Therapeutic uses of the apohemoglobin-haptoglobin complex

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Technology description

The Need

Hemolysis is a burgeoning health condition that results from various pathophysioloigical conditions. It is characterized by the rupture of red blood cells, which release toxic, cell-free hemoglobin into the bloodstream. The cell-free hemoglobin further break down into heme and apoglobin, which cause a toxic overload of cell-free hemein vivo. The heme also further breaks down into several components parts, one of which is iron, causing free iron buildup within the blood. The complications associated with hemolysis include vasoconstriction, hypertension, oxidative injury, and kidney damage. Currently, no effective treatment for hemolysis exists. Patients suffering from the condition usually receive blood transplants to replace lost blood cells, but there is no therapy for the cell-free hemoglobin, heme, and apoglobin toxicity that occurs as a result of the red blood cells rupturing.
There also exists a need to improve drug delivery, especially with certain types of cancers. Although chemotherapeutic drugs exist and can be effective, they can also fail to deliver as needed. A more effective method of drug delivery and binding would be helpful for increasing chemotherapeutic drug efficacy.

The Technology

Dr. Andre Palmer and his team have developed complexes for treating hemolysis in patients suffering from the condition. The purpose of these complexes is to detoxify the cell free heme, hemoglobin, and iron the the body. Buildup of these toxins within the body causes a myriad of side effects that are unaffected by the current method of treatment. These complexes would allow the toxins to be safely and effectively cleared from the body. Removal of these toxins from the body would help mitigate the myriad of negative side effects caused by hemolysis. These complexes also have other therapeutic applications. They can be used a drug carriers to CD163+ macrophage and monocyte cells, which are expressed in some conditions such as certain types of cancer. The use of the complexes as carriers would allow direct targeting of these macrophages and monocytes, improving the therapeutic value of the drugs on these conditions.

Beyond the treatments described above, these complexes also have potential as therapeutic agents in other contexts. Several events, such as surgery and radiation therapy, are known to cause hemolysis. These complexes can be administered to patients prophylactically in order to prevent the occurrence of hemolysis associated with such events, and these complexes can be administered in conjunction with other therapies that are known to cause hemolysis in order to prevent the condition. Besides hemolytic conditions, these complexes can be added to compositions comprising of red blood cells in order to stabilize said compositions.
Finally, these complexes can also be used to modulate CD163+ expression, and help trigger CD163+ uptake of drug-conjugated haptoglobin. These complexes have many applications for treatments of various diseases, for example HIV and various cancers, that involve macrophages and monocytes or the overexpression of CD163+.

Application area

Treatment of hemolysis associated with various conditions such as sickle cell anemia and malaria
Preventative therapy for anticipated hemolysis
Red blood cell composition stabilization
Can be used as a drug carrier for CD163+ macrophages and monocytes

Advantages

Can detoxify the body from cell free entities
Can be used as a treatment before and after development of hemolytic conditions
Does not rely on the body's already depleted stores of haptoglobin for treatment
Has chemotherapeutic applications
Original, synthetic complexes used to detoxify hemoglobin, heme, and free iron in patients suffering from hemolysis. The use of these complexes would allow effective treatment of various states of hemolysis and would mitigate the numerous side effects associated with the condition. Complexes could also be used as a drug carrier for targeting CD163+ macrophages and monocytes.

Institution

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