Testing divalent cations as essential activators of the ATPase activity and effect of ssRNA on the catalytic cycle of Zika Virus NS3 helicase

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Zika Virus non structural protein 3 (NS3h) is a molecular motor that couples translocation along single stranded and unwinding of double-stranded RNA with the catalysis of the hydrolysis of nucleoside triphosphates (NTPs)[1]. ATPase activity of NS3h is dependent on the presence of magnesium, which is an essential activator.

In this work we study the effect of single-stranded RNA on the ATPase activity of NS3h and investigated the ability of different divalent cations to replace the role of magnesium.

ATP substrate curves were obtained at different concentrations of homopolyribonucleotide poly(A). ATPase activity of NS3h was enhanced by the presence of RNA, we propose and fit to the experimental data a kinetic model that describes such effect.

In order to determine the ability of different divalent cations to replace magnesium as an essential activator on the catalysis of ATP hydrolysis by NS3h we performed ATPase activity measurements in media containing $CaCl_2$, $SrCl_2$, $MnSO_2$ or $FeSO_4$ in the absence of Mg2+. Activity was observed in the presence of both $MnSO_2$ and $CaCl_2$ and was non detectable in the case of $SrCl_2$ and $FeSO_4$.

References

[1] S. Xu *et al.*, *Nucleic Acids Res.*, vol. 47, no. 16, pp. 8693–8707 (2019) doi: 10.1093/nar/gkz650.

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