Recent Developments on Conquering Zika

Kasturi Pawar*

Abstract

Recently, the World Health Organization (WHO) has declared that Zika, a virus, which has been linked to birth defects and neurological complications, no longer constitutes an international emergency. However, it still remains a threat which calls for a long term efforts to address the issue through development of vaccines. Several ongoing clinical trials led by government and private pharmaceutical companies have shown a great promise in the treatment of Zika. Apart from these trials, there are also ongoing research on understanding the virus better, its transmission mode and future possibility of leveraging it in other disease treatments. This article provides an insight on these efforts and their findings.

Keywords

Zika virus; Vaccine; Clinical trials

Introduction

In November 2016, WHO declared an end to its global health emergency over the spread of the Zika virus [1], this, however does not downgrade the importance of Zika, as per WHO. The Zika virus has become established in more than 80 countries, infected millions of people, and left many babies with birth defects [2]. Recent data shows about 385 and 611 symptomatic Zika virus disease cases reported in US states and US territories, respectively [3].

Since the outbreak of Zika threat in 2016, the quest to better understand the virus and find a solution to the global threat has been continuing. A team of researchers in Western University, Canada have identified a quicker and cost-effective way to identify the virus by examining the proteins and peptides in saliva over the existing blood test that detects changes to RNA [4]. In another study, researchers investigated the transmission mode of the virus and detected that the virus is more prevalent in reproductive tract after vaginal transfer than after skin injection, when studied in rhesus macaques. This underlines the higher risk of infection for women through sex than from the mosquito [5]. Similar studies done by researchers at the University of Wisconsin-Madison on rhesus macaques investigated the transmission of the virus by direct mosquito bite versus injection of the virus under the skin [6]. While the differences between the resulting infections were subtle, the disease progression was found to be faster with needle-injected virus than mosquito bitten subjects.

Further, monkeys who had been bitten were less prone to the virus invasion in central nervous system tissues like the eye or brain. Interestingly, the reproductive tract tissues were infected in both groups of animals, which corroborate the findings of Dr. Griffin. Richner et al reported vaccine-mediated protection to mouse fetuses across two vaccine platforms: a lipid nanoparticle-encapsulated modified mRNA vaccine encoding Zika virus prM and E genes, and a live-attenuated Zika virus strain encoding an NS1 protein without glycosylation. These results show a great promise for pregnant women and fetus bearing the destructive brunt of Zika [7].

There have been several clinical trials ongoing by various groups including scientists at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health (NIH). Table 1 shows the various clinical trials sponsored by either government of pharmaceutical companies:

<table>
<thead>
<tr>
<th>Trial</th>
<th>Sponsor</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zika Vaccine Trial 1</td>
<td>NIAID</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Zika Vaccine Trial 2</td>
<td>Pharmaceutical Company X</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

In conclusion, the ongoing clinical studies along with the continued research in the area of Zika have given enough reasons to hope that final victory - a vaccine preventing infection and an actual cure - may be possible in the foreseeable future for this deadly disease. These vaccines, however, need to be tested in actual pregnant women and resulting off springs in future trials to validate their efficacy.
Table 1: Ongoing Zika vaccine clinical trials.

<table>
<thead>
<tr>
<th>Vaccine platform</th>
<th>Vaccine name</th>
<th>Sponsor</th>
<th>Number of subjects</th>
<th>Testing phase</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactivated virus</td>
<td>Zika virus purified inactivated vaccine (ZPIV)</td>
<td>NIAID</td>
<td>75</td>
<td>Multiple Phase 1</td>
<td>[8]</td>
</tr>
<tr>
<td>DNA vaccine</td>
<td>VRC-ZKADNA090-00-VP</td>
<td>NIAID</td>
<td>2490</td>
<td>Multisite Phase 2/2b</td>
<td>[9]</td>
</tr>
<tr>
<td>mRNA vaccine</td>
<td>GLS-5700</td>
<td>GeneOne Life Sciences</td>
<td>40</td>
<td>Phase 1</td>
<td>[10]</td>
</tr>
<tr>
<td>Mosquito saliva protein vaccine</td>
<td>AGS-v</td>
<td>NIAID</td>
<td>60</td>
<td>Phase 1</td>
<td>[12]</td>
</tr>
<tr>
<td>Live attenuated recombinant vaccine</td>
<td>MV-ZIKA</td>
<td>Themis Bioscience</td>
<td>48</td>
<td>Phase 1</td>
<td>[13]</td>
</tr>
</tbody>
</table>

References

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