Acid-Base Chemistry

Normal Blood pH 7.35 to 7.45

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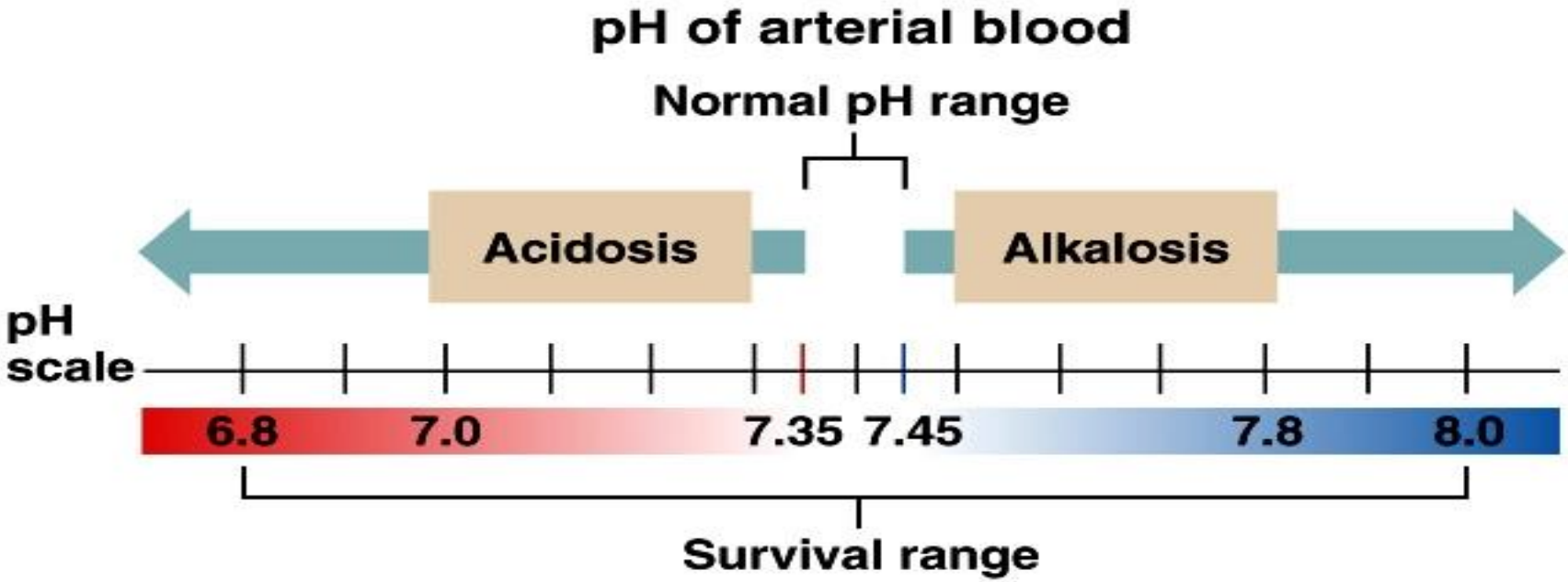
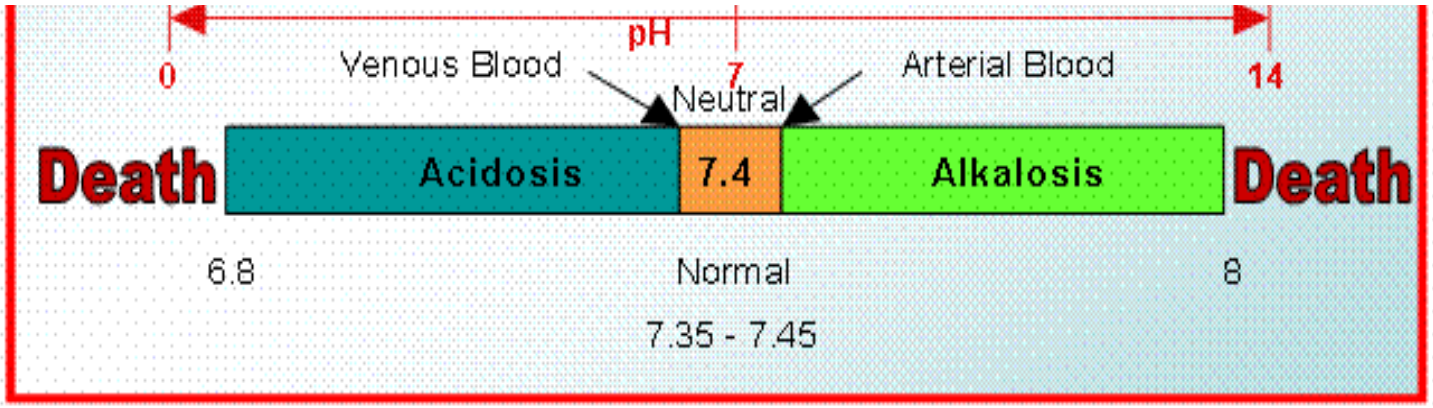
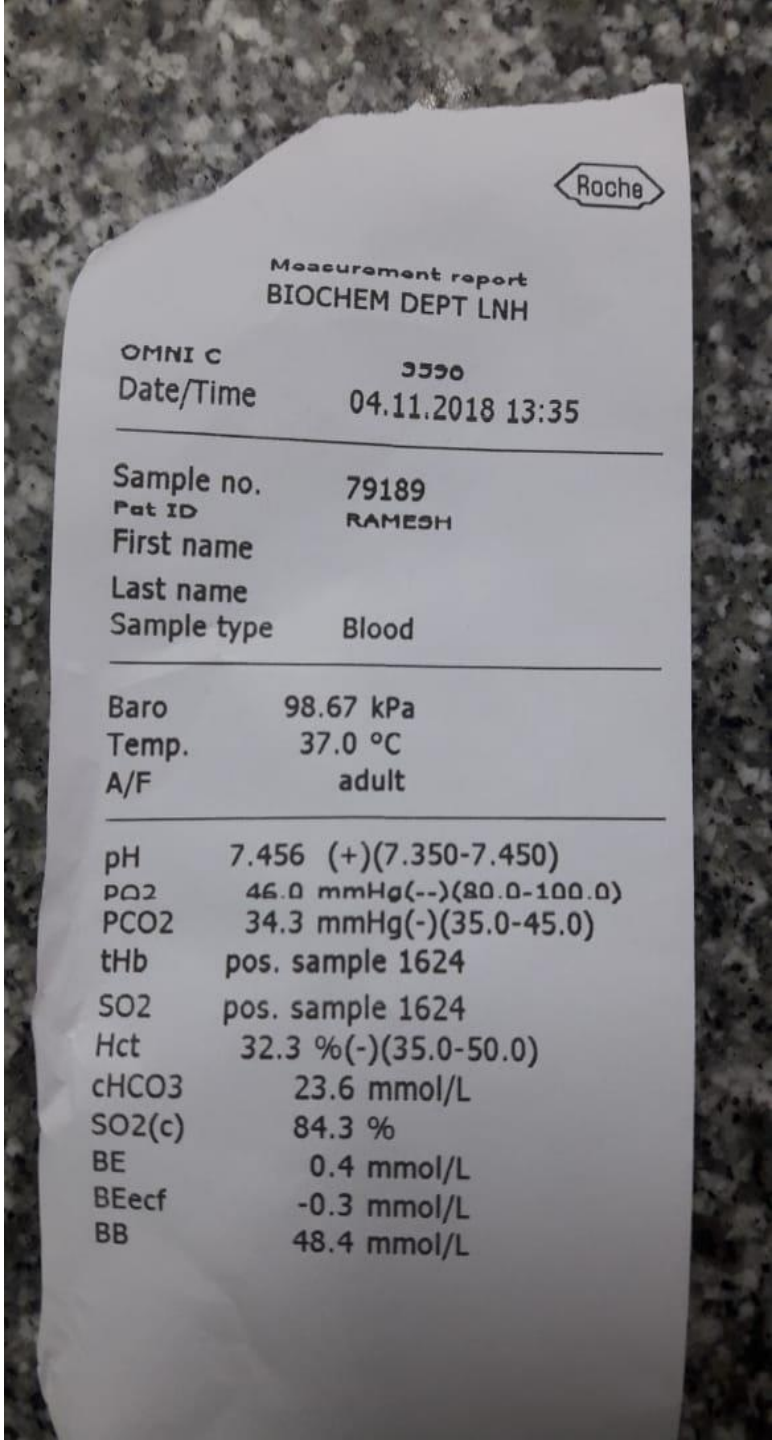




