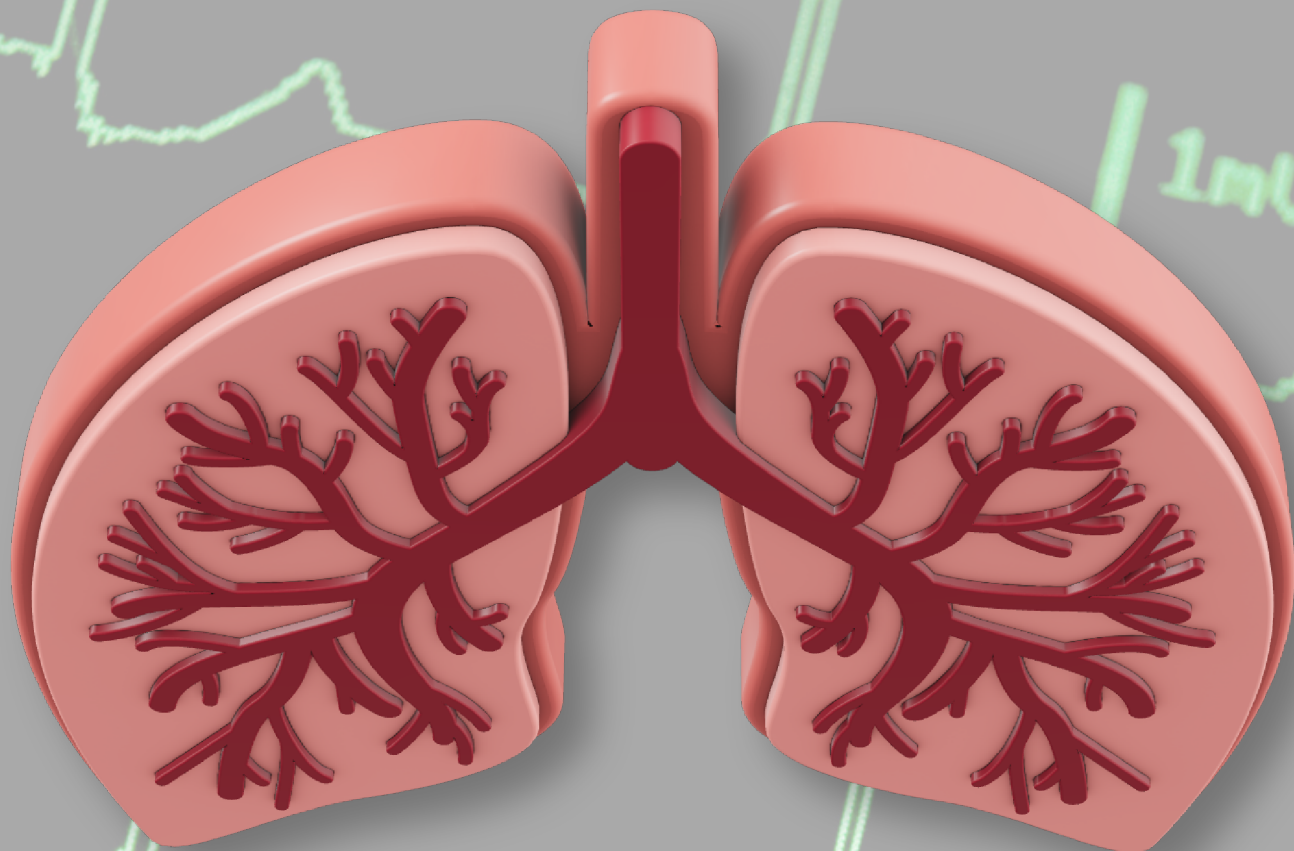




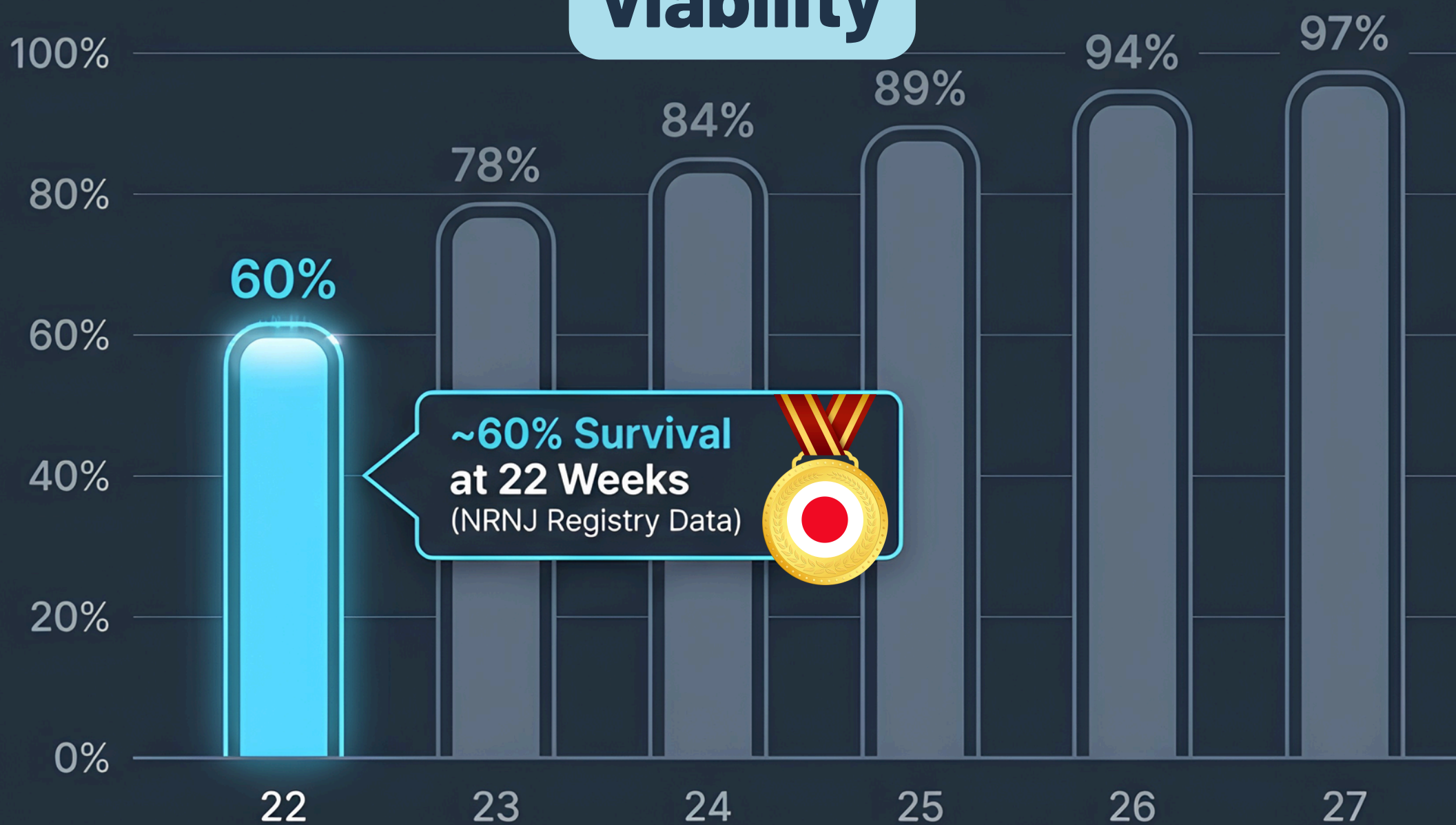
Japanese **First-Line** High-Frequency Oscillatory Ventilation **Protocols** for the Extreme Preterm Infants

