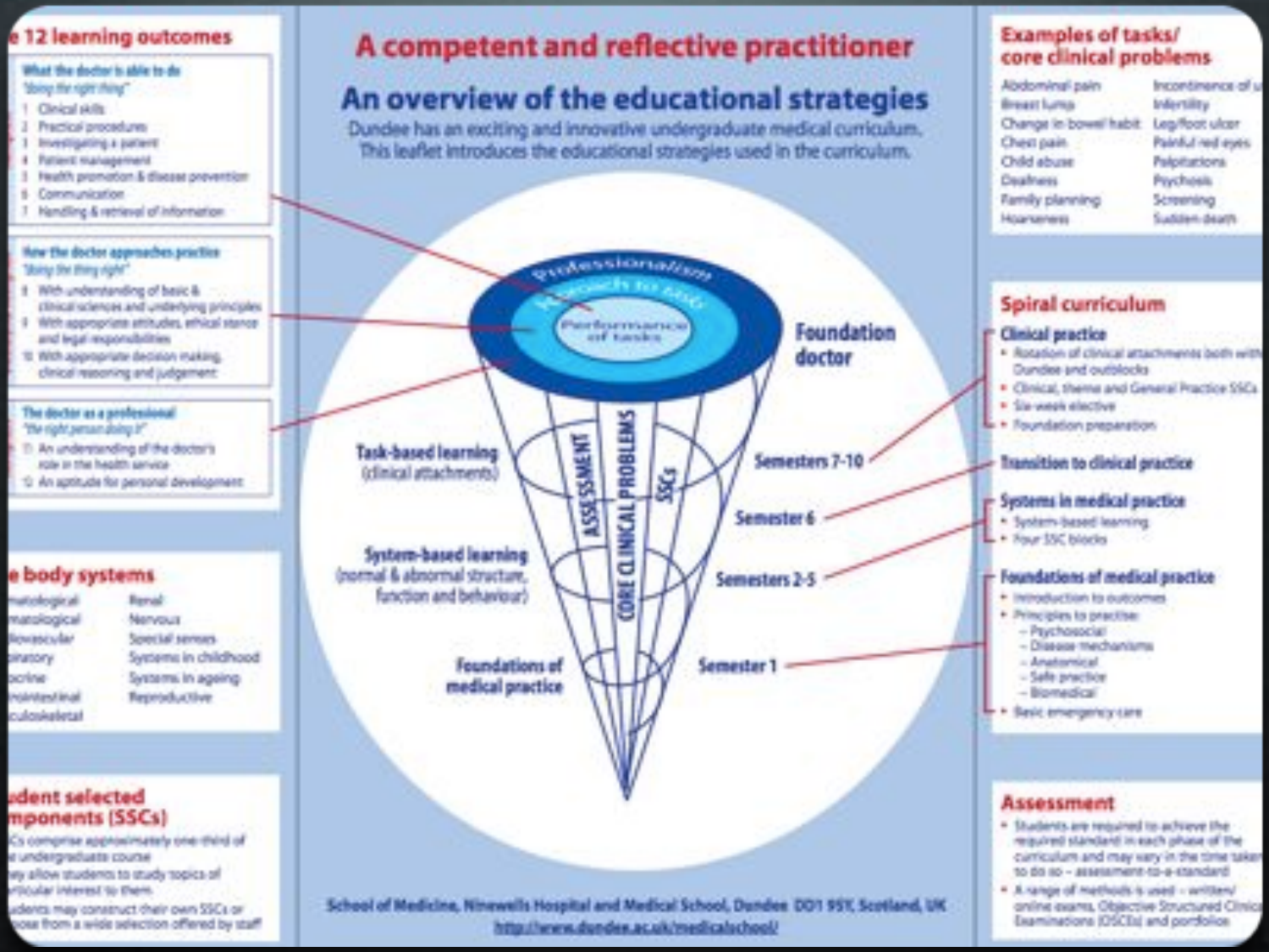
Core Clinical Problems 2

Dr Tom Fardon
Respiratory Medicine

- Causes of Oedema
  - Heart Failure
  - Hypoalbuminaemia
  - Severe Burns
  - Localised Trauma
- Causes of Breathlessness
  - Pulmonary Oedema
  - Pulmonary Embolus
  - Pneumonia of the Lung
  - Pleural Effusion
  - Lung Cancer
  - Mesothelioma
- Causes of Clubbing
  - Congenital Heart Disease
  - Sub acute bacterial endocarditis
  - Bronchiectasis
  - Squamous Cell Carcinoma
  - Cystic Fibrosis
  - Empyema
  - Lung Abscess
  - Hepatitis
  - Ulcerative Colitis
  - Primary Biliary Cirrhosis
- Causes of Metabolic Acidosis with a increased anion gap
  - Alcohol intoxication
  - Methanol Poisoning
  - Metformin Overdose
  - Acute Kidney Injury
  - Chronic Kidney Disease
  - Diabetic Ketoacidosis
  - Thiamine Deficiency
  - Paraquat Poisoning
  - Sepsis
  - Lactic acidosis
  - Ethylene Glycol Poisoning
  - Salicylate poisoning
- Causes of Metabolic Acidosis with a normal anion gap
  - Addison's Disease
  - Types 1, 2 and 2 Renal Tubular Acidosis
  - Diarrhoea
  - High Output Fistula
- Causes of Small Bowel Obstruction
  - Intraluminal
    - Tumour
    - Gallstone Ileus
    - Foreign Body
  - Luminal
    - Tumour
    - Inflammatory Bowel Disease
  - Extra luminal
    - Tumour
    - Volvulus
- Causes of Mono-neuritis Multiplex
  - Wegener's Granulomatosis
  - Alcohol
  - Amyloid
  - Rheumatoid Arthritis
  - Diabetes
  - Sarcoidosis
  - Polyarteritis Nodosa
  - SLE
  - Carcinomatosis
- Causes of peripheral neuropathy
  - Diabetes
  - Alcohol
  - Drugs
    - Isoniazid
    - Vincristine
    - Vinblastine
  - Rheumatoid Arthritis
  - Chronic Renal Failure
  - Malignancy
  - Leprosy
- Causes of cerebellar ataxia
  - Alcohol
  - Stroke
  - Lead poisoning
  - Carbon monoxide poisoning
  - Friedrich's Ataxia
  - Cerebro-spinal Ataxia
  - Multiple Sclerosis
  - Ataxia Telangectaisia
  - Wilson's Disease
  - Tumour
  - Paraneoplastic phenomenon
  - Trauma
- Causes of mitral stenosis
  - Rheumatic fever
  - SLE

