The Influence of Temperature on the Concentration of Hemoglobin in Lumbricus terrestris and Eisenia fetida Erythrocruorins

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The leading cause of potentially survivable deaths in war is hemorrhage. This is frequently due to shortcomings of ready-to-use donated human whole blood with their short shelf lives, storage requirements, and blood-typing, as well as soldiers being limited to supplies carried on hand. Hemoglobin Based Oxygen Carriers (HBOC's), an artificial blood substitute, can relieve nearly all of these restrictions: longer shelf lives, lack of blood-typing, minimized storage requirements, and faster oxygen recovery. However, HBOC's have risks, like that of dimer-dissociated, oxidizing toxicity due to the absence of red blood cells. Even so, different types of hemoglobin (Hb) can alter the performance of this technology; Lumbricus Terrestris (LtEc) and Eisenia Fetida (EfEc) erythrocruorins, the Hb of different earthworms, for instance, demonstrate great stability, resistance to oxidation, and transport oxygen in a similar manner to whole blood. Knowing temperature can influence countless aspects of human Hb, LtEc and EfEc will be placed in a variety of thermoregulators ranging from 5ºC-35ºC for an experimental and statistical analysis aiming to distinguish the ways in which temperature can be used to modify the performance of Hb in earthworm erythrocruorins to limit the risks of HBOC's to replace donated whole blood, combatting preventable fatality rates in war zones. The spectrophotometer's graphs and absorbance integrations reveal strong correlations between higher temperature causing higher concentration and oxidation. EfEc's absorbency stayed more resistant while displaying greater visible aggregation with increasing temperature and incubation time. This signifies a possible safer, faster alternative to the current HBOC solutions by use of different earthworm erythrocruorins.