Normal Arterial Blood Gas Values

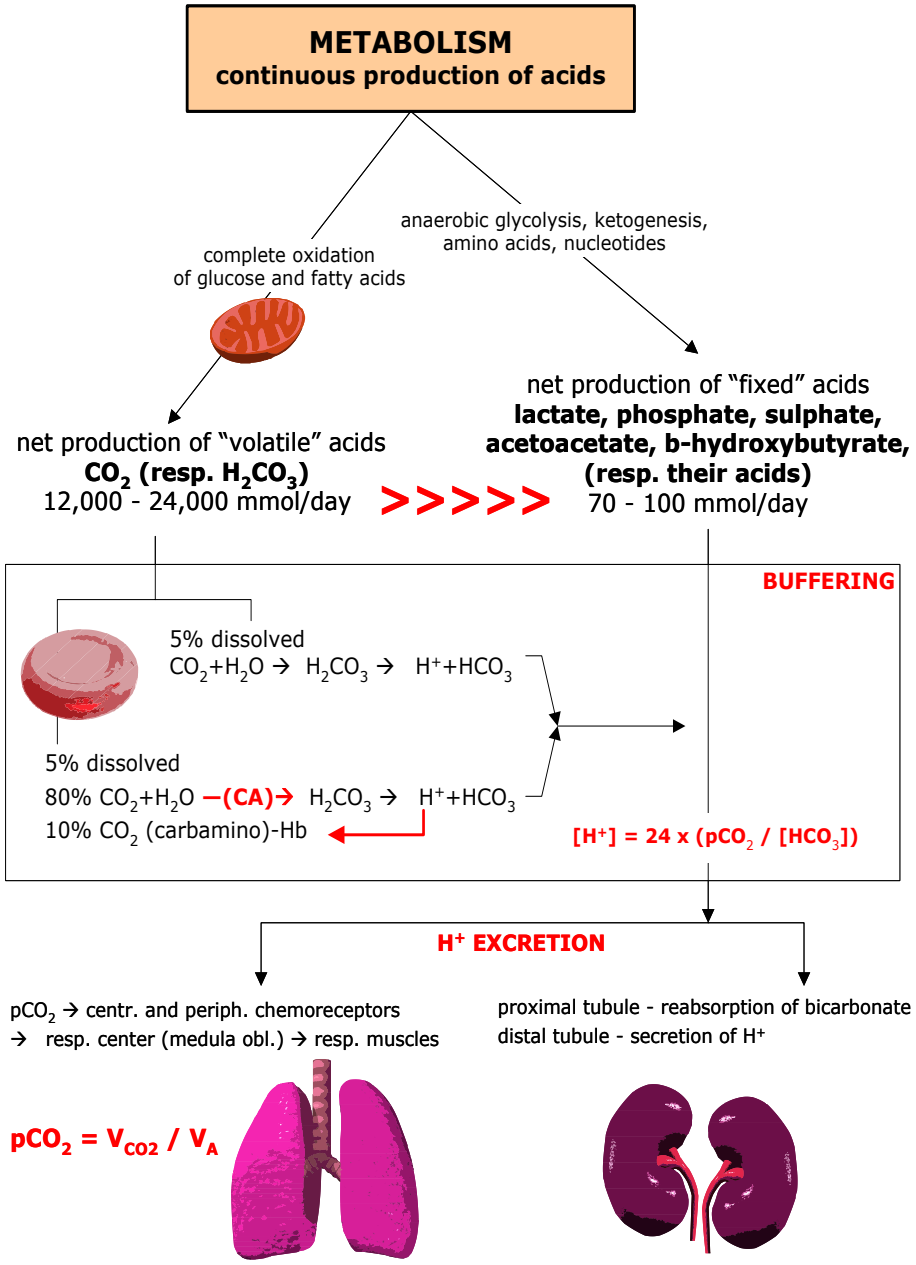
pH	7.35 - 7.45
$PaCO_2$ mm Hg	35 - 45
PaO_2 100 mm Hg	80 -
SaO_2 98%	93 -
HCO_3^- mEq/L	22 - 26



Assessment of A-B balance

	Arterial blood		Mixed venous blood	
		range		range
pH	7.40	7.35-7.45	pH	7.33-7.43
pCO	40 mmHg	35 – 45	pCO_2	41 – 51
pO_2	95 mmHg	80 – 95	pO_2	35 – 49
Saturation	95 %	80 – 95	Saturation	70 – 75
BE	±2		BE	
HCO_3^-	24 mEq/l	22 - 26	HCO_3^-	24 - 28