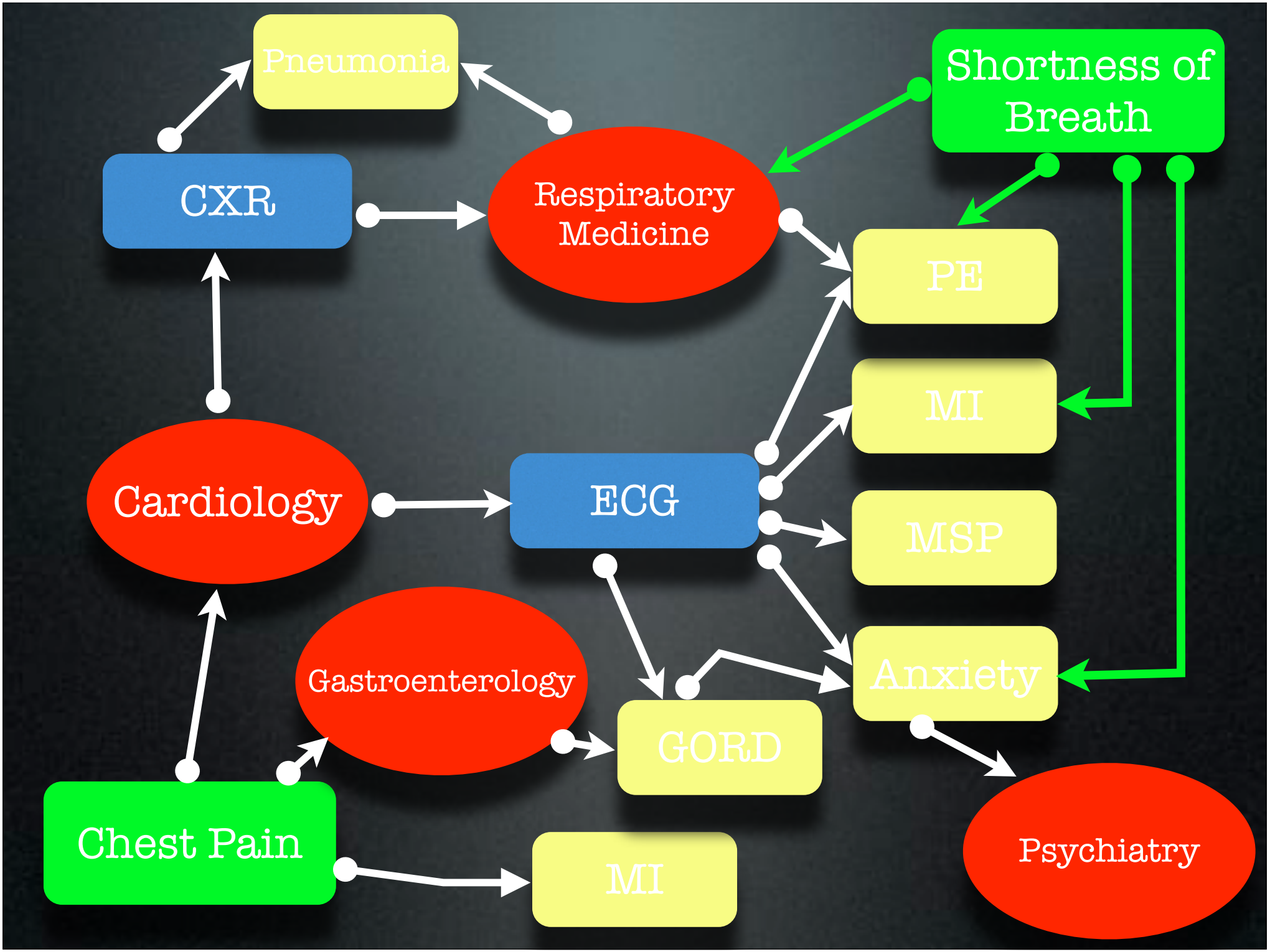
Medicine as a List

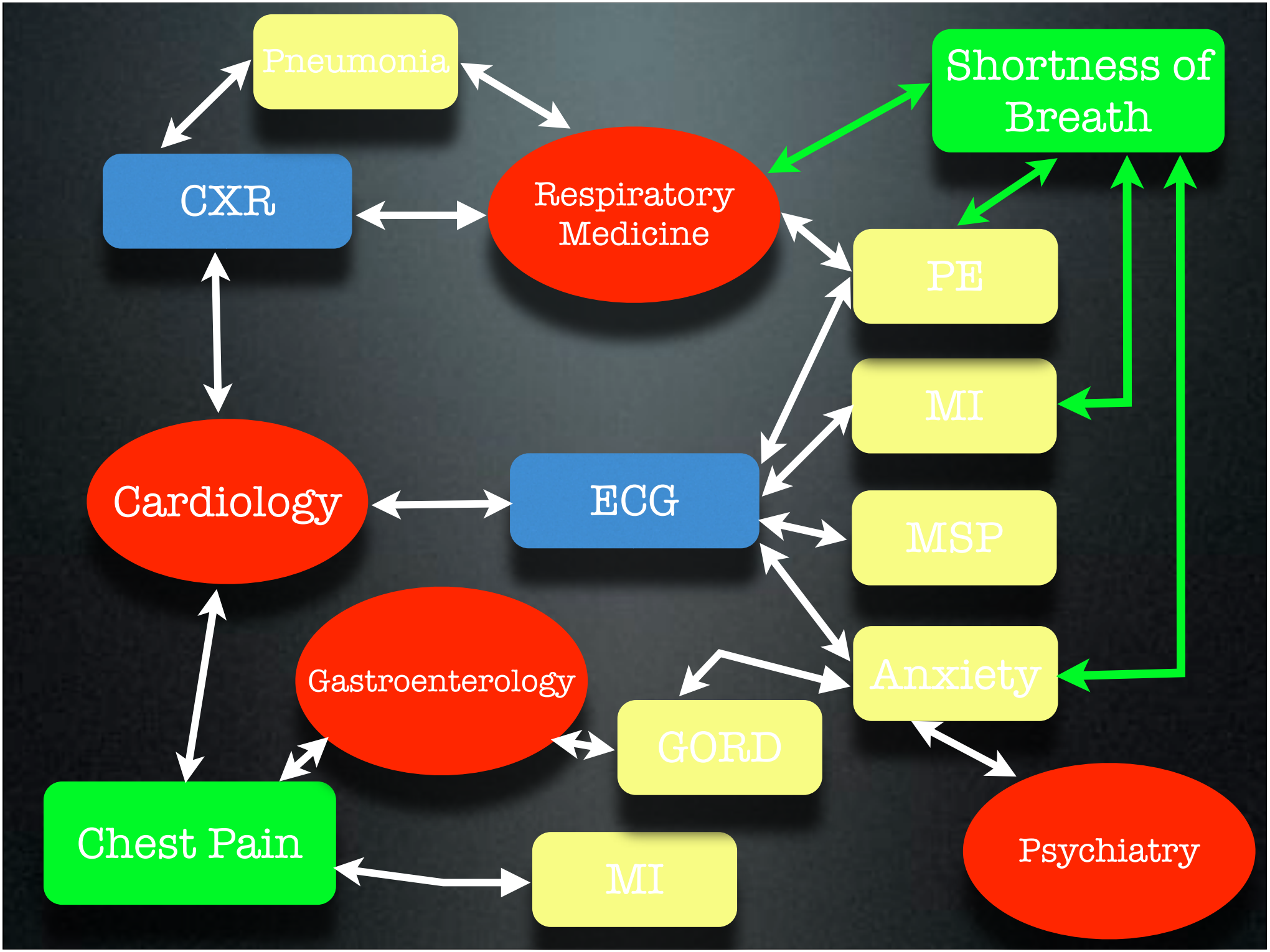


Medicine as a Spiral

Medicine as a Web

Key Aspect


Pneumonia
Shortness of Breath
CXR
Respiratory Medicine
PE
MI
Cardiology
ECG
MSP
Gastroenterology
Anxiety
GORD
Chest Pain
MI
Psychiatry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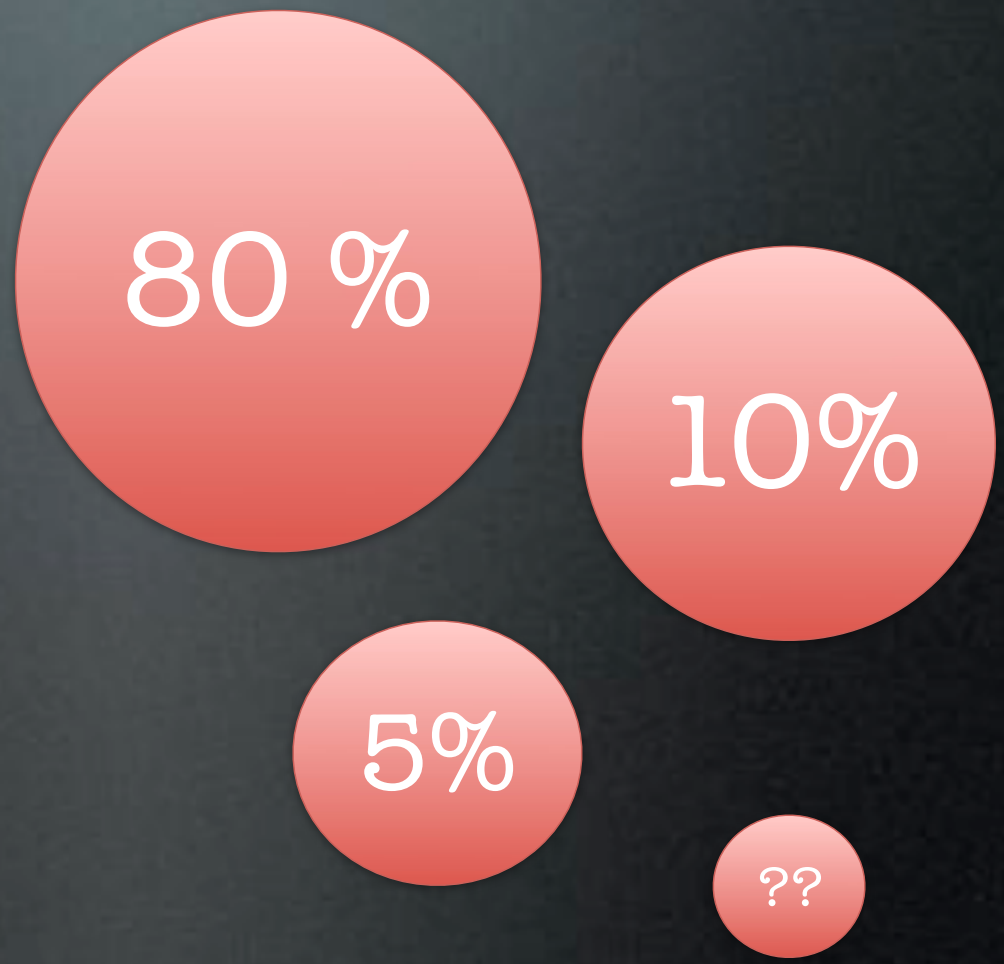
Making a Diagnosis

