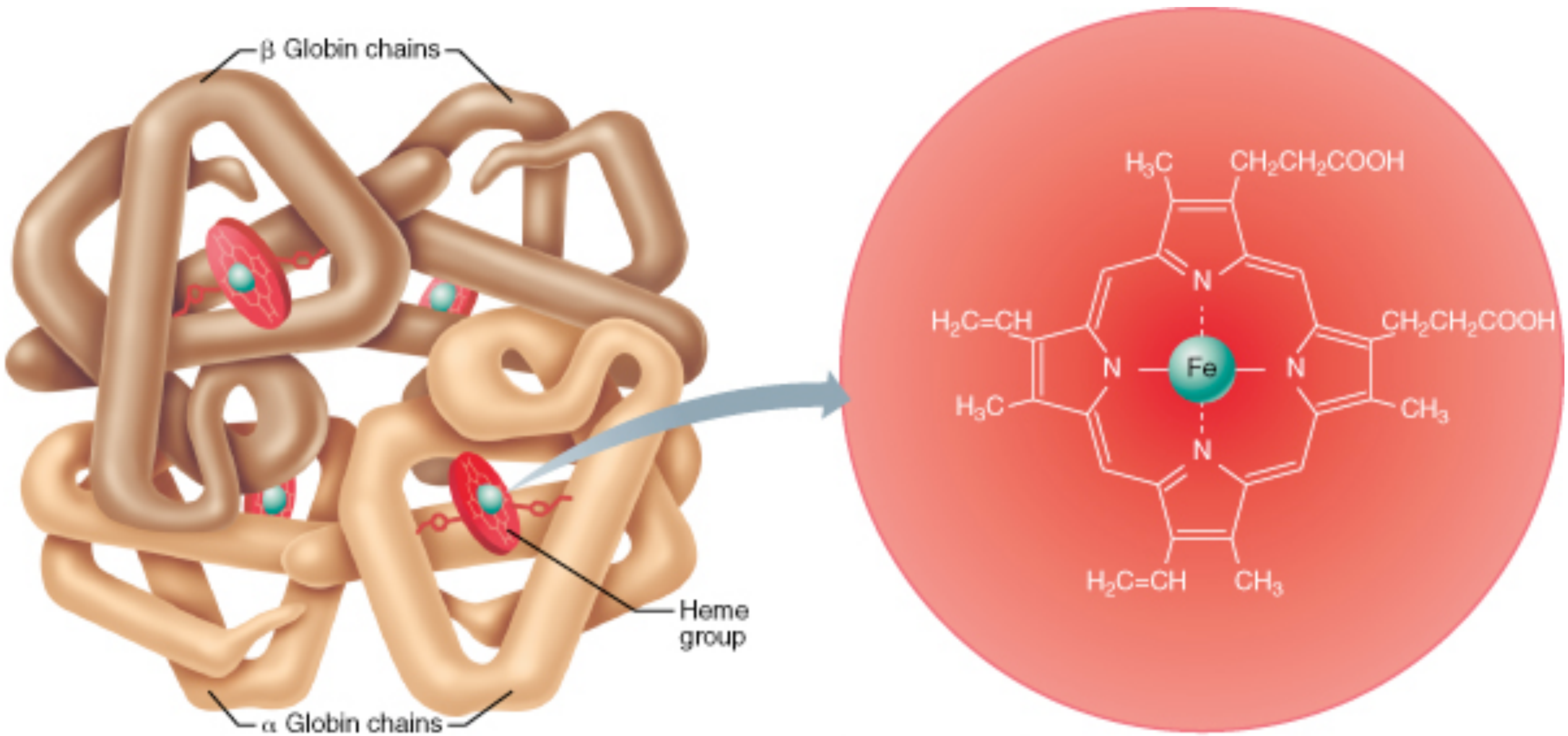
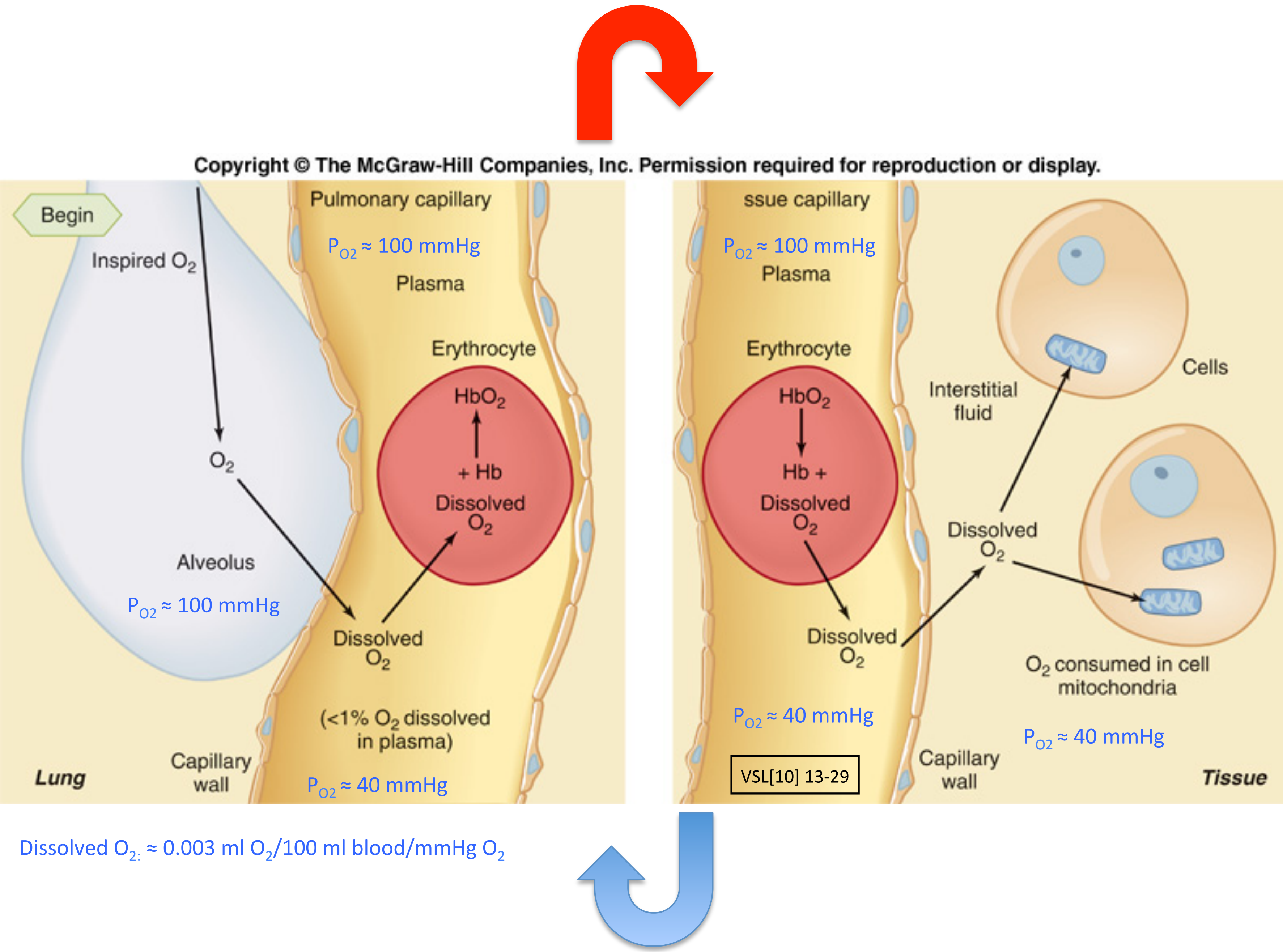


