



# CDH international SYMPOSIUM, Lille 2024

## *quelques éléments marquants*

SEBASTIEN MUR



## CDH 2024

Congenital Diaphragmatic  
Hernia International Symposium  
Lille, France

### Mechanical Ventilation in CDH: Do we really understand our objectives?

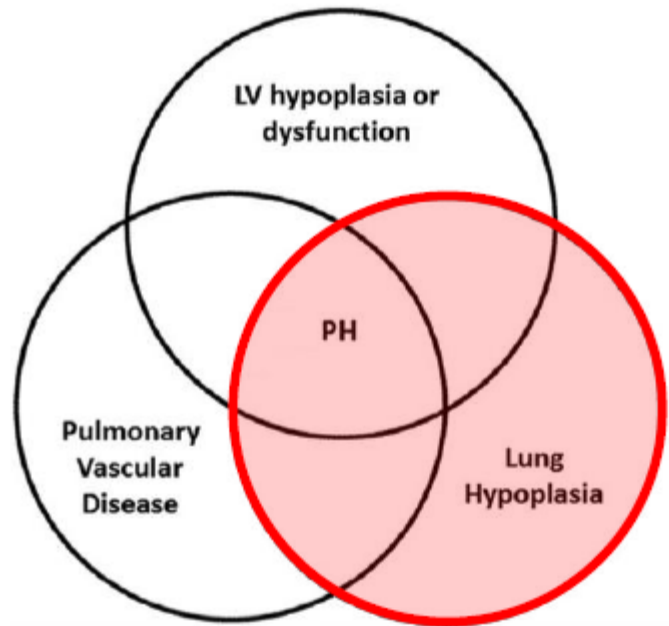
David Tingay

1. Neonatal Research, Murdoch Children's Research Institute, Melbourne
2. Neonatology, Royal Children's Hospital
3. Dept of Paediatrics, University of Melbourne



**LE CŒUR EST PLUS  
IMPORTANT QUE  
LE POUUMON EN  
PHASE AIGUE !!!**

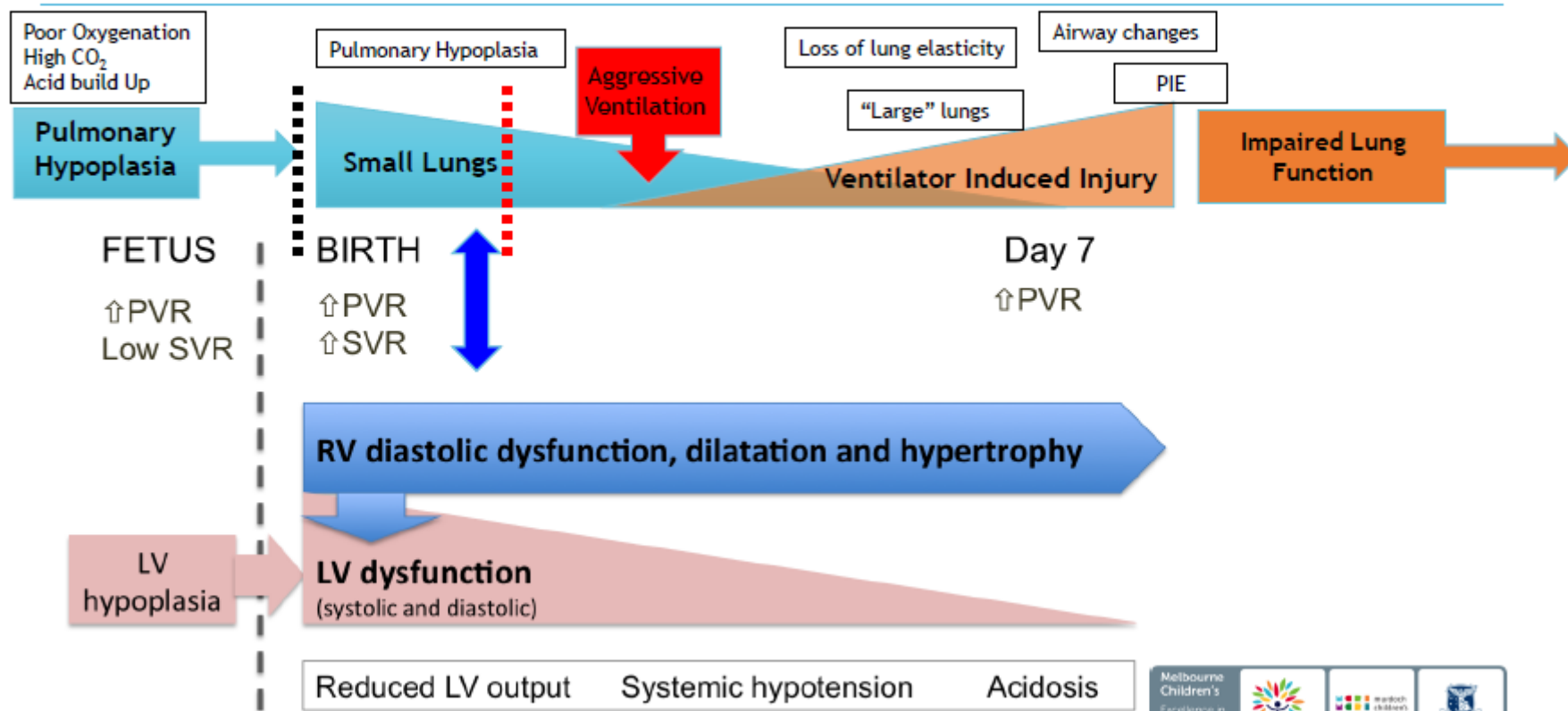
## The CDH cardiorespiratory triumvirate