The 22-Week Clinical Playbook

Source: KUSUDA, Satoshi; NAKANISHI, Hidehiko; ISAYAMA, Tetsuya (Eds.). Neonatal Intensive Care for Extremely Preterm Infants: Japanese NICU Practices to Prevent Mortality and Morbidities. Elsevier/Academic Press, 2024



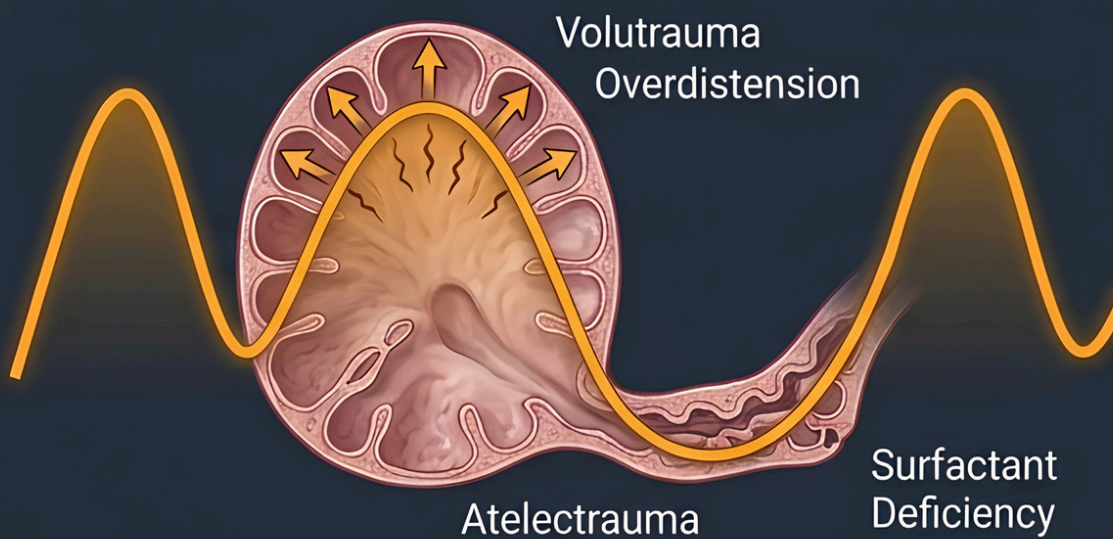
Redefining survival at the edge of viability



In Japanese NICUs, High-Frequency Oscillatory Ventilation (HFOV) is deployed proactively a first-line, lung-protective strategy-not as a rescue therapy. This proactive mechanical strategy is a primary driver of 22-week viability.

The physical limits of the canalicular lung

CMV (Conventional)



