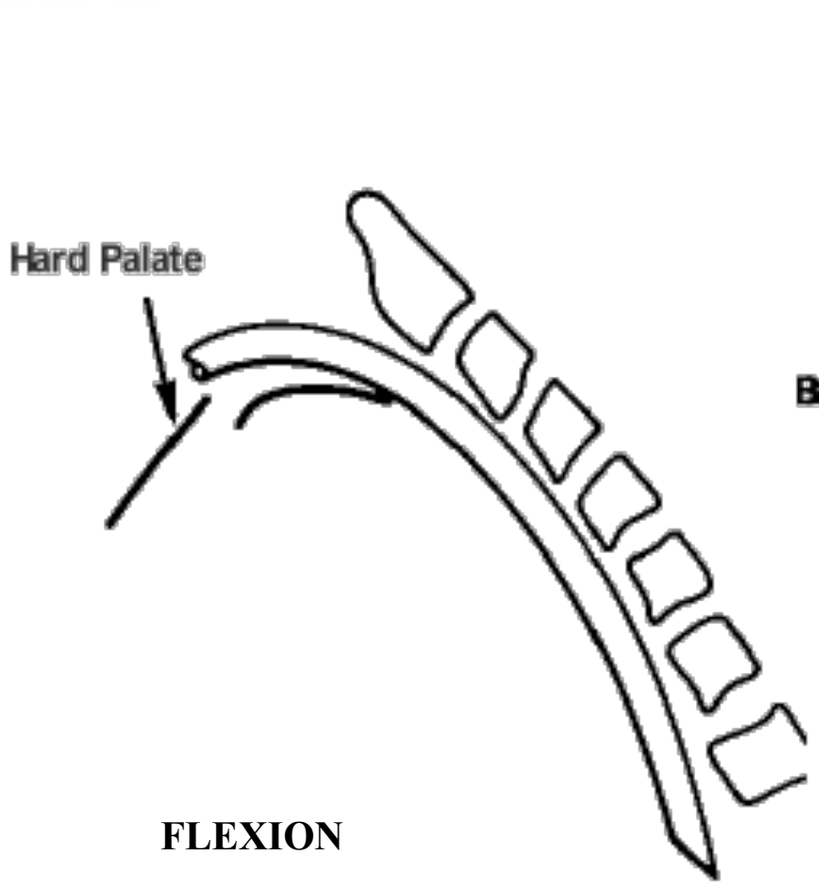


Fulcrum for movement of this lever arm is the upper cervical spine..

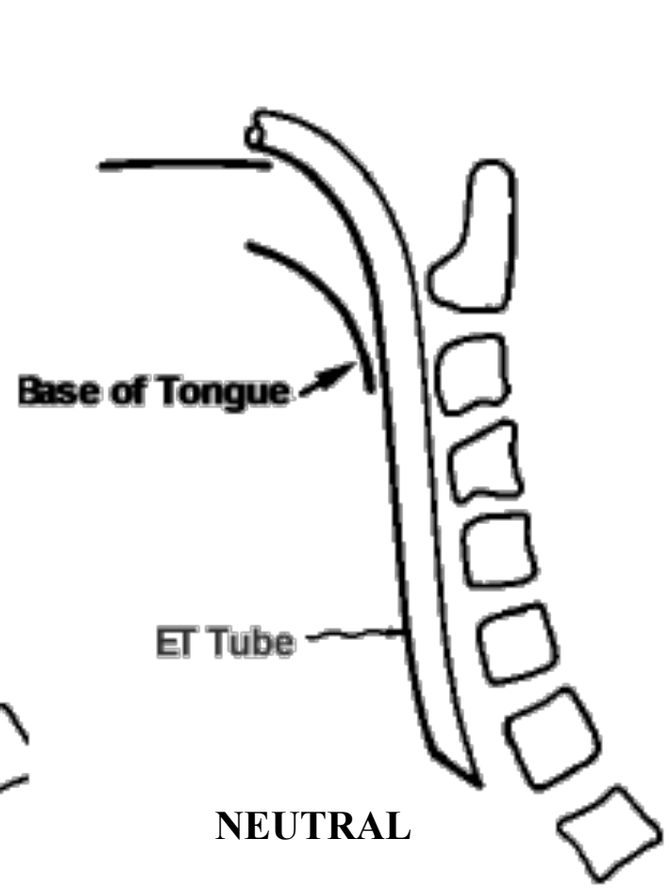
Fulcro paro o movimento da alavanca é a coluna cervical superior.