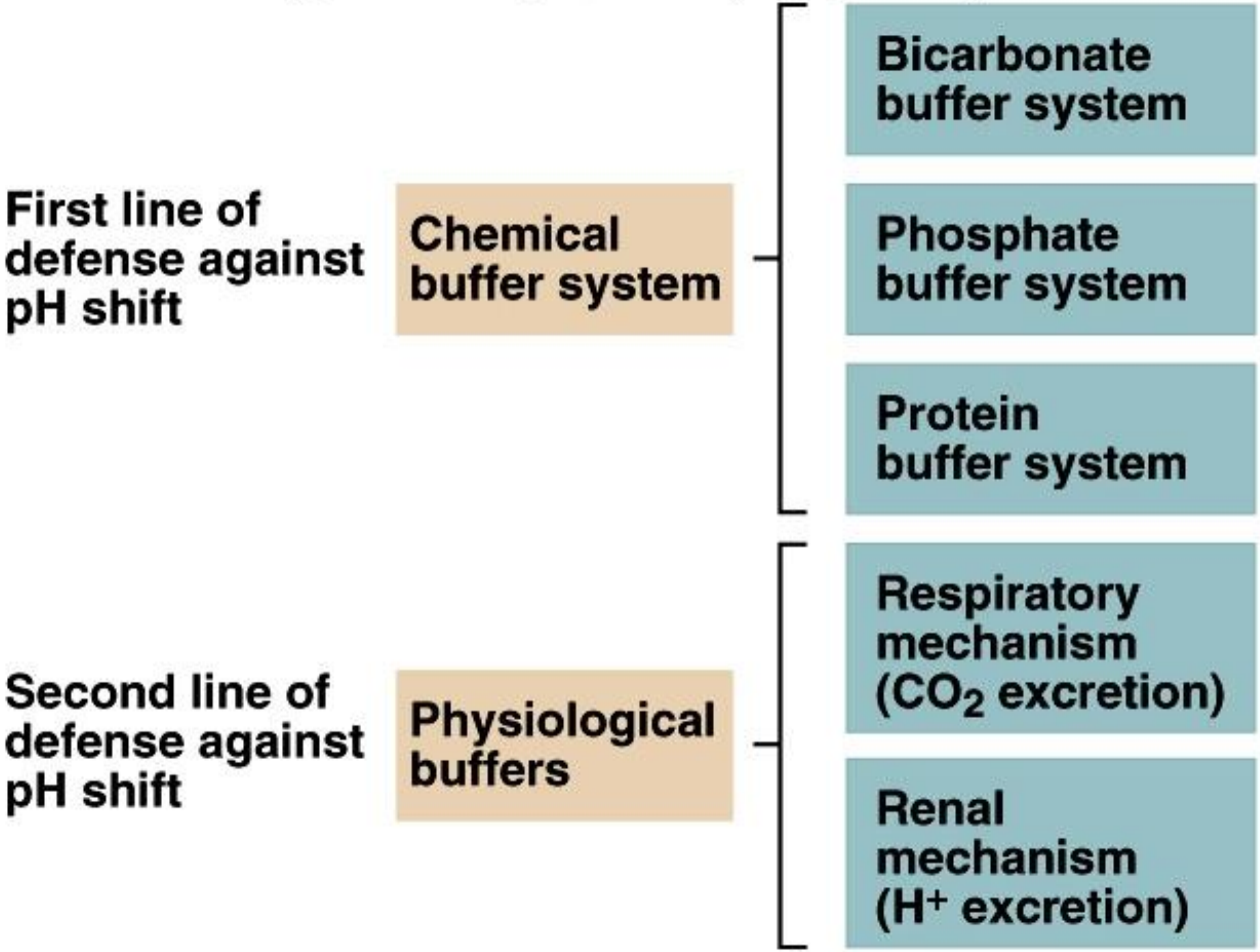
pH is constantly “impaired” by metabolism



> Volatile acid : carbonic acid→ respiration via CO2
> Fixed acid: lactate, ketoacid, sulfuric acid, phosphoric acid→ buffered and later execrated via renal in the form of H+

> Lactate and keto are produced at constant amount
> Sulfuric and phosphoric acid depended on the dietary protein

Total CO_2:
= $[HCO_3]$ + $[H_2CO_3]$
+ [carbamino CO_2]
+ [dissolved CO_2]



