

# Gas Exchange

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## Gas exchange

► **Gas exchange** is the uptake of molecular oxygen ( $O_2$ ) from the environment and the discharge of carbon dioxide ( $CO_2$ ) to the environment.

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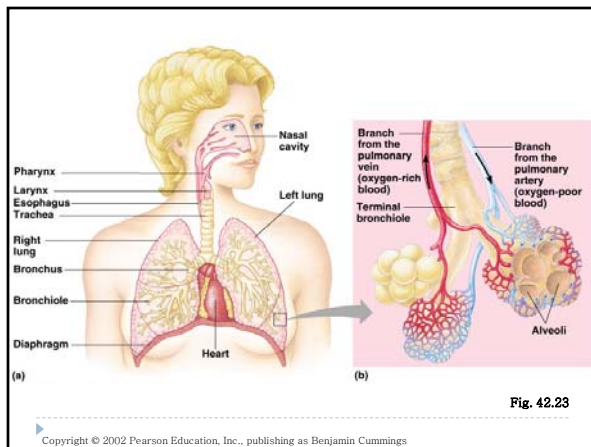
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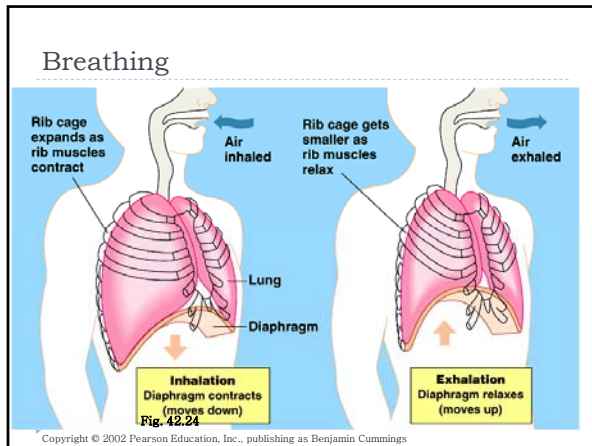
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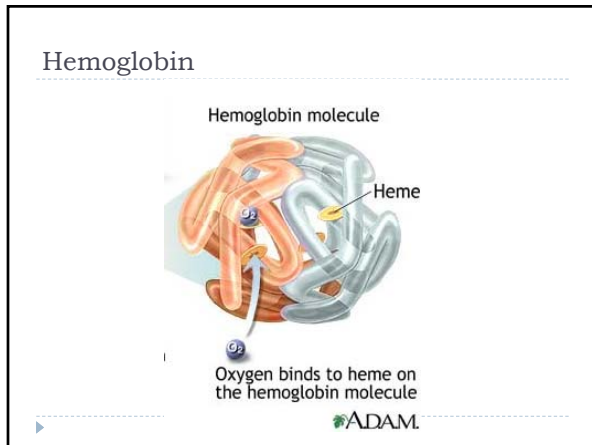
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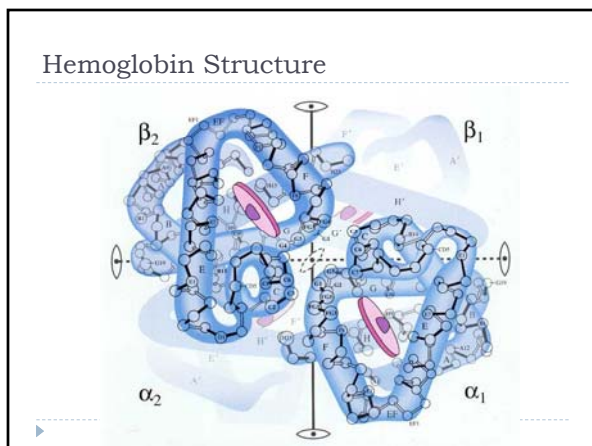
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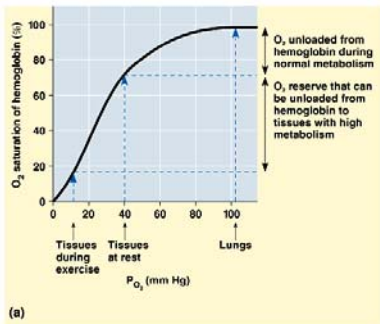
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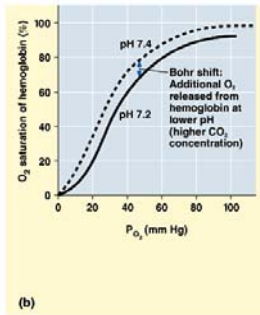
## Oxygen Dissociation Curve



