BanLec, a banana lectin, is a potent inhibitor of Middle East respiratory syndrome coronavirus in *in vitro* assays

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Background: **Middle East respiratory syndrome coronavirus (MERS-CoV) continues to cause human infections with multiple clusters two years after the onset of the epidemic. Though mild cases have been recognized, the infection is severe in those with co-morbidities and >30% of patients die from the infection. Our recent structure-based development of a fusion inhibitor is one of the few treatment options for MERS and it led us to hypothesize that other existing antivirals that block cellular entry may also be active against MERS-CoV.[1] BanLec is a jacalin-related banana lectin that has potent anti-HIV activity through binding to glycosylated viral envelope proteins and blocking cellular entry. We assessed the anti-MER-CoV activity of BanLec in cell culture assays.**

Methods: **The anti-MERS-CoV activity of BanLec was assessed by cytopathic effect inhibition, viral yield reduction, and plaque reduction assays in Vero, Calu-3, and/or HK2 cells as previously described.[2] The cytotoxicity of BanLec was also assessed.**

Results: **The CC50 of BanLec was >10 nM in Vero and Calu-3 cells. CPE was completely absent in Vero and HK2 cells infected with MERS-CoV on 3 dpi with 30.00 nM of BanLec. In Calu-3 cells, CPE was completely absent at 90.00 nM of the drug. The EC50 of BanLec ranged from 3.99-4.82 nM (Table 1).**

Conclusion: **BanLec exhibits potent *in vitro* anti-MERS-CoV activity. The detailed mechanism and *in vivo* correlation of its antiviral activity should be further tested in animal models. The potential advantages of using BanLec for MERS include its high stability and the prospect of using it as a topical treatment or prophylaxis for exposed patients.**

References: **1. Lu L et al. Structure-based discovery of Middle East respiratory syndrome coronavirus fusion inhibitor. Nat Commun 2014;5:3067; 2. Chan JF et al. Broad-spectrum antivirals for the emerging Middle East respiratory syndrome coronavirus. J Infect. 2013; 67:606-16.**

Table 1. Inhibitory effect of BanLec on MERS-CoV (cytopathic effect inhibition)

Cell line[a]	EC_{50}	EC_{90}	EC_{99}	CC_{50}[b]	SI[c]
Vero	3.99 ± 0.22	7.95 ± 0.21	8.84 ± 0.20	>10	>2.51
Calu-3	4.82 ± 0.48	8.95 ± 0.40	9.88 ± 0.39	>10	>2.07
HK2	4.58 ± 0.005	8.74 ± 0.17	9.67 ± 0.21	NA	NA

[a]EC50 was determined by CPE inhibition assay in Vero and Calu-3 cells, and by PRA in the HK2 cells
[b]NA, not available; [c]Selectivity index = CC50/EC50.

Fig. 1. Inhibitory effect of BanLec on MERS-CoV (viral yield reduction)

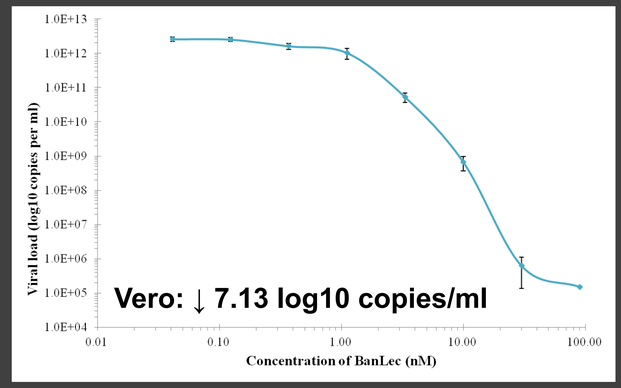
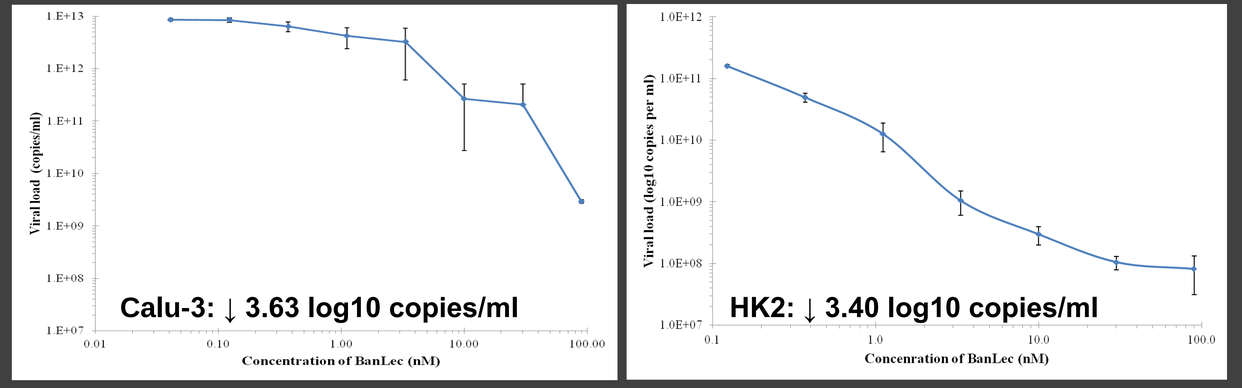
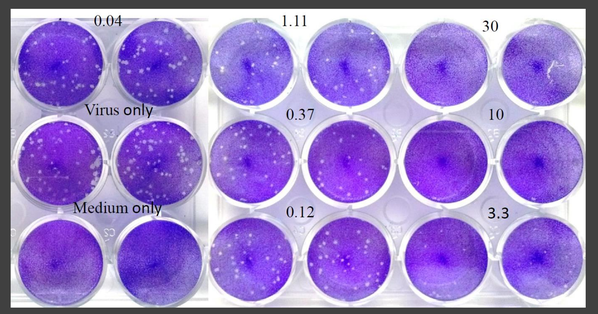
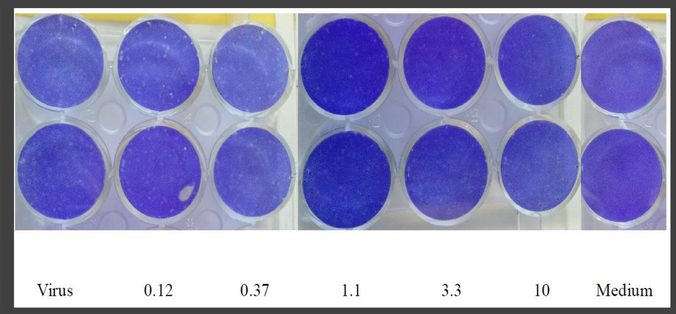


Fig. 2. Inhibitory effect of BanLec on MERS-CoV (plaque reduction assay)





Vero: 100% reduction (>10nM)



HK2: 59.5% reduction (>10nM)