From Art to Science

Old and new concepts in the application of high frequency oscillatory ventilation

Day 1
Session 1: The basics

Introduction/Housekeeping: David Tingay
Is HFOV still relevant in 2015?: David Tingay/Andreas Schibler
How does HFOV work?: John Mills
What do we know about the modern oscillator?: David Tingay

WHAT DO WE KNOW ABOUT THE MODERN OSCILLATOR
Are all oscillators created equal?

David Tingay

Neonatal Research, Murdoch Childrens Research Institute
Neonatology, Royal Children’s Hospital
Dept of Paediatrics, University of Melbourne, Melbourne, Australia
HFOV – Cutting edge NICU technology of the 1990s

Assessment of high-frequency neonatal ventilator performances
Thome & Pohlandt JAP 1998

Which high-frequency ventilator in 2015?
Are all oscillators created equal?

Are all oscillators created equal: VN500

Dräger VN500’s oscillatory performance has a frequency-dependent threshold

Journal of Paediatrics and Child Health
How to define the modern oscillator?

<table>
<thead>
<tr>
<th>Ventilator</th>
<th>Manufacturer</th>
<th>Principle of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensormedics 3100A</td>
<td>CareFusion, Yorba Linda, CA, USA</td>
<td>Electromagnetic flow generator</td>
</tr>
<tr>
<td>HFOV</td>
<td></td>
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<tr>
<td>Sensormedics 3100B</td>
<td>CareFusion, Yorba Linda, CA, USA</td>
<td>Electromagnetic flow generator</td>
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<tr>
<td>HFOV</td>
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<tr>
<td>SLE5000</td>
<td>SLE UK Ltd, Croydon, UK</td>
<td>Bi-directional jets</td>
</tr>
<tr>
<td>fabian HFO</td>
<td>Acutronic, Hirzel, Switzerland</td>
<td>Active Membrane (piston type)</td>
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<tr>
<td>Leoni Plus</td>
<td>Heinen+Löwenstein, Bad Ems, Germany</td>
<td>Membrane integrated diaphragms</td>
</tr>
<tr>
<td>Sophie</td>
<td>Stephan, Kirchstrasse, Germany</td>
<td>Valve oscillator with active expiration</td>
</tr>
<tr>
<td>VN500</td>
<td>Drägerwerk, Lübeck, Germany</td>
<td>Expiratory valve with Venturi-assisted expiration</td>
</tr>
<tr>
<td>BL8000</td>
<td>Drägerwerk, Lübeck, Germany</td>
<td>Expiratory valve with Venturi-assisted expiration</td>
</tr>
</tbody>
</table>

Comparison of flow and pressure waveforms

Square Wave Devices

Harcourt et al PCCM 2014
Pressure and Flow Waveform Characteristics of Eight High-Frequency Oscillators

Edward R. Harcourt, BSc; Jashal Jhun, MD; Peter A. Dargaville, MD; Emanuela Zannin, PhD; Peter G. Davis, MD; David G. Tingay, PhD

Submitted Anaesthesiology Feb 2015

Multi-Frequency Oscillatory Ventilation

The future?

HFOV + Volume Guarantee

FIGURE 3

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