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Hypoxia and It's Effects on Human Body

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ABSTRACT

Hypoxia is a condition in which the human body tissues are not oxygenated sufficiently to maintain adequate homeostasis, resulting from inadequate oxygen delivery to the tissues due to either low blood supply or low oxygen content in the blood.

Introduction

Hypoxia can be due to external causes, when the breathing gas is hypoxic, or internal causes, such as reduced effectiveness of gas transfer in the lungs, reduced capacity of the blood to carry oxygen, compromised general or local perfusion, or inability of the affected tissues to extract oxygen from, or metabolically process, an adequate supply of oxygen from an adequately oxygenated blood supply.

Different types

There are several types of hypoxia that are caused by various conditions and situations. The main types of hypoxia include:

Hypoxic hypoxia (hypoxemic hypoxia): There is a lack of oxygen in the blood flowing to the tissues.

Hypemic hypoxia: Blood isn't able to carry oxygen as well as it should. Often this is because of an insufficient amount of healthy red blood cells. This leads to a lower supply of oxygen in the tissues.

Stagnant/circulatory hypoxia: Poor blood flow leads to less oxygen available to the tissues. This may occur in one specific area or throughout the whole body.

Histiotoxic hypoxia: Enough oxygen is taken in through the lungs and delivered to the tissues, but the body has difficulty using it.

Cytopathic hypoxia: Oxygen is able to be used properly by the tissues, but there is a higher demand for oxygen than usual.

EFFECT ON CELLS AND TISSUES

During hypoxic injury blood flow falls below a certain critical level that is required to maintain cell viability. The interrupted supply of oxygenated blood to cells results in anaerobic metabolism and loss of adenosine triphosphate (ATP), and cellular membrane disruption.

Nutrients, such as glucose and fatty acids, as well as oxygen, enter the cell across the cell membrane. Hypoxic injury results in an inadequate flow of nutrients and oxygen to the cell. If tissue perfusion continues to be insufficient, hypoxia occurs and the cell resorts to anaerobic metabolic pathways for energy production. This produces several changes in cell function: mitochondrial activity is diminished due to a lack of oxygen for glycolysis and the electron transport chain; cellular ATP stores are rapidly used up (Gosling, 1999). The end product is lactic acid and nitric oxide, which can rapidly build up in high concentrations in the cell and blood, lowering the pH.

Consequently, the results of anaerobic metabolism are the production of lactic acid and a reduction in the energy available for cell work. Lactic acidosis reduces myocardial contractility, arteriolar responsiveness to further adrenaline and noradrenaline release, potentiating vasomotor collapse and stimulating the intravascular clotting mechanism.

An important cell structure containing enzymes, which break down cell waste, the lysosomal membrane becomes fragile when the cell is injured or deprived of oxygen (Marieb, 2001). Lysosomal membrane instability is made worse by the lack of ATP and the cell starts to use its own structural phospholipids as a nutrient source. Eventually the lysosomal membrane becomes more permeable and may rupture. This allows the release of lysosomal enzymes, resulting in self-digestion of the cell. The use of steroids is thought to help stabilise the lysosomal membrane and prevent lysosmal enzyme damage to the cell

Formation of free radicals/nitric oxide

Free radicals can be formed in a number of ways, but their damaging presence usually results from an absence of oxygen.The most well-known molecule associated with the formation of free radicals is nitric oxide. Under normal circumstances this is a potent vasodilator and a regulator of blood flow (Marieb, 2001). Nitric oxide can accumulate in high concentrations, and can react with other free radicals thereby setting up two mechanisms of cell death: oxidative injury and energy depletion (Edelstein et al, 1997). The end result of these mechanisms include those listed in Box 1 (Zuccarelli, 2000.

The mitochrondria can lose their membrane potential in high concentrations of nitric oxide and halt ATP production all together. This process can lead to endothelial damage, further stimulating the inflammatory response (Huddleston, 1992).

Role of calcium

Intracellular calcium is an important signalling system responsible for activation of phospholipases and proteases, and its derangement results in membrane disruption and remodelling (Zuccarelli, 2000). As a result, calcium accumulates in the mitochondria, causing structural derangement of the organelles, and may be the hallmark of irreversible cellular injury and, eventually, death (Buckman et al, 1992)

Effects on Organ & Organ system

Effects on blood

Hypoxia induce secretion of erythropoietin from kidney.Erythropoietin increase production of RBC.This in turn,incerase the oxygen capacity of blood

Effect on cardiovascular sysytem

Intially,due to reflex stimulation of cardiac and vasomotor center,there is increase in rate and force of contraction of heart ,cardiac output and blood.Later,there is reduction in the rate and force of contraction heart.Cardiac output and blood pressure are also decreased.