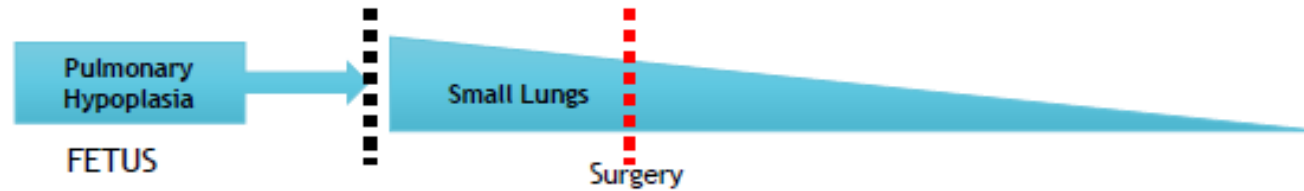
### **PULMONARY HYPOPLASIA**

- Lower alveolar surface area for gas exchange
- Less bronchi/bronchioles
- Abnormal vascular bed
- Altered lung growth signalling

## Cardiorespiratory trajectory of CDH Lung Function

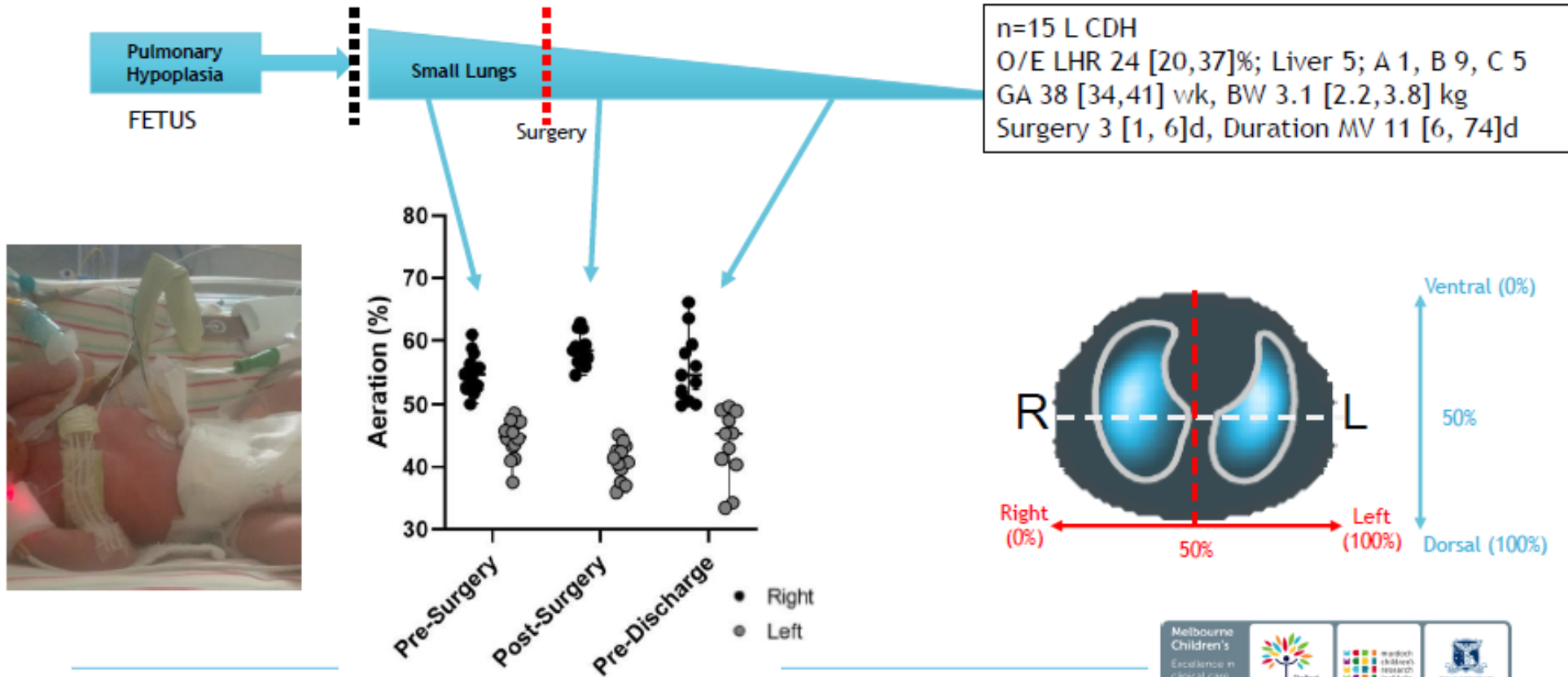


Adapted from Patel and Kipfmüller *Sem Ped Surg* 2017



- Tidal Volume: 4.7 ml/kg (pre) and 4.5 ml/kg (post)
- Deadspace: unknown; related to lung size rather than function
- Are the lungs the same?
- Concept of lung disunity?
- Is there discordant growth?