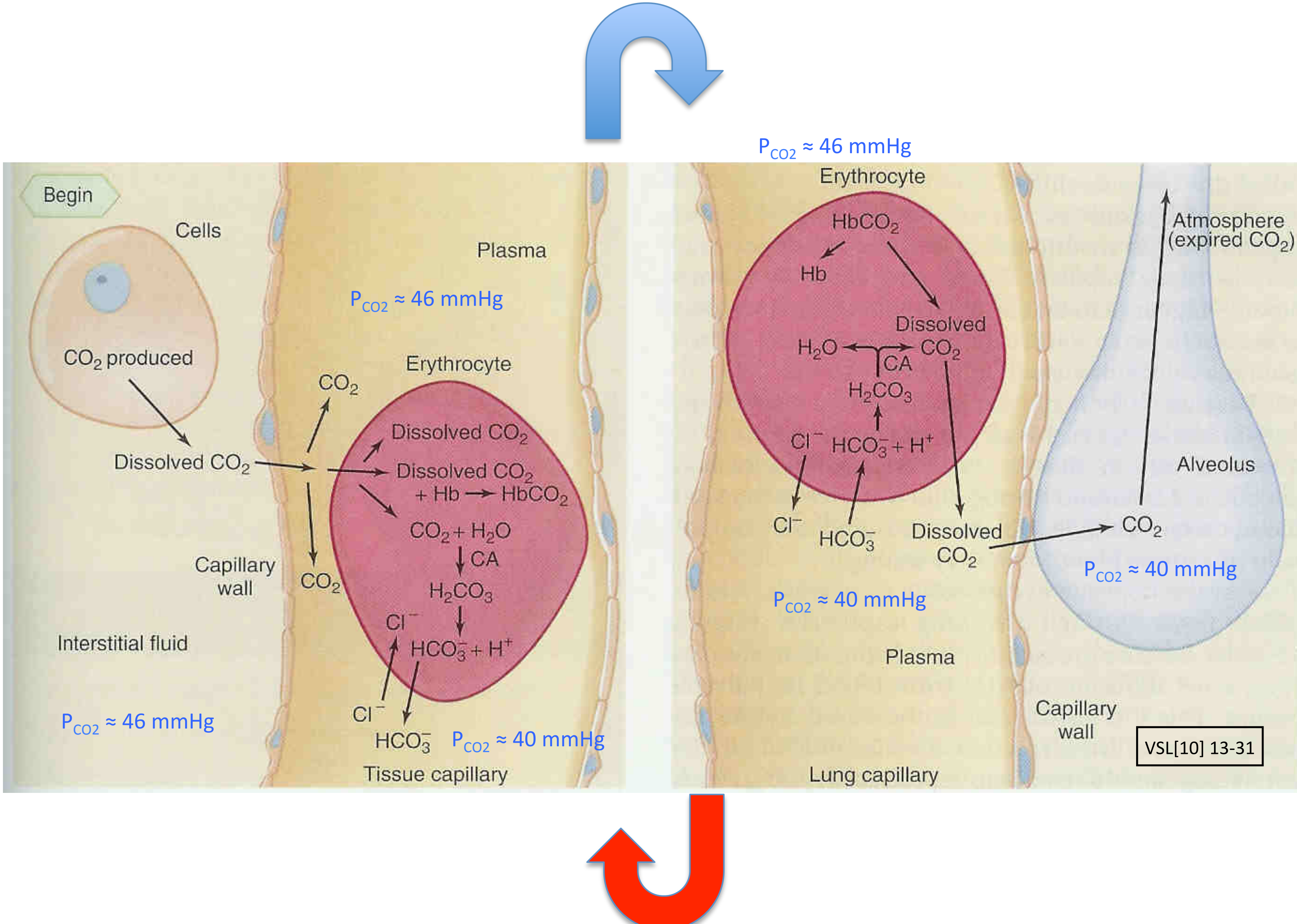
(a) Hemoglobin consists of globin (two alpha and two beta polypeptide chains) and four heme groups.

