



SNS COLLEGE OF ALLIED HEALTH SCIENCES
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DEPARTMENT OF PHYSICIAN ASSISTANT

COURSE NAME: PULMONOLOGY

TOPIC - HYPOXIA

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INTRODUCTION



- Hypoxia is a condition in which the body or a region of the body is deprived of adequate oxygen supply at the tissue level.
- In its extreme form, where oxygen is entirely absent, the condition is called anoxia.
- Hypoxemia (low oxygen in our blood) can cause hypoxia (low oxygen in our tissues) when our blood doesn't carry enough oxygen to our tissues to meet our body's needs.
- The word hypoxia is sometimes used to describe both problems.



SYMPTOMS



Although they can vary from person to person, the most common hypoxia symptoms are –

- Changes in the color of your skin, ranging from blue to cherry red
- Confusion
- Cough
- Fast heart rate
- Rapid breathing
- Shortness of breath
- Slow heart rate
- Sweating
- Wheezing



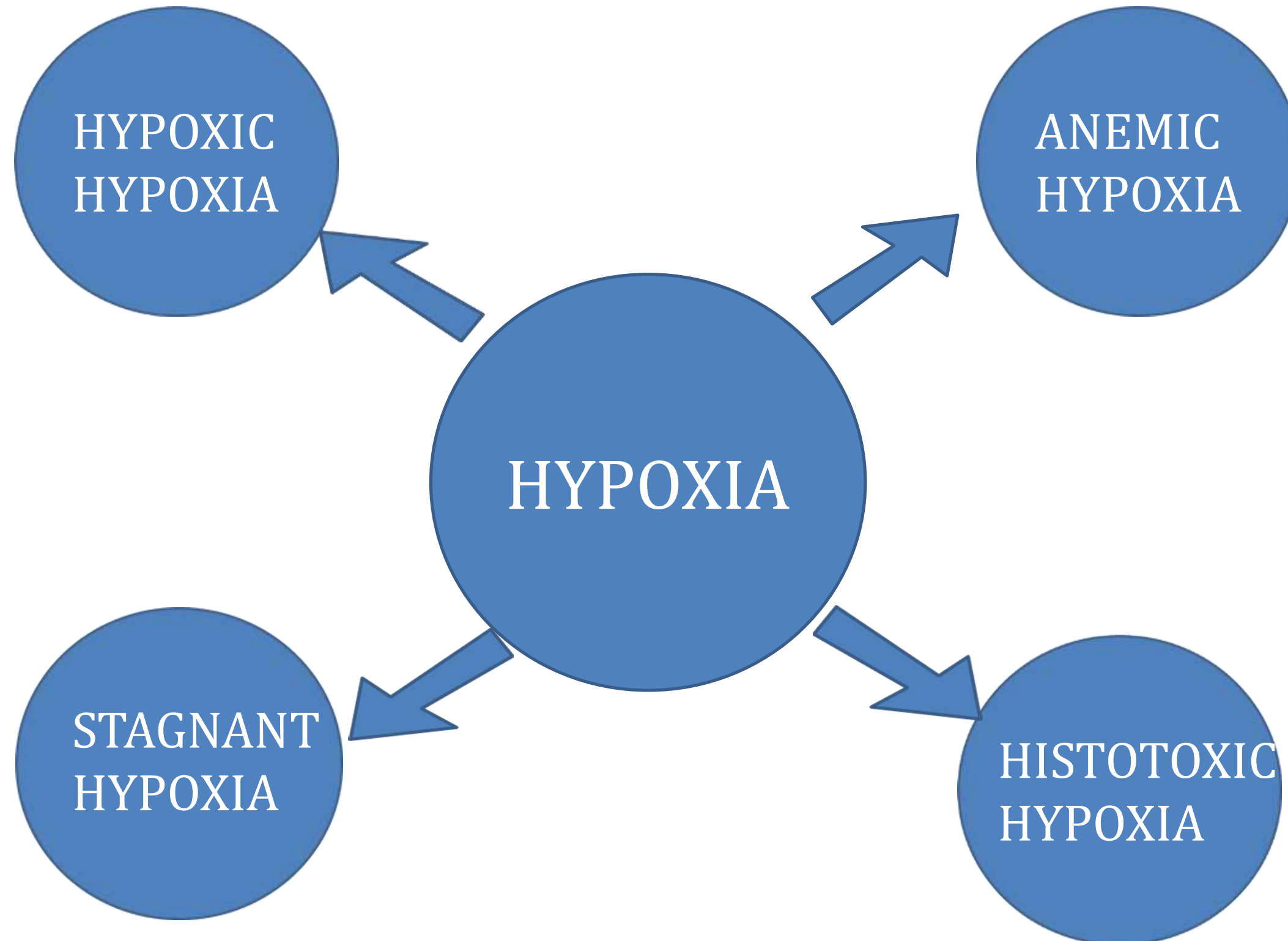
COMMON CAUSES



- High altitude.
- Low hemoglobin level.
- Decreased oxygen supply to an area.
- Low oxygen carrying capacity.
- Poor tissue perfusion.
- Impaired ventilation.
- Decreased diffusion of oxygen



TYPES OF HYPOXIA





HYPOXIC HYPOXIA



It is the most common form of hypoxia in which the P_{O_2} of the arterial blood is reduced.