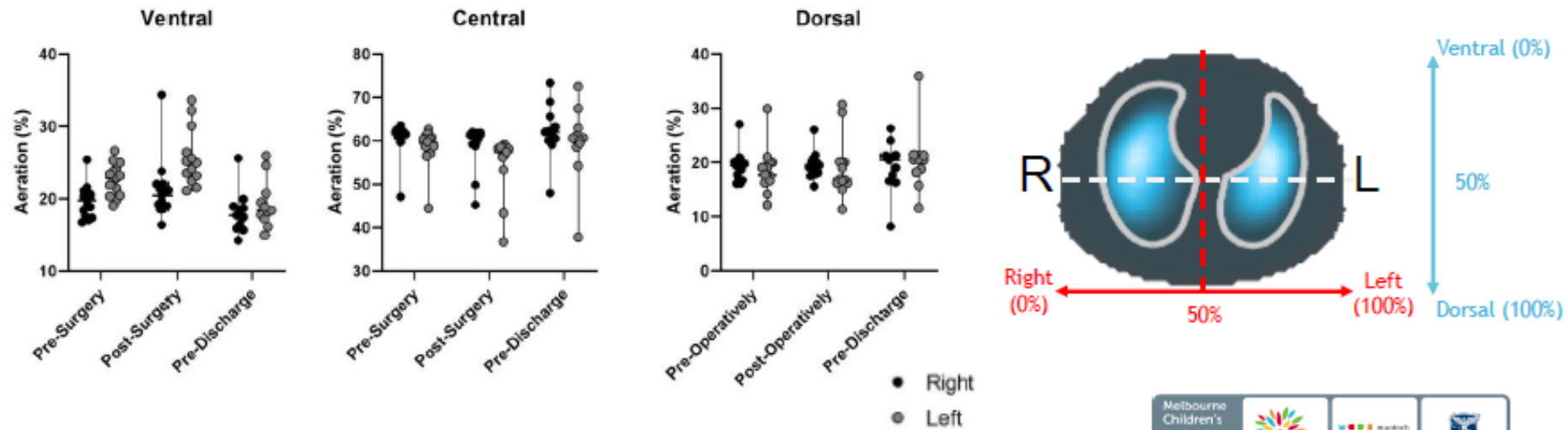
## Lung Function during NICU admission Disunity of aeration?



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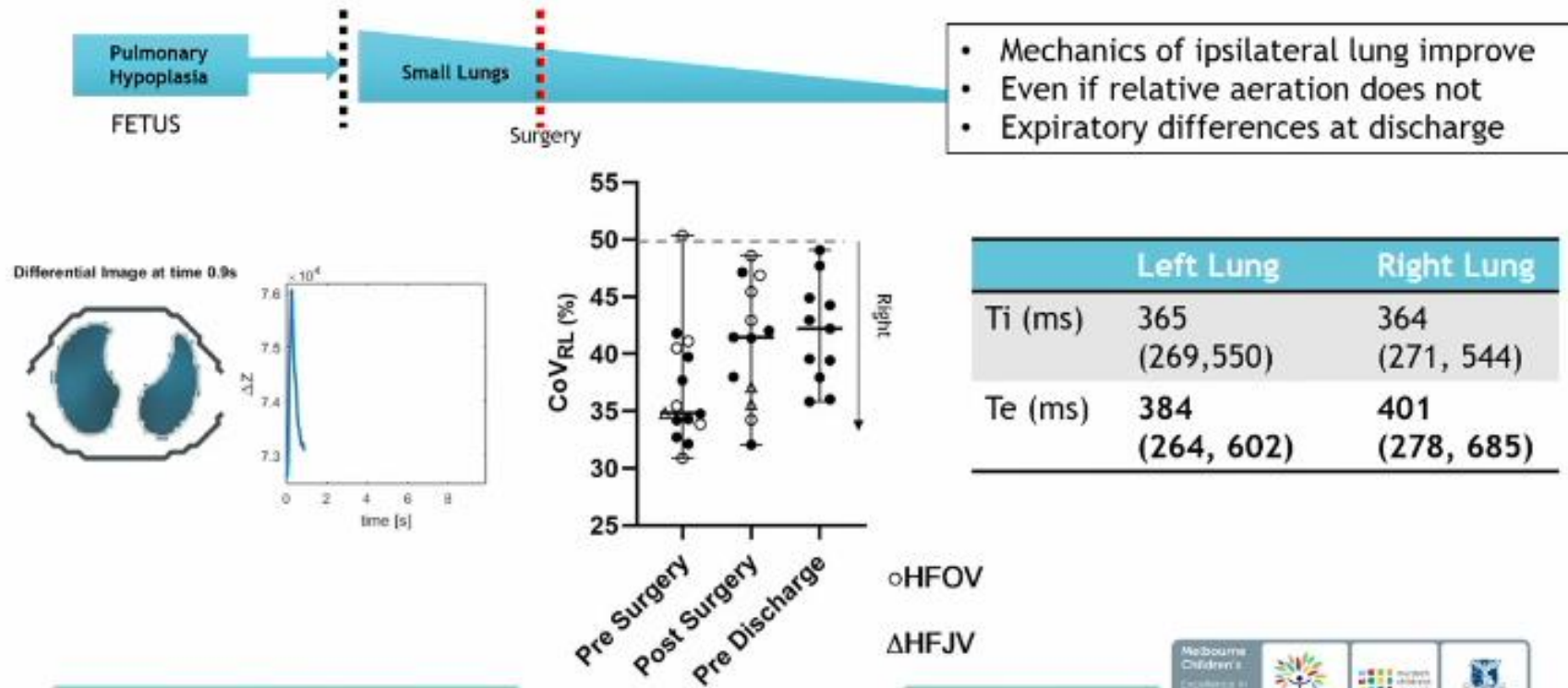
Regional Aeration as a % of each lung mass



