GANSHORN
SCHILLER GROUP

Provo.X

Provocation system
Safe and hygienic challenge testing

MADE IN GERMANY • MADE IN GERMANY •

OVERVIEW

GANSHORN's Provo.X is an aerosol dosimeter that is able to do specific and unspecific provocations within seconds – no matter where the measurements are carried out. Perform inhalational provocation tests quickly and with reproducible results. The PC based system is designed for accurate and safe direct challenge tests. Various protocols and sequences can be easily adapted. All accessories with patient contact are designed as disposable items, which 100 % excludes possible cross-contamination. Eliminating the disinfection steps save time and money.

Configurable: precise and adjustable

Hygienic disposable solution

Provides standardized protocols and offers individual series

Flexible choice of control module

Powerful and quiet compressor

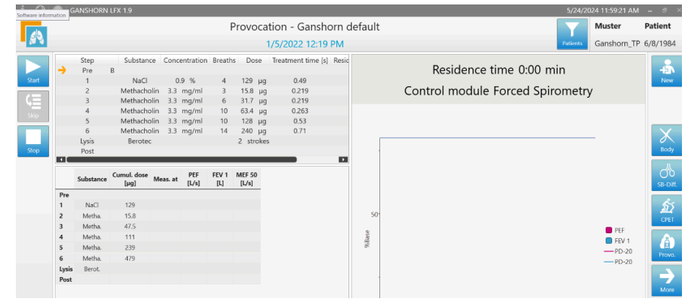
Stores up to six provocation series

The measurement of hypersensitivity or hyper-responsiveness of the bronchial airway is necessary if asthma is suspected. With the help of bronchial provocation, certain lung diseases can be excluded. Specifically, a bronchial provocation test is indicated in the following cases:

- If there is a need to rule out hyper-reactivity as a diagnosis (e.g. asthma)
- Contradiction between asthmatic complaints and normal basic pulmonary function
- When results of provocation tests indicate expected therapeutic or preventive consequences

LFX - SOFTWARE PLATFORM

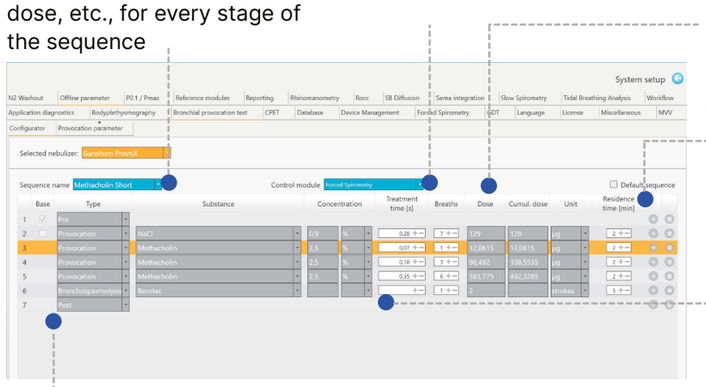
The LFX software is GANSHORNs user-friendly interface. For provocation tests, LFX provides selectable standardized provocation steps for the management of controlled measurements. In addition, user defined provocation rows can be individually configured as required.



Select sequence name to display substance, residence, dose, etc., for every stage of the sequence

Select control module for type of measurement

The desired medication can be added, the dose is adjusted precisely by adapting the breaths and application time.



Adjust the residence time here, if needed. It will be displayed as countdown after the step.

Change the treatment time and/or the number of breaths in order to alter the delivered dose.

