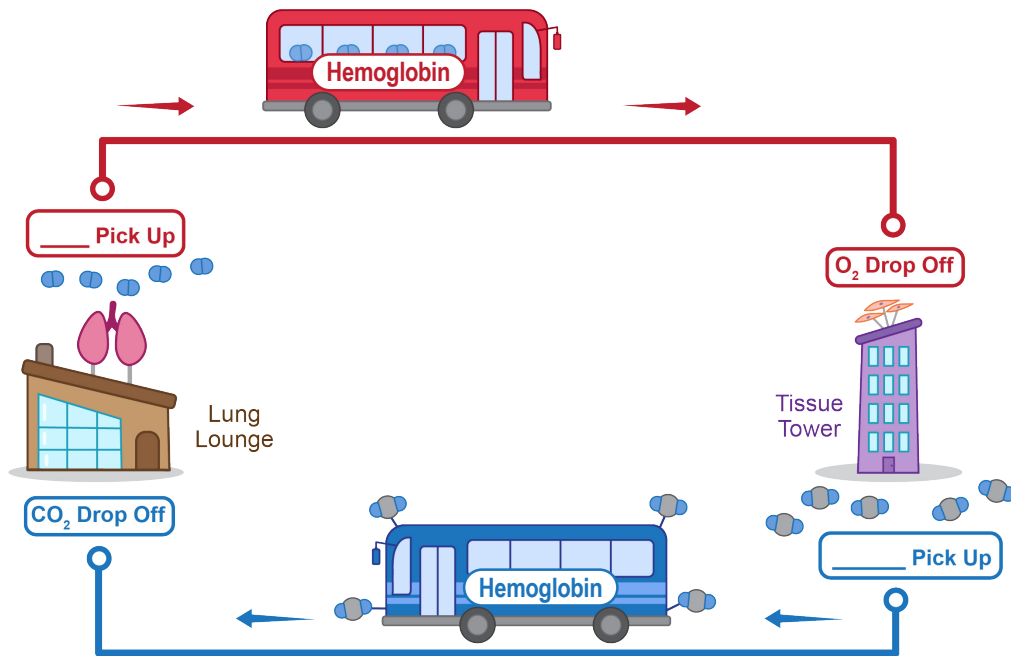


TOPIC: ERYTHROCYTES: HEMOGLOBIN

Function of Hemoglobin

- ♦ **Hemoglobin (Hb):** protein inside of RBCs that transports _____ and CO_2 .
 - 1 RBC contains ~250 million hemoglobin molecules, making up ~97% of the RBC's mass.
 - Hemoglobin effectively *transports* O_2 and CO_2 because it binds them _____ (it binds & releases).



EXAMPLE

Which of the following is most likely to occur if hemoglobin started binding to oxygen *irreversibly*?

- a) Your blood would circulate through your body slower.
- b) Your blood would circulate through your body faster.
- c) Your tissues would receive less oxygen.
- d) Your tissues would receive more oxygen.