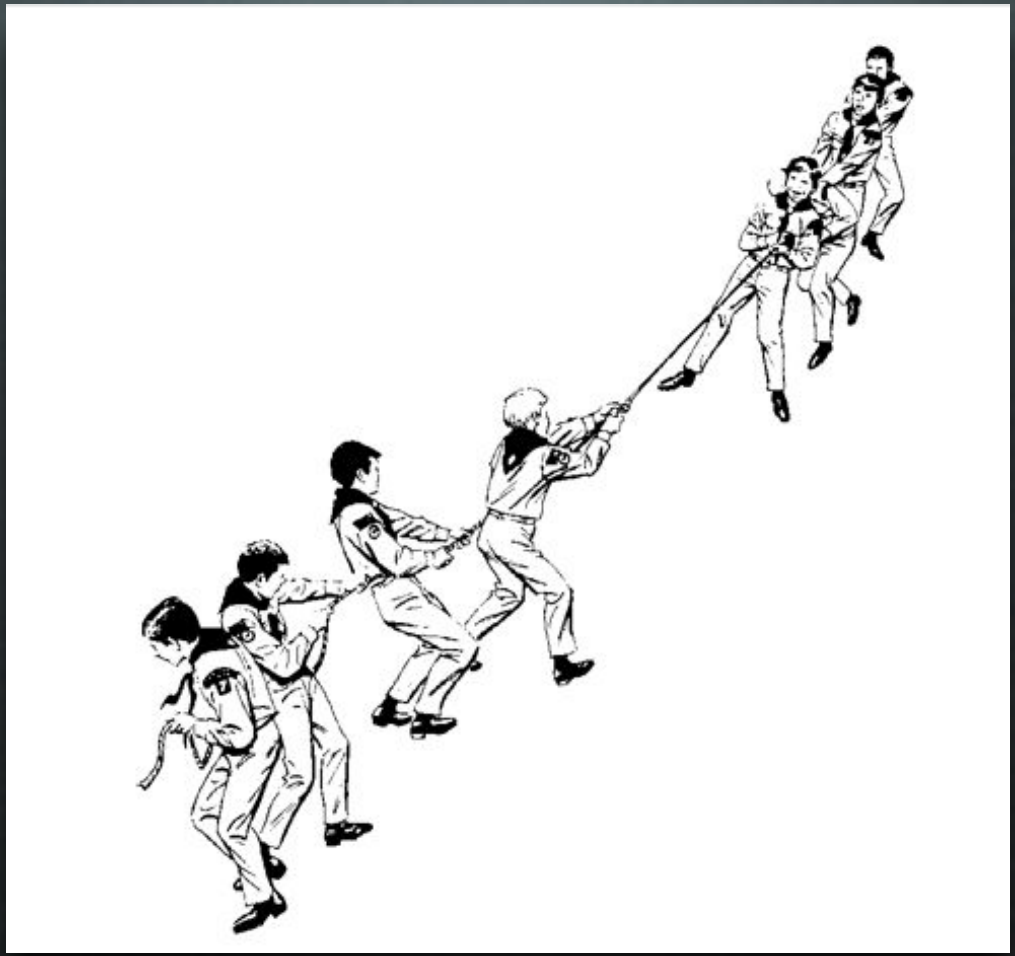
- History
- Examination
- Investigations
- ??????
- Genius
- Inspiration
- Luck



Mathematics

Probability

"Miliped"



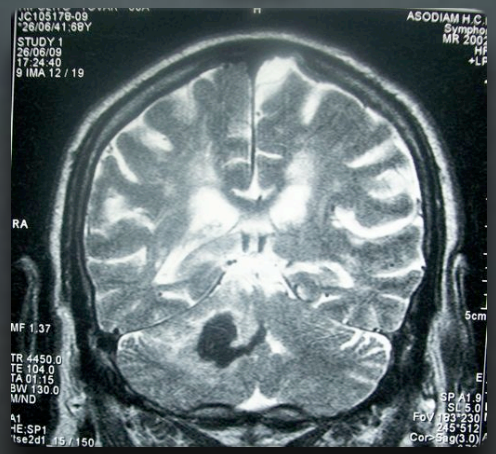
Tug o’ War

Headache

Question 1

Alice has an early morning headache...

- ...and can't concentrate in lectures
- ...and has difficulty walking
- ...and has inguinal lymphadenopathy
- ...and is homeless
- ...and has retarded sexual development

