

Retrospect and prospect on the GfV Workshop "Cell Biology of Viral Infections" Upcoming Workshop 2013 "Cell Biology of Metabolic Processes"

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The annual meeting of the study section "Cell Biology of Viral Infections" of the Society of Virology (GfV) held at the Ketschauer Hof in Deidesheim, Pfalz, has become a well-known tradition. The workshop intends to foster research of cell biological aspects of virus infections by bringing together cell biologists and virologists at all levels of their career. Each workshop is organized around 4 keynote lectures held by invited cell biological experts working on topics with emerging relevance in the field. To foster collaborations, to exchange newest technologies and to facilitate discussions between participants and "cell-biologists" the workshop takes place in a pleasant and rather intimate setting, with ample time to meet and to converse. Furthermore, a traditional wine tasting organized in one of the famous wineries in Deidesheim and the excellent cuisine of the Ketschauer Hof contribute to lively exchange.

Retrospect on Workshop 2012 "Nuclear Structures and Chromatin Dynamics"

The 11th meeting took place September 19th – 21st of September 2012 and focused on "Nuclear Structures and Chromatin Dynamics". Faithful to our strategy we invited four excellent speakers to introduce us to their respective fields of research on nuclear processes, to provide us with overviews of their current work and to present techniques of particular importance in their studies.

As a special treat this year we invited **Prof. Harald zur Hausen**, the Nobel Laureate of physiology or medicine in 2008. We were very honored and grateful that Prof. zur Hausen accepted our invitation despite a very tight schedule travelling and lecturing on an international level. Prof. zur Hausen presented a lecture entitled "Viral infections in human cancers" that was received with great interest by young students and mature scientists alike as indicated by an extended discussion following the presentation. In his lecture Prof. zur Hausen talked about a potential link between the increased consumption of beef and colorectal cancer. Based on epidemiological evidence he suggested that "red" beef, e.g. a juicy steak, often is prepared in a way that would allow several pathogens, like some DNA viruses to survive the food preparation process. These pathogens then may at the basis of a transforming process lead to increased rates of colorectal cancer as observed in the western world.

Peter Hemmerich, professor at the FLI-Leibniz Jena, gave a lecture entitled "Assessing protein dynamics in the nucleus: new clues on genome function". Peter Hemmerich analyses dynamics



Nobel Laureate Prof. Harald zur Hausen with the organizers

and architecture of the cell nucleus with a particular focus on age-related alterations. With his talk he provided insight into recent developments in the field as revealed by high resolution and live microscopy in combination with several other techniques like photobleaching and -activation, and fluorescence correlation spectroscopy (FCS). The techniques applied are of particular importance in studying dynamics and interactions as well as biophysical properties of proteins in their natural environment.

M. Cristina Cardoso, professor at the TU Darmstadt, summarized the work of her laboratory with a talk entitled "DNA replication and repair, a 4D matter". She presented her studies aimed at elucidating principles that enable and govern the dynamic organization of the cell nucleus. In addition, M. Cristina Cardoso's lab focuses on how the genetic and epigenetic information of the genome is replicated in a faithful and coordinated manner. In general, the Lab's results provide the basis to understand how genome stability is maintained, with important implications for cancer development, as well as cell differentiation. Like P. Hemmerich, M. C. Cardoso applies high-resolution microscopy based on fluorescent fusion proteins, complemented by biochemical and biophysical techniques.

Gernot Längst, professor at the University of Regensburg, our third plenary speaker, presented a talk entitled "From local to global chromatin structures - Regulation by chromatin remodeling enzymes and non-coding RNA". Gernot Längst provided insight into a fascinating research area using cell biological and biochemical techniques. The Längst lab analyses how various



proteins and non-coding RNAs dynamically organize the chromatin. While highly compacted and organized, genomic DNA needs to be accessed by numerous factors to reach versatile chromatin modification, activity, and modulation.

Contributions by young scientists

A major aim of this workshop is to encourage the participation of young together with mature scientists from the field of virology and give them the chance to present their work in 20-minute oral presentations. The workshop was attended by numerous participants from outside of Germany underlining the quality of the research presented at and the dynamic nature of this workshop. In general, the talks covered major viral families including α - (HSV-1), β - (mCMV, HCMV) and γ -herpesviruses (MHV-68, EBV, KSHV), several other DNA viruses (adenovirus, papilloma virus, Hepatitis B virus) as well as HIV, Hepatitis C virus and some more exotic candidates. The presented topics covered various aspects of virus replication, virus-host interaction and formation of progeny virions.

Entry of virus particles into host cells is an important topic in virus research with great potential to apply the insights for antiviral interventions. Enveloped viruses initiate infection by a virus-based fusion machinery that triggers the merging of host and virus membranes to eventually release the capsid to the cytosol. Alteration of the cortical actin may often be required for early steps of virus entry likely induced by a virus-triggered signalling event. Transport of capsids through the cytoplasm either of incoming or newly formed particles is another major interest of virus research. Here, tegument proteins and the relevance of embedded motifs for interaction with host microtubular motor proteins are analysed. Similarly, kinetics of capsid transport were determined and compared between various virus species suggesting that particle transport is primarily governed by host rather than by virus factors.

Several contributions centered around nuclear structures and chromatin dynamics perfectly fitting the focus of last years workshop. PML nuclear bodies (PML-NB) are intranuclear sites with functions in DNA repair, transcriptional regulation, chromatin remodelling, protein degradation, and stress response. Numerous viral proteins target and destroy PML proteins and structures, in addition, genomes of various DNA viruses associate with these functionally important cellular structures. Quite obviously, PML-NB connect genome replication and gene expression thereby exhibiting pro- and antiviral activities. In addition to PML-NB, the nuclear envelope was identified to be active in stress response by a novel type of autophagy called nuclear-envelope derived autophagy (NEDA).

Quite obviously transcriptional regulation is of utmost importance for viral propagation. To modulate or interfere with host expression programs, viral proteins apply various strategies. The transcriptionally active RNA polymerase II may be differentially degraded to inhibit antiviral host protein production. Viral transcription factors are key regulators of viral and cellular transcription and may regulate chromatin activity by directly interacting with core histones. Moreover, to exploit the host machinery for their own benefit, viral factors preferentially export viral rather than host transcripts out of the nucleus. MiRNAs either of viral or host origin continue to be of major interest as factors that regulate and fine-tune viral lytic infections and play a role during virus-induced transformation of host cells. Virion formation, transport and release to the surface are research interests actively pursued with the ultimate goal to identify components that can be attacked by siRNAs and other small molecules to prevent virion release and thus spread of the infection. Last but not least, the analysis of viral co-infections indicates a new trend with clinical relevance.