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Virl Mitosis Lab Answers

This event will bring together research scientists, post docs, principal investigators, lab directors and professionals from around ... experts Chat live with peers and speakers Browse a virtual ...

Genetics and Genomics 2013

My laboratory is thus trying to answer two fundamental questions: Macroautophagy is a critical process used by cells to recycle nutrients to survive starvation, but also for protein and organelle ...

Dr Jason King

elegans endogenous chromosomes. Can artificial chromosomes in worms be the answer to gene therapy? Finally, how are worms relevant to humans? While the order of how genes are arranged on a ...

Artificial chromosomes study sheds light on gene therapies

are able to reproduce both through mitosis and via sex. (Credit: Correa Lab/Rice University) A dinoflagellate tetrad cell that will soon split into four separate cells, captured by Rice University ...

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The DNA damage response (DDR) is a critical cellular network that affords cells the ability to repair DNA damage, thus preventing the development of cancer and ensuring passage of intact genomic information to offspring. It has become appreciated in the last 15 years that viruses activate, interact with, utilize, and modulate this vital cellular response, which has been hypothesized to be an ancient anti-viral system in addition to its role in maintaining genomic integrity. Viruses of many types and families interact with the DDR, and understanding this interaction can deepen our knowledge of how these viruses survive and continue to infect humans. Importantly, this information can also inform us of novel methods to treat and prevent infection, as this interface is central to many viral lifecycles. Our research probes the interaction of the DDR with the parvovirus Minute virus of mice (MVM), which provides a simple, tractable system to investigate at the molecular level how and why viruses negotiate this cellular response. Parvoviruses are incredibly small viruses capable of infecting species ranging from moths to humans, which rely on hijacking cellular components to replicate and complete their viral lifecycle. Previous work from our lab has shown that MVM utilizes and modulates the DDR to halt the cell cycle, which provides an environment conducive for viral replication. Unexpectedly, we found that MVM induces this cell cycle block in a novel manner, dissimilar to typical cellular methods, by specifically depleting a key CDK-inhibitor, p21, and a key mitotic cyclin, Cyclin B1. The loss of p21 during viral infection was confounding, as a cell will typically utilize p21 to induce this type of cell cycle block, suggesting to us that MVM depletes p21 for a specific reason. Careful investigation into the virally-induced loss of p21 revealed that MVM hijacks a key cellular protein that targets p21 for degradation. Introduction of mutant p21 proteins into MVM infected cells allowed up to determine that p21 must be depleted during infection to allow the activity of a key cellular cofactor, PCNA, which is utilized for viral replication. As the virally-induced cell cycle block did not utilize the CDK-inhibitor p21 as predicted, we next focused on the key mitotic cyclin, Cyclin B1, which would also be expected to halt the cell cycle. Previous work from our lab demonstrated that MVM programmed the depletion of Cyclin B1 in a novel manner by targeting its encoding RNA, which no other virus is known to do. Our research demonstrated that MVM prevents key cellular factors from binding to the Cyclin B1 gene, thus preventing the generation of Cyclin B1 RNA. Importantly, reconstituting some of these factors onto the Cyclin B1 gene during viral infection could overcome this virally-induced RNA depletion. Taken together, our findings suggest that MVM can target key cellular processes utilizing a multitude of methods, demonstrating that this \(\text{lsimple} \) virus is a master of regulating and modulating its host cell. This research has made significant contributions to our understanding of how parvoviruses interact with and modulate their cellular hosts. European clinical trials are currently investigating certain parvoviruses that preferentially infect, and kill, cancerous cells. The DDR is as the crux of understanding why parvoviruses target these cells and how they are destroyed. In addition to making significant contributions to the advancement of our field, our insights may inform these studies and aid in our understanding of oncolytic therapy.

In the past decade, the global efforts in the control of HIV disease were basically concentrated on the search for anti-retroviral agents. So far, anti-HIV therapies have been shown to be disappointing because of rapid development of drug-resistant mutant variants. Despite this drawback in the therapeutic

fight against HIV infection, antiviral research should be actively pursued. However, failure of antiviral therapy indicates that other avenues of research should be rapidly explored with the same energy. In this setting, striking advances have been recently made in the dissection and understanding of the viro-immunological processes governing the progressive destruction of lymphoid organs associated with AIDS develop ment, and HIV-induced activation and apoptosis have been identified as key phenomena of the immune system destruction. This book assembles the most recent advances on basic and clinical aspects of T-cell activationiapoptosis in HIV infection and their implications for immunotherapy. These data were presented at an international symposium held on July 11-12, 1994, in Paris. The book is partitioned into 21 chapters covering four comprehensive fields: 1) T-celllmacrophage activation and HIV infection; 2) Apoptosis and viropathogenesis of HI V disease; 3) Apop tosis and immunopathogenesis of HIV disease; 4) Mediators of T-cell activationiapoptosis and therapeutic applications. We hope that this book will assist the readers in understanding recent advances in the viro-immunopathogenesis of HI V disease as well as the rationales for potential immune cell-targeted therapeutic interventions.

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