# Rebreathing Diffusion

**Introduction.**

Since 1999 we sell our re-breathing diffusion option.
The reproducibility and interpretation has always been a point of discussion.
The predicted values where always to high, and differently corrected than published in the literature.
Since the predicted DLCO rb is not a predicted as normally calculated but the predicted value depends on the measured Alv. Ventilation and Alv Volume.
This document describes the introduction of a new parameter that will be the new normalized estimated DLCO rb value.
After a discussion with the author, H. STam, he created a new exponential formula for the KCO from his study, this formula now, is
Implemented, since JLAB 5.10.

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# Needed Parameters

Parameter text editor number

5
6
22
23
35
36

| | Pred | Best | %(B/P) |
|---|---|---|---|
| FRC-He [L] | 3.63 | 4.01 | 110.5 |
| ERV [L] | 1.57 | 1.83 | 116.2 |
| RV-He [L] | 2.06 | 2.18 | 106.1 |
| VC max [L] | 5.69 | 5.73 | 100.7 |
| TLC-He [L] | 7.86 | 7.91 | 100.6 |
| | | | |
| DLCO rb [mmol/min/kPa] | | 5.54 | |
| DLCOrb/VA mol/min/kPa/l] | | 1.29 | |
| | | | |
| VA rb old [l] | 3.72 | 4.26 | 114.7 |
| Alveol. ventil.o [l/min] | 8.43 | 7.94 | 94.1 |
| | | | |
| KCOrbc No mol/min/kPa/l] | | 1.07 | |
| KCOrb/KCOcN [%] | | 120.5 | |
| Quality [%] | | 91.96 | |

Quality > 90%

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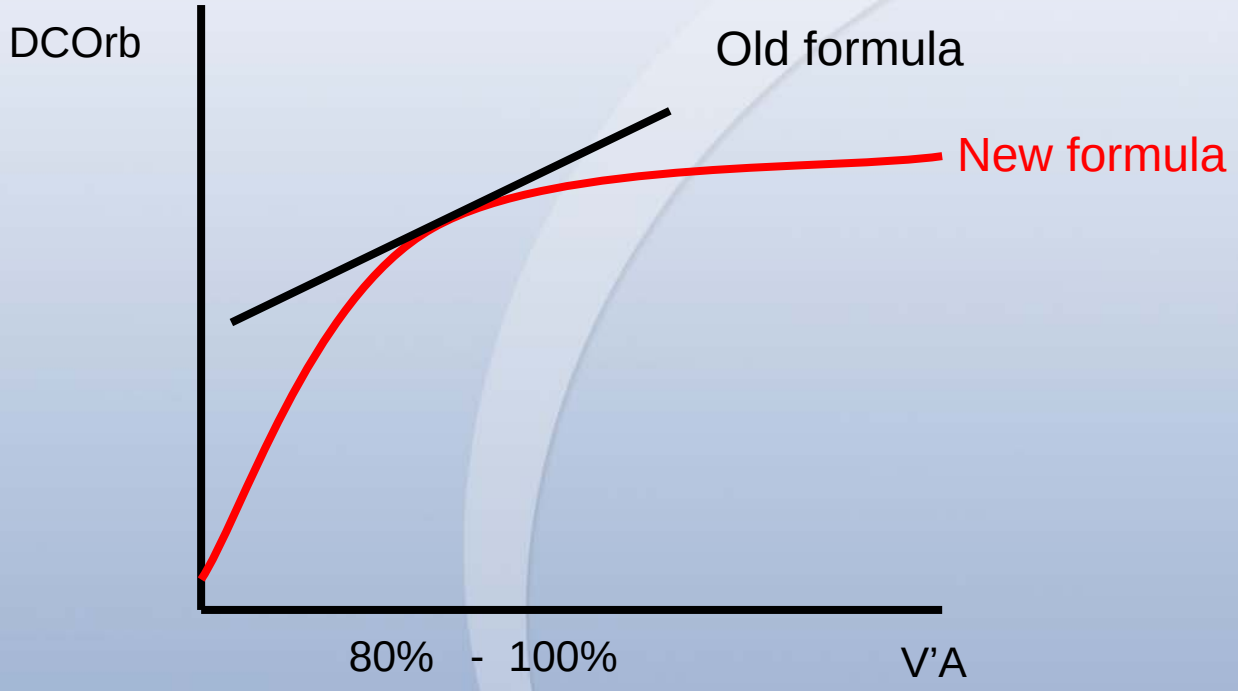
# Rebreathing Diffusion

