I'm human

Metalloprotein respiratory pigments are a vital group of molecules that play crucial roles in various bodily functions, primarily oxygen transport. Other essential functions include storing and transporting carbon dioxide as well as other substances besides gases. There are four main categories of these pigments: hemoglobin, hemocyanin, erythrocruorin-chlorocruorin, and hemerythrin. Hemoglobin, which contains heme, is the most commonly found respiratory pigment, existing in at least 9 different animal phyla. Key characteristics of various metalloprotein respiratory pigments include: * **Hemoglobin**: The most widely occurring respiratory pigment, found in vertebrates and certain invertebrates. * **Hemocyanin**: Found in mollusks and arthropods, it contains copper. * **Erythrocruorin and Chlorocruorin**: Giant globins used by some invertebrates, with chlorocruorin having a distinct heme group. The globin molecule is believed to be an ancient one, serving as a molecular clock for dating the separation of vertebrates and invertebrates over 1 billion years ago. Globins have a broad biological distribution, occurring not only among different animal phyla but also in fungi, bacteria, and even some plant roots. In vertebrates, tetrameric hemoglobin is carried in red blood cells to facilitate breathing. Multiple types of hemoglobin exist within the human body, including Hemoglobin A (the most common after birth), Hemoglobin A2 (a minor component found in red blood cells), and Hemoglobin F (primarily present during fetal development). Hemoglobins in non-vertebrate organisms: a diverse group with unique characteristics Animals use various types of hemoglobins for respiration, each with distinct structures and functions. Intracellular Hbs are found inside cells, similar to vertebrate Hb. Multi-subunit Hbs form complexes outside the cell and have multiple globin domains per peptide chain. Erythrocruorin and chlorocruorin belong to this group, specifically the 12-dodecamer type. Leghemoglobin, a molecular mimic of myoglobin, is used in artificial meat products to replicate meat's color and taste. It contains trace amounts of iron but is primarily found in plant roots, similar to hemoglobin. Hemocyanin, a copper-based respiratory pigment, is found in arthropods and Mollusca, where it has independently evolved. Other molecules, such as copper-containing tyrosinases, play significant roles in immune defense, wound healing, and cuticle maintenance in these groups. These molecules are grouped under the hemocyanin superfamily. doi:10.1098/rspb.1949.0031. ISSN 0080-4649. JSTOR 82565. PMID 18143368. S2CID 6133526. The oxygen affinity of chlorocruorin. Proceedings of the Royal Society of London. Series B, Containing Papers of a Biological Character. 111 (772): 356–363. doi:10.1098/rspb.1932.0060. Oxygen-binding characteristics of Potamilla chlorocruorin. European Journal of Biochemistry. 147 (3): 453–463. doi:10.1111/j.0014-2956.1985.00453.x. ISSN 1432-1033. PMID 3979380. The phylogenetic odyssey of the erythrocyte. I Hemoglobin: the universal respiratory pigment" (PDF). Histol Histopath. 4 (4): 509–514. PMID 2520483. Hemoglobinopathies". sickle.bwh.harvard.edu. Retrieved 2020-11-21. Nonvertebrate Hemoglobins: Functions and Molecular Adaptations". Physiological Reviews. 81 (2): 569–628. doi:10.1152/physrev.2001.81.2.569. PMID 11274340. S2CID 10863037. Status of meat alternatives and their potential role in the future meat market — A review". Asian-Australasian Journal of Animal Sciences. 33 (10): 1533–1543. doi:10.5713/ajas.20.0419. ISSN 1011-2367. PMC 7463075. PMID 32819080. Meat 2.0 the regulatory environment of plant-based and cultured meat. European Food and Feed Law Review (EFFL), 14(4),323-331. Molecular Evolution of the Arthropod Hemocyanin Superfamily". Molecular Biology and Evolution. 18 (2): 184–195. doi:10.1093/oxfordjournals.molbev.a003792. ISSN 0737-4038. PMID 11158377. Immunological properties of oxygen-transport proteins: hemoglobin, hemocyanin and hemerythrin". Cellular and Molecular Life Sciences. 