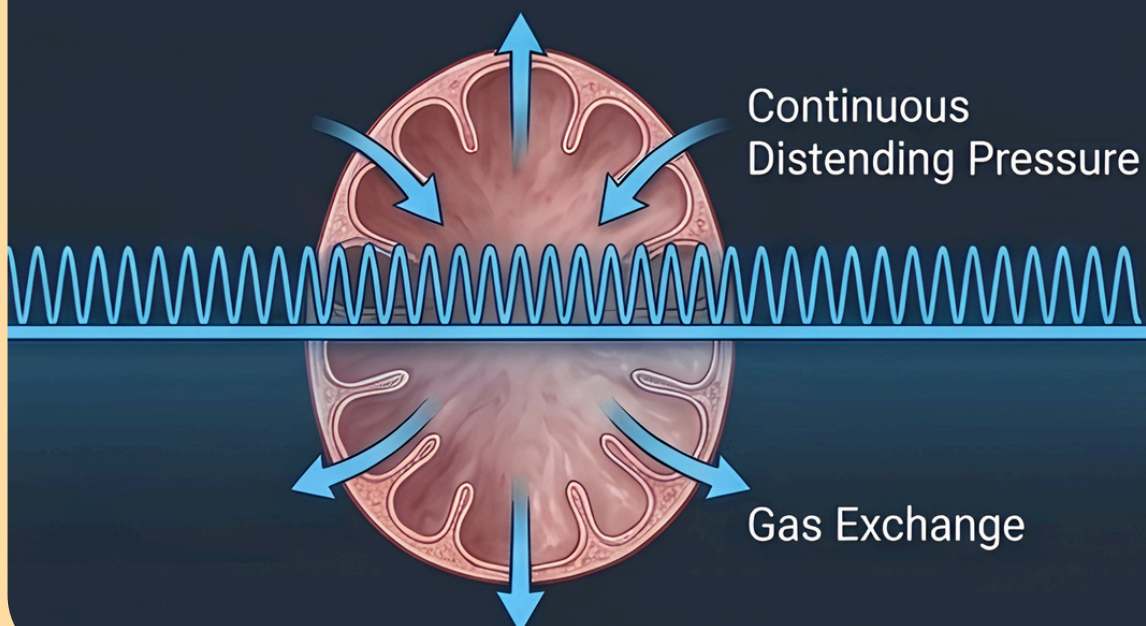
22-Week Reality

Lungs are in the canalicular stage; surfactant is deficient; **alveoli** are virtually absent

CMV Failure

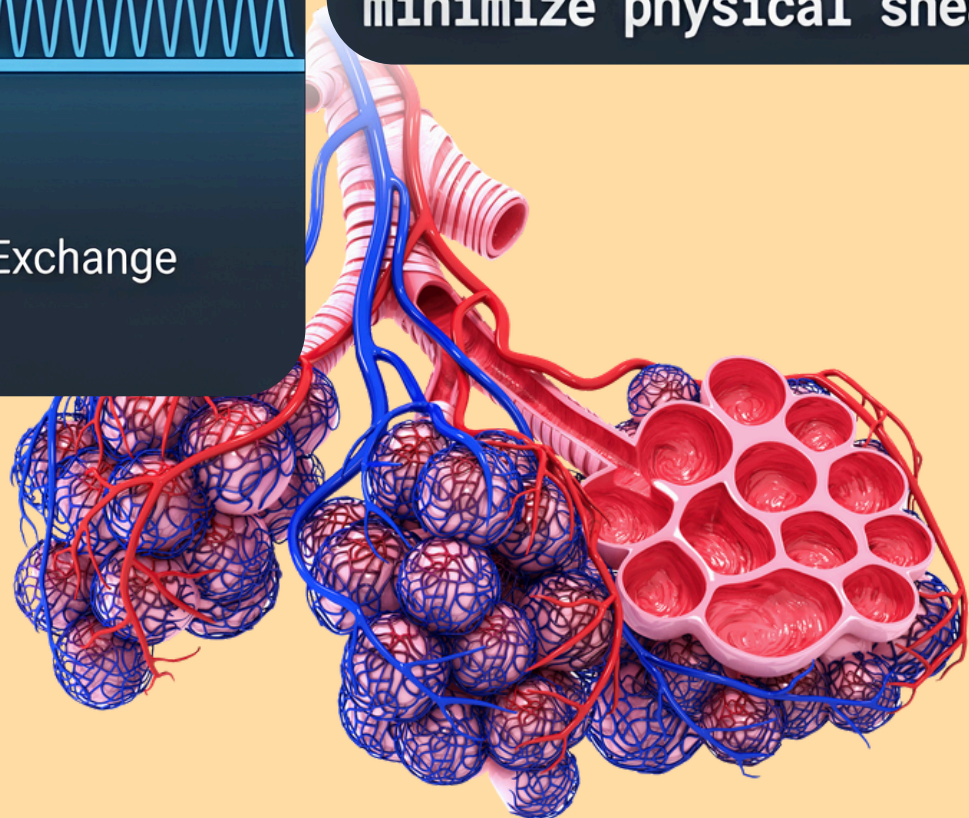
Large tidal volumes induce severe **volutrauma** and **atelectrauma**

HFOV (High-Frequency)



HFOV Advantage

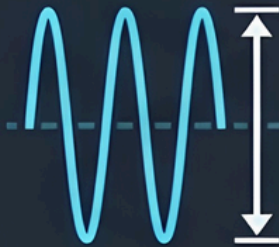
Constant MAP prevents collapse; **sub-dead-space** volumes **minimize physical shearing**



The Core HF0V Interface



Mean Airway Pressure (MAP)
Prevents alveolar collapse.



