




WHISTLER

LUNG FUNCTION
MEASUREMENT
INSTRUMENT



THE WHISTLER IS THE FIRST HANDHELD,
WIRELESS DEVICE IN THE WORLD
FOR PERFORMING PULMONARY FUNCTION TESTS WITH
BOTH BABIES AND PRESCHOOL CHILDREN



A young child with curly hair is sitting on a colorful mat on a wooden floor, looking up. In the foreground, a white and green device is resting on the mat. The background is blurred, showing other people sitting on the floor.

THE WHISTLER MAKES TESTING OUTSIDE
THE PULMONARY FUNCTION LABORATORY
SETTING POSSIBLE IT CAN NOW
BE DONE IN THE CLINIC
OR EVEN AT HOME



MEASURING WITH THE WHISTLER IS EASY

NO FORCED EXHALATION IS REQUIRED AS IN SPIROMETRY; PULMONARY FUNCTION VALUES ARE OBTAINED DURING TIDAL BREATHING

The Whistler consists of a cradle and interchangeable modules. This smart solution will make it possible to perform several different measuring methods with only one cradle and one software package. With the currently available module, flow can be interrupted automatically at a specific point of time, so that both the single occlusion technique (SOT) and the interrupter technique (RINT) can be done. In addition, tidal flow volume (TFV) loops can be monitored and analysed. In the near future, a second module will be available, with which spirometry can be performed. Modules for other tests are in development.



RINT

Determination of airway
resistance (R_{int})



SOT

Determination of compliance (C_{rs}),
resistance (R_{rs}) and the time constant
(τ_{rs}) of the respiratory system

SOT

With the single occlusion technique, the airways are occluded for a brief period (400 – 1500 milliseconds) after maximal inhalation. This invokes the Hering-Breuer inflation reflex (HBIR) in an infant under one year old, leading to relaxation of the respiratory muscles. During occlusion, there is no airflow and pressures can equilibrate, so the airway opening pressure (P_{ao}) reflects the pressure within the alveoli. After occlusion, the infant's exhalation is relaxed and prolonged, making it possible to calculate the compliance (C_{rs}), the time constant (τ_{rs}) and the resistance (R_{rs}) of the airway.

Using these pulmonary function parameters, a population with CF, BPD or recurrent wheezing can be discriminated from a healthy population. The clinical relevance of the device consists of comparing baseline values, evaluating the response to a treatment (bronchodilator response), and monitoring the severity of a disease over time.

RINT

With the interrupter technique, the point in time at which the airway is occluded differs. Occlusion does not take place after maximal inhalation but at maximal flow during exhalation. A sudden interruption of flow (up to 100 milliseconds so that the patient does not notice it) causes the pressure at the mouth opening to equal the alveolar pressure. The resistance (R_{int}) can be calculated by dividing the change in pressure at the mouth opening by the flow immediately before occlusion.

With R_{int} it is possible to discriminate a population with recurrent wheezing from a healthy population. The clinical relevance of this technique is the possibility to evaluate bronchodilator response and to monitor the course of the disease over time.





FEATURES

- » **THE WHISTLER IS EASY TO USE**
THERE IS ONLY ONE BUTTON TO TURN THE DEVICE ON OR OFF
- » **FLOW MEASUREMENT IS ULTRASONIC**
SO THE WHISTLER DOES NOT NEED CALIBRATION BY ITS USERS
- » **THE LACK OF MOVING PARTS** WITHIN THE AIR TUBE MEANS THE WHISTLER IS EASY TO CLEAN
- » **THE DEVICE IS LIGHTWEIGHT** (< 500 GRAM), EASILY TRANSPORTABLE AND DESIGNED WITH AN OPTIMAL WEIGHT DISTRIBUTION
- » **THE WHISTLER CONNECTS WIRELESSLY** TO A PC OR LAPTOP ON WHICH THE INCLUDED SOFTWARE IS INSTALLED
- » **THE WHISTLER IS POWERED BY** RECHARGEABLE BATTERIES
- » **MEASUREMENTS ARE NON-INVASIVE** AND RAPID, AND THE OCCLUSION IS DONE AUTOMATICALLY

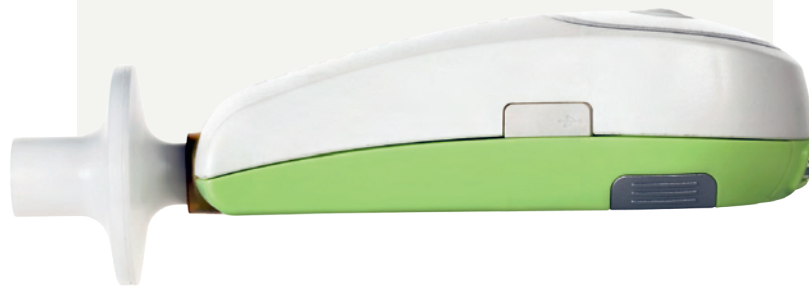
SPECIFICATIONS ACCORDING TO ATS AND ERS STANDARDS:

ITEM	SPECIFICATION
SOT/RINT MODULE	
Sample rate	160 Hz
Flow range	-1250 to +2000 ml/s*
Flow resolution	1 ml/s
Flow accuracy	2.5% or 2.5 ml (whichever is greater)
Flow linearity	< 2 ml
Dead volume	11 ml

* DURING EXHALATION



ITEM	SPECIFICATION
PRESSURE SENSOR (IN CRADLE)	
Sample rate	1600 Hz
Pressure range	-6.895 to +6.895 kPa
Pressure resolution	0.007 kPa
Pressure accuracy	1%
Pressure linearity	< 0.1 kPa
OCCLUSION VALVE	
SOT occlusion time	400 – 1500 ms (configurable)
RINT occlusion time	100 ms
Valve type	Low noise silicon rubber valve



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