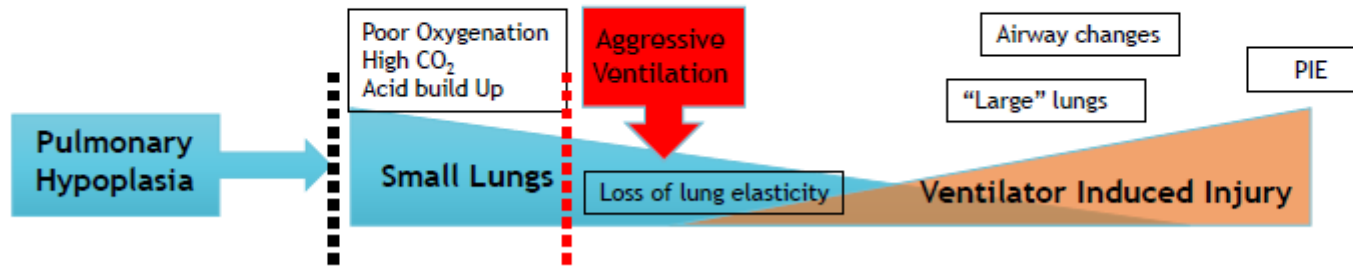
Data Median [Min, Max]



## Lung Function during NICU admission Disunity of ventilation?



## 'Gentle' Mechanical Ventilation of the CDH Lung What are we trying not to injury?



### Ventilator Induced-lung Injury

- Volutrauma
- Barotrauma
- Atelectotrauma
- Ergotrauma
- Oxygen-related trauma

### Ventilator Induced-lung Injury

- Damage to lung tissue
- Damage to airways
- Damage to vascular bed
- Damage to CVS
- Damage to diaphragm