FLEXION



NEUTRAL

EXTENSION

name wt.

size 2.5 3.0 3.5

sn
date / /
inspector
pass fail

path: oral nasal

Ett depth

ett length + 5 (+ 6 for JET)

name wt.

sn
date / /
inspector
pass fail

size 2.5 3.0 3.5

path: oral nasal

Ett depth

ett length + 5 (+ 6 for JET)

name wt.

sn
date / /
inspector

size 2.5 3.0 3.5

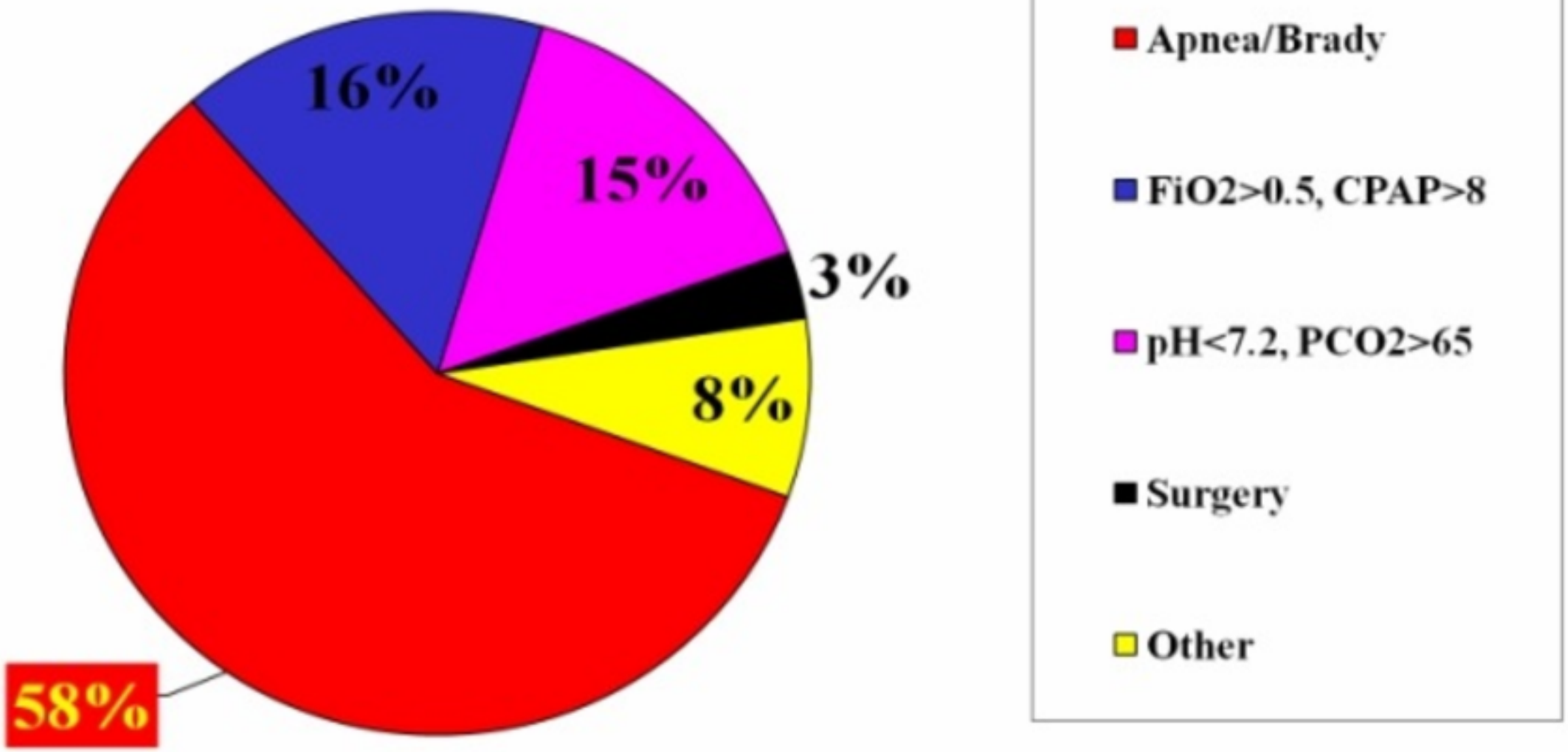
pass fail

path: oral nasal

Ett depth

ett length + 5 (+ 6 for JET)