Important principles

H^+ secreted = HCO_3^- reabsorbed

H^+ excreted = titratable acidity + urinary NH_4^+

Most of the H^+ secreted is used to "reclaim" filtered HCO_3^-

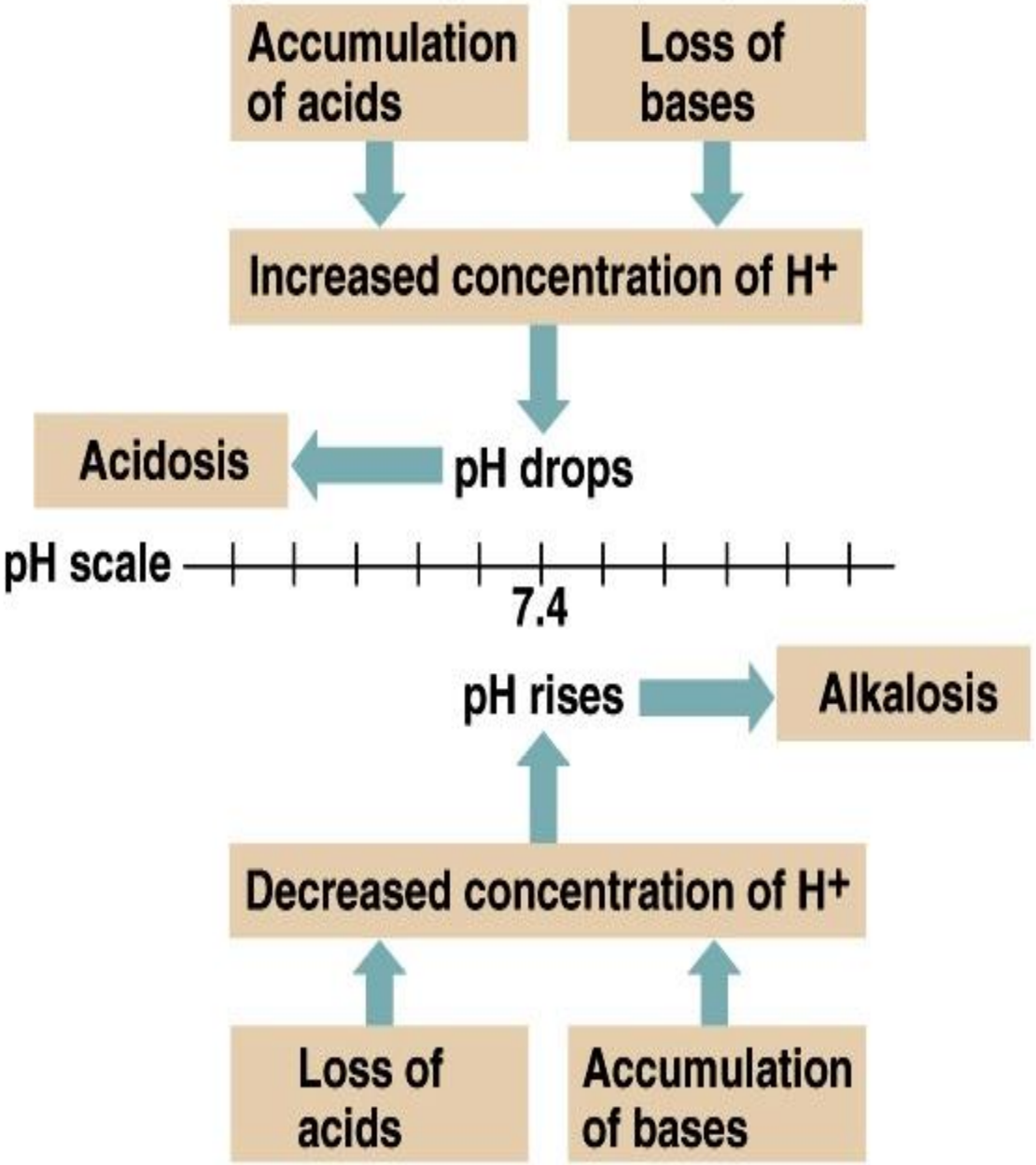
Filtered HCO_3^- is not reabsorbed as such; it is destroyed in tubule and resynthesized in tubular cell

- Plasma [HCO_3^-] depends on the rate of renal H^+ secretion

  $\uparrow H^+$ secretion $\rightarrow \uparrow$ plasma [HCO_3^-] (metabolic alkalosis)

  $\downarrow H^+$ secretion $\rightarrow \downarrow$ plasma [HCO_3^-] (metabolic acidosis)

- Healthy kidney maintains the constancy of plasma [HCO_3^-] by maintaining constancy of H^+ secretion (irrespective of moderate acid or alkaline assaults)



SIMPLE ACID BASE DISORDERS

Acid Base Disorder	pH	pCO2	$[HCO_3^-]$
Metabolic Acidosis	**Low**	Low	**Low**
Respiratory Acidosis	**Low**	**High**	High
Metabolic Alkalosis	**High**	High	**High**
Respiratory Alkalosis	**High**	**Low**	Low