Amplitude (Delta P)
Drives CO₂ clearance.

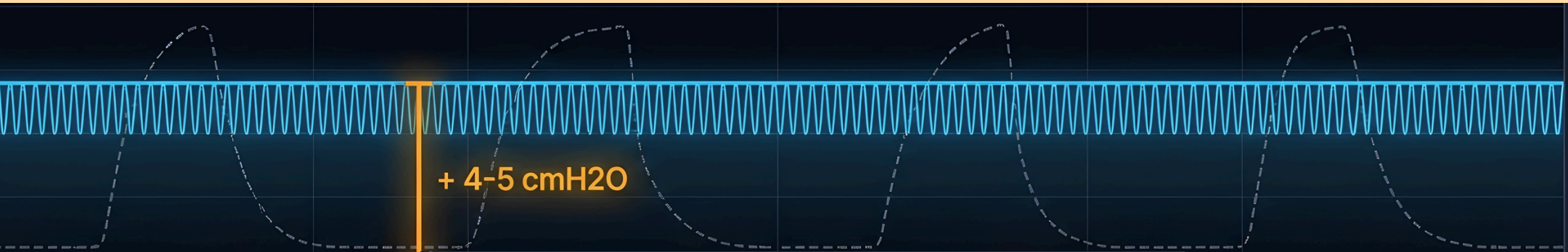


Frequency (Hz)
Calibrates to lung compliance.



High-Frequency Tidal
Volume (V_{Thf})
Guarantees stable ventilation.

Establishing baseline volume



Amplitude (Delta P) Default

Initial default setting: 20 cmH2O.

Adjust based on continuous blood gas data and measured tidal volume.