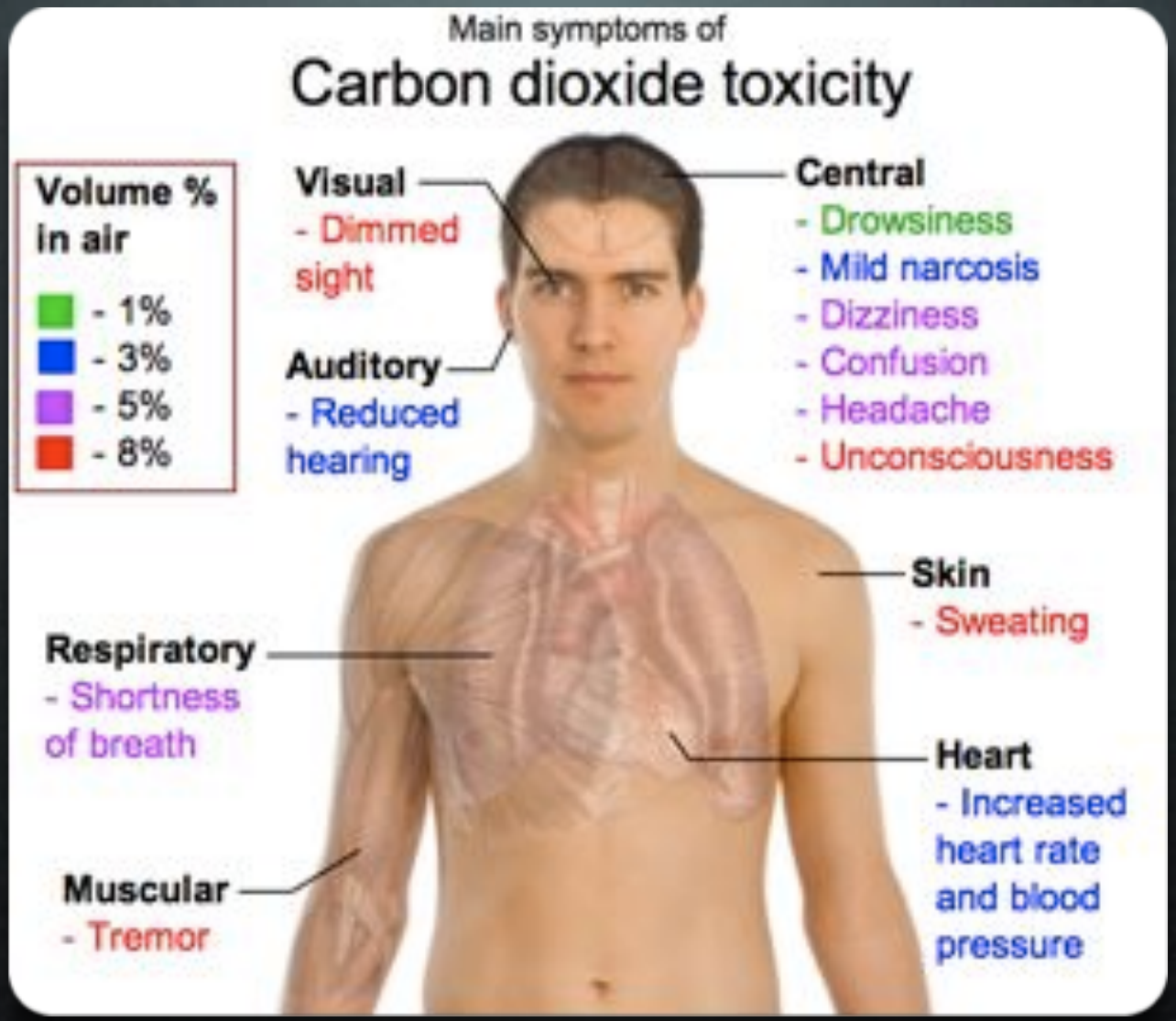

ASODIAM H.C.
STUDY 1
26/06/09
17:24:40
9 IMA 12 / 19
RA
MF 1.37
TR 4450.0
TE 104.0
TA 01:15
BW 130.0
5cm

Headache

Headache in Respiratory Medicine

CO_2 Retention Headache

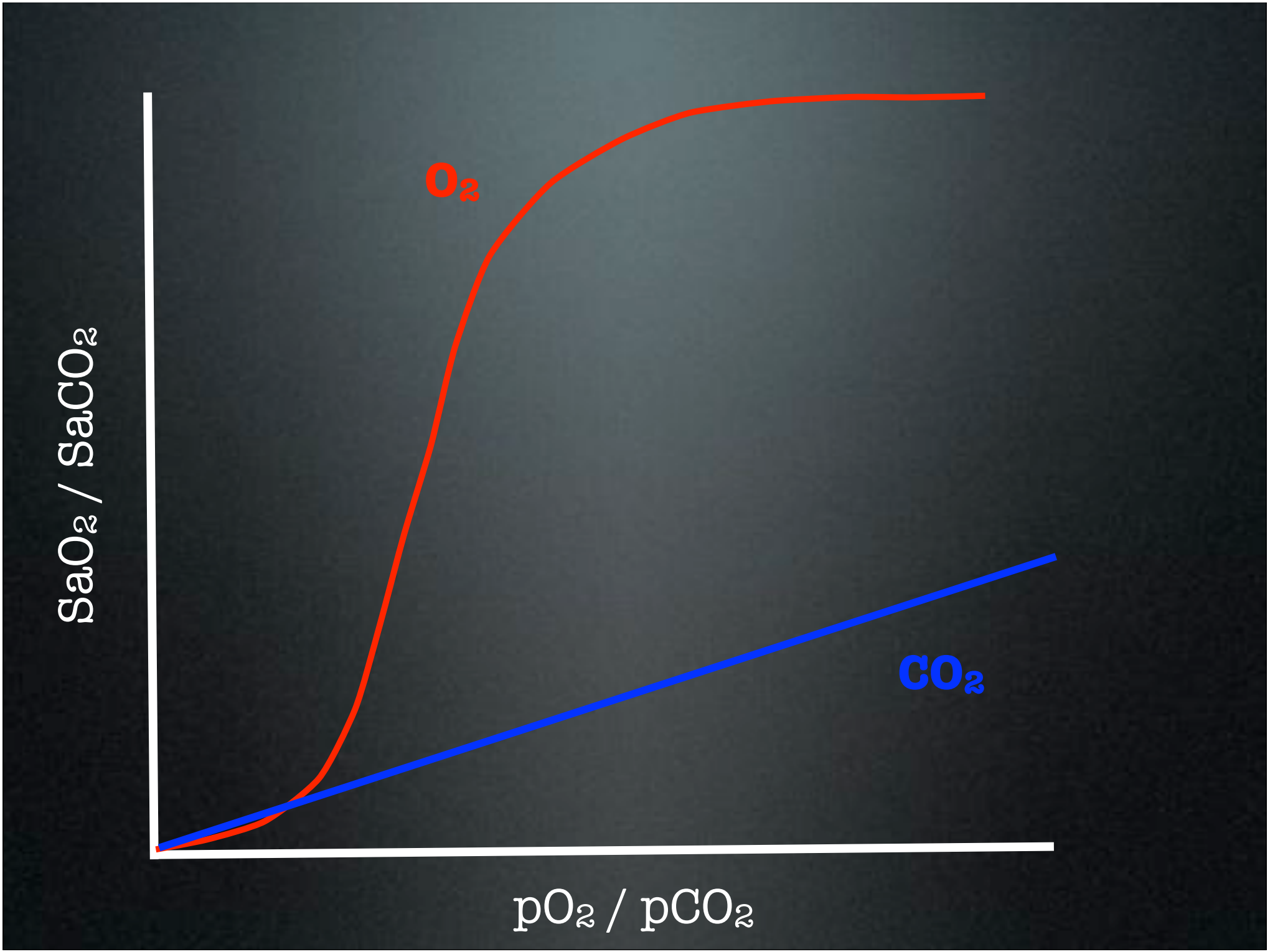
- Characteristically a headache on wakening
- Does not change with posture
- “Thick Head”
- Not unlike a hangover
  - A good reason for this!