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# New parameter

KCOrbN = KCO calculated according to the following formula.

**KCOrbN =**

**((44,584949202 + (-30,79427195*exp(-0,084992119*{V'A measured}))
-1,825664937 * {VArb measured} - 0,087302371*{Age})) / 16,66667**

**KCOrbN in mmol/min/kPa**

KCOrbN% = DLCO/VAc measured / KCOrbN

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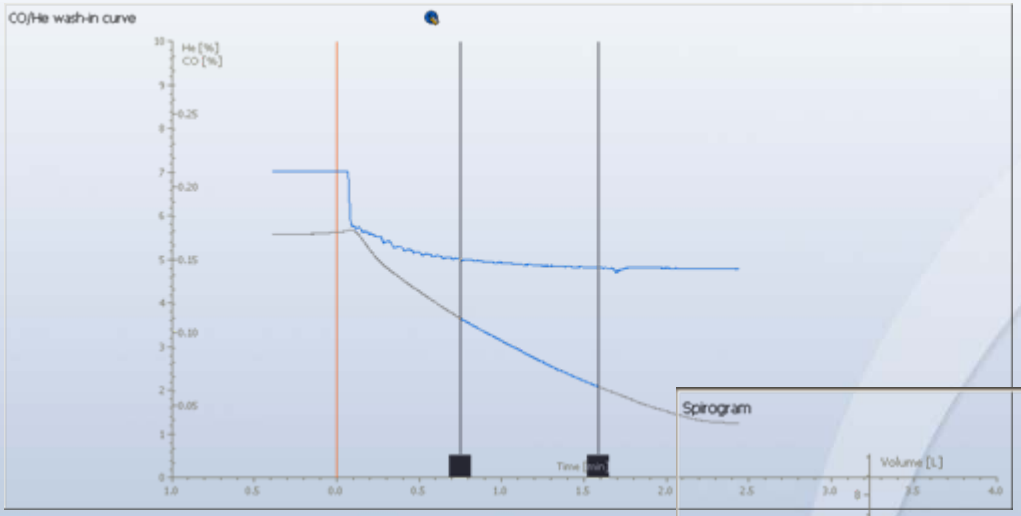
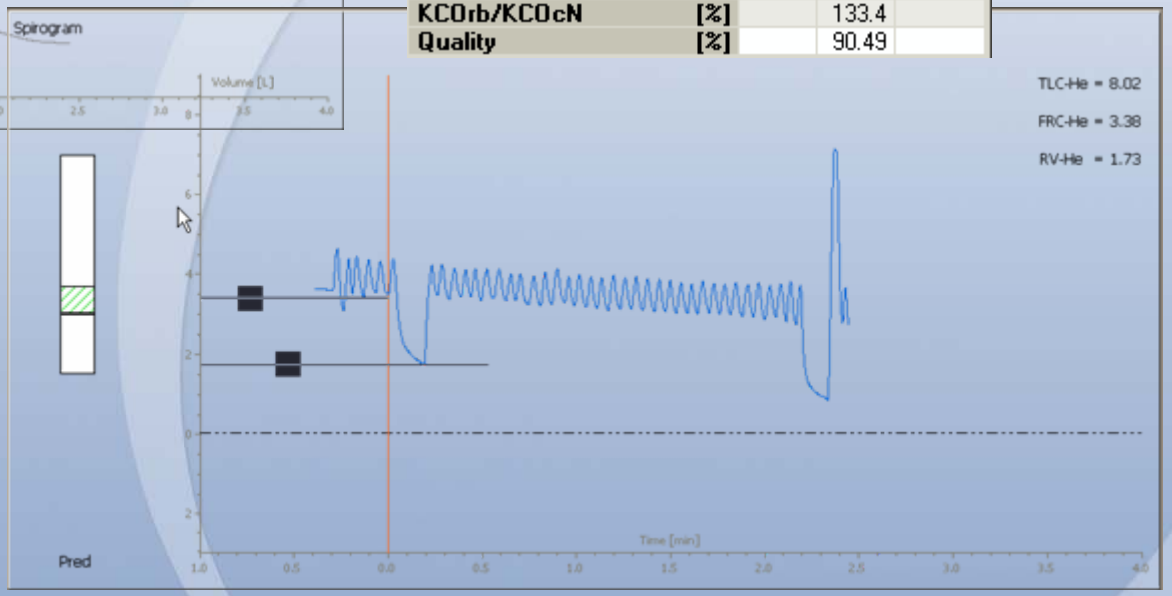
# Rebreathing Diffusion