(b) Iron-containing heme pigment.

Source: http://www.easynotecards.com/notecard_set/24151 - downloaded on 14 November 2014. See # 48 - 50



Dissolved $O_{2:}$ ≈ 0.003 ml O_2/100 ml blood/mmHg O_2



Begin
Cells
CO_2 produced
Dissolved CO_2
Plasma
P_{CO2} ≈ 46 mmHg
Erythrocyte
CO_2
Dissolved CO_2
Dissolved CO_2 + Hb → $HbCO_2$
$CO_2 + H_2O$
CA
H_2CO_3
Cl^-
$HCO_3^- + H^+$
Capillary wall
CO_2
Interstitial fluid
P_{CO2} ≈ 46 mmHg
Cl^-
HCO_3^-
P_{CO2} ≈ 40 mmHg
Tissue capillary
P_{CO2} ≈ 46 mmHg
Erythrocyte
$HbCO_2$
Hb
Dissolved CO_2
H_2O
CA
H_2CO_3
Cl^- $HCO_3^- + H^+$
Cl^-
HCO_3^-
Dissolved CO_2
Atmosphere (expired CO_2)
Alveolus
CO_2
P_{CO2} ≈ 40 mmHg
P_{CO2} ≈ 40 mmHg
Plasma
Capillary wall
VSL[10] 13-31
Lung capillary