Reasons for Extubation Failures



Stefanescu BM et al. (Winston-Salem NC) Pediatrics 112:1031-8;2003

Non-Invasive Ventilation Neonatal CLD Working Group

Setup of NIPPV

	rate	Ti	PIP	PEEP	rise time	flow LPM	Pressure MAX
Ramanathan	40 max 50	0.5 to 1	PEEP plus 10-15	5-8	0.1-0.2	10-15	PIP 30
V Bhandari *	~40	~0.45	PIPvent plus 4	4-6	Not specified	8-10	MAP 14 < 1000g 16 > 1000 g
Chronic Lung Disease NIPPV Overview	15-20	0.3 to 0.5	PIPvent plus 2-4	5	Not specified	Not specified	Not specified

*

* V Bhandari JOP 2010 30, 505-512

- O2 to optimize saturation per policy,
- Caffeine
- Hct. ≥ 35

Non-Invasive Ventilation Neonatal

Transition of Support

- Remove NIPPV
  - Rate 15-25
  - PIP < 17
  - PEEP <6
  - FiO2 <35
- Intubate
  - pH < 7.25 PaCO2 > 60
  - Apnea requiring bagging
  - Frequent As & Bs
  - Frequent desaturations

"…can use blood gases to help wean, but not typically needed—can wean or increase settings based on clinical appearance" CLD Working Group

V Bhandari JOP 2010 30, 505-512

Non-Invasive Ventilation Neonatal

NAVA

Beth Israel Hospital Boston Respiratory Care

Neonatal and Adult ICU Ventilators to Provide Ventilation in Neonates, Infants, and Children: A Bench Model Study

Laurence Vignaux PhD, Lise Piquilloud MD, Pierre Tourneux MD, Philippe Jolliet MD, and Peter C Rimensberger MD

BACKGROUND: Using a bench test model, we investigated the hypothesis that neonatal and/or adult ventilators equipped with neonatal/pediatric modes currently do not reliably administer pressure support (PS) in neonatal or pediatric patient groups in either the absence or presence of air leaks. METHODS: PS was evaluated in 4 neonatal and 6 adult ventilators using a bench model to evaluate triggering, pressurization, and cycling in both the absence and presence of leaks. Delivered tidal volumes were also assessed. Three patients were simulated: a preterm infant (resistance 100 cm H2O/L/s, compliance 2 mL/cm H2O, inspiratory time of the patient [TI] 400 ms, inspiratory effort 1 and 2 cm H2O), a full-term infant (resistance 50 cm H2O/L/s, compliance 5 mL/cm H2O, TI 500 ms, inspiratory effort 2 and 4 cm H2O), and a child (resistance 30 cm H2O/L/s, compliance 10 mL/cm H2O, TI 600 ms, inspiratory effort 5 and 10 cm H2O). Two PS levels were tested (10 and 15 cm H2O) with and without leaks and with and without the leak compensation algorithm activated. RESULTS: Without leaks, only 2 neonatal ventilators and one adult ventilator had trigger delays under a given predefined acceptable limit (1/8 TI). Pressurization showed high variability between ventilators. Most ventilators showed TI in excess high enough to seriously impair patient-ventilator synchronization (> 50% of the TI of the subject). In some ventilators, leaks led to autotriggering and impairment of ventilation performance, but the influence of leaks was generally lower in neonatal ventilators. When a noninvasive ventilation algorithm was available, this was partially corrected. In general, tidal volume was calculated too low by the ventilators in the presence of leaks; the noninvasive ventilation algorithm was able to correct this difference in only 2 adult ventilators. CONCLUSIONS: No ventilator performed equally well under all tested conditions for all explored parameters. However, neonatal ventilators tended to perform better in the presence of leaks. These findings emphasize the need to improve algorithms for assisted ventilation modes to better deal with situations of high airway resistance, low pulmonary compliance, and the presence of leaks. Key words: mechanical ventilators; ventilatory support; neonatal; pediatrics; intensive care units; equipment safety; respiration; artificial; models.

