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Molecular Insight into Integrin Alpha Beta 6 Receptor of Cattle and their Relationship with FMD Infectivity

Editorial

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Foot and mouth disease (FMD) of cattle, which causes severe economic losses, is caused by the virus under the family of Picornaviridae. There are total seven serotypes viz. A, O, C, Asia-1and South African Territories 1 (SAT1), SAT2, and SAT3 of FMDV was identified, among them serotype O are most prevalent in India. The virus exhibits a strong tropism for the epithelial cells, during natural infection of FMD the viral entry into the host as well as the replication machinery take place in the pharynx as well as soft palate. During viral infection inside the host system the observable lesions developed on feet and mouth (7-8).

The three-dimensional structure of FMDV has revealed a prominent surface feature formed by the loop between the G and H strands of VP1, one of the structural protein of FMDV identified. The virus enters the host cell by receptor-mediated endocytosis process after the initial attachment of the virus to the host cell-surface receptors. Once the virus enter the endosome, uncoating of the viral genome takes place due to acidic environment, which is then translocated crossways the endosomal membrane into the cytoplasm [1,2].

Integrins are one of the important biologically active proteins responsible for FMD virus host interaction. Functional integrins consist of two non covalently bound trans membrane glycoprotein subunits viz. alpha (a) and beta (b). Each subunit is composed of a large extracellular domain of a and b residues (120-180 and 90-110 kDa, respectively), a single transmembrane domain and a small, C-terminal cytoplasmic domain. In mammals, the integrin family consists of around 24 different heterodimers, each of which has a distinct tissue distribution. FMDV has been shown to use four kinds of integrins viz. avb1, avb3, avb6 and avb8 as receptors to initiate infection. Virus attachment to the integrin receptors is mediated by anarginine-glycine-aspartic acid (RGD) tripeptide located onVP1 loop of FMDV. The integrin receptors of FMDV have been investigated extensively in cell culture which shown that avb6 but not avb3 are expressed constitutively on the epithelial cell surfaces at the site of viral replication to allow initiation of infection. Expression of avb6 is restricted to the epithelial cells at the variety of sites including the epithelia of the uterus, bladder, respiratory tract and salivary glands.

Presently our team investigated that, genetic variation at 5'UTR region of integrin beta 6 receptor are associated with FMD susceptibility in cattle [3-8].

The understanding of the mechanism of infection and replication of this virus is important to the control of this worldwide threat. An important question that has yet to be addressed concerns the role of viral receptors in the pathogenesis of FMD.

References

1. Longjam N, Deb R, Sarmah AK, Tayo T, Awachat VB, et al. (2011) A brief review on diagnosis of Foot-and-Mouth Disease of livestock: conventional to molecular tools. Vet Med Int 2011: 905768.
2. Thomson GR, Vosloo W, Bastos ADS (2003) Foot and mouth disease in wildlife. Virus Res; 91:145-161.
3. Berinstein A, Roivainen M, Hovi T, Mason PW, Baxt B (1995) Antibodies to the vitronectin receptor (integrin avb3) inhibit binding and infection of foot-and mouth disease virus to cultured cells. J Virol 69: 2664-2666.
4. Burman A, Clark S, Abrescia NG, Fry EE, Stuart DI, Jackson T (2006) Specificity of the VP1 GH loop of foot-and-mouth disease virus for alpha-v integrins. J Virol 80: 9798-9810.

ISSN: 2350-0190

5. Duque H, Baxt B (2003) Foot-and-mouth disease virus receptors: comparison of bovine av integrin utilization by type A and O viruses. J Virol;77: 2500-2511.

6. Jackson T, King AM, Stuart D, Fry E (2003) Structure and receptor binding. Virus Res 91: 33-46.

7. Jackson T, Sheppard D, Denyer M, BlakemoreW, King AMQ (2000) The epithelial integrin avb6 is a receptor for foot-and-Mouth disease virus. J Virol 74: 4949-4956.

8. Knowles NJ, Samuel AR (2003) Molecular epidemiology of foot and mouth disease virus. Virus Res 91: 65-80.

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