

Use of Haptoglobin-related protein in the treatment of parasitic diseases

University of Aarhus

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Technical Field

Biotechnology

Business opportunity

Investment

Research collaboration

Licensing opportunity



Current state of technology

Haptoglobin-related protein (Hpr) is produced as a functional recombinant protein. A chemist is presently working on different protocols for linkage of trypanolytic drugs to the protein and in vitro trypanolytic effects of the conjugate drugs are scheduled for March-April 2009. The Research group of Professor Soeren Moestrup has received an €2.25 M grant from the European Research Council – ERC for application in research on drug delivery – Targeting Receptors Of Jointly Associated ligand-drug constructs (TROJA).

Applications

The new invention may be applied as a treatment of the human pathogenic forms of sleeping sickness and perhaps also other microbial diseases, where the microbe in question has a receptor with the ability to take up Hpr-hemoglobin complexes.

Commercial Value

Every year between 50.000 -100.000 human individuals are infected with trypanosomes. The WHO has estimated that 60 mio. people in the Central Region of Africa are at high risk of being infected with the parasite. There is a great need for new treatments as current standards are related with great inexpedient side effects and drug resistances.

The Technology

Human African trypanosomiasis (HAT), also known as Sleeping Sickness, is caused by trypanosomes that are transmitted by the tsetse fly. Human serum contains a lipoprotein particle with the proteins haptoglobin-related protein (Hpr) and apolipoprotein L (apoL). This particle is able to kill certain forms of trypanosomes. Killing of the parasite by the Hpr/apoL-containing particle requires binding to a receptor on the parasite surface which then mediates uptake of the particle. Inside the parasite, apoL acts as a membrane-attacking toxin causing damage that eventually kills the parasite. Some human-pathogenic trypanosome forms are, however, resistant to apoL. In the present invention the natural drug delivery function of Hpr-hemoglobin is used to develop a method for specific import of other toxins into trypanosomes. Recombinant Hpr has been developed and will be linked to a drug. After binding to hemoglobin, the complex of Hpr-drug conjugate and hemoglobin will be taken up by the parasites through the above-mentioned receptor leading to drug-induced killing of the parasites.

This invention may be used to treat infections with the human-pathogenic apoL-resistant trypanosomes causing serious sleeping sickness and perhaps also treatment of other parasitic diseases.

Intellectual Property Rights

The Intellectual Property Rights are owned by the University of Aarhus and Molecular Parasitology Lab-IBMM-ULB, Belgium. Patent application will enter PCT April 2009 and has not been published.

Inventors



Professor Soeren K. Moestrup,
University of Aarhus, Denmark.

The Moestrup laboratory has more than 20 years experience in receptor biology and has state-of-the-art facilities in molecular biology, protein chemistry and cell biology for this kind of studies. The laboratory has a comprehensive publication record and among many major discoveries, the laboratory has identified CD163 as the haptoglobin-hemoglobin receptor. Several patented discoveries has been taking into the clinic and biotech industry for disclosing disease mechanism and for development of new diagnostic and therapeutic tools.



Professor Etienne Pays,
Molecular Parasitology lab-IBMM-ULB, Belgium.

The Pay lab is world leading in trypanosome parasite research. Among a range of patented break-through discoveries the laboratory has discovered the trypanolytic effect of apoL and the molecular mechanism causing apoL resistance in human-pathogenic forms of trypanosomes. The laboratory has all modern facilities to continue the research and has an advanced experience in studying transgenic forms of trypanosome in vitro and in animal models.



PostDoc Marianne Jensby Nielsen,
University of Aarhus, Denmark.

Marianne Jensby Nielsen is PostDoc in the Moestrup lab and she has extensive molecular experience on the haptoglobins. She discoverer haptoglobin-related protein as a novel hemoglobin-binding protein.

References

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