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Assistant Professor
Professional specialty：
Virology, Biochemistry, Molecular Biology

Courses Taught：
Undergraduate：Laboratory of Veterinary Virology, Infectious Diseases of Domestic Animals, Medical Biochemistry, Veterinary Preventive Medicine, Principles of Molecular Medicine
Graduate: Seminar on Special Topics, Seminar on Animal Virology

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Educational background

2000-2007 Dept. of Cell and Developmental Biology, Rutgers University, Ph.D.
1997-1999 Graduate Program of Veterinary Microbiology, National Chung-Hsing University, M.S.
1992-1997 Dept. of Veterinary Medicine, National Chung-Hsing University, B.V.M.

Current position and professional career

2018- Assistant Professor, Dept. of Veterinary Medicine, National Chung-Hsing Unversity
2016-2017 Research Fellow, Vascular and Genomic Center, Changhua Christian Hospital
2015-2016 Postdoctoral Fellow, Institute of Biomedical Sciences, Academia Sinica,
2014-2015 Postdoctoral Fellow, Institute of Molecular Biology, Academia Sinica,
2008-2014 Postdoctoral Visiting Fellow, Laboratory of Viral Diseases, National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health(NIH)

Honors

2013 Postdoctoral Travel Award: 2013 American Society of Virology Annual Meeting. Pennsylvania State University, State College, PA, USA

2014 Fellows Award for Research Excellence (FARE): National Institutes of Health, Bethesda, MD, USA

Past Research Findings

1. Biochemical characterization of the eukaryotic scavenger decapping enzyme (DcpS) revealed its higher affinity to short capped-dinucleotide substrates relative to long capped-mRNAs. Kinetic analysis demonstrated that the enzymatic activity of DcpS dimer was regulated by the concentration of its cap substrate. Excessive amount of the substrate conferred negative cooperativity between the two monomers of DcpS protein and reduced hydrolysis rate of substrates, while lower amount of substrate than the enzyme did not cause this negative effect. The results are supportive of a dynamic model in which the cap substrates are hydrolyzed in a mutually exclusive way at each monomer of the DcpS protein.

2. Vaccinia virus (VACV) encodes two decapping enzymes, D9 and D10. The D10 catalytic mutant caused persistence of viral and host mRNAs. The double deletion mutant of D9 and D10 displayed severely inhibited viral replication and impaired synthesis of viral intermediate and later proteins. The infected cells exhibited accumulation of dsRNA and increased phosphorylation of dsRNA dependent antiviral response factors PKR and eIF2α. Moreover, the double deletion mutant was extremely attenuated in mice. The data suggest that D9 and D10 also function to prevent the induction of dsRNA dependent antiviral response and contribute to the VACV virulence in mice.

Current Research Interests

1. The role of viral decapping enzyme in the life cycle of parapoxviruses.
2. The regulation of mRNA processing and degradation by infection of poxviruses.

Selected publications

1. **Liu SW**, Chang JC, Chuang SF, Liu KH, Cheng WL, Chang HJ, Chang HS, Lin TT, Hsieh CL, Lin WY, Hsieh M, Kuo SJ, Liu CS. 2019. Far-infrared Radiation Improves Motor Dysfunction and Neuropathology in Spinocerebellar Ataxia Type 3 Mice. Cerebellum. 18:22-32. (co-first author)
2. Tarn WY, Kuo HC, Yu HI, **Liu SW**, Tseng CT, Dhananjaya D, Hung KY, Tu CC, Chang SH, Huang GJ, Chiu IM. 2016. RBM4 promotes neuronal differentiation and neurite outgrowth via modulating Numb isoform expression. Mol Biol Cell 27: 1676-1683.
3. **Liu SW**, Katsafanas GC, Liu R, Wyatt LS, Moss B. 2015. Poxvirus decapping enzymes enhance virulence by preventing the accumulation of dsRNA and the induction of innate antiviral responses.Cell Host & Microbe 17: 320-331.
4. **Liu SW**, Wyatt LS, Orandle MS, Minai M, Moss B. 2014. The D10 decapping enzyme of vaccinia virus contributes to decay of cellular and viral mRNAs and to virulence in mice. J Virol 88: 202-211.
5. Parrish S, Hurchalla M, **Liu SW**, Moss B. 2009. The African swine fever virus g5R protein possesses mRNA decapping activity. Virology 393:177-182.
6. **Liu SW**, Jiao X, Welch S, and Kiledjian M. 2008. Analysis of mRNA decapping. Methods Enzymol 448: 3-21.
7. Singh J, Salcius M, **Liu SW**, Staker BL, Mishra R, Thurmond J, Michaud G, Mattoon DR, Printen J, Christensen J, Bjornsson JM, Pollok BA, Kiledjian M, Stewart L, Jarecki J, Gurney ME. 2008. DcpS as a therapeutic target for spinal muscular atrophy. ACS Chem Biol 3: 711-722.
8. **Liu SW**, Rajagopal V, Patel SS, and Kiledjian, M. 2008. Mechanistic and kinetic analysis of the DcpS scavenger decapping enzyme. J Biol Chem 283:16427-16436.
9. Shen V, Liu H, **Liu SW**, Jiao X, and Kiledjian M. 2007. DcpS scavenger decapping enzyme can modulate pre-mRNA splicing. RNA 14:1132-1142.
10. **Liu SW**, Jiao X, Liu H, Gu M, Lima CD and Kiledjian, M. 2004. Functional analysis of mRNA scavenger decapping enzymes**.** RNA 10:1412-1422.
11. Gu M, Fabrega C, **Liu SW,** Liu H, Kiledjian M and Lima CD. 2004. Insights into the structure, mechanism, and regulation of scavenger mRNA decapping activity. Mol Cell 9:14:67-80.

Updated:2019/02/18