PRACTICE

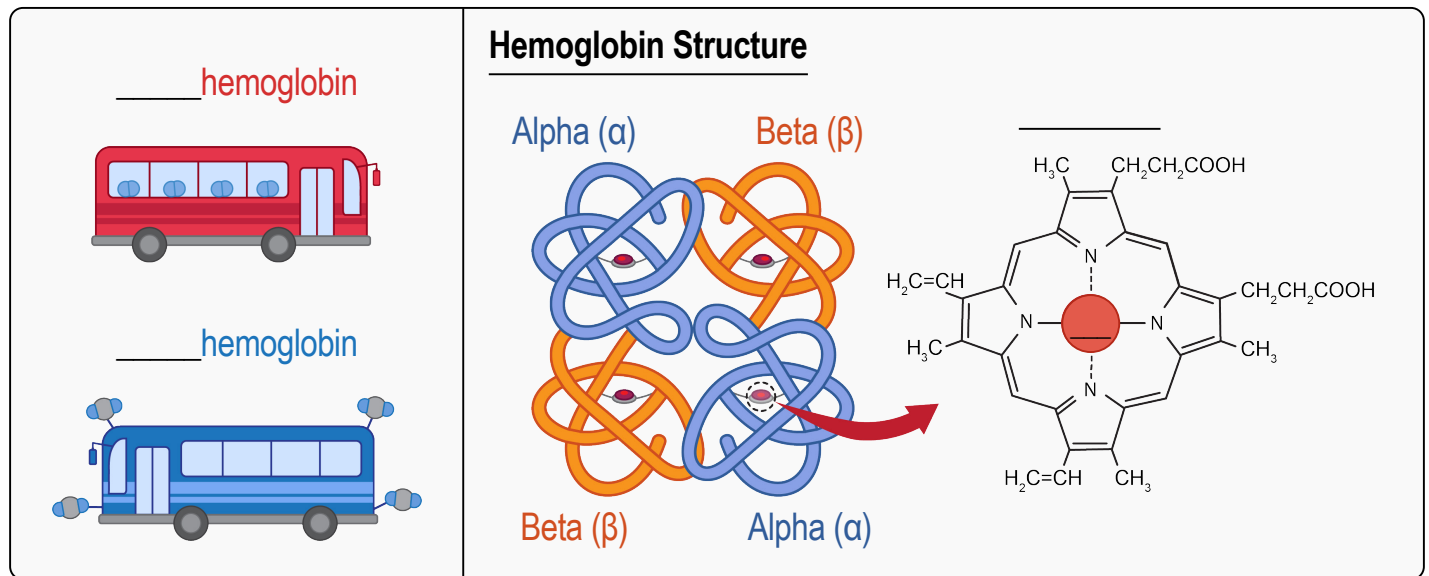
Why is it important for erythrocytes to have a high surface area to volume **ratio**?

- a) Increased cell flexibility.
- b) Allows for more efficient gas exchange.
- c) Allows each RBC to carry more hemoglobin.
- d) Allows RBCs to fit through small gaps.

TOPIC: ERYTHROCYTES: HEMOGLOBIN

Structure of Hemoglobin

- ♦ Hemoglobin (Hb): 4-subunit protein _____ that transports O_2 using _____ groups.
- ♦ Each subunit has a heme group with a central Fe^{2+} that reversibly binds _____ O_2 , making oxyhemoglobin.
 - Therefore, each hemoglobin molecule can carry up to _____ O_2 at once $\rightarrow Hb(O_2)_4$.
- ♦ Hemoglobin can also bind _____ CO_2 at once (forming deoxyhemoglobin) but via *amino groups*, not heme.



EXAMPLE

If each erythrocyte can carry 250 million hemoglobin molecules, how many molecules of oxygen can each erythrocyte carry at a time?

- a) 250 million.
- b) 62.5 million.
- c) 500 million.
- d) 1 billion.

PRACTICE

How many heme groups are required to synthesize 4 hemoglobin molecules?

- | | |
|-------|--------|
| a) 4. | c) 16. |
| b) 8. | d) 32. |

TOPIC: ERYTHROCYTES: HEMOGLOBIN

PRACTICE

Cynthia lives in Miami, a city at low altitude. She goes on a month-long vacation to the Andes Mountain range (at high altitude) where the air pressure is lower and therefore there is less oxygen in each breath she takes in. Upon returning to Miami, how might a sample of her blood differ from a sample taken before she left for her vacation?

- a) Each of her blood cells would carry more hemoglobin molecules.
- b) Each of her hemoglobin molecules would carry more oxygen molecules.
- c) Her hematocrit will have increased (more erythrocytes per μL).
- d) There would be no change.

PRACTICE

Anemia is a blood disorder where the O_2 -carrying capacity of blood is too low to support the body's tissues. Which of the following is not a possible cause of anemia?

- a) Iron deficiency.
- b) Blood loss.
- c) Deformed hemoglobin.
- d) Excess erythrocytes.