## HFOV and CVS Function

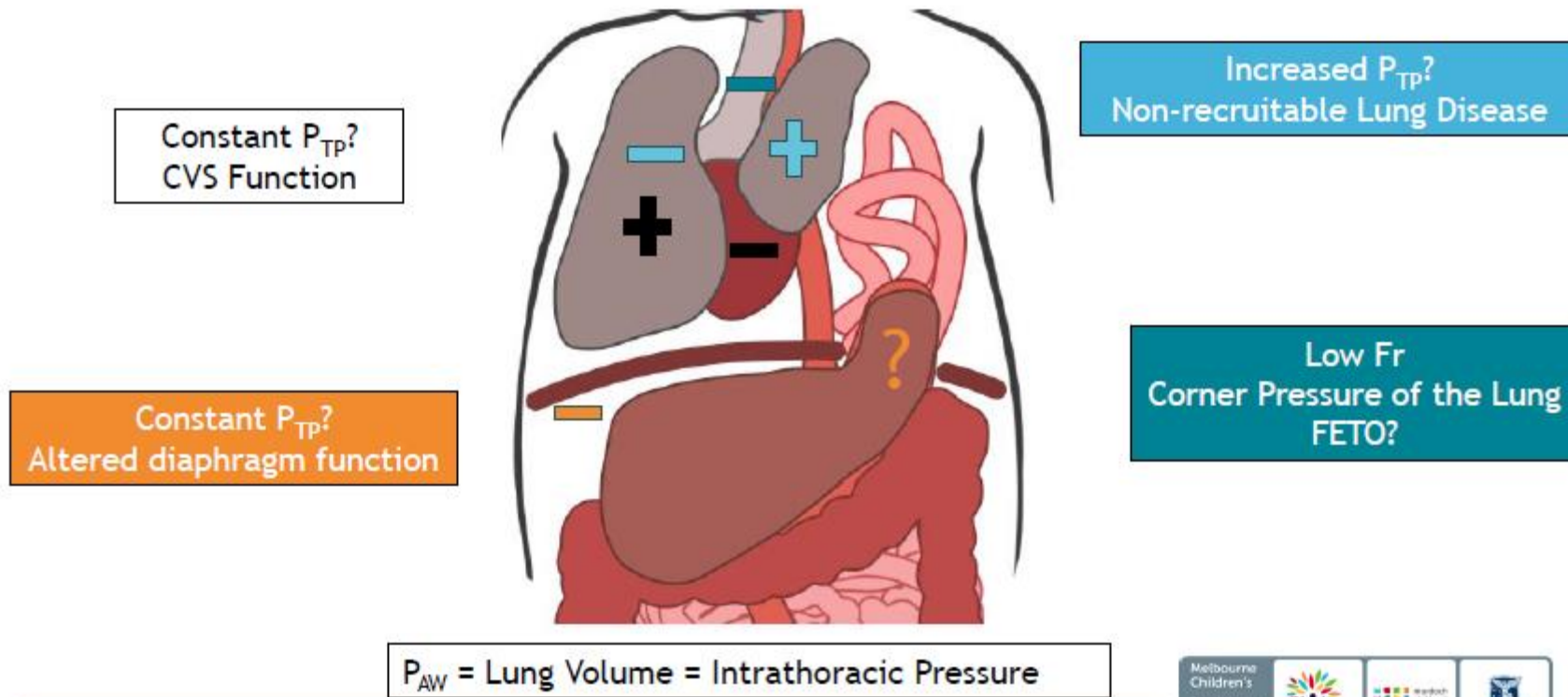


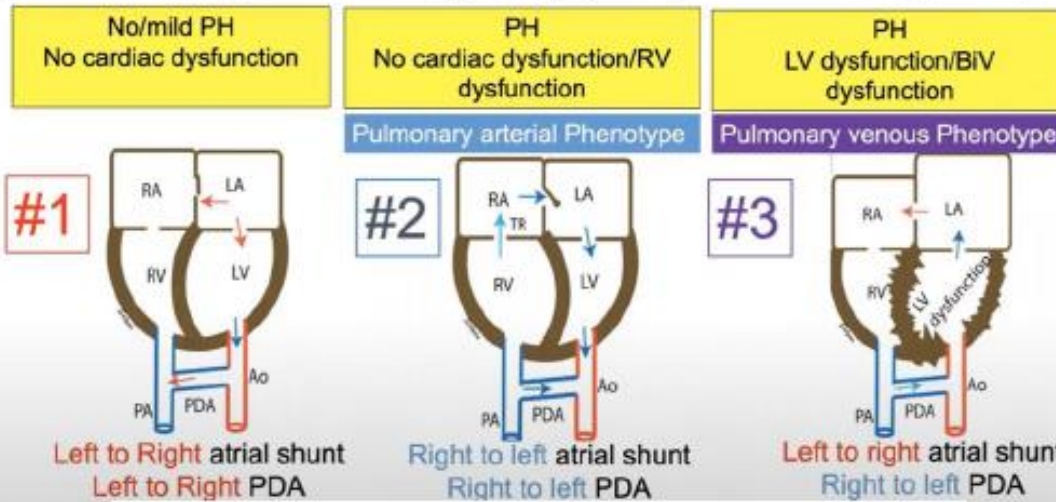
Figure <https://fetus.ucsf.edu/cdh/>

## Cardioprotective Ventilation Moderate - Severe Hypoplasia

Impact of magnitude and pattern of  $P_{TP}$  is not equal

### CDH Pathophysiology Review

by Dr Shazia Bhombal (Stanford University), drawings by Dr Satyan Lakshminrusimha (UC Davis)