[Respir Care 2014;59(10):1463–1475. © 2014 Daedalus Enterprises]

Dr Vignaux is affiliated with the Cardio-Respiratory Physiotherapy Unit, Hoˆpital de La Tour, Meyrin, Switzerland. Drs Vignaux and Tourneux are affiliated with Peritox, EA 4284-Unite´ Mixte I01, L'Institut National de l'Environnement Industriel et des Risques, Universite´ de Picardie Jules Verne, Amiens, France. At the time of this study, Dr Vignaux was affiliated the Adult Intensive Care Unit, University Hospital of Geneva, Geneva, Switzerland. Drs Piquilloud and Jolliet are affiliated with the Adult Intensive Care and Burn Unit, University Hospital of Lausanne, Lausanne, Switzerland. Dr Tourneux is also affiliated with the Pediatric Intensive Care Unit, University Hospital North, Amiens, France. Dr Rimensberger is affiliated with the Neonatal and Pediatric Intensive Care Unit, University Hospital of Geneva, Geneva, Switzerland.

The new engl and journa l of medicine
n engl j med 369;7 nejm.org august 15, 2013 611

original article

A Trial Comparing Noninvasive Ventilation Strategies in Preterm Infants

Haresh Kirpalani, B.M., M.Sc., David Millar, M.B., Brigitte Lemyre, M.D., Bradley A. Yoder, M.D., Aaron Chiu, M.D., and Robin S. Roberts, M.Sc., for the NIPPV Study Group*

N Engl J Med 2013;369:611-20.
DOI: 10.1056/NEJMoa1214533

ABSTR ACT

BACKGROUND

To reduce the risk of bronchopulmonary dysplasia in extremely-low-birth-weight infants, clinicians attempt to minimize the use of endotracheal intubation by the early introduction of less invasive forms of positive airway pressure.

METHODS

We randomly assigned 1009 infants with a birth weight of less than 1000 g and a gestational age of less than 30 weeks to one of two forms of noninvasive respiratory support — nasal intermittent positive-pressure ventilation (IPPV) or nasal continuous positive airway pressure (CPAP) — at the time of the first use of noninvasive respiratory support during the first 28 days of life. The primary outcome was death before 36 weeks of postmenstrual age or survival with bronchopulmonary dysplasia.

RESULTS

Of the 497 infants assigned to nasal IPPV for whom adequate data were available, 191 died or survived with bronchopulmonary dysplasia (38.4%), as compared with 180 of 490 infants assigned to nasal CPAP (36.7%) (adjusted odds ratio, 1.09; 95% confidence interval, 0.83 to 1.43; P = 0.56). The frequencies of air leaks and necrotizing enterocolitis, the duration of respiratory support, and the time to full feedings did not differ significantly between treatment groups.

CONCLUSIONS

Among extremely-low-birth-weight infants, the rate of survival to 36 weeks of postmenstrual age without bronchopulmonary dysplasia did not differ significantly after noninvasive respiratory support with nasal IPPV as compared with nasal CPAP. (Funded by the Canadian Institutes of Health Research; NIPPV ClinicalTrials.gov number, NCT00433212; Controlled-Trials.com number, ISRCTN15233270.)

Response of Preterm Infants to 2 Noninvasive Ventilatory Support Systems: Nasal CPAP and Nasal Intermittent Positive-PressureVentilation

Carmen Salum Thome´ Silveira MD, Kamila Maia Leonardi, Ana Paula Carvalho Freire Melo, Jose´ Eduardo Zaia PhD, and Marisa Afonso Andrade Brunherotti PhD

BACKGROUND: Noninvasive ventilation (NIV) in preterm infants is currently applied using intermittent positive pressure (2 positive-pressure levels) or in a conventional manner (one pressure level). However, there are no studies in the literature comparing the chances of failure of these NIV methods. The aim of this study was to evaluate the occurrence of failure of 2 noninvasive ventilatory support systems in preterm neonates over a period of 48 h.

