

## How Next Generation Sequencing (NGS) Untying the Knots in Viral Pathogenesis

### About IIT Indore

IIT Indore located at Simrol, Khandwa Road, Madhya Pradesh, was established by the Ministry of Human Resource Development (MHRD), Government of India in 2008-09. The Centre for Biosciences and Biomedical Engineering (BSBE) is a center of excellence that focuses on research in multidisciplinary areas of Biosciences and Biomedical Engineering. Recently IIT Indore is ranked 15<sup>th</sup> amongst all engineering universities and institutions in India and a very impressive 5<sup>th</sup> in teaching and resource category by MHRD as per NIRF 2017.

### Faculty

**Dr. Subhash C Verma** is Associate Professor at Department of Molecular Microbiology and Immunology at University of Nevada. Dr. Verma's lab is interested in understanding the mechanism of Kaposi sarcoma associated Herpesvirus (KSHV) genome replication during reactivation and during de-novo infection of human cells. The major research interests are defining the genetic and epigenetic factors involved in regulating viral DNA replication during latent as

well as lytic phases of the viral life cycles. His lab using a novel, Single Molecule Analysis of the Replication DNA (SMARD), approach aims to localize the replication initiation (ori) and termination sites on the viral genome. Also, they are using NGS to delineate the changes in chromatin structure required for replication initiation. Additionally, Dr. Verma's lab uses various other biochemical and recombinant approaches to establish the role of viral genes in replication and persistence of the viral genome.



**Dr. Hem Chandra Jha** is Assistant Professor at Centre for Biosciences and Biomedical Engineering at IIT Indore. Dr. Jha's lab is working on the interface of Medicine, Biology and Engineering.

### You Should Attend If...

- You are a student/researcher/scientist in biological sciences.
- You are a clinician/ paramedical staff.
- You are a university/college teacher.

### Fees

- Academic Institutions/Hospital: Rs 1,000/per participant.
- Participants from industry: Rs 3,000/ per participant
- This fee includes all instructional course materials, assignments, laboratory equipment usage charges and refreshments.
- The participants will be provided with accommodation on payment basis.

### Overview

The term 'Virus' itself can cause panic among communities. There are limited information and resources available to differentiate and distinguish viral infections from other illnesses. Internationally, lots of research groups are working on next generation sequencing (NGS) to understand the mechanism associated with pathogens. These NGS tools along with other techniques are very helpful to unravel the viral replication. Studies of viral replication are extremely important for the control and manipulation of viral pathogens. This course will be of a great benefit to students and researchers for the development of new methodology in virus replication. Furthermore, potent therapeutics and vaccine candidates would be targeted with the help of this course.

### Tutorials (Afternoon session) 2-3 pm

T1 (23/10)	Evolution of viruses, how virus evolution is different than other primitive micro-organism, how it survives during adverse era on earth?
T2 (24/10)	How viruses infect us; Why India has more viral associated infection than western countries?
T3 (25/10)	How host immunity is important to keep us healthy, how virus targets our immune system?
T4 (26/10)	What are the pre-symptoms of viral infection?
T5 (27/10)	Why viruses are always harmful?
T6 (28/10)	How to cross check new virus generation? Study the evolution of viruses on earth
T7 (29/10)	How to analyze big data through NGS?
T8 (30/10)	Tools to interpret the NGS data.
T9 (31/10)	What are differences among RNA-Seq, ChIP-Seq and Methyl-Seq?

### Lectures (Morning session) 10am-12 pm

L1 (23/10)	What is virus, classification of virus.
L2 (23/10)	Life cycle of viruses, various phases in virus life cycle and their importance.
L3 (24/10)	Host targeted by viruses, what are the host those infected through virus, why virus specifically infected several species not others?
L4 (24/10)	Virus driven diseases. Classification of viral diseases based on bio-safety levels
L5 (25/10)	About DNA viruses, types of virus, structure of virus, specific characteristics of virus.
L6 (25/10)	About RNA viruses, types of virus, structure of virus, specific characteristics of virus.
L7 (26/10)	What is replication, importance of viral replication in disease progression.
L8 (26/10)	Importance of viral antigens, how viral antigens manipulates host machinery.
L9 (27/10)	Mechanisms of Viral replication.
L10 (27/10)	Techniques used for the studies of viral replications.
L11 (28/10)	What is next generation sequencing (NGS)? Why this is important in modern biology?
L12 (28/10)	How NGS helps in the study of disease mechanism?
L13 (29/10)	Importance of NGS in viral replication study
L14 (29/10)	Importance of RNA-Seq through NGS and how it different than Micro arrays studies
L15 (30/10)	Importance of ChIP-Seq through NGS and how it different than ChIP
L16 (30/10)	How Methyl-Seq study is enhancing our understanding in virus mediated cancer progression
L17 (31/10)	Future direction in viral replication study.
L18 (31/10)	How to invent and characterizes new virus in unknown samples?

**Course Coordinator:** Dr. Hem Chandra Jha,  
Phone: 9971653189, E mail: [hemcjsa@iiti.ac.in](mailto:hemcjsa@iiti.ac.in)