'Low' PEEP CMV

'Gentle' HFOV

$P_{AW} < 15 \text{ cmH}_2\text{O}$   
 $Fr > 7 \text{ Hz}$

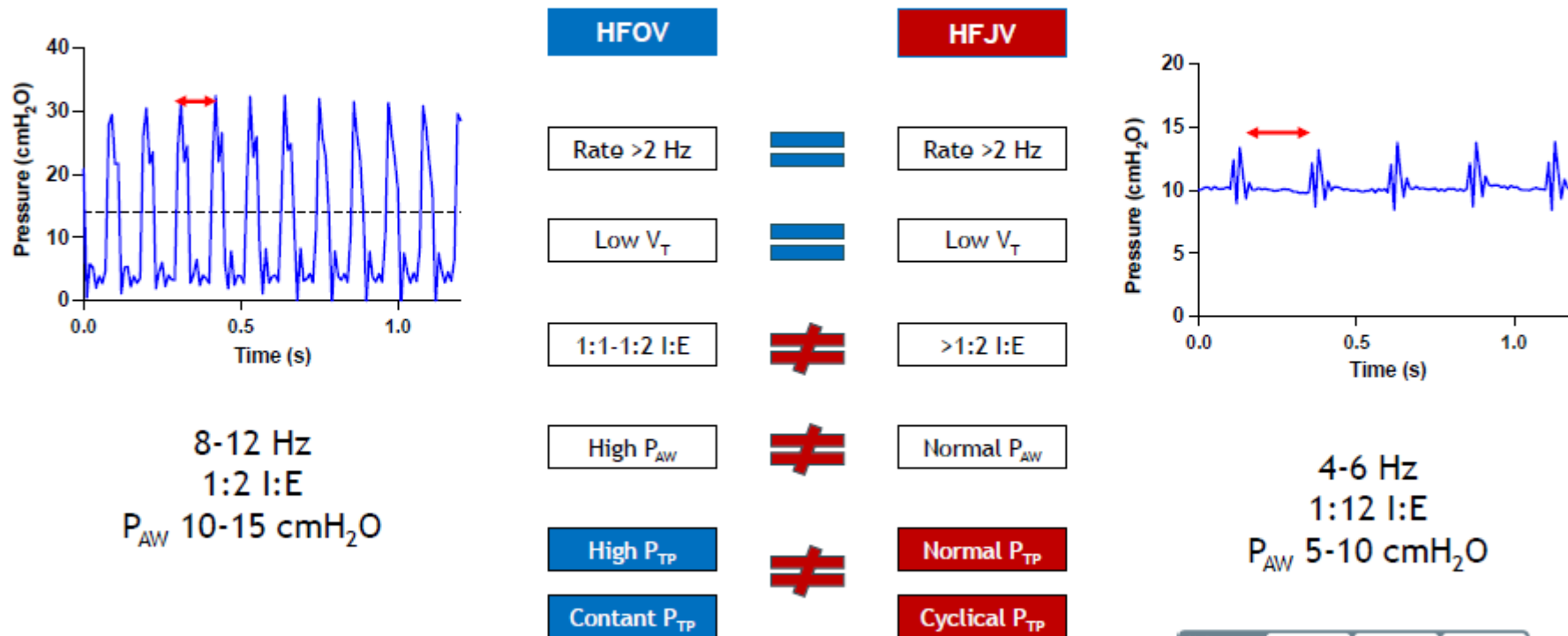
HFJV  
ECMO

Avoid HFOV

HFOV

Improved oxygenation  
Reduced VQ mismatch

## HFJV is physiologically the logical choice in severe CVS dysfunction



Based on SM3100A; Pressure recording at  $P_{AO}$  in infant with Left CDH (O/E LHR 34%) post-repair  
 Kuluz J Pediatr Surg 2010; Zhang Crit Care Res Pract 2013

*Elsa Kermorvant*

# **NUTRITIONAL NEEDS AND PRACTICAL IMPLICATIONS**

## Context

Nutritional management of CDH infants varies widely

Controversies regarding:

- when to initiate nutrition
- energy requirements
- composition of enteral and parenteral feeds

## The different phases of critical illness

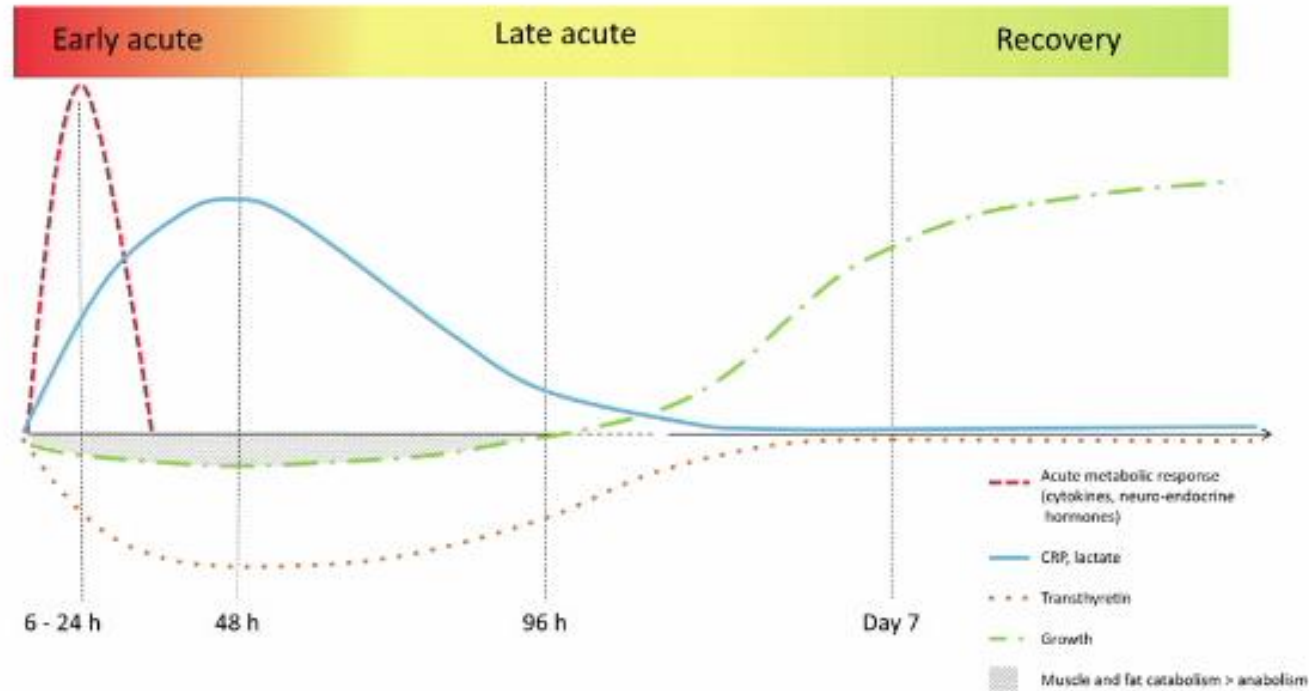


FIGURE 1. Simplified overview of different phases of critical illness. Note that the timing durations may be extremely variable.