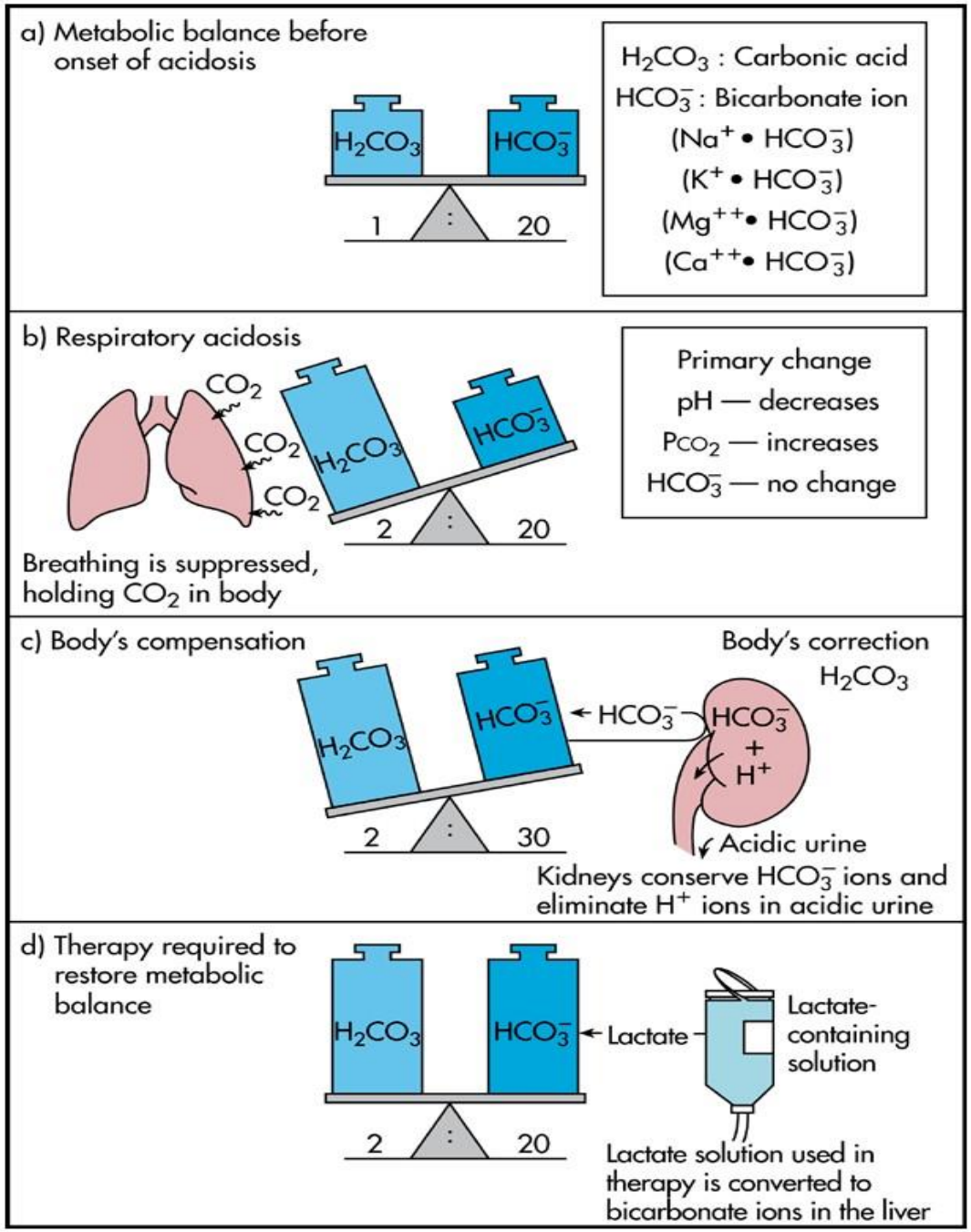
pH	7.35-7.45
pCO2	35-45 mm Hg
[HCO3-]	24 mEq/L

- Clinically acid base disturbance are divided into

1)Uncompensated

2)Partially compensated

3)Fully compensated



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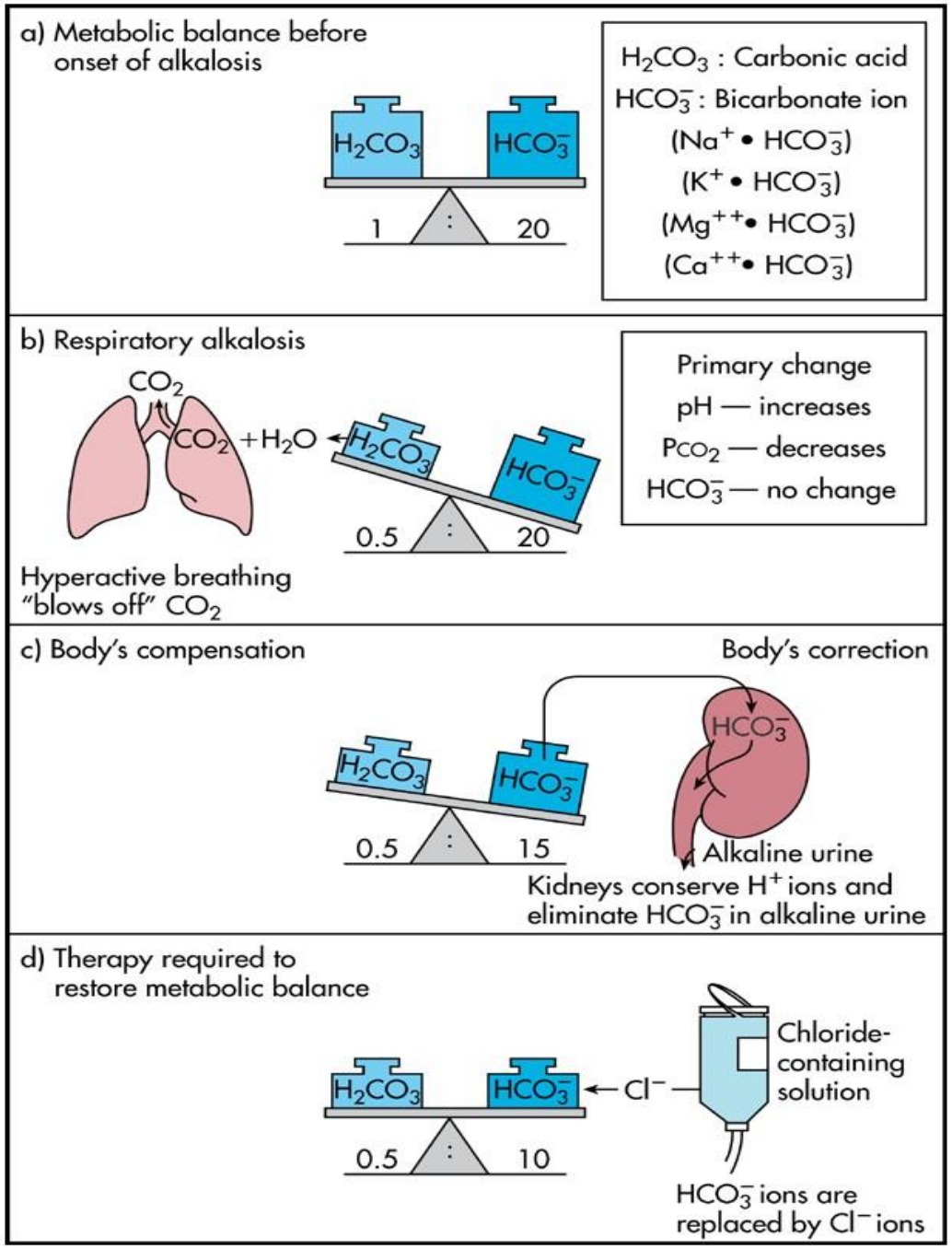

