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The use of anthrax and orthopox therapeutic antibodies from human origin in biodefense

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Abstract
It is impossible to protect whole nations from the effects of bioterrorism by preventive vaccination. There are too many possible agents, the costs would be exorbitantly high, and the health risks associated with complex mass vaccination programs would be unacceptable for the public health authorities. Adequate protection, however, could be provided via a combination of rapid detection and diagnosis with proper treatment for those exposed to biological weapon agents. Preferably this should be done with therapeutics, which would be beneficial in all stages of infection to disease. Monoclonal antibodies, preferably from human origin, can be used to prevent severe complications by neutralizing or blocking the pathological elements of biological agents and these are the optimal candidates to be deployed in case of biological warfare or a bioterrorist event.

Methods

Recent research in aerosol challenged rabbits has shown that the application of a combination of a human monoclonal antibody against the protective antigen (PA) and one against the lethal factor (LF) of the anthrax toxin is highly efficacious even when given 48 hours after the exposure.

Results

In this models, all animals are symptomatic around 30 hrs after exposure and all exposed but untreated rabbits have died around 90 hrs after exposure. The successfully used effective therapeutic antibodies were fully human IgG1 (κ-light chain) antibodies, with an affinity of around 10-10 M against the protective antigen (PA) and 10-9 M against the lethal factor (LF) toxin components of Bacillus *anthracis*.

Discussion/Conclusion

The lifesaving treatment of the animals with a normal dose has proven to still be effective when the treatment is given 48 hours after the lethal dose in a model where the mean time to death of untreated animals is around 90 hrs after exposure. This is important for the real life setting as not everybody will immediately be aware of the infection with anthrax spores, or will have access to immediate treatment. The ability of the dual antibody approach, enabling successful treatment even when victims are clearly symptomatic, will have a significant impact on managing the anthrax threat.

Biography

Strategic and creative development manager in biomedical science, who works internationally for several medical and biotech companies as scientific advisory board member. He is also an active reserve-officer of the Royal Dutch Navy in his rank as Commander (OF4) and Lector at the Rhein-Waal University of Applied Sciences at the Faculty of Political Sciences, Peace & Security studies.

He has finished both his studies in Medicine and in Biochemistry in The Netherlands with a doctorate and has extensive practical experience in cell biology, immuno-haematology, biodefense and transfusion medicine.