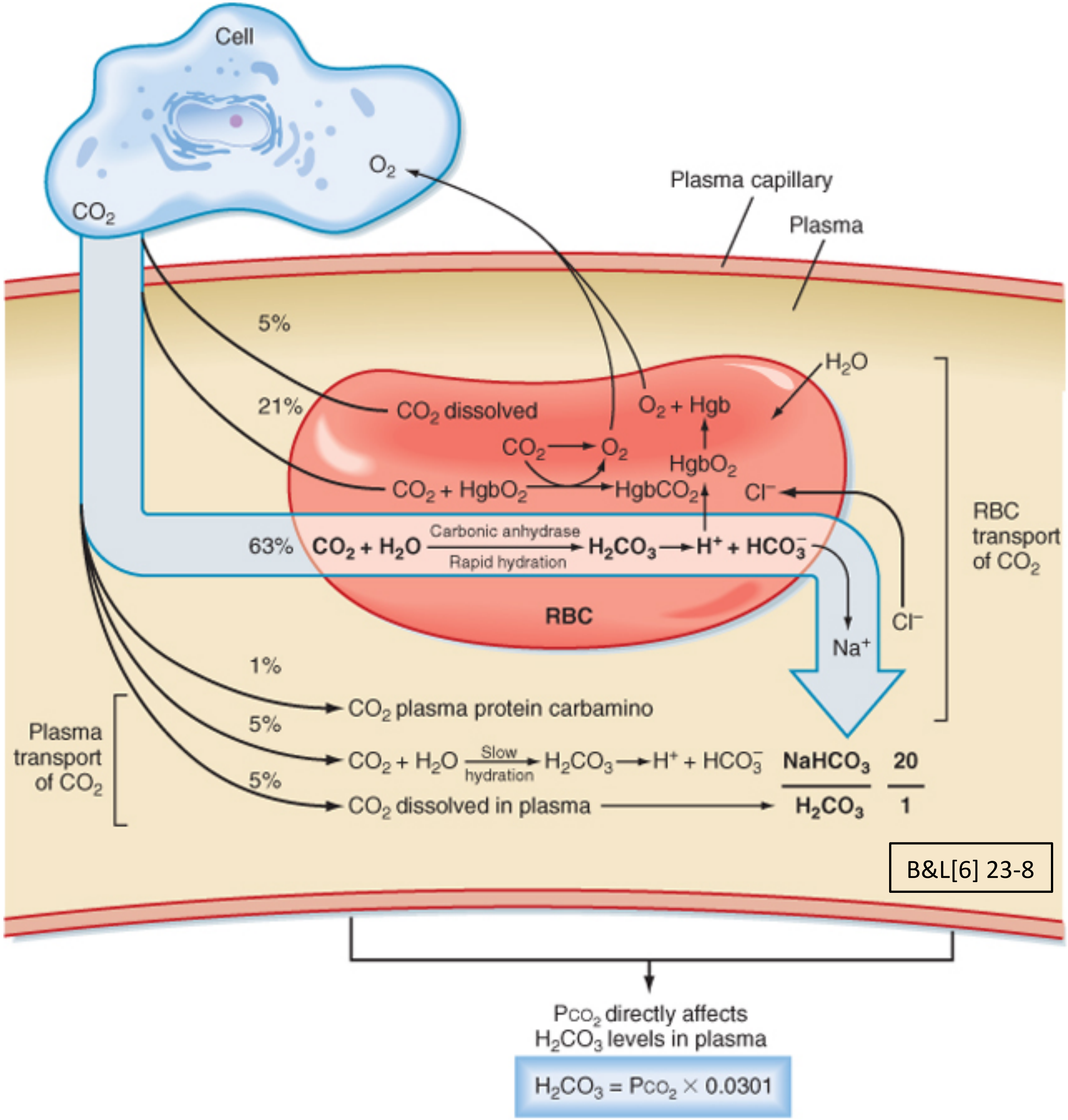
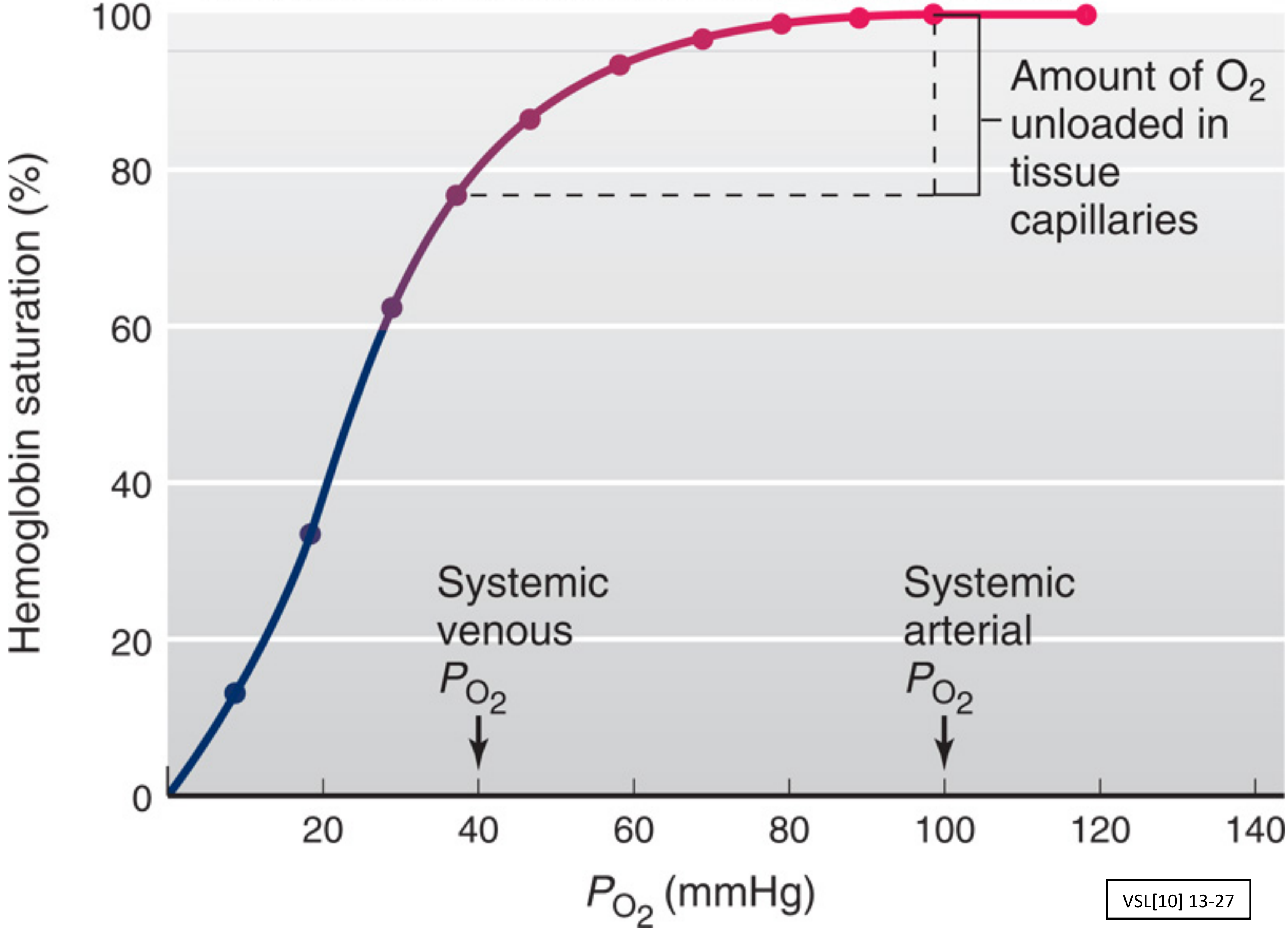
