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Engineering Chikugunya vaccine based on the fusion of E2EP3 peptide into papaya mosaic virus nanoparticles

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Background: Chikugunya (CHIKV) is transmitted by the mosquito vectors *Aedes aegypti* and *Aedes albopictus*. The CHIKV disease is characterised by acute symptoms that generally last about a week and are self-limiting. At present, there is no available licensed vaccine or particularly effective drug for human use for any alphaviruses. Owing to this, the research was conducted by designing a fusion of E2EP3 with papaya mosaic virus nanoparticles.

Methods and materials: Firstly, recombinant papaya virus particle fused with CHIKV peptide-epitope E2EP3 was designed. Subsequently, the fusion was cloned and expressed in competent cells. After purification of the fusion protein, immunisation assay was carried out in mice and CHIKV-specific IgG antibodies were determined. Following this, *in vitro* neutralisation, plaque formation assay and indirect immunostaining were performed.

Results: From this study, the recombinant vaccines were expressed and purified with the expected size approximately 27–30 kDa. *In vivo* analysis revealed that the recombinant vaccines were able to induced immune response in mice against CHIKV. The results were further analysed through plaque formation assay, and the infected Vero cells treated with the recombinant vaccines demonstrated no plaque formation.

Conclusion: The data showed that levels of neutralising antibodies correlate with a protective immune response, which can accelerate the development accessibility of CHIKV. Therefore we sought to investigate further on the protection efficiency and immunogenicity of engineered papaya mosaic virus nanoparticles fused with peptide-epitope derived from CHIKV E2 protein.

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Another form of Lassa fever? Early neurological symptoms and high mortality reveal differences in two outbreaks in Ebonyi State, Nigeria 2017–2019

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Background: Lassa fever (LF) is an acute viral haemorrhagic illness with various clinical manifestations. Neurological symptoms are not commonly present at the early stage of the disease; however, early manifestation of central nervous system features depicts poor prognostication. In Ebonyi state, an unusual pattern was observed between two outbreaks with patients presenting early neurological symptoms and a high mortality rate in the second outbreak. The study described the epidemiological evolution, socio-demographic profiles, clinical characteristics and patients' outcomes.

Methods and materials: A retrospective analytic analysis of routinely collected clinical data was conducted of all confirmed and probable LF patients admitted to the Virology Centre of the AEFUTHA in Ebonyi State, December 2017 to January 2019.

Results: In a total of 83 cases, 70 were RT-PCR confirmed and 13 probable cases. In outbreak 1, 69 were seen with 53.6% being urban residents, 19% farmers, 15% students, and 10% health workers. Fourteen cases were seen in outbreak 2 with 92.9% rural residents, 58.3% being farmers and 49.9% students. There were differences in clinical and laboratory signs and symptoms between the two outbreaks with neurological symptoms present 43% of the time in outbreak 1 and 93% in outbreak 2 ($p=0.001$), with a shorter time of onset for these symptoms in outbreak 2. The mortality rate was 85.7% in outbreak 2 versus 29.9% in outbreak 1 ($p<0.001$). Patients with neurological symptoms, who were more common in outbreak 2 had a RR of dying of 8.5 compared to those without.

Conclusion: This study revealed a different form of LF that is of great concern due to its high mortality rate. Further studies are needed to better define its characteristics.

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