

SAMPLE PRETREATMENT FOR DRASTIC ENHANCEMENT OF THE ZIKV DETECTION SENSITIVITY: CLINICAL SAMPLES PRETREATMENT WITH APOH-COATED MAGNETIC BEADS PRIOR TO RT-PCR TO AVOID ZIKV FALSE- NEGATIVE DIAGNOSES OR TO TEST THE ZIKV INFECTIVITY

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The Zika virus (ZIKV) circulates at low levels in endemic areas such as South America or some Pacific islands and may be transmitted by mosquitoes or through sexual intercourse. Epidemics may flare up, such as in 2015, and spread due to travel-associated cases. Surveillance has greatly increased since ZIKV infection has been associated to neurological disorders such as microcephaly in newborns or Guillain-Barré syndrome in adults.

Here, we report an innovative method to increase ZIKV detection sensitivity, in response to the surveillance needs of frequent low viral charges. This method combines a novel pretreatment step to further purify ZIKV in various clinical samples with a standard lysis and RT-PCR detection system. Taking advantage of the interaction between any ZIKV variant and the acute phase scavenger protein β 2-glycoprotein 1 or Apolipoprotein-H (ApoH), Zika viruses present in clinical samples are collected with a simple magnet using ApoH-coated magnetic beads. Here we show that this viral capture is efficient in various types of clinical samples leading to a drastic sensitivity increase of any ZIKV-molecular detection method. Thus, using ApoH-ZIKV-enriched clinical samples, our method coupled with RT-PCR tests was able to avoid false-negative detection generated by using commercial RT-PCR alone. In addition, this capture system allowed testing the target cell infectivity of captured ZIKVs.

This sample pretreatment step could be applied upstream of many diverse detection methods in order to improve and drastically reduce the number false negative diagnoses of ZIKV as well as improve the ZIKV therapeutic monitoring.