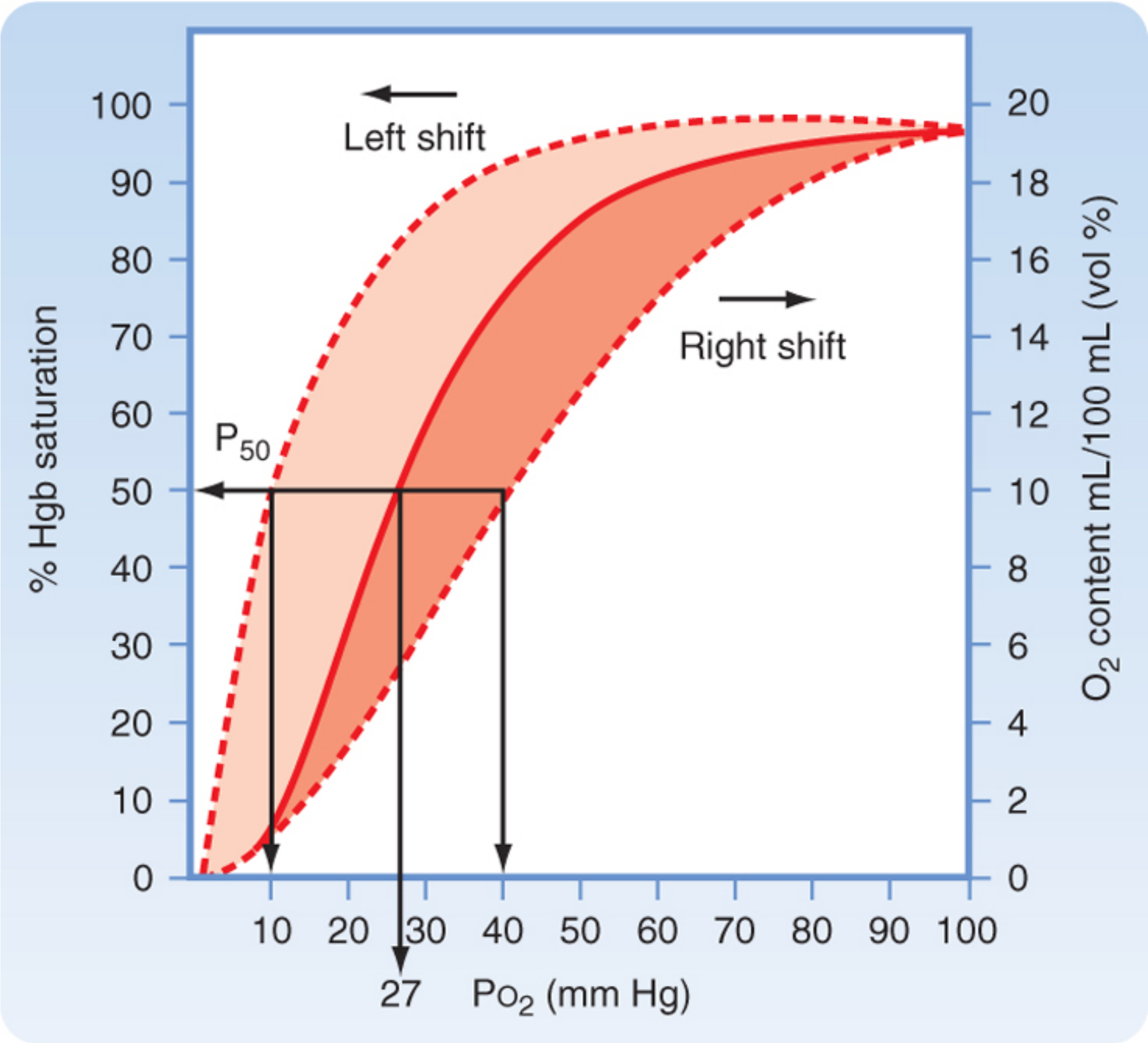