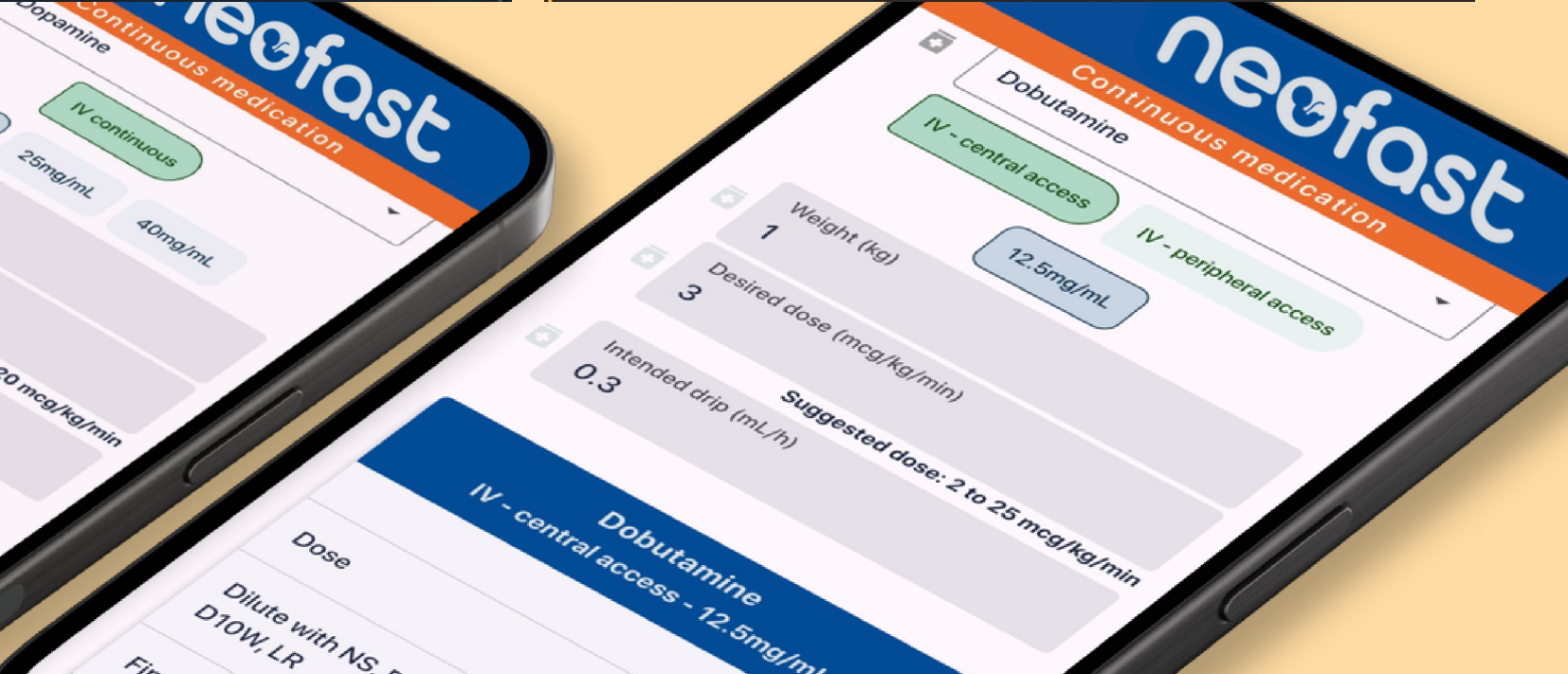
MAP Calibration

Set MAP 4–5 cmH2O above the required CMV baseline, OR

Set MAP at 1.5x the CMV baseline (e.g., CMV MAP of 8 → HFOV MAP of 12).

⚠ Hemodynamic Alert

Elevated MAP can compromise venous return. Anticipate need for volume expanders (FFP) and early inotropic support (Dopamine/Dobutamine at 3.0 µg/kg/min).



Calibrating for compliance

<12 Hz: High Resistance (Severe CLD)

>12 Hz: Low Compliance (RDS)

12 Hz

Center Default: standard
extreme prematurity.

Standard VG Target

1.0–2.0 mL/kg

Standard Babylog VG mode requirement.

CLD VG Target

2.0–3.0 mL/kg

Required to achieve stable ventilation in severe
Chronic Lung Disease.

The anatomical bottleneck: ETT Physics

	The Ideal (≥2.5mm ETT)
Physics	Efficient transmission of high-frequency oscillations directly to the lower airways.
Airway	Easily accommodates standard suctioning protocols.
	The 22-Week Reality (2.0mm ETT)
Physics	Severe dampening of pressure amplitudes due to extreme tube narrowness.
Airway	Fits the 22-23 week trachea but introduces massive risk of fatal secretion blockages.

Clinical Directive: Continuous, vigilant monitoring of graphic waves and pressure amplitude trends is mandatory to detect acute 2.0mm tube obstructions.

The 22-Week HF0V Calibration Algorithm

Step 1: Airway
Intubate (Prepare 2.0mm ETT for 22w).

Step 2: Base Settings
Set MAP = CMV + 4-5 cmH₂O.
Set Delta P = 20 cmH₂O.
Set Freq = 12 Hz.

Step 3: Hemodynamics
Initiate DOA/DOB (3.0 µg/kg/min).
Monitor echo for LVIDd (8-10mm).

Step 4: Pathology Fork

If RDS:
Hz >12, VThf 1.0-2.0 mL/kg.

If CLD:
Hz <12, VThf 2.0-3.0 mL/kg.

Continuou Loop:

Monitor graphic waves for 2.0mm ETT secretion blockages. Adjust Delta P to maintain pCO₂ 50-60 mmHg.



neofast



Venous hydration



Continuous medication



Medicines



Intubation



Other calculations and scores



Procedures

Mechanical ventilation coming soon!



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