Add a new step, or adjust an existing one in a few seconds

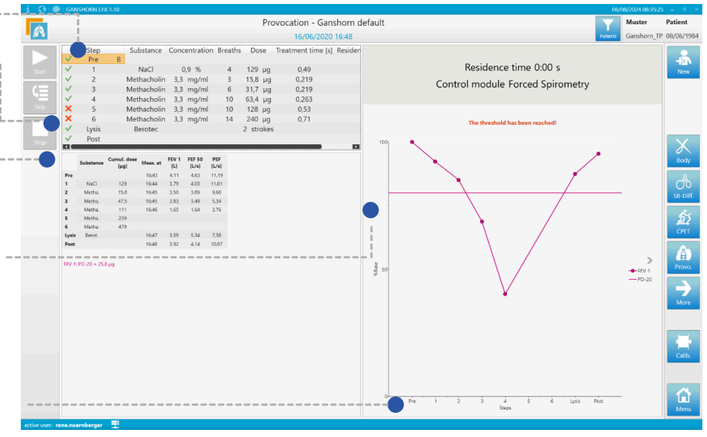
Completed step

Indicates next step to be taken

Provocation substance, dose and treatment time and tabular results for each step

PD-20 = Provocation dose at which FEV1 for example, decreases by 20% (default) from the pre or base 100% reference. When FEV1 falls below PD-20 line, provocation should be stopped

Graphical comparison of bronchial challenges for each step



Measurement principle

An FVC test is typically used for reference and post-provocation assessment. Other possible measurements for a provocation sequence include:

- Offline parameter (manual input)
- No measurement (e.g., biomarkers)
- Body plethysmography

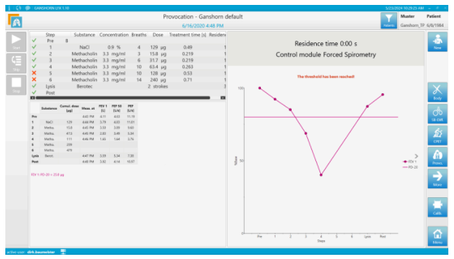
Each control module allows for specific measurements and can be used to determine the PD reference with percentage differences from the base or pre-measurements.

Reference measurement

A

The patient inhales an aerosolized provocation substance using a nebulizer, taking slow, deep breaths. The substance is nebulized during the inspiratory cycle for a set bolus time. If inhalation is shorter than bolus time, the remaining time is added to the next breath. LFX monitors breathing and administers the aerosol only during inhalation, optimizing delivery and minimizing waste. The total dose per stage is automatically adjusted for short breathing cycles. As nebulization progresses, water vapor increases the concentration of the test substance, so the volume of the nebulizer solution should be increased accordingly.

Inhalation of medication

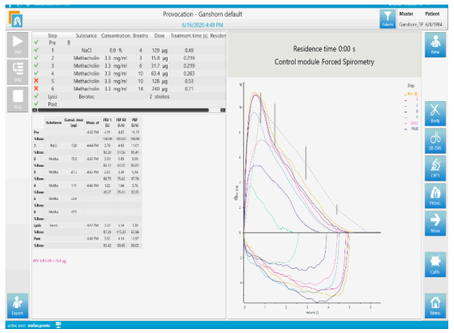


B

After a set residence time (1-20 min), indicated by a countdown, the user undergoes a body plethysmography, spirometry or oscillometry test. Then, the next provocation stage can begin. This cycle of inhalation and control tests repeats until all stages are completed or the patient opts to stop.

For each control module, measurements can be defined and used for the PD reference with percentage differences from the base, such as a 20% decrease in FEV1 or a 100% increase in sRaw.

Control test



C

Interpretation of results

If after the last inhalation the FEV1 or alternative control parameter doesn't fall below the threshold, the provocation test is regarded negative and asthma can be ruled out. If the threshold (PD20 in spirometry) is reached, the provocation should be stopped and the PD20 value of this positive provocation test is reported.

