

## Introduction to adjustment of DLCO measurements

Adjustments of DLCO measurements are described in detail the 2005 ERS/ATS statement.

In the paper, however, the adjustment is described as a change of the DLCO predicted values. After several discussions with opinion leaders, we have to conclude that it is more common to compute a  $DL_{adj}$  value that is computed from the measured DLCO value. This  $DL_{adj}$  value is then compared to the (unchanged) predicted values. The following table describes this:

Comment	Parameter	Predicted	% Predicted
	$DLCO_{meas}$	$DLCO_{pred}$	$DLCO_{pred} / DLCO_{meas}$
ERS/ATS statement	$DLCO_{meas}$	$DLCO_{pred} * \alpha$	$DLCO_{pred} * \alpha / DLCO_{meas}$
EasyOne Pro	$DL_{adj} = DLCO * \beta$	$DLCO_{pred}$	$DLCO_{pred} / (DLCO_{meas} * \beta)$

As can be seen from the table above, the %Predicted is the same if  $\beta = 1 / \alpha$ .

This means that the equations of the ERS/ATS statement have to be inverted (e.g. factor is multiplied instead of divided). If compared to the original formulas in the ERS/ATS statement the following formulas are therefore 'inverted' (multiplication instead of division and vice versa).

### Adjustment for haemoglobin

The following formula is applied to correct for hemoglobin:

Male adults (age  $\geq 15$ ):  $DL_{adj} = DLCO / (1.7 * Hb / (10.22 + Hb))$   
Hb in g/dL

Female and children (age  $< 15$ ):  $DL_{adj} = DLCO / (1.7 * Hb / (9.38 + Hb))$   
Hb in g/dL

Unit conversion:  $Hb [g/dL] = Hb [mmol/L] / 0.616$   
(according to other sources the factor is 0.6206)

Allowed range for Hb: 0 to 100 g/dL.

Default value male adults (age  $\geq 15$ ): 14.6 g/dL (9.00 mmol/L)

Default value female and children (age  $< 15$ ): 13.4 g/dL (8.26 mmol/L)

## Adjustment for P<sub>A,O2</sub> or altitude

The following formula for DL<sub>adj</sub> is applied if the patient uses supplemental O2:

$$DL_{adj} = DLCO * (1 + 0.0035 * (P_{A,O2} - 100)) \quad P_{A,O2} \text{ in mmHg}$$

If no supplemental O2 is applied the following formula is always applied to correct for altitude. The partial pressure of O2 in the lungs is computed by subtracting the water vapor pressure in the lungs (47 mmHg) from the ambient pressure and multiplying it with the O2 concentration:

$$DL_{adj} = DLCO * (1 + 0.0031 * (P_{I,O2} - 150)) \quad P_{I,O2} \text{ in mmHg}$$

$$P_{I,O2} = (P_{amb} - 47) * 0.20942 \quad P_{amb} \text{ and } P_{H2O} \text{ in mmHg}$$

Unit conversion:  $P [\text{mmHg}] = P [\text{mbar}] * 0.750$

Pressure at altitude:  $P_{amp} = 760 \cdot \left(1 - \frac{0.0065 \cdot h}{288}\right)^{5.255}$   $P_{amb}$  in mmHg, H in meters

Allowed range for P: 100 to 750 mmHg

Feet to meter conversion:  $h [\text{m}] = h [\text{ft}] / 3.28084$

## Adjustment for COHb concentration and CO back pressure

Adjustment for Carboxyhaemoglobin is performed as follows:

$$DL_{adj} = DLCO / (102\% - COHb\%) \quad COHb \text{ in } \%$$

Allowed range for COHb: 0 to 100%

Default value: 2% at this value DL<sub>adj</sub> equals DLCO

## Example of DLCO adjustment

The following example can be used to test the DLCO adjustment feature.

Factor	Adjustment for men	Adjustment for women and children < 15 years
Haemoglobin 32.4675 mmol/L	0.7023	0.69292
P <sub>A,O2</sub> 400 mb	1.7	1.7
COHb 30%	1.38889	1.38889
Total correction factor	1.6582	1.6361