Histatin Peptides as a Treatment for Ocular Surface Injury and Prevention of Corneal Neovascularization

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PUBLIC ABSTRACT
This proposal is focused on development of a novel drug that will be of great value to Service members suffering from eye surface injuries. War-related eye injuries have increased from less than 2 percent up to the Second World War; between 2 and 3 percent up to the Korean War; and between 5 and 7 percent in the three Arab-Israeli conflicts, and has been attributed to urban and tank warfare. Moreover, while peacetime injuries typically involve one eye only, ocular war injuries affect both sides in 15%-25% of cases [1].

These injuries can vary from the minor scratch at the eye surface to more severe injury cause by heat or chemical, which may result from fire, explosions, and chemical agents released in battlefield. Ocular burns of the eye account for 7.7%-18% of all ocular traumas. Among civilians, the majority of victims are young and exposure occurs at home, work, and in association with criminal assaults. Alkali injuries occur more often than acid-based injuries [2]. Immediately available therapies to Service members with these injuries are limited and often require evaluation by skilled personnel.

All of these injuries can cause acute damage and long-term consequences including scarring of the eye surface and loss of vision. We have identified proteins that have antibacterial and antifungal properties and are developing a new drug treatment that will be easily and immediately accessible to and administered by nonmedical personnel in the field. This new peptide drug will reduce delays in initiating care for injured Service members, increase acute healing of ocular surface injury, and prevent the development of secondary (long-term) complications like scar formation and loss of vision.

The principal target for drug development is an eye drop treatment, which consists primarily of a protein (peptide) that is also present in human body. We have already obtained the promising results by testing this new drug on human cells in our laboratory. Therefore, we are planning to study, select, and develop the best peptide-based therapy for eye injury patients. We are specifically planning to test several different concentrations of various peptides to choose the best peptide, and optimize concentration and dosing to obtain the best healing and scar prevention in surface injuries of the eye. We will also test these drugs in animal models that reflect conditions very similar to those experienced by Soldiers with chemical wounds burns of the eyes.

We are projecting 3 years to finish our proposed study and drug development. At the end of this period, we will have a new drug in the form of eye drops that can be tested in future clinical studies. This drug will increase healing in eye surface injuries in Service members and help them return to normal daily life more quickly than standard treatments. These drugs will also help prevent long-term effects of eye surface injuries, including scarring and loss of vision.

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