Figure 23-8 Mechanisms of CO_2 transport in blood. The predominant mechanism by which CO_2 is transported from tissue cells to the lung is in the form of HCO_3^-. RBC, red blood cell.



100
80
60
40
20
0
Hemoglobin saturation (%)
Amount of O_2 unloaded in tissue capillaries
Systemic venous P_{O_2}
Systemic arterial P_{O_2}
20
40
60
80
100
120
140
P_{O_2} (mmHg)

VSL[10] 13-27



Koeppen & Stanton: Berne and Levy Physiology, 6th Edition.

Figure 23-4 Oxyhemoglobin dissociation curve showing the relationship between the partial pressure of O_2 in blood and the percentage of Hgb binding sites that are occupied by oxygen molecules (percent saturation). Adult hemoglobin (HgbA) is about 50% saturated at a PO_2 of 27 mm Hg, 90% saturated at 60 mm Hg, and about 98% saturated at 100 mm Hg. The P50 is the partial pressure at which Hgb is 50% saturated with O_2. When the O_2 dissociation curve shifts to the right, P50 increases. When the curve shifts to the left, P50 decreases.

$$[O_2] = K\times[Hb]\times(\%Hb_{sat}/100) + 0.003\bullet P_{O2}$$

Where:

- $[O_2]$ = amount of O_2 in blood, in ml O_2/100 ml blood
- $1.34 \leq K \leq 1.39$ ml O_2/g Hb
- [Hb] = amount of Hb in blood, in g/100 ml of blood
- % Hb_{sat} = % Hb saturation with O_2
- P_{O2} = partial pressure of O_2 in blood