Effect on respiration

Intially,respiratory rate increase due to chemoreceptor reflex.Because of this,large amount of carbon dioxide is washed out leading to alkalemia.Later,the respiration tends to be shallow and periodic.Finally,the rate and the force of breathing are reduced to a great extent due to failure of respiratory centers.

Effect on digestive system

Hypoxia is associated with loss of apeptide,nausea and vomiting.Mouth becomes dry and there is feeling of thirst

Effect on Kidneys

Hypoxia causes increased secretion of erythropoietin from juxtaglomerular appratus.And alkaline urine is excreted.Erythropoietin is potent mediator for formation of new RBC and it released mainley during hypoxia.

Effect on central nervous system

In mild hypoxia,the symptoms are similar to those of alcholic intoxication.Individual is depressed,apathetic with general loss of self control.The person becomes talkative,quarrelsome and rude.There is disorientation and loss of discriminative ability and loss of power of judgement.Memory is impaired.Weakness,lack of coordination and fatigue of muscle are common in hypoxia.

If hypoxia is acute and severe,there is sudden loss of consiousness.If not treated immediately,comma occur,which leads to death.

Sign & Symptoms

The signs and symptoms of hypoxia can vary from person to person. Some common symptoms include changes in skin color (ranging from blue to cherry red), confusion, coughing, fast heart rate, rapid breathing, shortness of breath, slow heart rate, sweating, and wheezing.

Treatment

One of the most important methods of treating hypoxia is to administer oxygen. This increases the concentration of oxygen being inhaled which increases the partial pressure of oxygen in the blood and corrects hypoxia1. Other treatments might include inhaled steroids that can open up your airways to treat asthma or other lung disease, medications that help to reduce excess fluid on the lungs (diuretics), continuous positive airways pressure mask (CPAP) to treat sleep apnea, and BiLevel positive airway pressure.

1. Sarkisova V., Xegay R., Numonova A. ENDOCRINE CONTROL OF THE DIGESTION PROCESS. GASTROINTESTINAL ENDOCRINE CELLS //Science and innovation. – 2022. – T. 1. – №. D8. – C. 582-586.
2. Sarkisova V. ASPECTS OF THE STATE OF THE AUTONOMIC NERVOUS SYSTEM IN HYPOXIA //Science and innovation. – 2022. – T. 1. – №. D8. – C. 977-982.
3. Vladimirovna S. V. Epidemiology, Theories Of The Development, Conservative And Operative Treatment Of The Endometriosis //The Peerian Journal. – 2023. – T. 15. – C. 84-93.

4. Vladimirovna S. V. About the Causes of Endometrial Hyperplasia and Forms of Endometrial Hyperplasia //Global Scientific Review. – 2023. – Т. 12. – С. 25-32.
5. Саркисова В., Абдурахманова К. Астено-вегетативные нарушения, оценка качества жизни у женщин климактерического возраста с гиперпластическими процессами в матке //Журнал вестник врача. – 2014. – Т. 1. – №. 01. – С. 163-166.
6. Sarkisova V., Xegay R. CAUSES, DIAGNOSIS, CONSERVATIVE AND OPERATIVE TREATMENT OF UTERINE MYOMA //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 198-203.
7. Саркисова В. В. Патогенетические отношения артериальной гипертензии и сопротивления инсулина //IQRO. – 2023. – Т. 2. – №. 1. – С. 727-731.
8. Vladimirovna S. V. PATHOGENETIC RELATIONSHIPS OF ARTERIAL HYPERTENSION AND INSULIN RESISTANCE //IQRO. – 2023. – Т. 2. – №. 1. – С. 685-691.
9. Sarkisova V., Regina X. РОЛЬ БРАДИКИНИНА В ПРОТЕКАНИИ ОСНОВНЫХ ЖИЗНЕННЫХ ПРОЦЕССОВ //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 587-593.
10. Sarkisova V., Numonova A., Xegay R. АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ ИЛИ БОРЬБА С ГЛОБАЛЬНОЙ УГРОЗОЙ XXI ВЕКА //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 232-241.
11. Sarkisova V., Numonova A., Xegay R. АСПЕКТЫ СОСТОЯНИЯ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ ПРИ ГИПОКСИИ //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 228-231.
12. Джуманов Б. и др. Применение инструментальных методов исследование в диагностике острого аппендицита у беременных //Журнал проблемы биологии и медицины. – 2014. – №. 1 (77). – С. 9-12.
13. Саркисова В., Джуманов Б., Исроилова Г. Анализ репродуктивного и соматического здоровья женщин, госпитализированных по поводу гиперплазии эндометрия и маточных кровотечений //Журнал вестник врача. – 2014. – Т. 1. – №. 01. – С. 169-170.
14. Саркисова В., Абдурахманова К. Роль гормональных препаратов в терапии гиперпластических процессов эндометрия и в частности при миоме матки //Журнал вестник врача. – 2014. – Т. 1. – №. 01. – С. 167-168.
15. Sarkisova V. et al. UTERINE ARTERY EMBOLIZATION AS A METHOD OF TREATMENT OF UTERINE FIBROIDS //Science and innovation. – 2023. – Т. 2. – №. D3. – С. 115-121.
16. Vladimirovna S. V. ABOUT THE CAUSES OF ENDOMETRIAL HYPERPLASIA AND FORMS OF ENDOMETRIAL HYPERPLASIA //ResearchJet Journal of Analysis and Inventions. – 2022. – Т. 3. – №. 11. – С. 66-72.
17. Vladimirovna S. V. et al. PREGNANCY WITH CONGENITAL HEART DISEASE //Science and innovation. – 2023. – Т. 2. – №. D4. – С. 127-136.
18. Sarkisova V., Alvi I. THE PROBLEM OF COMORBIDITY OF AFFECTIVE DISORDERS AND PERSONALITY DISORDERS //Science and innovation. – 2023. – Т. 2. – №. D5. – С. 170-177.
19. Sarkisova V. et al. BIPOLAR AFFECTIVE DISORDER (BAR) //Science and innovation. – 2023. – Т. 2. – №. D5. – С. 165-169.