## Practical implications (term infants)

### Acute phase

Avoid overfeeding  
Energy intake should not exceed REE (cover BMR)

Suggested targets:

- 30-50 kcal/kg/d
- < 1.5 g/kg/d protein
- 4-7 g/kg/d glucose
- 1-2 g/kg/d lipids seems reasonable (30–50% of nonprotein calories)

Avoid pure soybean lipid emulsions (use composite LE, eg with fish oil)

### Late acute phase

Initiate more active nutritional support as the clinical state and the inflammatory response begin to resolve

Initiate enteral feeding as soon as possible

Increase total (PN+EN) intakes progressively to

- 60-80 kcal/kg/d (1.3–1.5 × REE)
- 1.5-2.5 g/kg/d protein to attain a positive protein balance
- 6-10 g/kg/d glucose
- 3-4 g/kg/d lipids

### Recovery phase

Nutritional needs vary by gestational age and severity

Suggested targets:

- 120 kcal/kg/d (moderate)
- 140 kcal/kg/d (severe)
- 2.5-3.5 g/kg/d protein
- 30-40 kcal NPE/g protein

- Adapt depending on growth and blood urea

Fortified breast milk  
Energy- and nutrient-dense formulas  
Up to 1 kcal/mL

CDH 2024

24-26th April 2024

Congenital Diaphragmatic Hernia Symposium

[www.cdh2024.com](http://www.cdh2024.com)

Nouveau Siècle Lille - France



## Preventing Oral Aversion in Infants with Congenital Diaphragmatic Hernia using an Improvement Science Approach

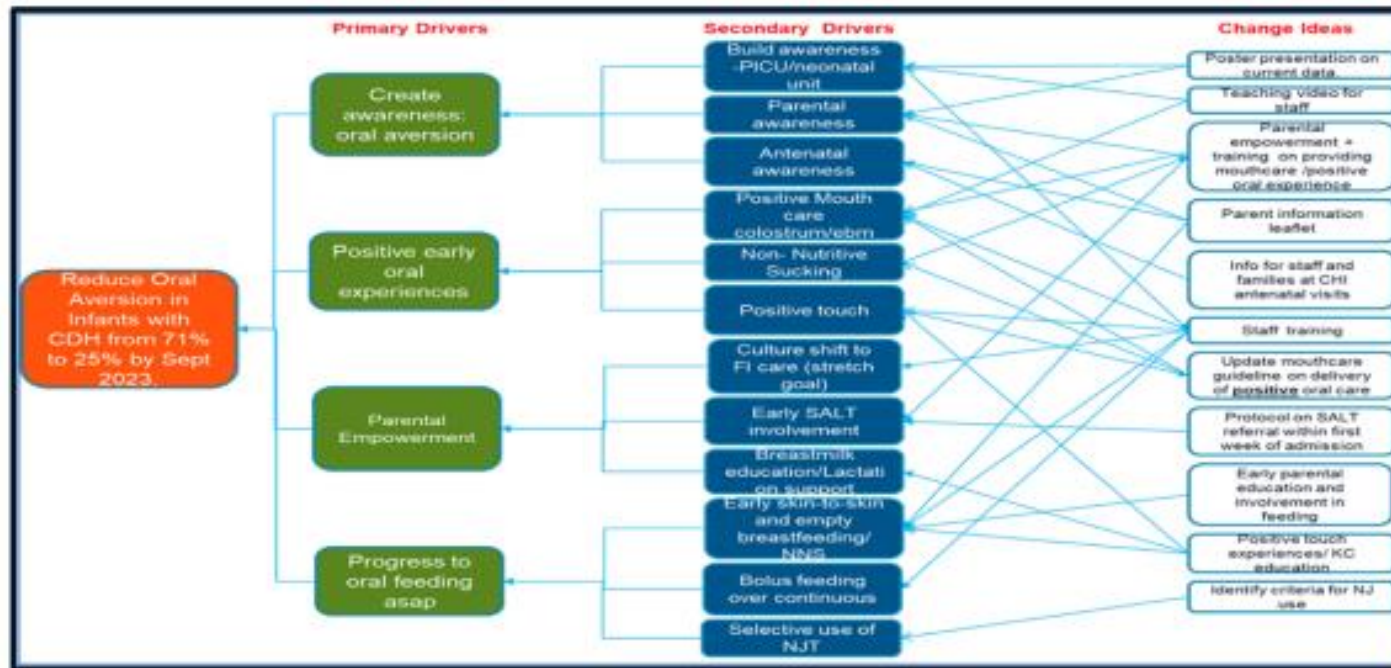


Carol Gilmore, Stephanie Galvin, Ann Hickey (presenting)

## Aim

We aimed to decrease the number of CDH patients presenting with aversive feeding behaviours from 71% to 20% (the number we estimate that are not preventable) over 1 yr. Measured on discharge from hospital.

