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.

Needed Parameters

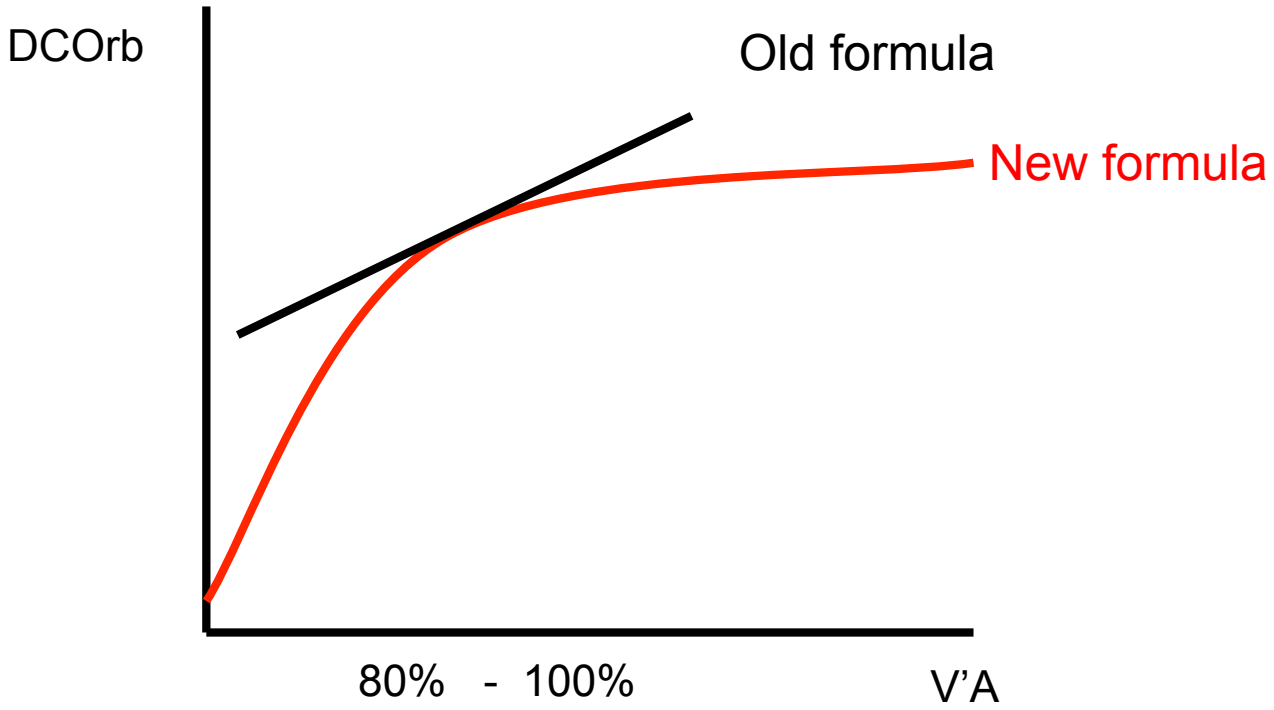
Parameter text editor number

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%

Rebreathing Diffusion



New parameter

KCOrbN = KCO calculated according to the following formula.