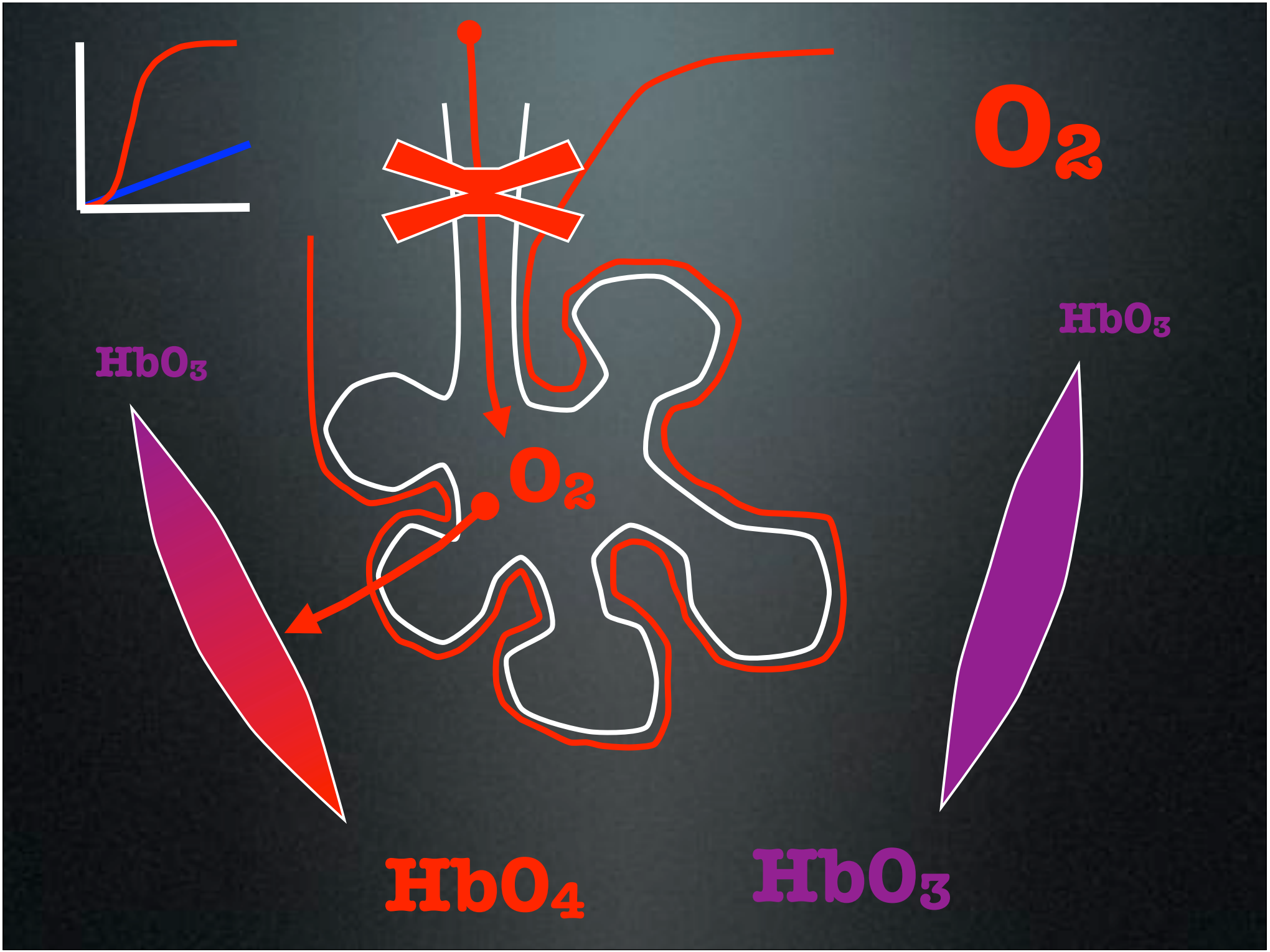


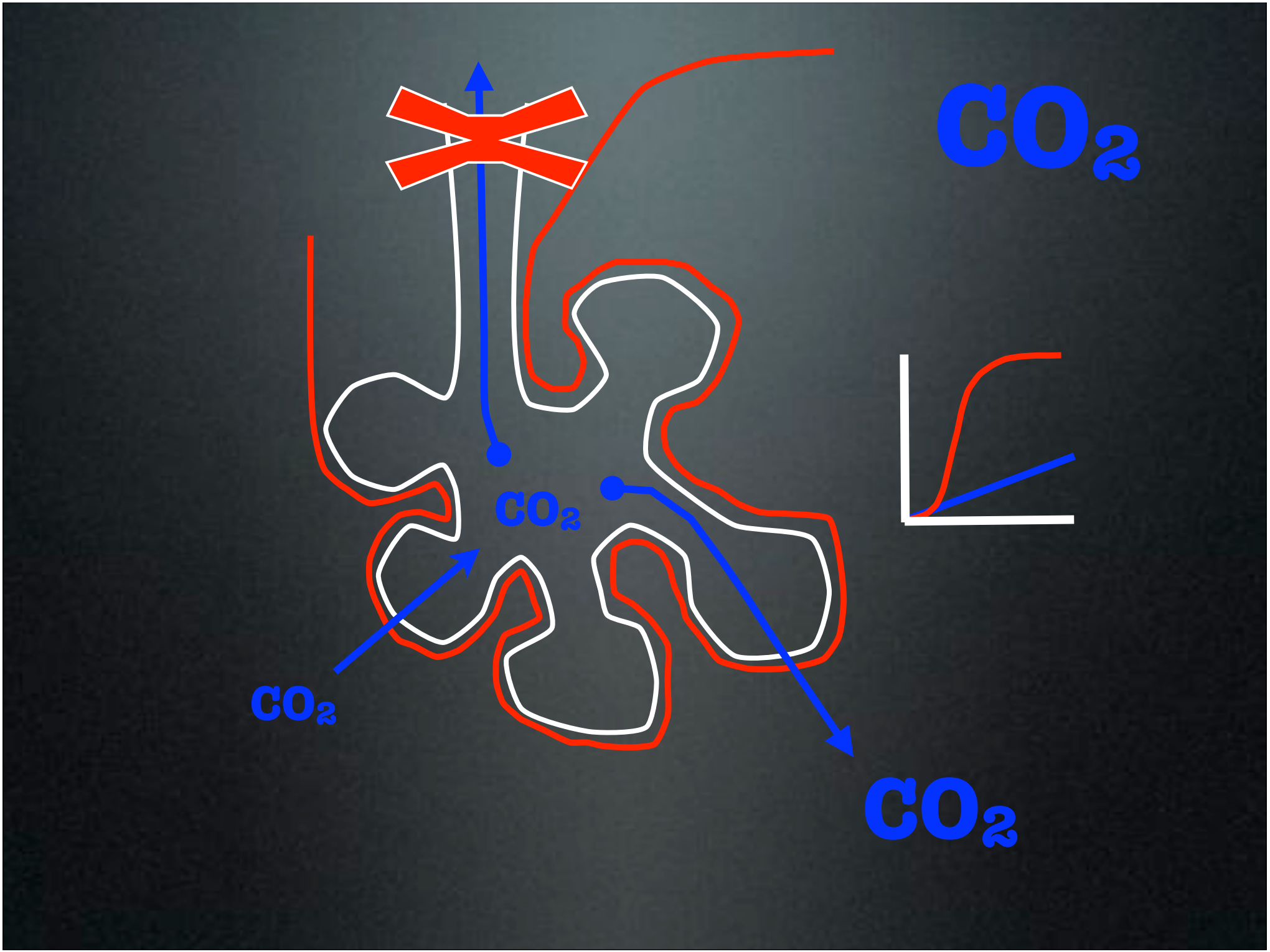
Hypercarbia / Hypercapnia

Differential

- Causes of Type II Respiratory Failure
  - Overnight Only
  - Overnight Exacerbated


O_2
CO_2
SaO_2 / $SaCO_2$
pO_2 / pCO_2


O_2
HbO_3
HbO_3
O_2
HbO_4
HbO_3


CO_2
CO_2
CO_2
CO_2

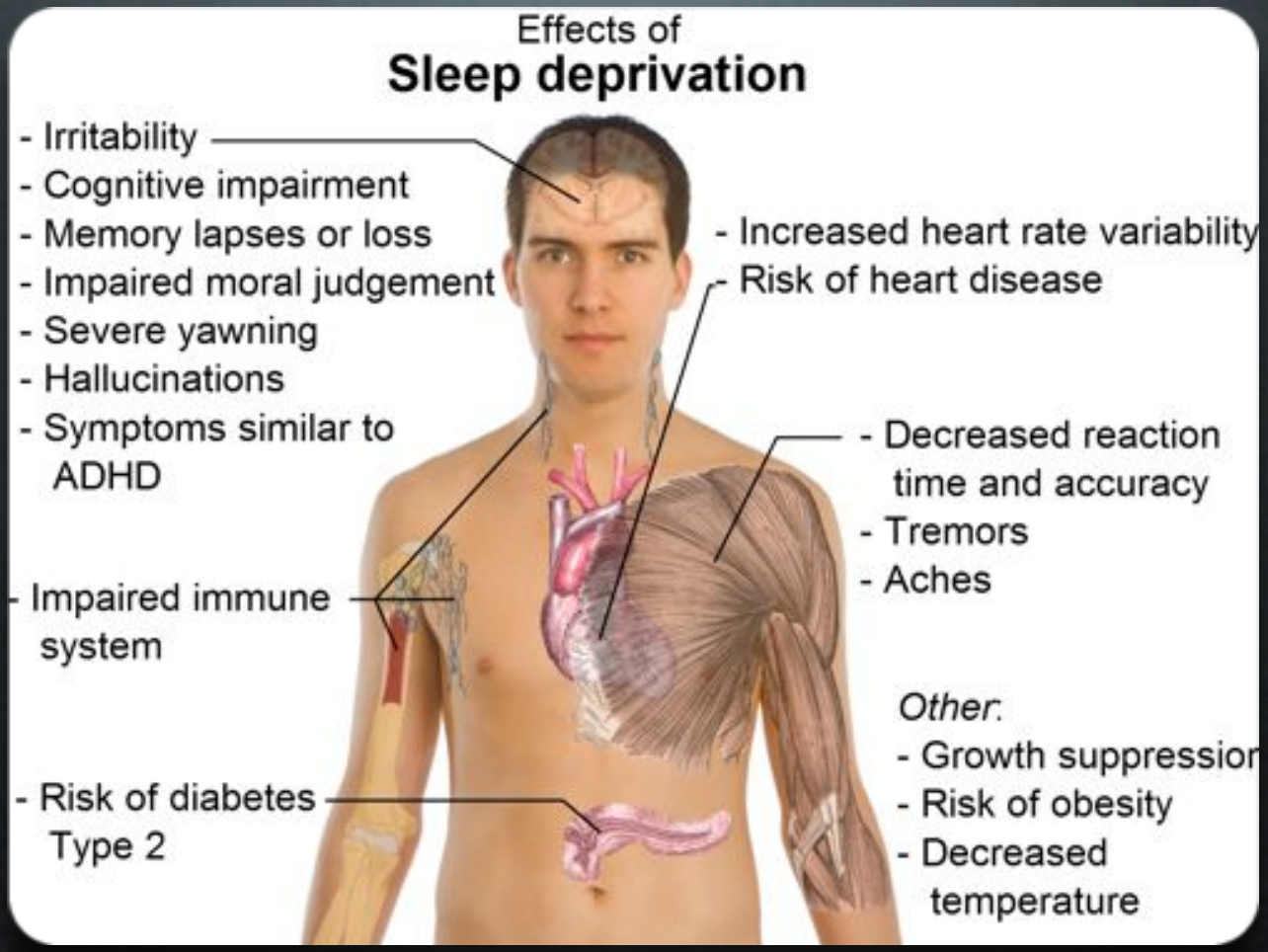
Normal Nocturnal Ventilation

- Reduced V_T
- Reduced RR
- pO_2 and pCO_2 maintained

Vivilore: The Pathway to Mental and Physical Perfection - Mary Ries Melency

Sleep Apnoea

- Episodic apnoeas
- Neurological arousal
- Fragmented sleep
- Poor sleep quality
- Daytime somnolence
- Early Morning Headache



Sleep Deprivation

Obesity Hypoventilation

- Snore little
- V_T falls dramatically
- pO_2 falls and pCO_2 rises steadily throughout the night
- High CO_2 in the morning

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SOME RIGHTS RESERVED

Other Causes

- Any cause of Chronic Type 2 Respiratory Failure Will Be Worsened Overnight
- Cystic Fibrosis
- Kyphoscoliosis
- Neuromuscular Weakness

Breathlessness

It's a Symptom, Not a Sign!

