ATS/ERS PULMONARY FUNCTION ACCEPTABILITY & REPEATABILITY GUIDELINES

Quick Reference Guide

FVC

ACCEPTABILITY

1. Back extrapolated volume must be ≤5% of the FVC or 0.100 L, whichever is greater.
2. The subject must achieve one of the following three End of Forced Expiration (EOFE) indicators:
   - The volume/time curve shows less than 25 mL change in volume for at least 1 second (subject has a plateau).
   - The subject has tried to exhale for ≥15 seconds.
   - The measured FVC is within the repeatability tolerance (in case the subject cannot expire long enough to achieve a plateau).
3. There should be no cough detected in the first second of exhalation which could affect FEV1.
4. There should be no glottic closure detected in the first second of exhalation which could affect FEV1 or FVC and there should be no glottic closure detected after the first second of exhalation which could affect the FVC.
5. There should be no evidence of a faulty zero-flow setting, leaks or obstruction of the mouthpiece.
6. The difference between FIVC minus FVC must be <5% of the FVC or ≤0.100 L, whichever is greater.
7. An adequate test requires a minimum of three acceptable FVC maneuvers with two of them meeting repeatability criteria.

ACCEPTABILITY PRESCHOOL CHILDREN (≤ 6 YEARS OLD)

1. All of the above applies for preschool children as well, except for a cough and glottic closure in the first second.
2. For children aged 6 years or younger, there should be no cough or glottic closure detected in the first 0.75 seconds of the exhalation for an acceptable measurement of FEV0.75.

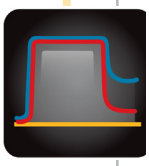
REPEATABILITY

1. The difference between the largest and next largest FVC is ≤0.150L.
2. The difference between the largest and next largest FEV1 is ≤0.150 L.

REPEATABILITY PRESCHOOL CHILDREN (≤ 6 YEARS OLD)

1. The difference between the largest and next largest FVC is ≤0.100 L or 10% of the highest value, whichever is greater.
2. The difference between the largest and next largest FEV1 is ≤0.100 L or 10% of the highest value, whichever is greater.

Diffusing Capacity



ACCEPTABILITY

1. Inspired volume should be ≥ 90% of largest Vital Capacity*.
2. 85% of test gas inhaled in < 4 seconds.
3. Breath Hold Time should be between 8-12 seconds.
4. Sample collection should be completed within 4 seconds of the start of exhalation. For RGA systems, virtual sample collection should be initiated after dead-space washout is complete.
5. No evidence of leaks, or Valsalva or Mueller maneuvers during lockout.
6. At least 4 minutes between tests to allow an adequate elimination of test gas from the lungs for classical systems. For RGA systems, tracer gas level at end-exhalation must be ≤ 2 % of the tracer gas concentration in the test gas.

REPEATABILITY

1. DLco values should be within 2 mL/min/mmHg (0.67 mmol/min/kPa) of each other.
2. The average of at least two acceptable tests that meet repeatability should be reported.

NOTE: Adjustments of DLco for Hb, COHB and altitude should be considered.

*A maneuver with an inspired volume of ≥ 85% of largest vital capacity may be deemed acceptable if the VA is within 200mL or 5% (whichever is greater) of the largest VA from other acceptable maneuvers.

Nitrogen Washout

ACCEPTABILITY

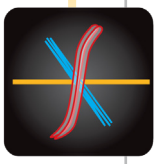
1. N_2 concentration should be <1.5% for at least three successive breaths before ending test
2. A change in inspired N_2 of >1% or sudden large increases in expiratory N_2 concentrations indicate a leak
3. At least one technically satisfactory measurement should be obtained

REPEATABILITY

1. If more than one measurement of $FRCN_2$ is made, the value reported should be the average of technically acceptable results that agree within 10%

NOTE: If more than one washout is performed, a waiting period of ≥15 minutes is recommended between trials. Patients with severe COPD should wait ≥1 hour between trials.

TGV FRCpleth



ACCEPTABILITY

1. Closed shutter panting frequency between 0.5 and 1.0 Hz (30-60/min).
2. Patient's cheeks are to be supported by both hands and the subject should breathe quietly until a stable end-expiratory level is achieved (usually 3-10 tidal breaths) before closing the shutter.
3. A series of 3-5 technically satisfactory panting maneuvers should be recorded.

NOTE: It is recommended to perform an SVC immediately after the shutter reopens in order to accurately calculate Total Lung Capacity.

REPEATABILITY

1. At least three TGV (FRCpleth) values that agree within 5% (the difference between the highest and lowest value divided by the mean).
2. The average value should be reported.

FOR ADDITIONAL INFORMATION ON PULMONARY DIAGNOSTICS, PLEASE CONSULT THE ATS/ERS GUIDELINES:

www.thoracic.org ||| www.ers-education.org

References:

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ATS/ERS Task Force: Standardization of Spirometry 2019 Update, Am J Respir Crit Care Med; Vol 200: e70–e88, Oct 15, 2019

ATS/ERS Standards for Single-Breath Carbon Monoxide Uptake in the Lung, Eur Respir J 2017; 49; 1600016

ATS/ERS Statement: Pulmonary Function Testing in Preschool Children, AM J Respir Crit Care Med; Vol 175: 1304-1345, 2007

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