

Resume

Naveen Kumar, Ph.D

Senior Scientist (Veterinary Virology)
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Career

- July 2011- **Senior Scientist (Veterinary Virology)**
Central Institute of Research on Goat, Makhdoom, Mathura, India
Area of research « Molecular Diagnostics and Development of new generation vaccines & novel antiviral agents against some important viruses of goats »
- 2006-2011: **Postdoctoral research fellow**
Emory University, Atlanta, USA
Area of research « Interaction of influenza virus with host cell signaling pathways »
- 2004-2006: **DAAD fellow (PhD research)**
Friedrich Loeffler Institute, InselRiems, Greifswald, Germany
Area of research « Development of DIVA test (Differentiation infected and Vaccinated Animals (DIVA) for FMD virus using baculovirus expressed nonstructural proteins »
- 2003-2006: **PhD (Veterinary Virology)**
CCS Haryana Agricultural University, Hisar, India
Title of thesis « Molecular and Immunological studies on persistence of FMD virus »
- 2002-2003: **Scientist**
BioMed Pvt. Ltd. Ghaziabad, UP, India
Area of research « Research and development in vaterinary tissue culture vaccines »
- 2000-2002: **MVSc (Veterinary Microbiology)**
Rajasthan Agricultural University, Bikaner, India
Title of thesis « Biochemical, pathogenicity, immunoserological and molecular characterization of *Escherichia coli* O78 isolates of sheep »
- 1994-2000: **BVSc&AH**
Rajasthan Agricultural University, Bikaner, India

Awards:

- 2010: Fellowship, American Society of Virology, USA
- 2008: Fellowship, American Society of Virology, USA
- 2008: Fellowship, Influenza Pathogenesis and Immunology Research Center, Atlanta, USA
- 2006: Postdoctoral research fellowship, Emory University, Atlanta, USA
- 2004: DAAD fellowship, DAAD Bonn, Germany
- 2002: Gold Medal, RAU Bikaner, India for first in MVSc (Vety. Microbiology).
- 2000: Sarabhai Zydus Animal Health Award for academic achievements.

Research Interest:

Viral pathogenesis, pathogen induced host cell signaling, antiviral drug discovery, vaccinology and molecular diagnostics

Across the developing world, viral pathogens such as Peste-des petits (PPR), Foot-and-mouth disease (FMD), goatpox and Blue tongue place a huge disease burden on animal industry particularly leads to loss of production in small ruminant and in turn increase poverty in some of the poorest part of the world. India is having highest livestock population which serves as an important means of livelihood security in the country. Accurate and quick diagnosis of the disease is required to initiate the proper prophylactic and control measures. Central Institute of Research on Goat is a premier Institute of research on goats in India and it is planned to develop it as a National Reference Center of Goat diseases in 12th five year plan. The prime objective of my lab is isolation, identification and characterization of important goat viruses as well as development of diagnostic tests/kits against these viral pathogens.

Other research projects:

In first project it is planned to develop antiviral agents against some acute viral pathogens of goats such as PPRV, FMDV, Blue tonhue etc. The intriguing feature of the viral pathogen is that its high mutation rate allows it to escape the pre-existing immunity and become resistant to available antiviral drugs. Most of the clinically approved antiviral drugs exclusively targets one or another viral components, repeated use of which allows the virus to escape the selection pressure and become resistant. Upon viral infection, an array of signal transduction events are initiated by the host cells that are basically antiviral. However, we have recently shown that the virus has acquired the capability to misuse some of these signaling functions (host factors) to support its effective replication. My laboratory is involved in identifying some novel cellular targets that are required for viral replication but are, at the same time dispensable for host. The overall strategy will lead to a paradigm changes in antiviral drug development in terms of drug resistance, as virus can not easily replace the missing cellular functions by mutations.

In a second project, it is planned to improve the duration of the immunity of some of the current veterinary vaccines such as FMD and blue tonge virus vaccines. Emerging evidences suggests innate immune system also plays an important role in modulating the strength, quality and persistence of adaptive immune response e.g. yellow fever vaccine which provide life long immunity stimulate synergistic production of proinflammatory cytokines via signaling through multiple innate immune receptors which results in enhanced T-cell responses. Using this approach, synthetic nanoparticles containing influenza virus antigens plus ligands that signal through TLR4 and TLR7 induced synergistic increases in antigen-specific, neutralizing antibodies as well as enhanced persistence of germinal centers and of plasma-cell responses. The duration of immunity for FMD vaccines is only upto 4-6 months which needs improvement. Using system biology approach, we first plan to analyze the molecular signature (gene expression pattern) induced after virus infection and this information will then be used to incorporate appropriate adjuvant/ligand to induce persistent antibody response.

Affiliation with scientific organisations:

- ❖ Member, American Society of Virology
- ❖ Life member, Indian Society for Sheep and Goat Production and Utilization (ISSGPU).
- ❖ Life member, Indian Association of Veterinary Microbiologist Immunologist & Specialist in Infectious Diseases (IAVMI).

Publications:

1. **Kumar N**, Liang Y, Parslow TG and Liang Y. (2011). Tyrosine kinase inhibitors as novel anti-influenza compounds and with broad spectrum antiviral activities. ***Antimicrobial agents and chemotherapy***. (In press).
2. **Kumar N**, Ly H and Liang Y. (2011). Characterization of the envelope glycoproteins of virulent and avirulent arenaviruses in mediating cell entry. ***Virology*** (In submission).

3. **Kumar N**, Liang Y, Parslow TG and Liang Y. (2011). Tyrosine kinase inhibitors block multiple steps of influenza A virus replication. *Journal of Virology*, 85, 2818-27.
4. Xin Z, Carrol K, **Kumar, N**, Song K and Ly H. (2011). Transcriptional activation of TIN2, a gene encoding the telomerase-associated protein by SP1 and NF- κ B. *PLOS one*, 6(6): e221333. doi:10.1371/journal.pone.0021333.
5. Sharma S, Mulick S, **Kumar N**, Suryavanshi A and Ruse B. (2011). An Anti-inflammatory role of VEGFR2/Src kinase inhibitor in HSV-1 induced immunopathology, *Journal of Virology*, 85, 5995-6007.
6. Lan S, McLay L, Wang J, **Kumar N**, Ly H, and Liang Y. (2009). Development of infectious clones for virulent and avirulent Pichinde viruses – a model virus to study arenavirus-induced hemorrhagic fevers. *Journal of Virology*, 83, 6357-6352.
7. **Kumar N**, Zin Z, Liang Y, Ly H and Liang Y. (2008). NF- κ B signaling differentially regulates influenza viral RNA synthesis. *Journal of Virology*. 82:9880-9889.
8. Brehm KE, **Kumar N**, Thulke, HH and Haas B. (2008). Protection against heterologous challenge with foot and mouth disease by high potency emergency vaccines. *Vaccine*, 26, 1681-1687.
9. **Kumar N**, Sharma R and Kakker NK. (2007). Non-structural protein 3A for differentiation of foot-and-mouth disease infected and vaccinated animals in a Haryana (India). *Journal of Veterinary Medicine B. (now Zoonoses and Public Health)*, 54, 376-382.