

# SPIROWARE® 3.1

Detection in an early stage . . . Small Airway Disease – Ventilation Inhomogeneity – Metabolics

## Your advantage:

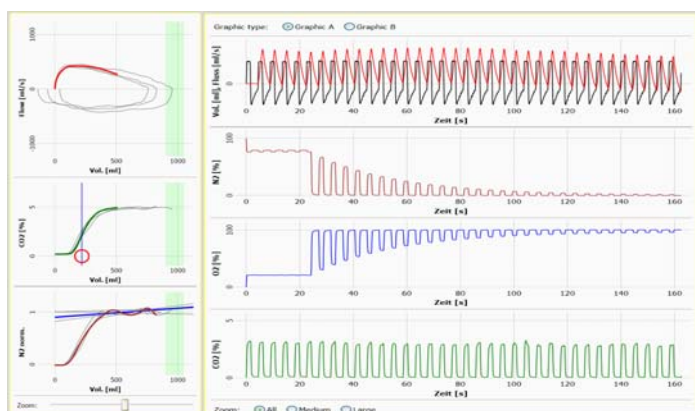
**Asthma, CF and COPD monitoring**

**Static lung volumes, ventilation inhomogeneity, trapped gas volume, alveolar N<sub>2</sub> slope analysis**

**Multiple breath test from infants to adults**

**Online quality control**

**Customized reporting**



The most promising lung function technique to monitor the involvement of small airways is the multiple breath washout technique (MBW). It reflects the ventilation inhomogeneity of the lung. It has been shown that MBW is extremely sensitive to detect early structural changes. The new SPIROWARE® 3.1 is a flexible software tool for easy performing, analyzing and reporting MBW and single breath (SBW) washout tests. This powerful package is the graphical interface between "ONLINE" quality controlled measurement and transparent documentation of the evaluated data. The future oriented concept fulfills highest requirements of reliability, functionality and easy operation.

### Small airway disease/Ventilation inhomogeneity (LCI, Moment Ratios, Slope III Analysis)

Peripheral airway involvement is an established component of respiratory diseases such as asthma, cystic fibrosis (CF) and chronic obstructive pulmonary disease (COPD). The combination of ultrasonic flow meter and new gas-sensors offers now an easy to use clinical setup. Such test has been used for years by research centers only. The application ranges from infants to adults. It offers a new perspective in terms of detecting and following up of "small airway diseases".

### Breathing Pattern (TBFVL) / Metabolic Exchange Rate (RQ) /Quality criteria

No re-breathing as well as low breathing resistance are technical essential requirements for a MBW washout test. Monitoring the breathing level and recording the "Breathing on a true FRC" through out the test are additional needs for reliable data recording, not only in small infants. Each application range (infants to adults) has an optimized dead space reduction to consider the ERS/ATS guidelines. Controlling the breathing pattern as well as the RQ is one of the major "online" quality control criteria for the MBW washout test.

### Static volumes (FRC), trapped gas volume (V<sub>TG</sub>)

FRC reflects the volume of the lung in direct communication with the airway opening (mouth). The amount of "trapped gas" (V<sub>TG</sub>) present in non-communicating lung volume compartments can now be reliably detected. Easy and efficient operation is guaranteed by the integrated user guidance. Cooperation of the patient is needed for this type of test.



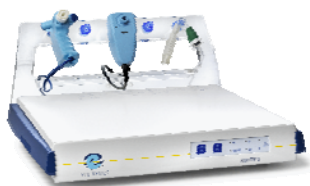
FRC-Bypass Setup

### HIS interface

The optional HL 7- interface enables the communication from hospital information system (HIS) and the EXHALYZER D / CLD 88sp with SPIROWARE® 3.1. Patient information and all numerical and graphical results may be transferred to a host computer for centralized data collection and storage.