74 (2): 293–317. doi:10.1007/s00018-016-2326-7. PMC 5219038. PMID 27518203. Gene Ontology – GO:0005344: oxygen carrier activity 1. Guided by Dr. R. K. Tamboli Sir Submitted by Girja Prasad Patel 2. Synopsis Introduction Definition Characteristics of respiratory pigment Types of respiratory pigment General account of respiratory pigment Comparative account of respiratory pigment Function of respiratory pigment Conclusion Reference Respiratory pigments play a crucial role in the transport of oxygen and carbon dioxide in various organisms, imparting color to body fluids and increasing oxygen-carrying capacity. Definition: Respiratory pigments are colored substances present in blood that facilitate gas exchange at both the extracellular and intracellular levels. Characteristics: * Colored pigment * Special affinity for respiratory gases * Distributed in the blood or body fluid * Colored proteins containing a metallic ion * Combine with oxygen and carbon dioxide to play a key role in transportation Types of respiratory pigments include Haemoglobin, Haemocyanin, Chlorocruorin, Haemerythrin, Pinnaglobin, Echinochrome, Molpadin, Vanadium, Neuroglobins, and Cytoglobins. Haemoglobin: * Occurs in blood plasma of invertebrates * Also known as erythrocrurin * A chromoprotein (conjugated protein) * Found in various organisms such as holothurians, crustaceans, insects, planorbis, annelids, parasitic nematodes, and flatworms * Molecular weight: 68,000 kDa * Metallic group present is Iron Chemical Structure: * Composed of two components: a protein component called Globin and a non-protein component called Haem * Globin formed of four polypeptide chains (α- and β-chains) * The haem is formed of iron and porphyrin * Porphyrin gives the red color to haemoglobin * Four haem molecules in one haemoglobin molecule The pigment is copper-based and gives it a characteristic blue color. It's composed of haemocyanin, which is a protein-copper complex found in plasma. The molecule of haemocyanin has one copper atom associated with a peptide chain of about 200 amino acids, but its molecular weight can vary between different animals. Like other proteins, haemocyanin absorbs UV rays and has an oxygen combining capacity lower than that of haemoglobin. Haemoglobin is found in the plasma of various organisms, including Arthropoda, Palaemon, Limulus, Daphnia, Mollusca (sepia, octopus, helix), and others. It's bright blue when oxygenated and colorless when deoxygenated. Chlorocruorin is another respiratory pigment that contains iron in the ferric form. It's found in plasma only and has a high oxygen combining capacity similar to haemoglobin. Its distribution is limited to four families of polychaetes (Annelida). Chlorocruorin appears light green in deoxygenated forms, dark green in oxygenated forms, and light red in concentrated solutions. Haemerythrin is an iron-based pigment found in corpuscles, which has a violet-pink color when oxygenated and is colorless when deoxygenated. Its molecular weight varies greatly, from 6,6000 kDa to 1,20,000 kDa, and it requires three atoms of iron to combine with one molecule of oxygen. There are also other less common respiratory pigments, including Pinnaglobin (manganese-based), Echiochrome (iron-based), Vanadium Chromogen (vanadium-based), Neuroglobins (discovered in 2000 and found in brain & retina of humans), and Cytoglobins (discovered in 2002). The primary function of respiratory pigments is to help transport oxygen and provide specific colors to body fluids or blood. The various components involved in gas storage and transport within the body include oxygen (O2) reservoirs, pH buffers, mechanisms to enhance gas diffusion gradients, and potential enzymatic functions such as those related to nitric oxide (NO). The respiratory pigments play a crucial role in facilitating gas transduction or carriage through bodily fluids. Notably, these pigments not only contribute to the distinctive coloration observed in different animals but also exhibit variations based on their habitat and environmental conditions.

Why do we need a respiratory pigment to perform respiration. What is the role of respiratory pigment in respiration class 10. What is the role of respiratory pigment in respiration give an example. What is the role of respiratory pigment in respiration give one example class 10. Respiratory pigments. Name the respiratory pigment in human beings. What is the role of respiratory pigment in respiration give one example.