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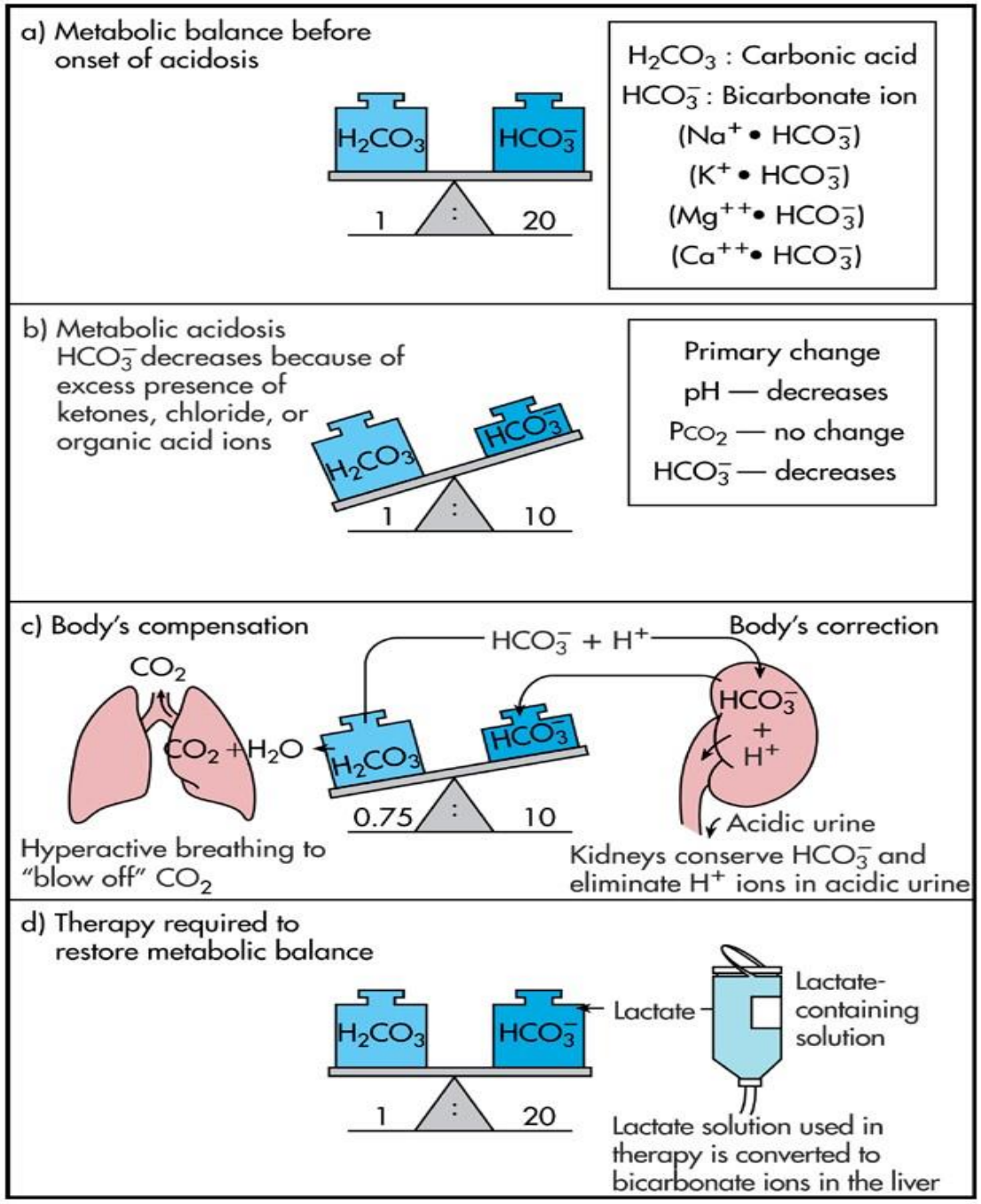

