

## HFOV theory & application

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### 3100A Ventilator

- Approved in 1991 for Neonatal Application for the treatment of all forms of respiratory failure.

- Approved in 1995 for Pediatric Application, with no upper "weight limit". For treating selected patients failing conventional ventilation.



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### Mean Airway Pressure

### Amplitude



HFOV 3100 B

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## Optimized Lung Volume Strategy:

**Decrease Tidal Volumes to less or equal than dead space and increase frequency.**

- Benefits:**
- enhanced gas exchange due to combined gas transport mechanisms
  - no excessive volume swings
  - reduced regional over-inflation and stretching
  - reduced Volutrauma

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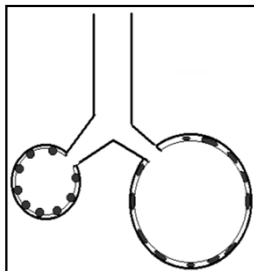
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## Ventilator Induced Lung Injury

- Stretch Injury
  - *Alters capillary transmural pressures*
  - *Relaxation changes in transmural pressure causes breaks in capillary endo and epithelium*
  - *Increases leak of proteinacious material*
    - Promotes Atelectasis



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## Why use HFOV?

- Maintaining a constant mean airway pressure (Paw) prevents the incidence of over-inflation-deflation which produces lung injury. This is known as lung protection strategy.

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## HFV vs CV

Ventilator Type	f, Breaths/min	Inspiration	Expiration
CV	approximately 5-60	Active	Passive
HFPPV	approximately 60-100	Active	Passive
HFJV	approximately 100-200	Active	Passive
HFOV	Up to approximately 2,400	Active	Active

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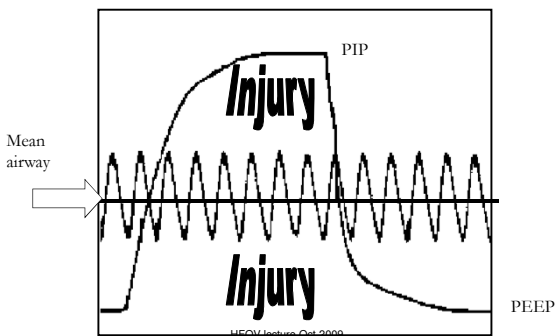
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## HFOV Principle: Pressure curves CMV / HFOV




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## How does HFOV work?

- HFOV provides a small tidal volume which is usually equal to or less than anatomical dead space.
- HFOV uses very fast respiratory rates, usually 600 to 900 breaths per minute (bpm), (small birth weight infants) (10 – 15Hz) for neonates. The frequency is expressed in Hertz's (Hz). One Hz equals 60 bpm, 15 Hz equals 900 bpm.

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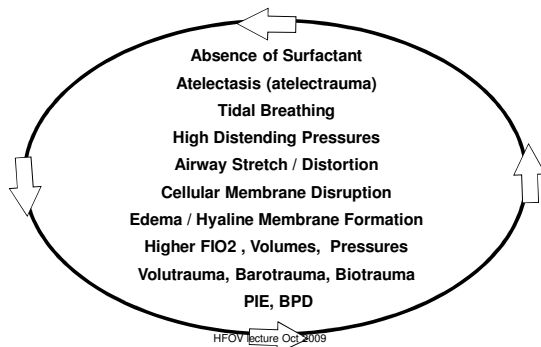
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## Pulmonary Injury Sequence of the neonatal patient:



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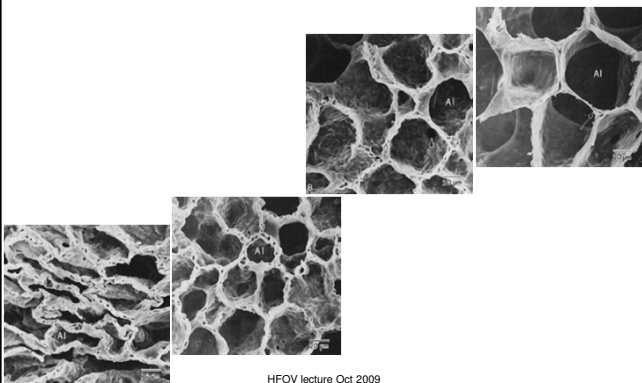
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## Open Lung Ventilation