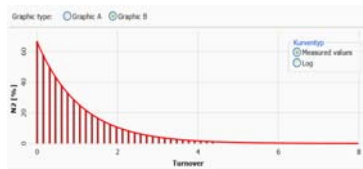
## Specifications SPIROWARE® 3.1

### Required Instrument: EXHALYZER D with FRC-Bypass Set up



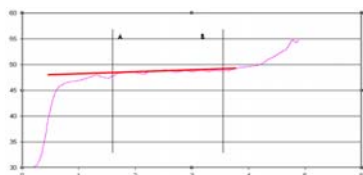
<b>Flow range:</b>	± 0.5 l/s (DSR small, 1.9 ml) ± 1.5 l/s (DSR medium, 7.2 ml) ± 8 l/s (DSR large, 20 ml)
<b>Volume resolution:</b>	0.6 / 1 ml
<b>Principle:</b>	N <sub>2</sub> washout, Helium or SF <sub>6</sub> for infants
<b>Cont. flow:</b>	adjust. up to 1250 ml/s
<b>Sampling frequency:</b>	200 Hz

### Multiple Breath Nitrogen Washout



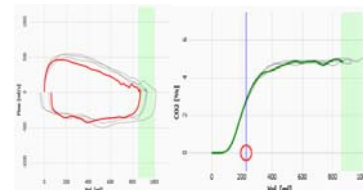
<b>Application:</b>	Infants, children and adults
<b>Range selection:</b>	Automatic
<b>Valve control:</b>	Automatic - flow controlled
<b>Insp. gas:</b>	100% O <sub>2</sub> , (inert gas washout optional)
<b>Parameters:</b>	FRC, LCI, MR <sub>1/2</sub> , V <sub>TG</sub> , V <sub>dFowler</sub> , S <sub>NIII</sub> , S <sub>acin</sub> , S <sub>cond</sub> , TBVFL-Indices, RQ
<b>Online Graphics:</b>	versus Time, Breath No. or Turnover (selectable)

### Single Breath Nitrogen Washout



<b>Application:</b>	Children and adults
<b>Valve control:</b>	Automatic - flow controlled
<b>Incentive screen:</b>	Flow and Volume (insp. / exp.)
<b>Insp. gas:</b>	100% O <sub>2</sub> , (inert gas washout optional)
<b>Phase detection:</b>	Automatic or user selectable cursors
<b>Parameters:</b>	Normalized alveolar N <sub>2</sub> Slope analysis (S <sub>NIII</sub> ) Closing Volume

### Tidal Breathing Analysis (TBFVL) and RQ



<b>Application:</b>	Infants, children and adults
<b>Range selection:</b>	automatic
<b>Insp. Gas:</b>	medical air, (others on request)
<b>Parameters:</b>	V <sub>dFowler</sub> , TBVFL-Indices, RQ
<b>Algorithms:</b>	ATS /ERS guidelines (IGW standardization)

### Database and Reporting



<b>Database:</b>	Microsoft SQL 2008 Compact or Express
<b>Application:</b>	Single computer or server-installation
<b>Reporting:</b>	Standard or custom specific reports Rich Text Format (RTF)

**HIS – Integration:** HL 7 and GDT (optional)

### System Requirements

Pentium 3 Processor or better, Microsoft Windows XP with SP3, VISTA or WIN 7, NET Framework 3.5 with SP1 or higher, RS232 Interface, 16MByte RAM, 10MB free space on hard disk, XGA-Graphics or better, USB 1.0 or higher

- Ref.: - Schibler A, Schneider M, Frey U, Kraemer R. Moment ratio analysis of multiple breath nitrogen washout in infants with lung disease. Eur Respir J 2000 Jun;15(6):1094-101.  
- Aurora P, Gustafsson P, Bush A, Lindblad A, Oliver C, Wallis CE, et al. Multiple breath inert gas washout as a measure of ventilation distribution in children with cystic fibrosis. Thorax 2004 Dec 1;59(12):1068-73.  
- Latzin P, Thamrin C, Kraemer R. Ventilation inhomogeneities assessed by the multibreath washout (MBW) technique. Thorax 2008 Feb;63(2):98-9.  
- Verbanck S, Schuermans D, Van Muylem A, Paiva M, Noppen M, Vincken W. Ventilation distribution during histamine provocation. J Appl Physiol 1997;83:1907-1916.  
- Robinson PD, Goldman MD, Gustafsson PM. Inert gas washout: theoretical background and clinical utility in respiratory disease. Respiration 2009;78(3):339-55.

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