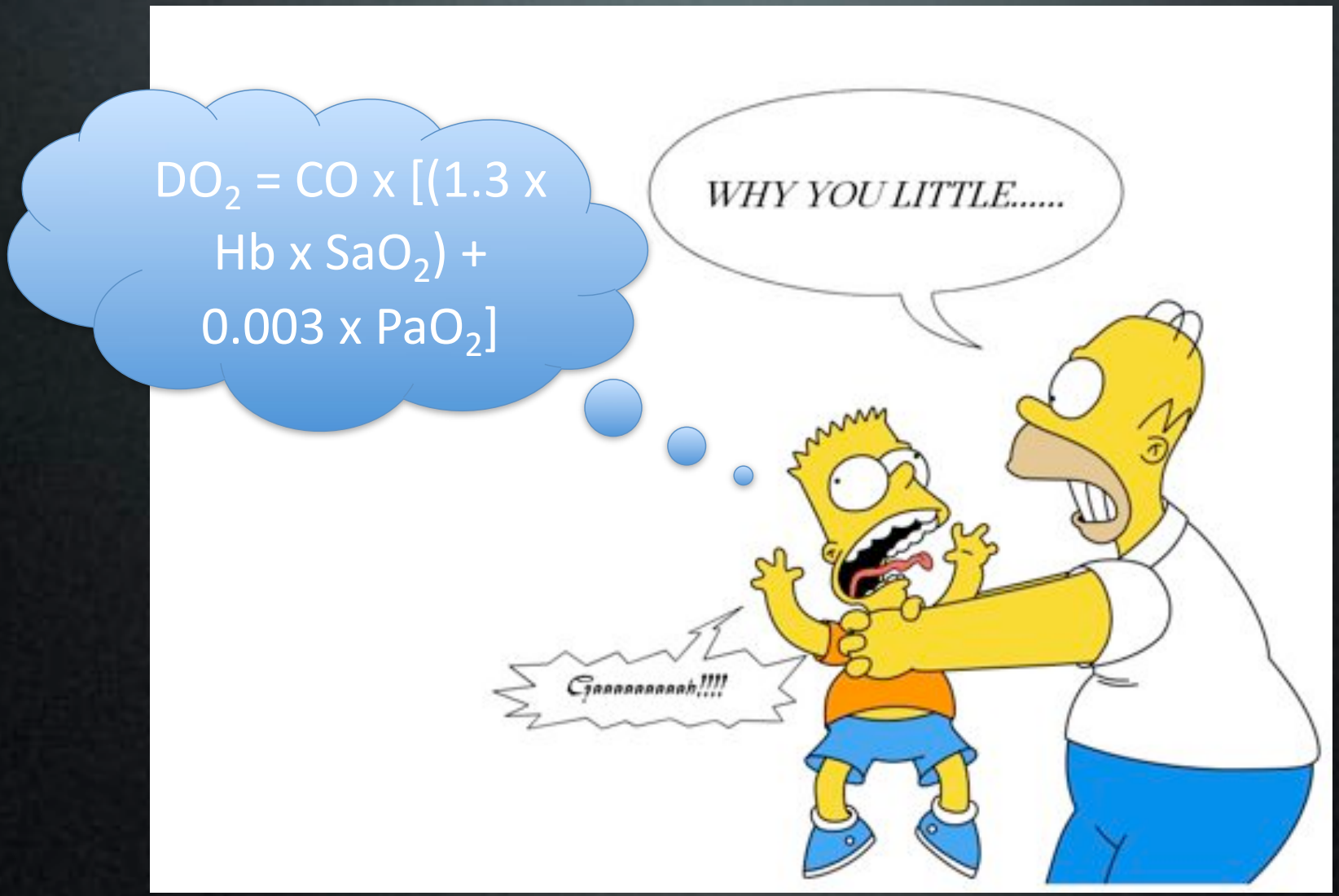
Breathlessness = ?

- Tachypnoea
- Hypoxaemia
- Sensation of choking/gasping
- Reduced exercise tolerance
- Chest pain

Hypoxia

Poor tissue oxygenation

Tissue Oxygen Delivery



$DO_2 = CO \times [(1.3 \times Hb \times SaO_2) + 0.003 \times PaO_2]$

- DO_2 = Oxygen Delivery to the tissues
- CO = Cardiac Output
- Hb = Haemoglobin
- SaO_2 = Oxygen saturation
- PaO_2 = Partial pressure of oxygen

Cardiac Output

- Is the heart beating?
  - Cardiac arrest is rarely a positive sign
- Is it beating normally?
  - Poor LV function
  - AF
  - Outflow obstruction

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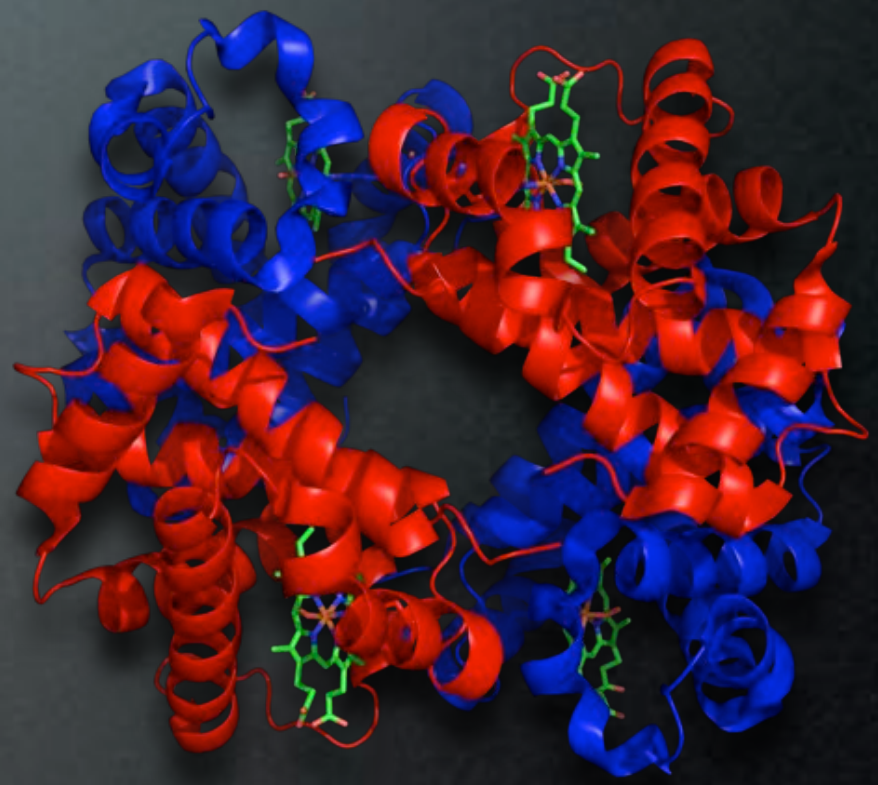
Haemoglobin

- Is there enough?
  - Anaemia
- Does it bind O_2?
  - Methaemoglobin
- Does it release O_2
  - Carboxyhaemoglobin



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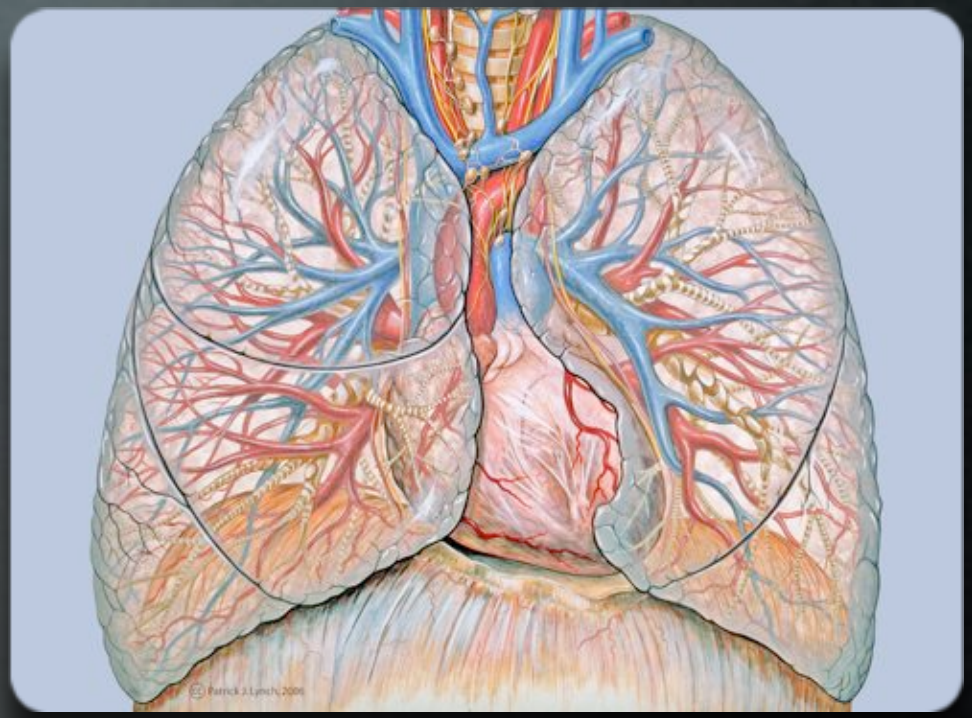
Can Oxygen get to the Hamoglobin?