METHODS: A randomized, prospective, clinical study was conducted on 80 newborns (gestational age < 37 weeks, birthweight < 2,500 g). The infants were randomized into 2 groups: 40 infants were treated with nasal CPAP and 40 infants with nasal intermittent positive-pressure ventilation (NIPPV). The occurrence of apnea, progression of respiratory distress, nose bleeding, and agitation was defined as ventilation failure. The need for intubation and re-intubation after failure was also observed.

RESULTS: There were no significant differences in birth characteristics between groups. Ventilatory support failure was observed in 25 (62.5%) newborns treated with nasal CPAP and in 12 (30%) newborns treated with NIPPV, indicating an association between NIV failure and the absence of intermittent positive pressure (odds ratio [OR] 1.22, P < .05). Apnea (32.5%) was the main reason for nasal CPAP failure. After failure, 25% (OR 0.33) of the newborns receiving nasal CPAP and 12.5% (OR 0.14) receiving NIPPV required invasive mechanical ventilation.

CONCLUSIONS: Ventilatory support failure was significantly more frequent when nasal CPAP was used. Key words: continuous positive airway pressure; intermittent positive pressure ventilation; newborn; infant; positive-pressure breathing.

[Respir Care 2015;60(12):1772–1776. © 2015 Daedalus Enterprises]

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DOI: 10.4187/respcare.03565

Response of Preterm Infants to 2 Noninvasive Ventilatory Support Systems: Nasal CPAP and Nasal Intermittent Positive-PressureVentilation

Carmen Salum Thome´ Silveira MD, Kamila Maia Leonardi, Ana Paula Carvalho Freire Melo, Jose´ Eduardo Zaia PhD, and Marisa Afonso Andrade Brunherotti PhD

BACKGROUND: Noninvasive ventilation (NIV) in preterm infants is currently applied using intermittent positive pressure (2 positive-pressure levels) or in a conventional manner (one pressure level). However, there are no studies in the literature comparing the chances of failure of these NIV methods. The aim of this study was to evaluate the occurrence of failure of 2 noninvasive ventilatory support systems in preterm neonates over a period of 48 h.

METHODS: A randomized, prospective, clinical study was conducted on 80 newborns (gestational age < 37 weeks, birthweight < 2,500 g). The infants were randomized into 2 groups: 40 infants were treated with nasal CPAP and 40 infants with nasal intermittent positive-pressure ventilation (NIPPV). The occurrence of apnea, progression of respiratory distress, nose bleeding, and agitation was defined as ventilation failure. The need for intubation and re-intubation after failure was also observed.

RESULTS: There were no significant differences in birth characteristics between groups. Ventilatory support failure was observed in 25 (62.5%) newborns treated with nasal CPAP and in 12 (30%) newborns treated with NIPPV, indicating an association between NIV failure and the absence of intermittent positive pressure (odds ratio [OR] 1.22, P < . 05). Apnea (32.5%) was the main reason for nasal CPAP failure. After failure, 25% (OR 0.33) of the newborns receiving nasal CPAP and 12.5% (OR 0.14) receiving NIPPV required invasive mechanical ventilation.

CONCLUSIONS: Ventilatory support failure was significantly more frequent when nasal CPAP was used. Key words: continuous positive airway pressure; intermittent positive pressure ventilation; newborn; infant; positive-pressure breathing.