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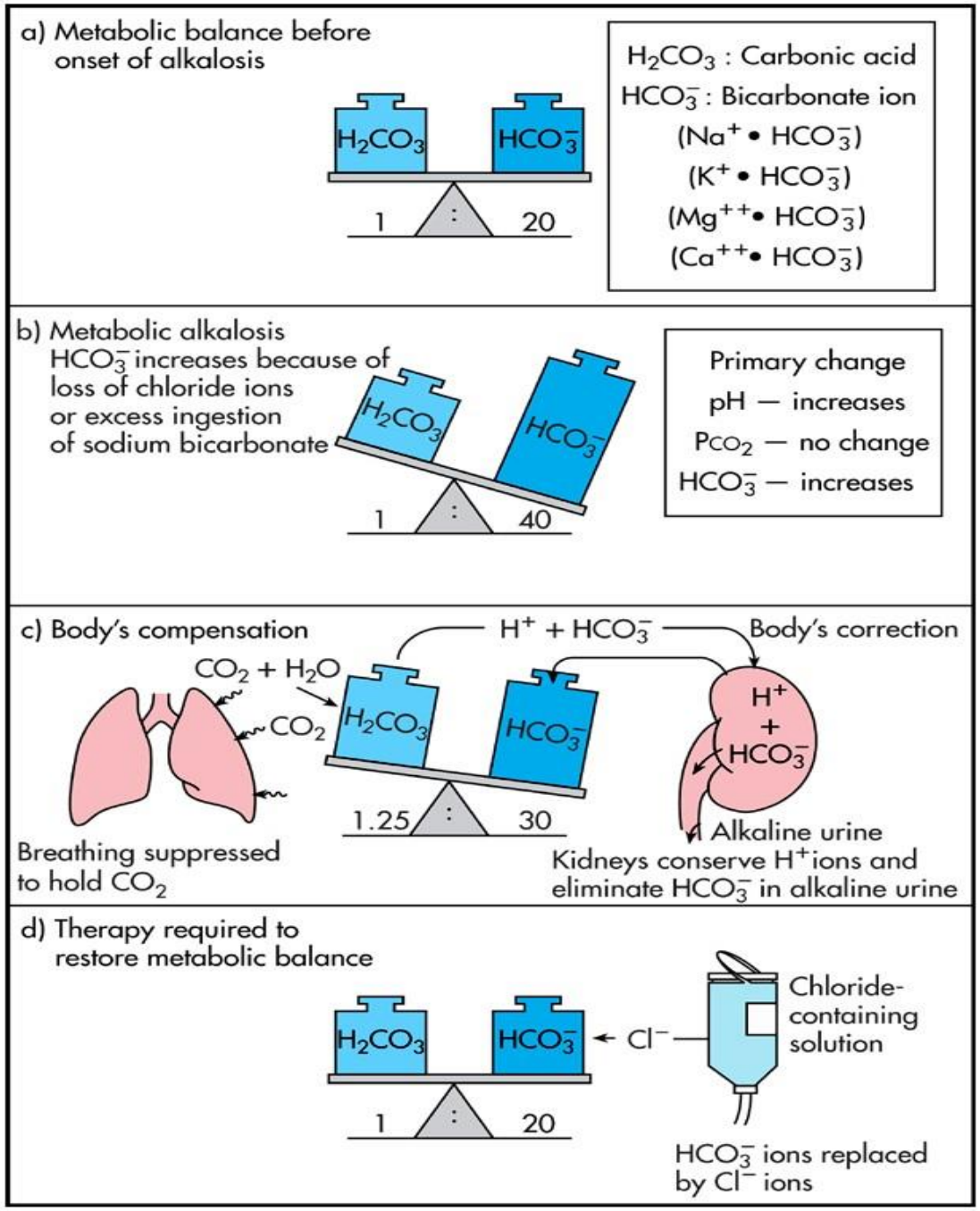

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