| | | Pred | Best | %(B/P) |
|---|---|---|---|---|
| FRC-He | [L] | 3.56 | 3.38 | 95.0 |
| ERV | [L] | 1.54 | 1.65 | 107.0 |
| RV-He | [L] | 2.02 | 1.73 | 85.9 |
| VC max | [L] | 5.51 | 6.29 | 114.1 |
| TLC-He | [L] | 7.62 | 8.02 | 105.2 |
| | | | | |
| DLCO rb | [mmol/min/kPa] | | 5.35 | |
| DLCOrb/VA | mol/min/kPa/l] | | 1.47 | |
| | | | | |
| VA rb old | [l] | 3.65 | 3.59 | 98.4 |
| Alveol. ventil.o | [l/min] | 8.53 | 7.45 | 87.3 |
| | | | | |
| KCOrbc No | mol/min/kPa/l] | | 1.10 | |
| KCOrb/KCOcN | [%] | | 133.4 | |
| Quality | [%] | | 90.49 | |

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# Formulas 1

$$TLCOrb = 60 * \tau_{CO} * \frac{\left\{FRC_{STPD} + (V_D + V_{fill})_{STPD}\right\}}{P_{amb} - 6.25hPa} * \frac{1000}{22.4\,l/mol}$$

with: $\tau_{CO}$ = time constant in [1/sec]

Pamb = ambient pressure in kPa

$FRC_{STPD}$ = FRC at 0°C, 101.3 kPa, dry

$V_D$ = apparatus dead space, which is added to the filling volume

$V_{fill}$ = filling or starting volume of the rebreathing system

The unit of the so calculated TLCOrb is: $\left[\frac{mmol}{kPa \cdot min}\right]$

## KCOrb

The Krogh-Factor KCO is calculated by:

$$KCO = \frac{TLCO_{rb}}{VA_{rb}}$$

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# Formulas 2

| Parameter number | Parameter name | Formula |
|---|---|---|
| • 5 | VA | FRC Helium - Vdsystem |
| • 6 | V'A Alveolar ventilation | (Vt * Bf) – (Bf * Vdsys) |
| • 22 | DLCO | See previous Slide |
| • 23 | DLCO/VAc | parameter 22 / par.5 |
| • 35 | KCOcN | |
| • 36 | KCOrbc%N | Par 23 / par 35 |