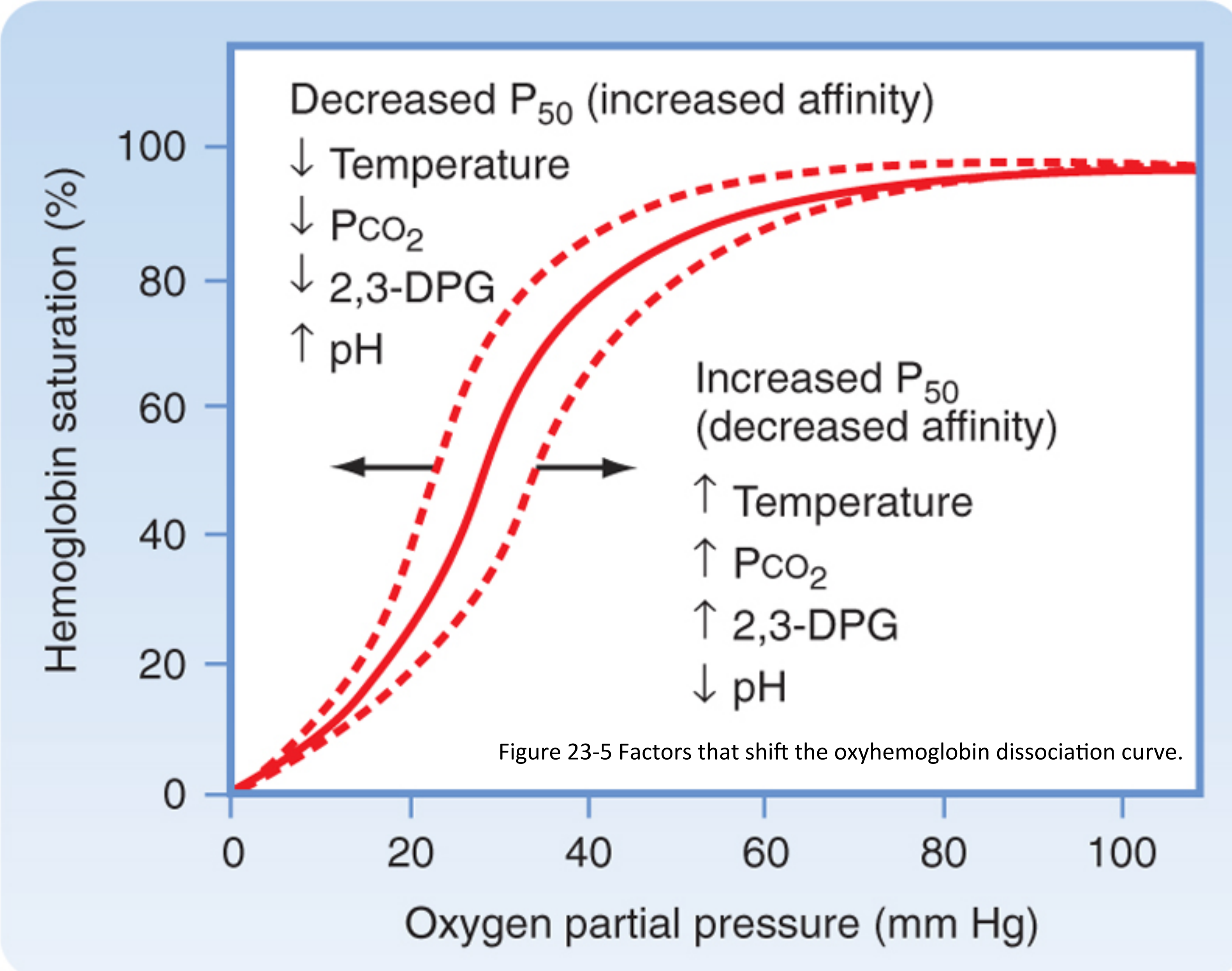
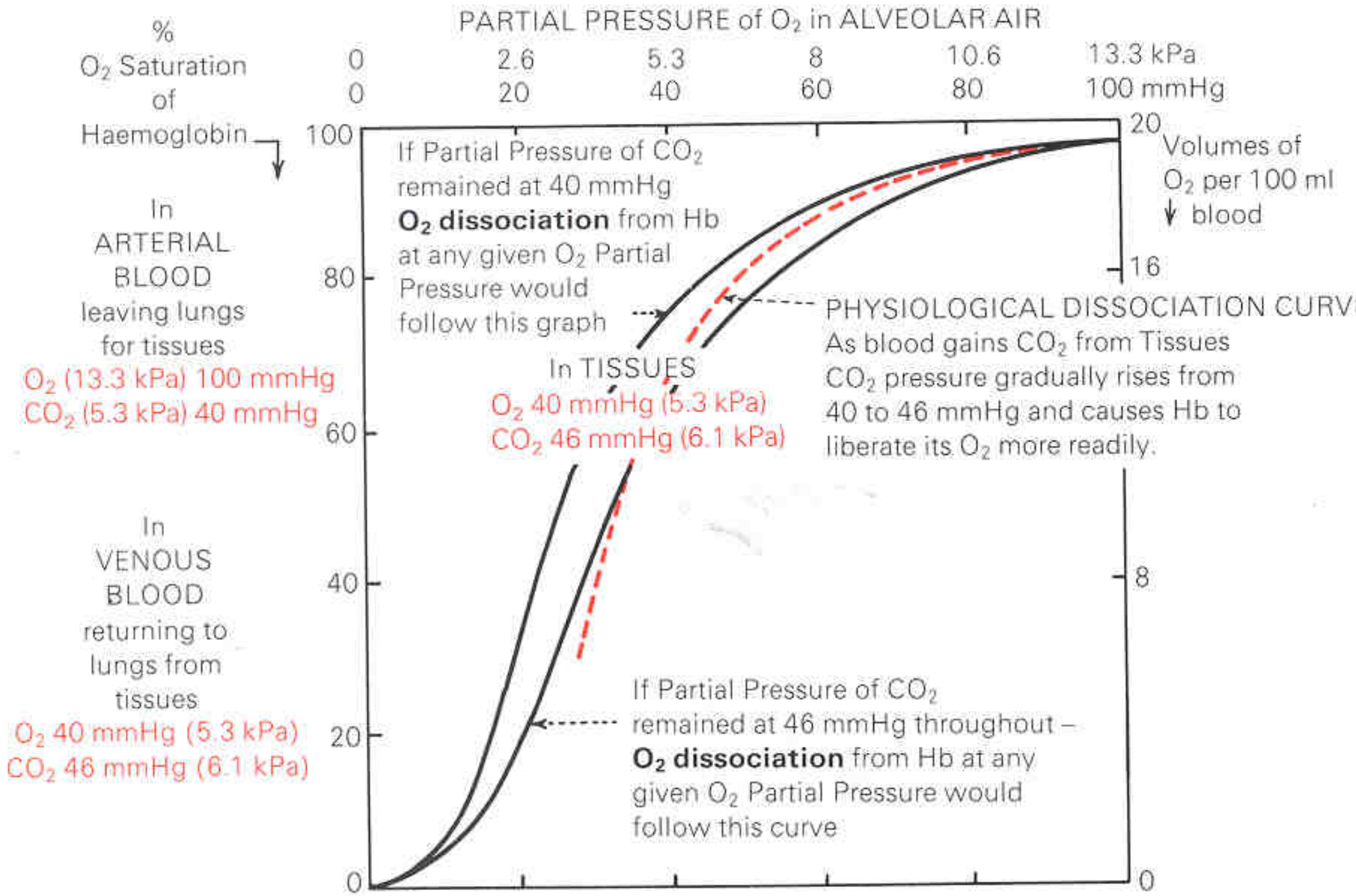


Figure 23-5 Factors that shift the oxyhemoglobin dissociation curve.