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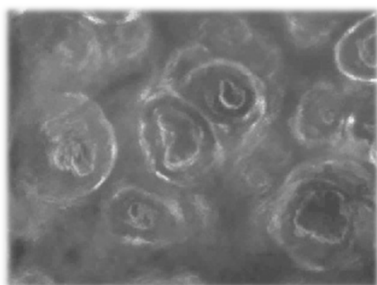
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## CMV



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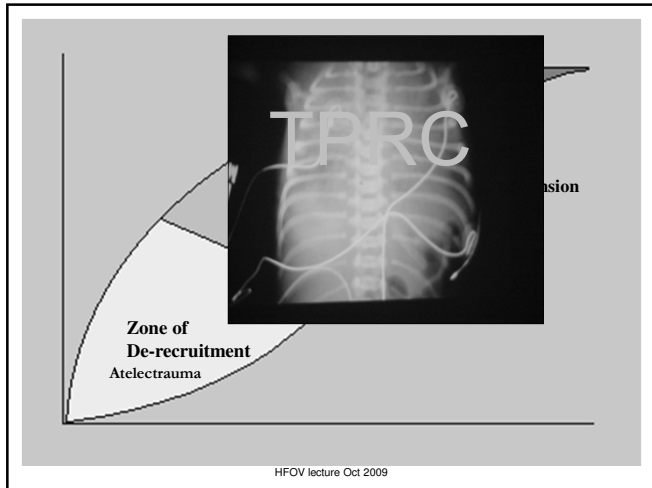
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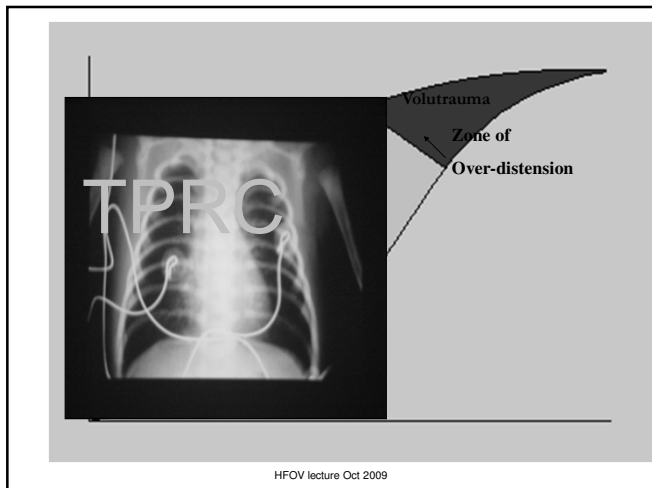
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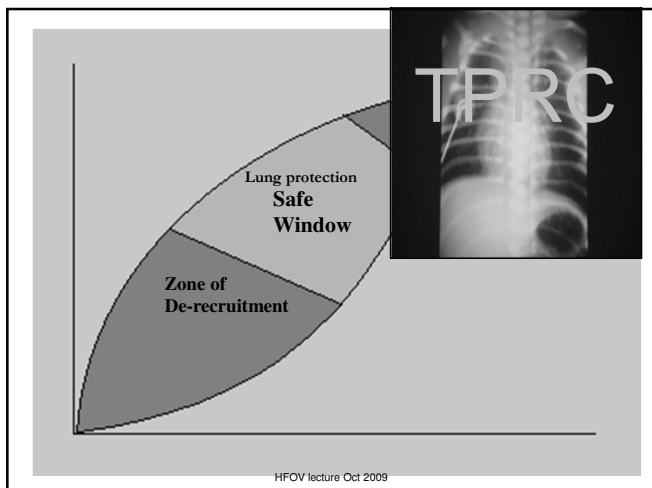
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