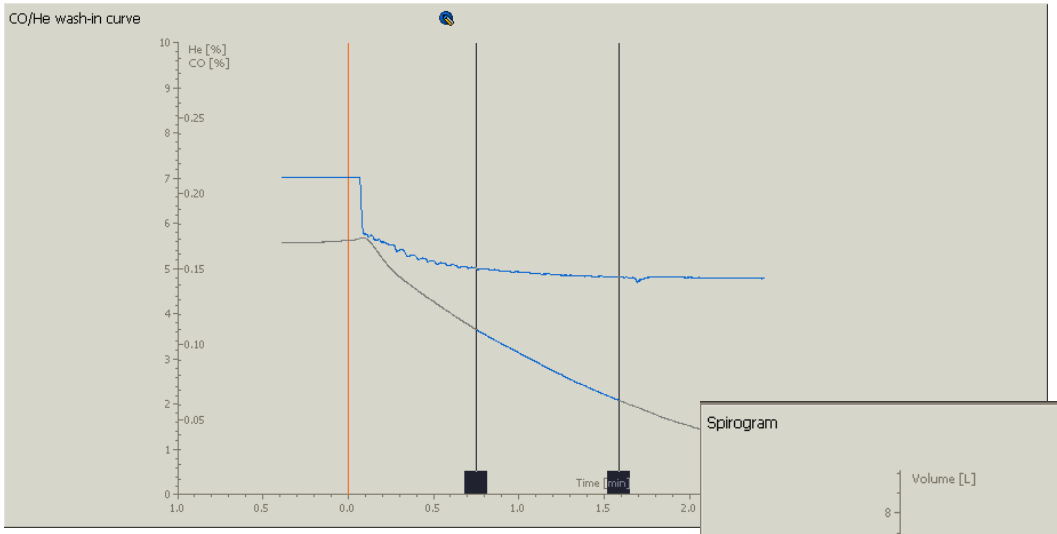
KCOrbN =

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

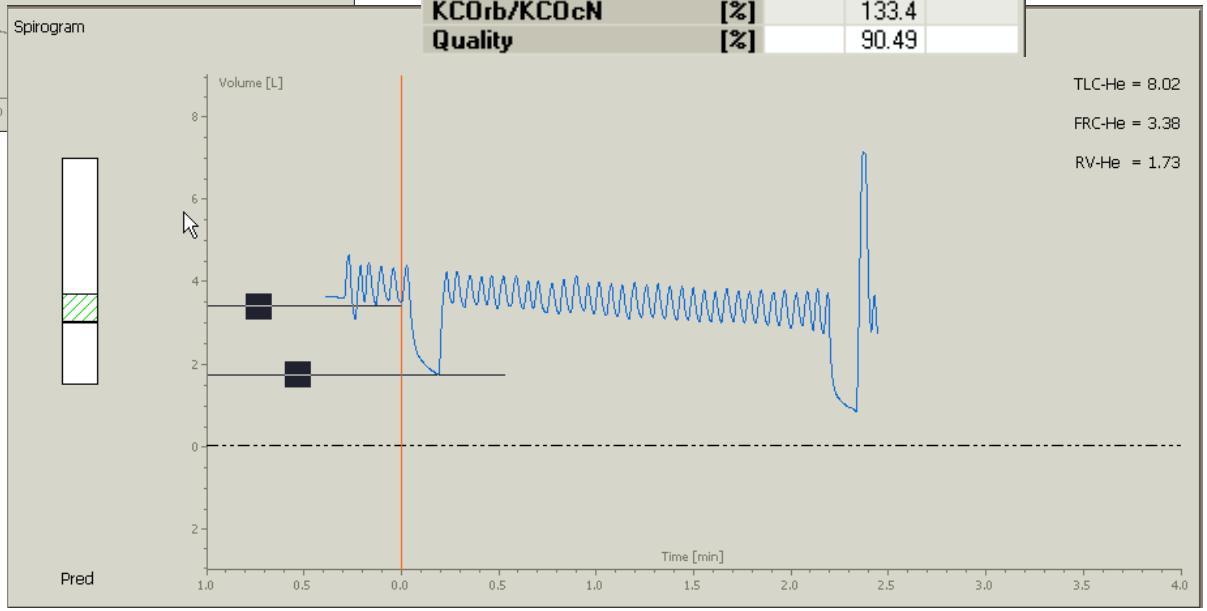
KCOrbN in mmol/min/kPa

KCOrbN% = DLCO/VAc measured / KCOrbN

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	



Formulas 1

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