Koeppen & Stanton: Berne and Levy Physiology, 6th Edition.



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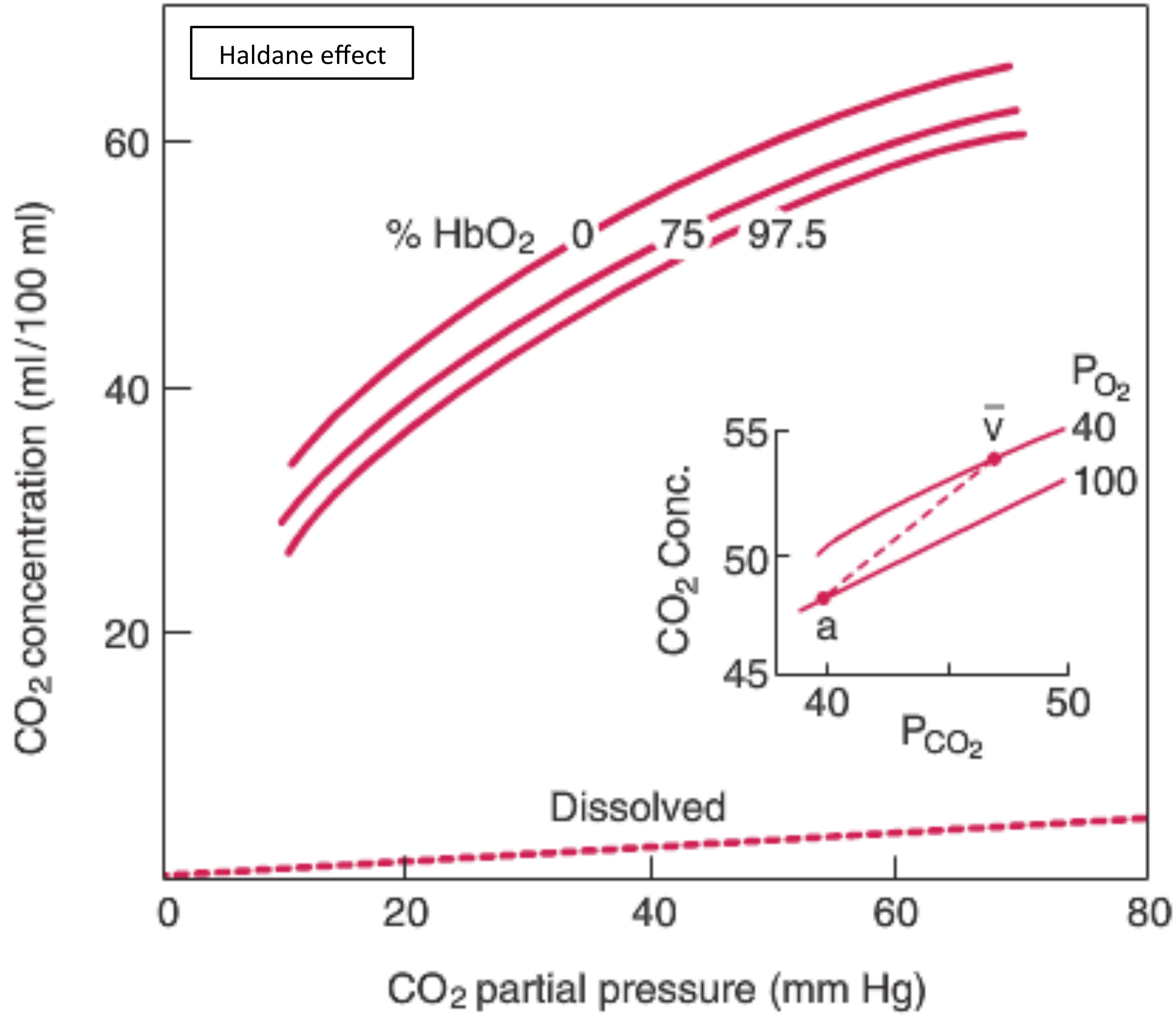
This effect of CO_2 partial pressure on dissociation of O_2 from Hb (the Böhr effect) is advantageous.

E.g. an increase in CO_2 partial pressure locally during tissue activity causes Hb to part more readily with its O_2 to the active tissues.

Similarly, an increase in temperature, H^+ and DPG move the curve to the right. DPG is formed from glucose in the RBCs. Its presence favours the dissociation of oxygen from HbO_2



Source: http://pex.referata.com/wiki/CO2_Carriage_and_Storage

END

Video 2, Module 13