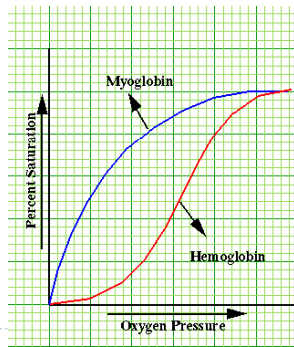
## Bohr Shift

### Bohr Shift

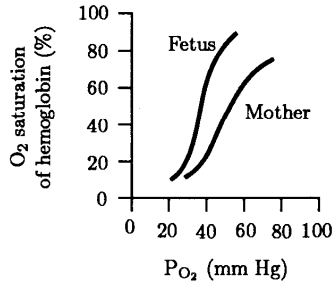
- When increase of CO<sub>2</sub> there is a lower pH and a greater need for O<sub>2</sub> release



## Myoglobin vs Hemoglobin Curves



### Fetal vs Mothers Hemoglobin




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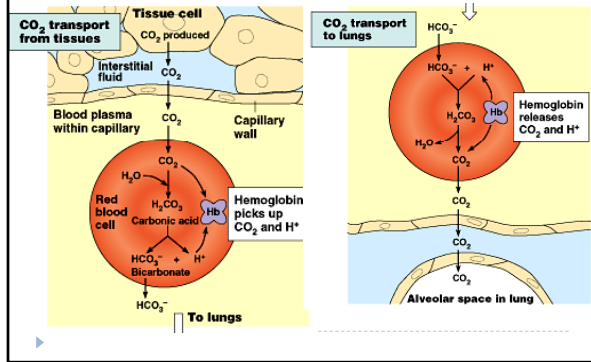
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### Carbon Dioxide Transport (Carbonic Anhydrase)




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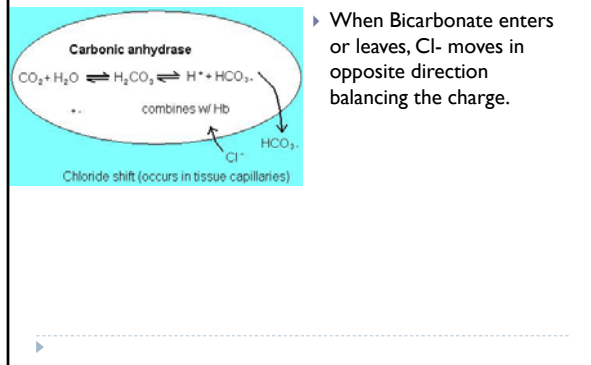
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### Chloride Shift




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## More on Carbon Dioxide Transport

- ▶ Carbon dioxide combines reversibly with haemoglobin to form carbaminohaemoglobin. Carbon dioxide does not bind to iron, as oxygen does, but to amino groups on the polypeptide chains of haemoglobin.
- ▶ Carbon dioxide also binds to amino groups on the polypeptide chains of plasma proteins
- ▶ About 10 % of carbon dioxide is transported bound to haemoglobin and plasma proteins

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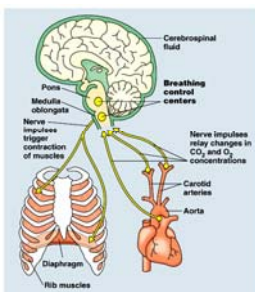
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## Control of Ventilation



- ▶ Exercise causes change in pH of blood.
- ▶ Chemoreceptors respond

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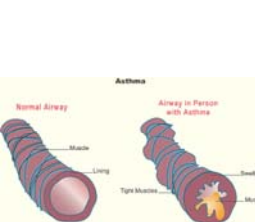
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## Asthma



- ▶ Causes
  - ▶ Allergens
    - ▶ Dust Mites
    - ▶ Pollen
    - ▶ Mold etc...
  - ▶ Irritants
    - ▶ Pollution
    - ▶ Smoke
    - ▶ Stress
  - ▶ Medicines

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### Gas Exchange at Altitude

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- ▶  $PO_2$  at higher altitude is lower
- ▶ Increased Heart Rate
- ▶ Increased breathing rate
- ▶ Production of more blood cells
- ▶ More Hemoglobin



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