20. Boltayev K. S., Jamalova F. A., Shodiyeva D. G. MIKOZLARGA MIKROBIOLOGIK MIKROSKOPIK TASHXIS QO ‘YISHNING O ‘ZIGA XOS XUSUSIYATLARI. GOLDEN BRAIN, 1 (3), 35–40. – 2023.
21. Жамалова Ф. А. и др. Цинк И Заживление Ран: Обзор Физиологии И Клинического Применения //Central Asian Journal of Theoretical and Applied Science. – 2022. – Т. 3. – №. 6. – С. 33-40.
22. Boltayev K. S. et al. MIKOZLARGA MIKROBIOLOGIK MIKROSKOPIK TASHXIS QO ‘YISHNING O ‘ZIGA XOS XUSUSIYATLARI //GOLDEN BRAIN. – 2023. – Т. 1. – №. 3. – С. 35-40.
23. Jamalova F. A. et al. BACILLUS THURINGIENSIS BAKTERIYALAR ASOSIDA YARATILGAN BIOPREPARATLAR //GOLDEN BRAIN. – 2023. – Т. 1. – №. 3. – С. 23-27.
24. Давлятова М. А. и др. ЦИТОМЕГАЛОВИРУСНАЯ ИНФЕКЦИЯ В АКУШЕРСТВЕ И ГИНЕКОЛОГИИ //Евразийский журнал медицинских и естественных наук. – 2023. – Т. 3. – №. 2 Part 2. – С. 26-35.
25. Тухтаназарова Ш. И., Маллаходжаев А. А., Нурмурадов И. И. РОЛЬ СЕЛЕНА В СТИМУЛЯЦИИ ПРОТИВООПУХОЛЕВОГО ИММУНИТЕТА //European Journal of Interdisciplinary Research and Development. – 2022. – Т. 8. – С. 135-148.
26. Giyosovna S. D., Abdusalomovna J. F. BACILLUS AVLODIGA MANSUB BAKTERIYALARNING ANTIMIKROB VA ANTOGONISTIK XUSUSIYATLARI //Scientific Impulse. – 2023. – Т. 1. – №. 6. – С. 1852-1858.
27. Вахидова А. М., ЭХИНОКОККОЗА Б. Э. В. Р. ОСЛОЖНЕННОГО ПЕЦИЛОМИКОЗОМ СРЕДИ НАСЕЛЕНИЯ И ДОМАШНИХ ЖИВОТНЫХ ГОРОДА САМАРКАНДА //ИННОВАЦИОННЫЕ ПРОЦЕССЫ В НАУКЕ, ЭКОНОМИКЕ И ОБРАЗОВАНИИ: ТЕОРИЯ, МЕТОДОЛОГИЯ, ПРАКТИКА. – 2017. – С. 202-230.