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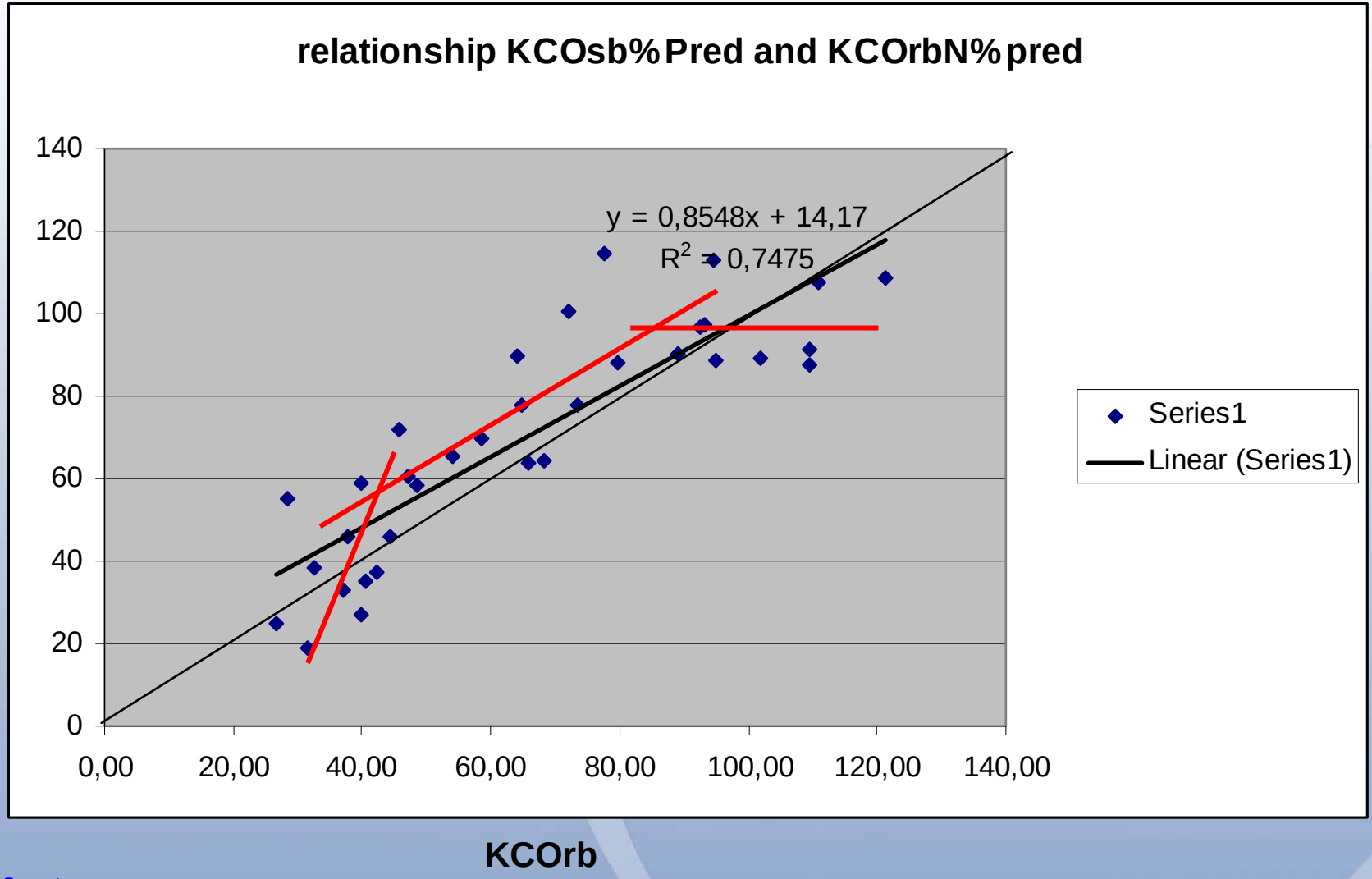
60 Patients randomly selected with emphysema, COPD, Asthma, CF, Healthy

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**Note: Below 50% and above 110% KCOsb is limited**