- Do the lungs work
- Lungs don't work
  - Ventilation
  - Perfusion
  - Mismatch
- Shunt
- Dead-space



Shunt

- Good Perfusion
- Poor Ventilation
- Pneumonia
- Lobar Collapse
- Pulmonary Fibrosis
- Asthma

Dead Space

- Good Ventilation
- Poor Perfusion
- Pulmonary Embolus
- Emphysema
- Asthma

Respiratory Failure

Hypoxaemia with or without Hypercarbia

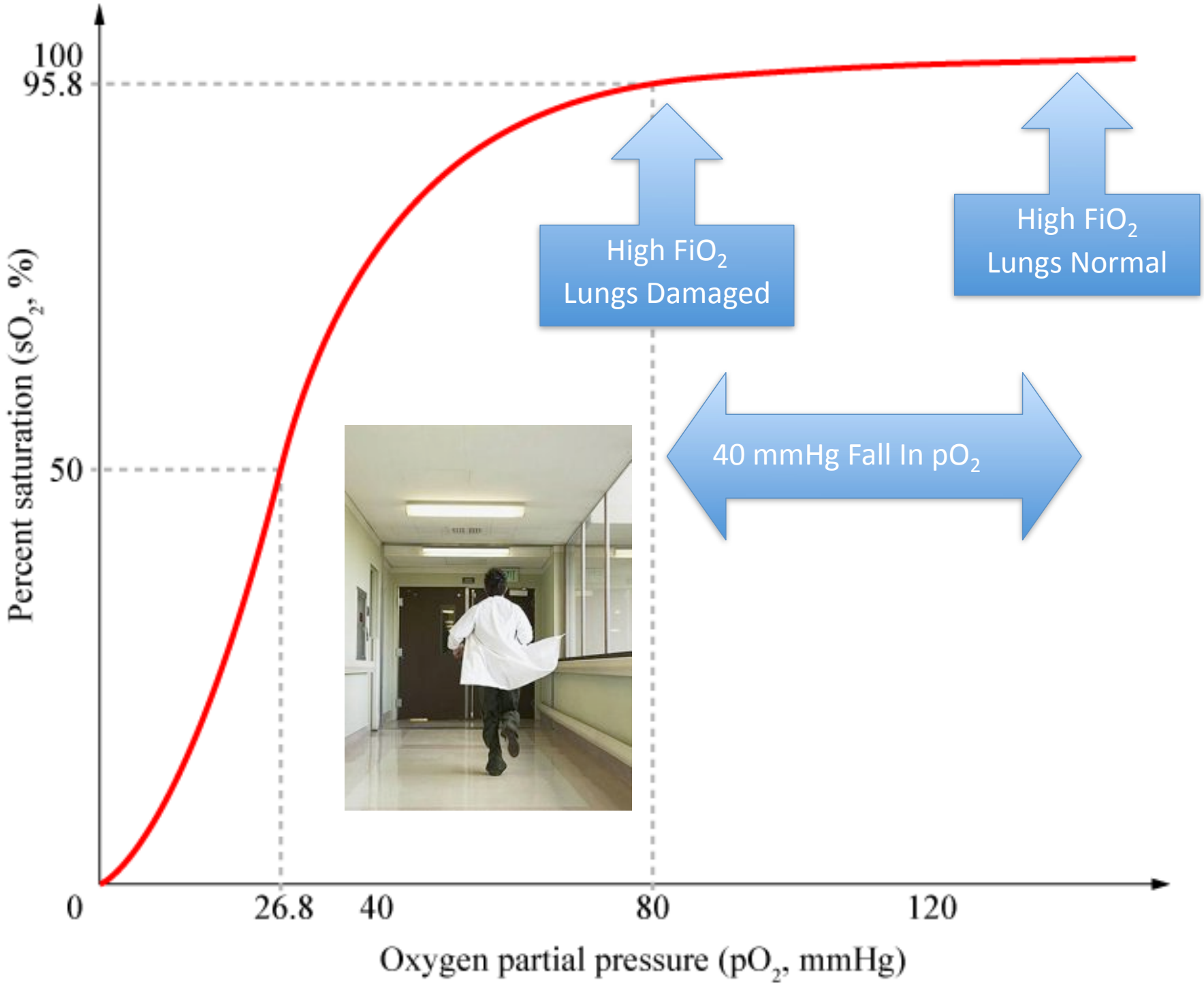
Confirm the Hypoxaemia

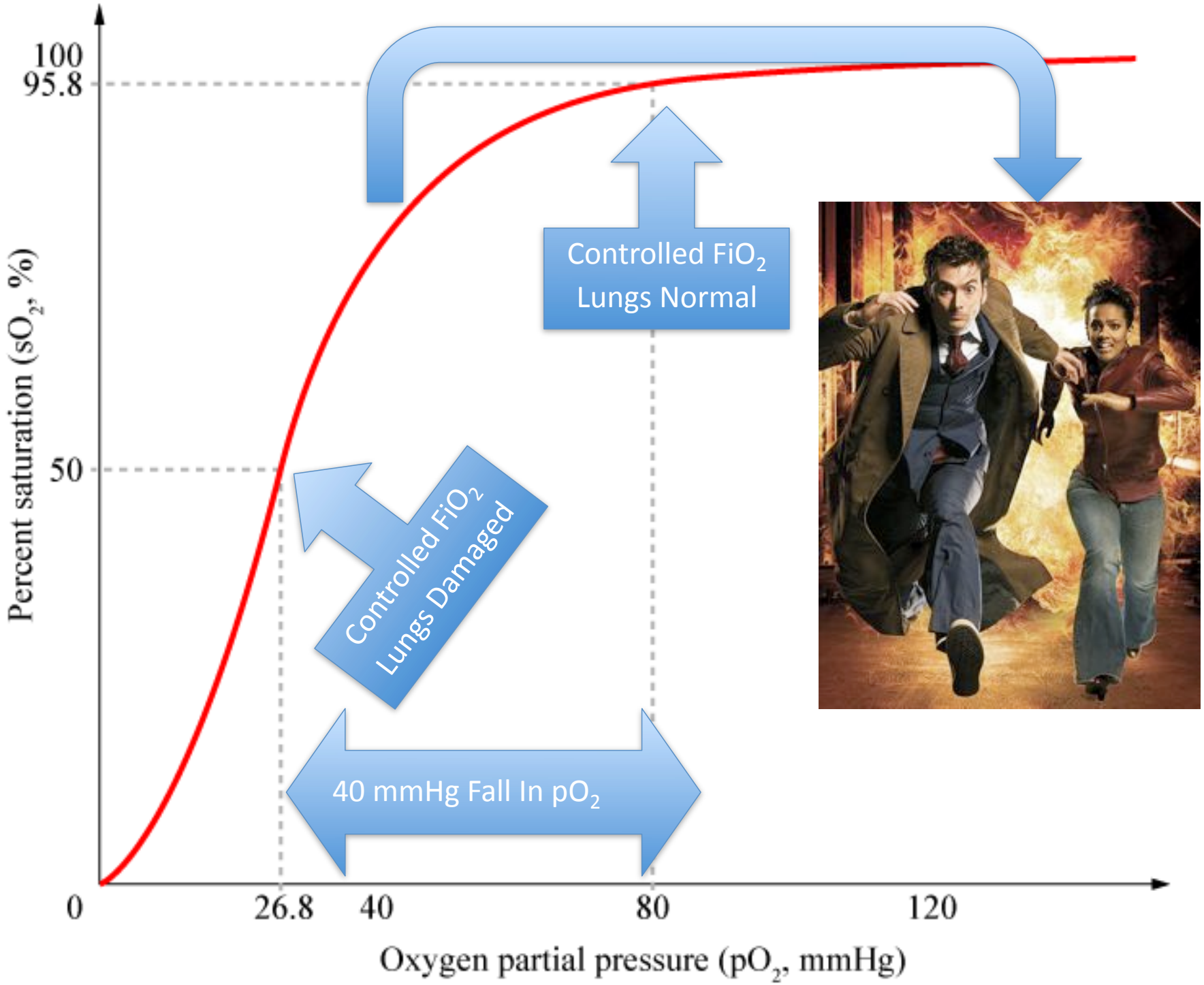
- Oxygen saturations on air
- Oxygen saturations at rest
- Oxygen saturations on exercise

www.wellsphere.com

Sometimes you need a Blood Gas...

...and sometimes you don't.