with: τ_{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

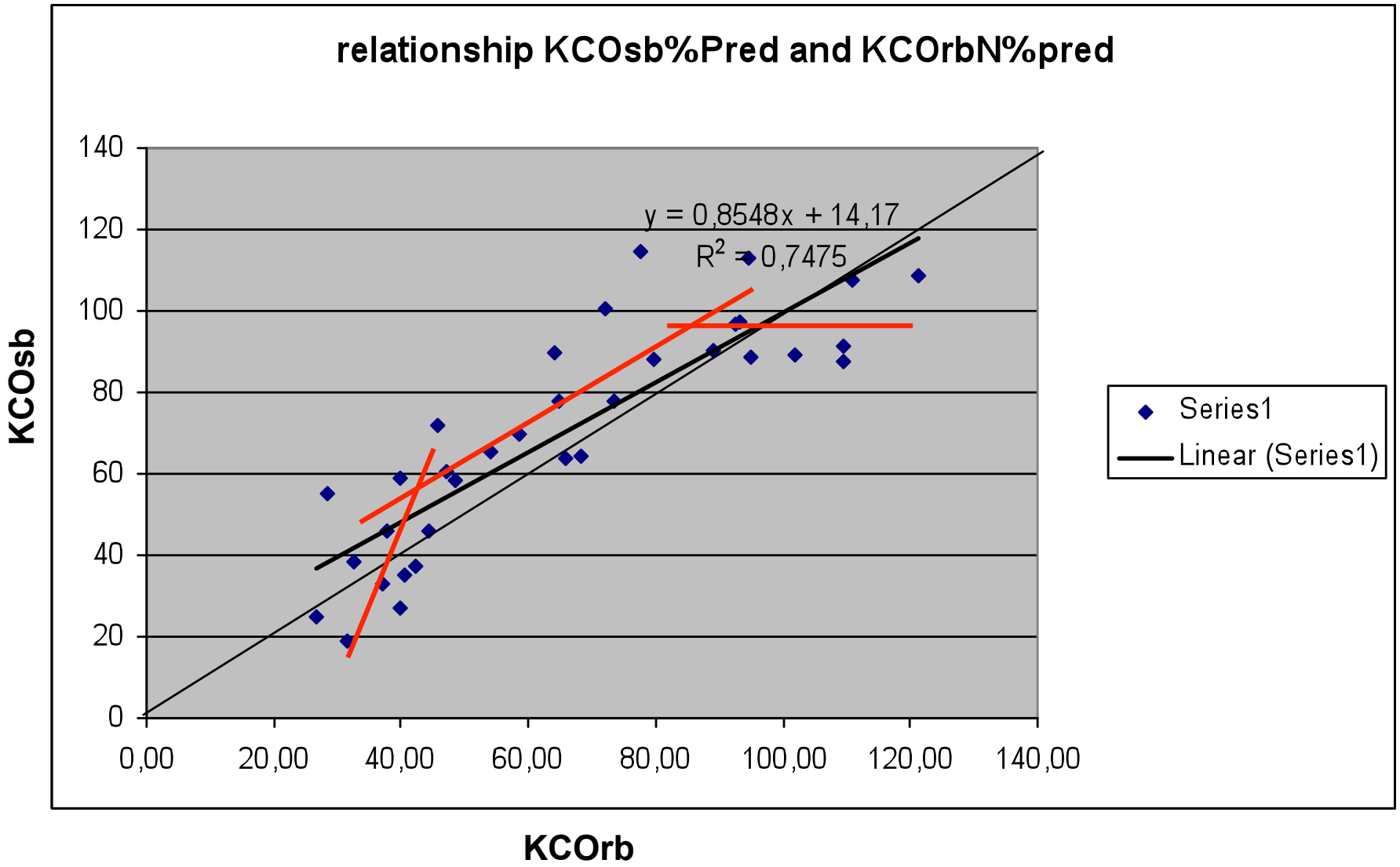
The Krogh-Factor KCO is calculated by:

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

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

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



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