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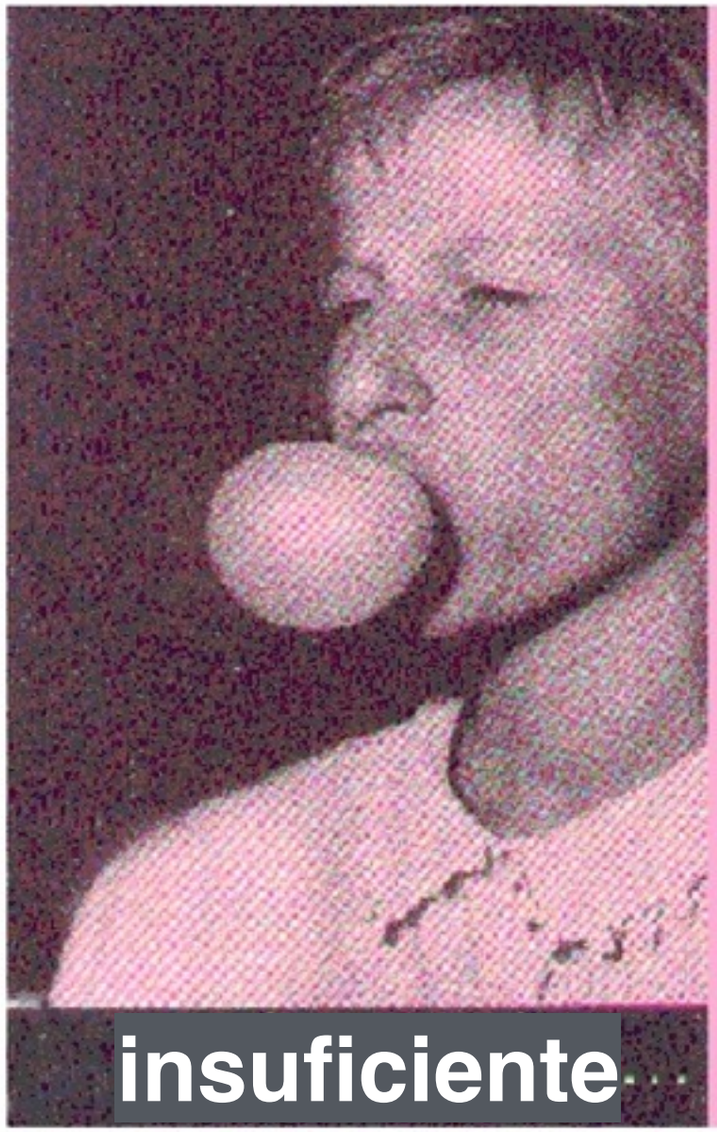
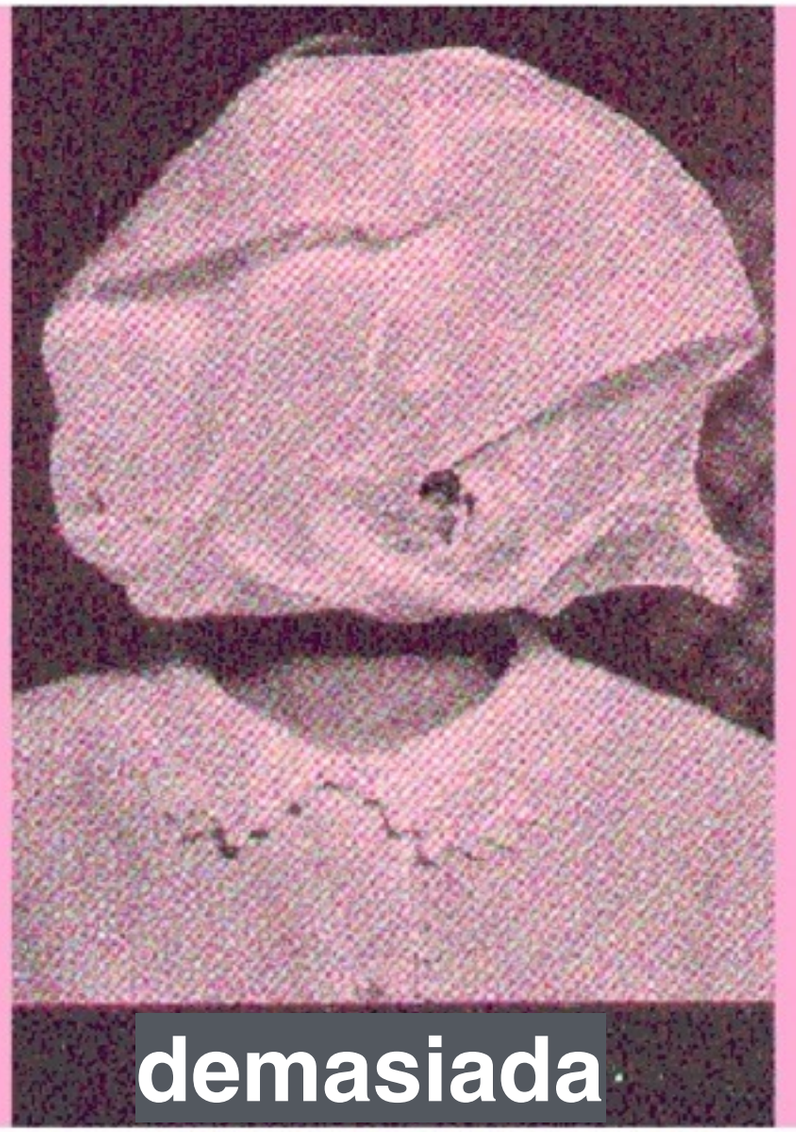
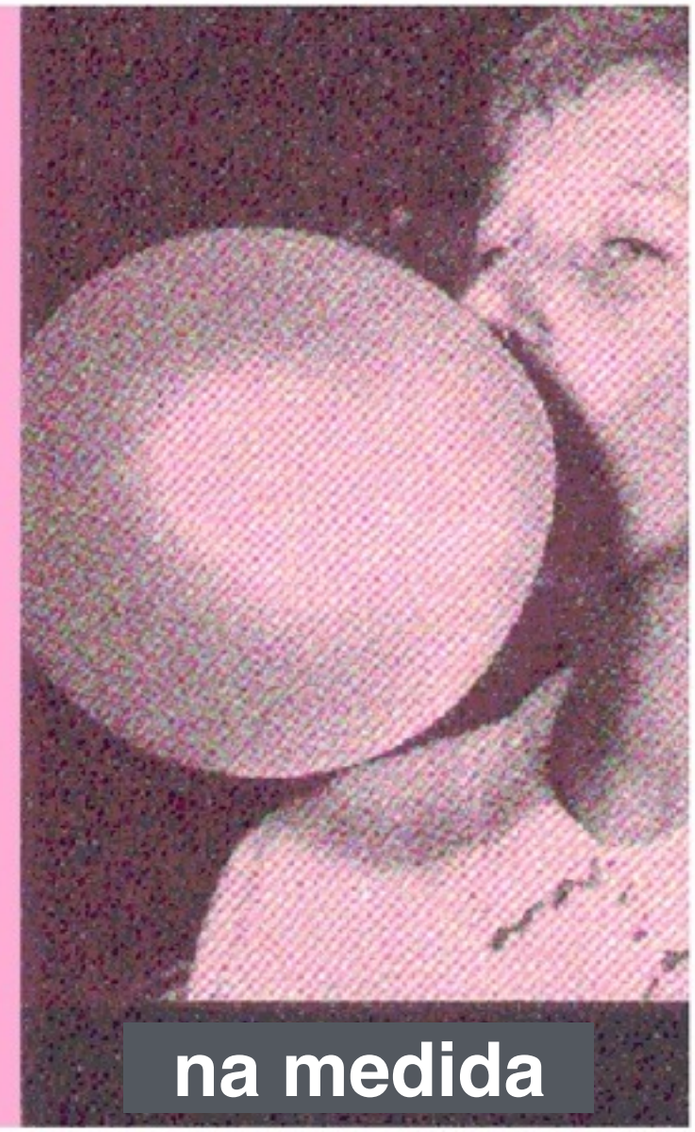
Goldilocks e os Três Ursos







Goldilocks e os Três Ursos

É bom ver a polícia a ficar difíceis sobre a criminalidade juvenil.


TEAM
FIRST
Beth Israel Deaconess
Medical Center
HUMAN
FIRST
Official Hospital
of the
Boston Red Sox
MAYOR MARTIN J. WALSH
LEFT LANE
MUST
TURN LEFT

Beth Israel Deaconess Medical Center

Official Hospital of the Boston Red Sox

MAYOR MARTIN J. WALSH