Causes of Hypoxic Hypoxia:-

Low P_{O_2} in the inspired air which include:

1. High Altitude
2. Breathing Gas mixture having Low P_{O_2}
3. Breathing in closed space

Decreased Pulmonary Ventilation due to Respiratory Disorders.

1. Obstructive Lung diseases e.g Asthma
2. Mechanical or Nervous Disorders (e.g. neuromuscular disorders)
3. Depression Of Respiratory centre
4. Pneumothorax (air in thoracic cavity)



HYPOXIC HYPOXIA



Inadequate Oxygenation Of Blood due to Respiratory Disorders Which includes:

1. Impaired alveolar Diffusion e.g. Emphysema(destruction Of alveoli)
2. Non Functioning Alveoli e.g Fibrosis
3. Pulmonary Edema
4. Lack Of Surfactant.
5. Collapse Of lungs
6. Pulmonary disease
7. Abnormal alveolar ventilation-perfusion ratio (T physiologic dead space)
8. Diminished respiratory membrane diffusion

Cardiac Disorders

1. Congestive Heart Failure
2. Venous-to-arterial shunts ("right-to-left" cardiac shunts)



ANAEMIC HYPOXIA



- Hypoxia in which arterial P_{O_2} is normal but the amount of haemoglobin available to carry oxygen is reduced.
- Anemic hypoxia is characterized by low oxygen carrying capacity of blood while the other features remain normal.
- **Causes:-**
 1. Decreased no. of RBCs
 2. Decreased haemoglobin content in blood (Anaemia)
 3. Formation of altered haemoglobin
 4. Combination of haemoglobin with gases other than O_2 and CO



ISCHAEMIC HYPOXIA



- Hypoxia in which the blood flow to the tissues is so low or slow that adequate oxygen is not delivered to them despite a normal arterial pO₂.
- Stagnant hypoxia is characterized by decreased velocity of blood flow while the other features remain normal.
- **Causes:-**
 1. Congestive cardiac failure.
 2. Hemorrhage.
 3. Surgical stroke.
 4. Vasospasm.
 5. Thrombosis.
 6. Embolism



HISTOTOXIC HYPOXIA



- Hypoxia in which the amount of oxygen delivered to the tissues is adequate, but because of the action of a toxic agent the tissue cells cannot make use of the oxygen supplied to them.
- **Cause:-**
Cyanide poisoning:- Cyanide destroys the cellular oxidative enzymes completely paralyzing the cytochrome oxidase system



EFFECT OF HYPOXIA



On nervous system	On respiratory system	On CVS	On GIT	On musculoskeletal system
<ul style="list-style-type: none">• Headache• Excitement• Drowsiness• Impaired judgment• Loss of time sense	<ul style="list-style-type: none">• Increased respiratory rate• Cyanosis• Periodic breathing	<ul style="list-style-type: none">• Tachycardia• Hypertension	<ul style="list-style-type: none">• Nausea• Vomiting• Anorexia	<ul style="list-style-type: none">• Reduced work capacity of the muscle



OXYGEN THERAPY



- Oxygen therapy: O₂ therapy means administration of oxygen to a patient for the treatment of conditions resulting from oxygen deficiency.
- Indication: O₂ Therapy is given in following cases
 1. Shock
 2. CO poisoning
 3. Pneumonia
 4. Pulmonary edema
 5. Respiratory distress
 6. Obstructive lung diseases (Asthma, COPD)
 7. Myocardial infarction



ROLE OF OXYGEN THERAPY IN DIFFERENT TYPES OF HYPOXIA



TYPES	ROLE OF OXYGEN THERAPY
Hypoxic hypoxia	Oxygen therapy is 100% effective except when it is due to venous-to-arterial shunts, because the unoxygenated venous blood by-passes the lungs and remains unoxygenated.
Anemic hypoxia	Oxygen therapy is of very limited value; because O ₂ transport by the hemoglobin is not increased. Administration of O ₂ only, increases the dissolved O ₂ in the arterial blood. This small amount of O ₂ can be the difference between life & death.
Stagnant or ischemic hypoxia	Oxygen therapy is of very limited value, because O ₂ cannot be carried to the tissues.
Histotoxic hypoxia	Oxygen therapy is of very limited value, because O ₂ cannot be used by the tissue.



INVESTIGATIONS AND TREATMENT



Investigations:

- Pulse oximetry (decreased oxygen saturation)
- ABG (decreased P_{aO_2})
- Chest X-ray
- Blood tests
- ECG and Echo

Treatment:

- Oxygen Supplementation :- (by nasal cannulas, face mask)
- Treatment of underlying causes



THANK YOU