

## COMBATting FUTURE BIOLOGICAL THREATS – HOST-DIRECTED INTERVENTIONS TO EMERGING THREATS FOR RAPID RESPONSE

### Plasma Nitric Oxide And The Treatment Of Wounds

David Dantzker Origin Life Sciences

Nitric Oxide An all-in-one treatment for wounds

Nitric oxide (NO) is produced in the body as a signal molecule in response to a number of stimuli. It serves among other things to regulate blood flow and neural transmission, modulate inflammation and collagen synthesis, and defend against infection from a variety of agents including bacteria, viruses, and fungi, with no possibility of resistance development. Augmented NO levels is the final pathway for many commonly used therapeutic agents used to relieve pain and inflammation and probably accounts for any benefit from medical devices that use mechanical stress to relieve pain or increase healing such as TENS, negative pressure, and sound.

Delivering NO directly to tissues, either in a gaseous form or using chemical technology in creams and ointments have failed to produce positive results for several reasons. In particular, the half-life of NO in air or tissues is on the order of seconds, the amount of NO produced is too low to be therapeutic and it doesn't penetrate below the dermal layer.

Origin Life Sciences has developed a technology, Ionojet, that produces NO from room air in a high energy plasma that can be delivered to the skin in therapeutic concentrations and increase NO activity in tissues up to 3cm below the skin. Using dermal blood flow as a marker, this energized NO has been shown to penetrate the skin and have prolonged effects up to an hour after turning off the device, suggesting a stimulation of endogenous NO activity.

In an FDA sponsored trial in patients with diabetic foot ulcers, efficacy was demonstrated and in over 1000 patient treatments there were no device related adverse effects. Proof of concept studies in humans have shown the beneficial effects of plasma NO in healing wounds caused by multiple etiologies such as trauma and radiation therapy. Treatment with plasma NO has also cleared up infected orthopedic and cardiac pacemaker implant sites with the need to remove the implant and to disrupt and eliminate biofilm, a problem that makes infected wounds so difficult to treat.

While the present configuration of the device is in the form of a movable cart, we have demonstrated the ability to easily create a portable version that could be taken out into the field. Since the NO permits the treatment of wounds of all types, clean and infected, without the need to determine etiology or type of infecting organism, it could make even complex wounds amenable to treatment without the need of transport to specialized wound treatment facilities.

We would suggest that plasma NO can become the standard of care in the healing of wounds.