SET-UPS

With SpiroScout

Combination with spirometer

In PowerCube Diffusion+

For combined use with diffusion system

Stand alone device

System with arm and clamp

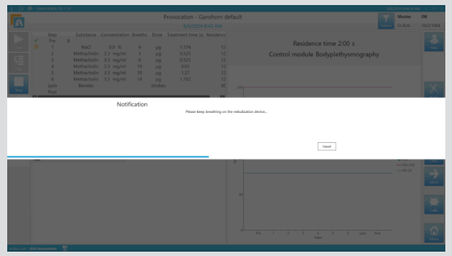
PowerCube Body+

For integrated use in bodybox

FEATURES

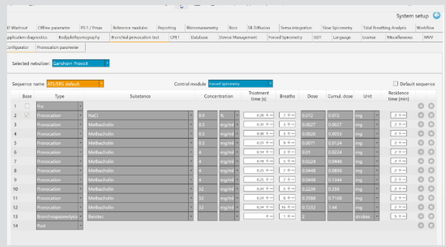
Threshold-controlled aerosol delivery

Provo.X administers the aerosol dose in a breath-synchronous manner during the inspiration phase, ensuring that the aerosol reaches deeply into the airways. That improves the reproducibility of results.



User-Friendly Software

GANSHORN´s software LFX includes pre-installed protocols, such as ATS and DGP, and allows for the creation and storage of custom protocols with up to 14 stages.



Adjustable Dosage

The dosage can be adjusted by changing the concentration of the provocation liquid or the atomization time, providing precise control over the amount of aerosol delivered at each stage.

Step		Substance	Concentration	Breaths	Dose	Treatment time [s]
Pre	B					
1		NaCl	0.9 %	4	129 µg	0.49
2		Methacholin	3.3 mg/ml	3	15.8 µg	0.219
3		Methacholin	3.3 mg/ml	6	31.7 µg	0.219
4		Methacholin	3.3 mg/ml	10	63.4 µg	0.263
5		Methacholin	3.3 mg/ml	10	128 µg	0.53
6		Methacholin	3.3 mg/ml	14	240 µg	0.71
Lysis		Berotec			2 strokes	

Hygienic Design

Components which can be contaminated are single use. They must not be sterilized what saves time and makes Provo.X one of a few devices with a perfect hygienic solution. This ensures maximum safety for patients.

CONSTRUCTION

Due to the perfect user guidance and simple handling of the Provo.X, you can ease the daily work of your staff. The well-structured display of the Provo.X software LFX continuously provides precise information on the status of the examination. The backside-ventilated special valve located directly at the atomizer and the large compressed air tank guarantee an optimal droplet size, which remains constant over the entire bolus time.

Mouth and T-piece

Provocation substance reservoir (single use)

Provo.X unit - communicates with the computer (LFX) via Bluetooth

Compressed air in (e.g. from compressor)

Breath detection via pressure sensor

The powerful compressor with a three-liter compressed air tank guarantees a stable atomizing pressure and a low noise level (operating time of only approx. 1-3 minutes per day).

WHY GANSHORN?

For 40 years GANSHORN has been manufacturing a complete state-of-the-art portfolio of pulmonary function testing systems for spirometry, body plethysmography, diffusion, bronchial provocation and cardiopulmonary stress testing. With its technological innovations, the company has been a leader in the diagnostics market since 1982. Many of these are now perceived as gold standards. In order to meet our high quality standards, it is important to us that all key components are made in Germany. Our devices are created in modern processes in Bavaria, from the initial idea to distribution. In the meantime GANSHORN is represented worldwide, with strong markets in Europe, Asia, North and South America.

PowerCube Body+
Body Plethysmography

Vivatmo pro
FeNO monitoring

SpiroScout
Spirometry

tremoflo®
Airwave oscillometry

PowerCube Diffusion+
Diffusion measurement

EucapSys
EVH provocation

Provo.X
Provocation testing

AltiTrainer
Hypoxic challenge testing, hypoxia training

PowerCube Ergo
Cardiopulmonary exercise testing (CPET)

GANSHORN Medizin Electronic GmbH
Industriestr. 6–8 | 97618 Niederlauer, Germany

sales@ganshorn.de
+49 9771 6222 0
www.ganshorn.de

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