

# A Complementary Approach in the Treatment of MRSA: Capturing and Removing the Toxins

## Abstract

There is no unique and/or uniformly effective means of treating MRSA and similar antibiotic resistant infections, either community or hospital acquired, which are potentially lethal. Recently, a resistant strain of *E. coli* has been identified in the USA, and there is every reason to believe that more such pathogens are yet to come. The MRSA organism is a culprit insofar as it produces toxins that are necrotizing. There is at hand a device that in clinical trials has removed vast quantities of virus and substances that inhibit the immune system from circulating blood in overwhelming viremia (e.g., HIV, HCV, Ebola, and others). It has recently been shown to remove *S. aureus* toxins and can act as a complementary agent in the treatment of MRSA infections.

**Keywords:** *E. coli*; *S. aureus*; Pathogens; Hemopurifier®; Methicillin; Ebola

## Opinion

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**Abbreviations:** MRSA: Methicillin Resistant *Staphylococcus aureus*; HIV: Human Immunodeficiency Virus; DARPA: Defense Advanced Research Projects Agency

## Discussion

Rare will be the person reading this brief note who has no knowledge of MRSA (methicillin resistant *Staphylococcus aureus*) and other diseases caused by viruses, bacteria, and toxins that are not susceptible to antibiotics and are thus potentially lethal pathogens. Recently an antibiotic resistant strain of *E. coli* has been found in a female patient in Pennsylvania prompting some to ask if we are entering a pre-antibiotic era [1]. For the sake of review and updating, I include a reference to a recent article discussing current concepts regarding the mechanisms by which the MRSA causes local tissue damage, septicemia, and organ failure leading to death, despite heroic nursing and medical attention that come at considerable costs [2].

We understand now that the MRSA bacterium does not directly cause the processes that are damaging. In itself, that organism is relatively inert, but it secretes toxins that permeate the body and are accompanied by other substances that prevent the immune system from recognizing the pathogens, thus causing tissue necrosis and organ failure. The concept of such an actor is not recent, but identification of the specific toxins is. Hopefully, in the future there will be vaccines and antitoxins to prevent and treat MRSA, but we are not at those points today, so the employment of any method of treatment, regardless of its complexity or cost, which increases the possibility of survival, must be considered.

In view of a recently reported increase in MRSA infections in the USA, the difficulty in effectively treating them, and the high frequency of attendant death, this note introduces a new complementary approach to dealing with overwhelming infections. It employs a device that is not curative itself but is complementary, augmenting the effects of established regimens by removing the toxins and the substances that block recognition of bacterium by the immune system.

Even if the MRSA organism itself does not directly cause damage, we still must inactivate it to end toxin production, but if the pharmacological tools are unable to do that in doses that are not so high as to be toxic themselves and lethal for some people, what option do we have? The question then arises whether in this situation removal of toxic materials should be regarded as an alternative means?

The device in question is called the Hemopurifier®, a product of Aethlon Medical, Inc. of San Diego, CA. It has been shown to remove viruses that cause diseases such as HIV, HCV, Ebola, Dengue, and chikungunya and is approved for use against the latter three in the USA. Recently, in studies conducted under a DARPA contract, it has trapped and removed the toxins associated with MRSA.

The Hemopurifier®, is not simple to engage; it currently uses the same system that is employed in hemodialytic therapy of patients with kidney failure, and the patient must be prepared for blood access and return as in conventional hemodialysis. But, when treating a patient facing imminent death due to organ failure from toxemia, there should be no limit to the life saving possibilities considered and employed.

The basic mechanism is dialysis with a membrane that passes the pathogen in question to the dialyate side and prevents it from re-entering the blood. The toxins being in the size range of viruses are passed from the circulating blood and trapped by a lectin coating on the dialyate side of the membrane. Obviously, the MRSA bacterium, being of a size similar to that of the blood cells, cannot pass across the membrane and is not removed, but the toxins and immune system blockers are. Also obvious is the need for some means of eliminating the MRSA organism, but removal of the toxins by Hemopurifier® dialysis treatment if applied to an end-stage patient approaching vital organ degradation can be a step closer to survival [3]. Clinical studies in overwhelming viremia have shown that reduction of the circulating viral load and mitigation of the inhibition of the immune system allow the latter to be reactivated and complete the clearance of the virus. It is not

unreasonable to project that in MRSA cases freeing the immune system's recognition of *S. aureus* could result in clearance of the bacteria.

Were we to have and employ vaccines to prevent the conditions discussed here, the war would not be won, just the current battle, since in all probability we can look forward to the continuing arrival of new pathogens as well as old ones sporting new genetic alterations. So, vaccines, while now appropriate and necessary, cannot be the end-all in our contests unless they are very broad spectrum in development and effect rather than being aimed at a single specific organism, a treacherous path at best because of the necessity of manipulating immunological characteristics at the bench. When we consider developing antitoxins, the same cautions are true. But here I suspect that the quest for a wider coverage may be more readily carried out by the pharmaceutical chemist.

In view of those difficulties in research and development, however, the Hemopurifier® is a broad spectrum tool that had been manufactured in limited quantities for those clinical trials, trials that are showing that the improvements are due to physical removal of the virus and agents that suppress the immune system, 300 billion copies of HCV removed in one treatment allowed an awakening of a previously overwhelmed immune system [4].

With so many questions to answer, old, new, and unforeseen, that depend upon adequate funding of and by The National Institute for Allergy and Infectious Diseases of the National Institutes of Health, for both in-house research and those of extramural research facilities, increasing the NIAID's budget is but a logical thing to do. When, not if, the next epidemic or pandemic outbreak occurs, we must be better prepared to meet it rapidly and effectively, since mobilizing to develop vaccines, antibiotics, and antitoxins specific for hitherto unknown pathogens is time consuming, costly, and often futile, while use of the Hemopurifier® is at hand.

Depending upon the pathogen and clinical situation, use of the Hemopurifier® can be either complementary or alternative therapy. The Hemopurifier® is complementary in viral diseases when used in conjunction with effective pharmacological agents in order to hasten recovery of the overwhelmed and blocked immune system. However, it can in some situations be regarded as alternative, as with Ebola, when there are neither vaccines nor effective medications nor in MRSA where the primary culprit is less the *S. aureus* itself but more so the toxic substances which it secretes.

In considering the defense of our country, we must think well beyond military hardware to possible biological terrorism and warfare [5,6]. Historically, septicemia and organ failure associated with MRSA and other pathogenic organisms has been the primary cause of death on the battlefield [7].

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