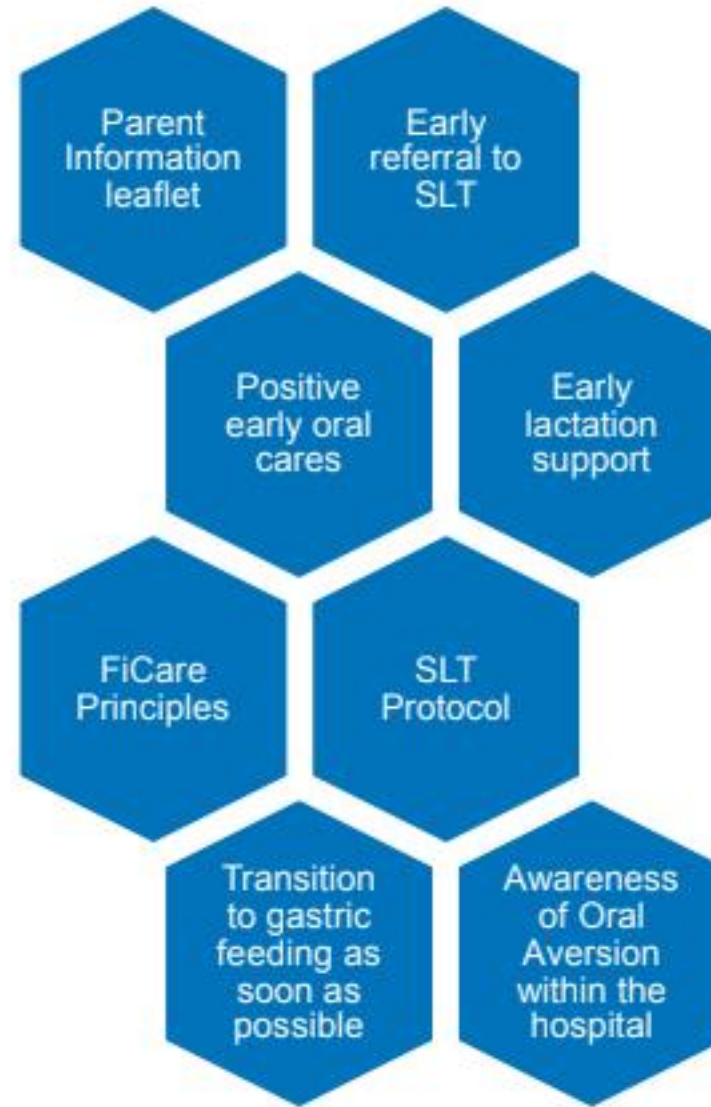
## Quality Improvement Methods



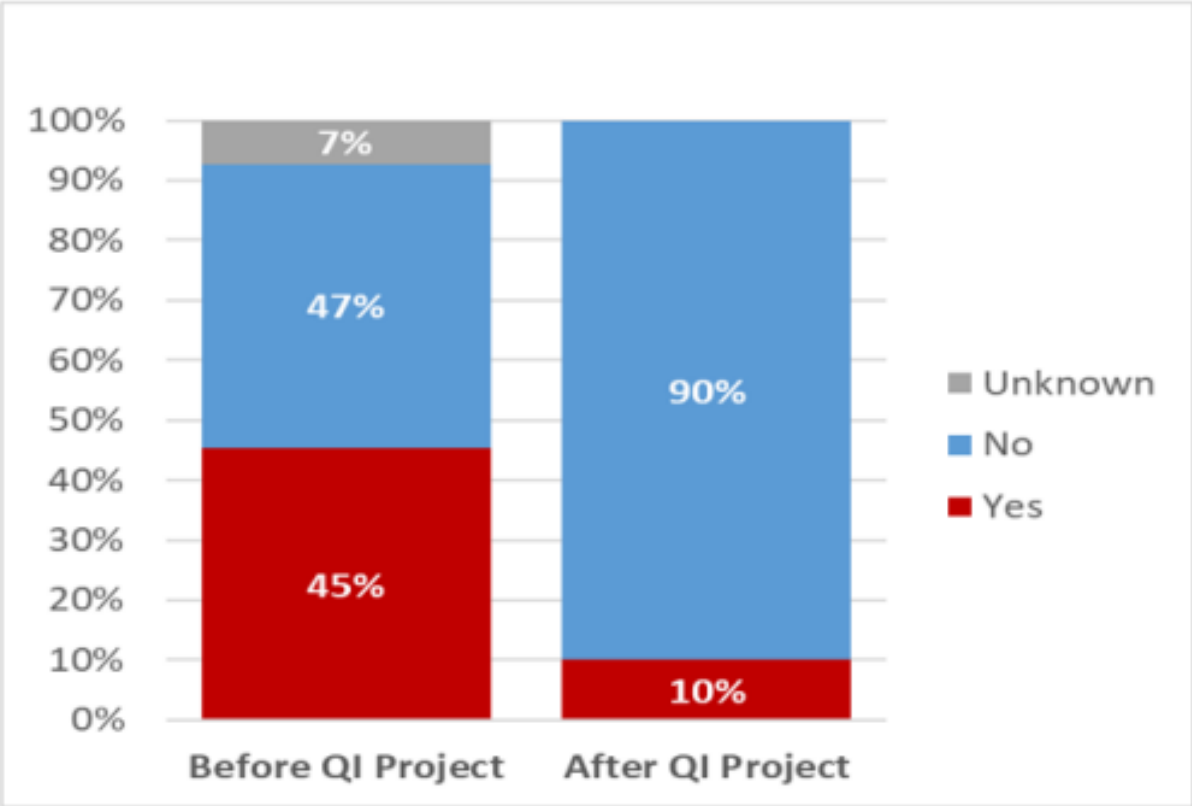
Driver Diagram: Significance of co-produced, targeted education: early oral care with EBM was achieved in 100% of cases.



## Interventions



## Oral Aversion Behaviours



## Feeding Status at Discharge