100
95.8
50
0
26.8
40
80
120
Percent saturation (sO_2, %)
Oxygen partial pressure (pO_2, mmHg)
High FiO_2
Lungs Damaged
High FiO_2
Lungs Normal
40 mmHg Fall In pO_2


100
95.8
50
0
26.8
40
80
120
Percent saturation (sO_2, %)
Oxygen partial pressure (pO_2, mmHg)
Controlled FiO_2
Lungs Normal
Controlled FiO_2
Lungs Damaged
40 mmHg Fall In pO_2

Get the Oxygen Right First

- People die from hypoxia, so get the oxygen sorted
- SaO_2
  - 94 - 98 %
  - 88 - 92 %

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Try to Work out The Most Likely Diagnosis

- Is it -
  - Cardiac
  - Haemoglobin
  - Pulmonary
- Is it
  - Shunt
  - Dead Space

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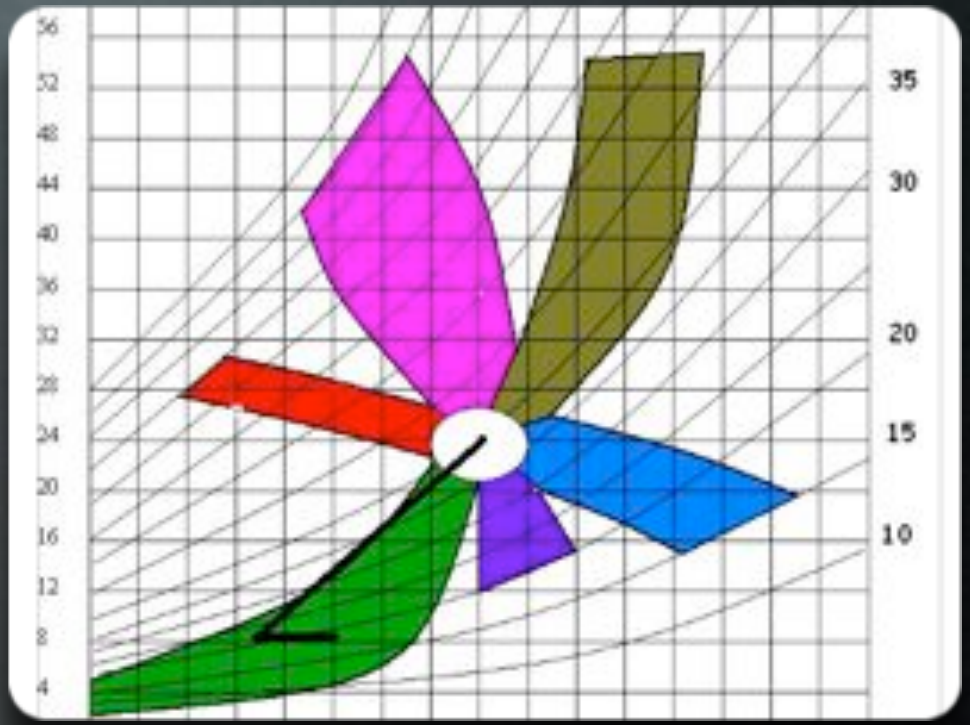
What if the Oxygen is Normal?

- Other causes of "breathlessness"
- Anxiety
- Pain
- Metabolic Acidosis

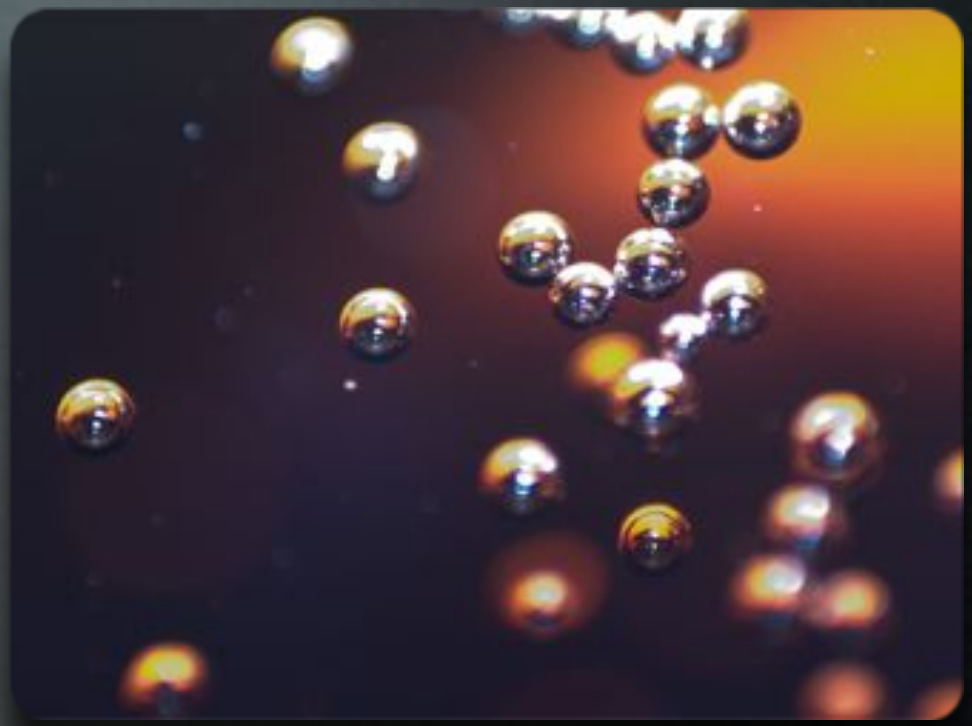
Metabolic Acidosis

- Don't forget this, it's really important
- Metabolic Acidosis
- Increased CO_2 production
- Increased respiratory rate
- "Breathlessness"



What about the CO_2?

- When does the CO_2 become important?
- Acute Type II Respiratory Failure
- Chronic Type II Respiratory Failure
- Acute on Chronic Type II Respiratory Failure



Blood Gas Patterns

- pH - Normal
- pCO_2 - Low
- HCO_3 - Normal

- pH - Normal
- pCO_2 - High
- HCO_3 - High

- pH - Low
- pCO_2 - High
- HCO_3 - Normal / Low

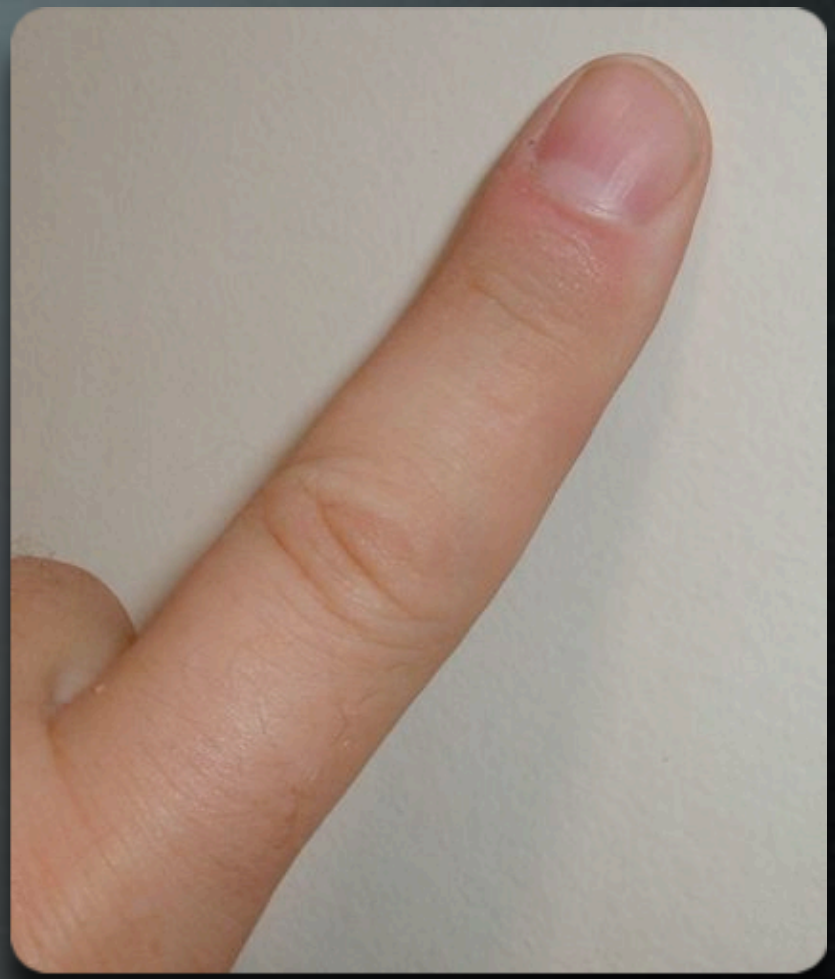
- pH - Low
- pCO_2 - High / Very High
- HCO_3 - High

Important Questions to Ask...

- All the time?
- Nocturnal Symptoms
- Postural Symptoms
- Pain
- Cough
- Past Medical History
- Smoking History
- Drugs
- Pets
- Foreign Travel
- Fever / Rigors
- Blood Loss
- Family History
- And all the rest of it..

Some Examples:

- I really wanna see those fingers.



All these People are Breathless

What's the Most Likely Cause?