MicroRNAs help control HIV life cycle

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Scientists at Burnham Institute for Medical Research (Burnham) have discovered that specific microRNAs (non-coding RNAs that interfere with gene expression) reduce HIV replication and infectivity in human T-cells. In particular, miR29 plays a key role in controlling the HIV life cycle. The study suggests that HIV may have co-opted this cellular defense mechanism to help the virus hide from the immune system and antiviral drugs. The research was published today in the journal *Molecular Cell*.

Tariq Rana, Ph.D., director of the Program for RNA Biology at Burnham, and colleagues, found that the microRNA miR29 suppresses translation of the HIV-1 genome by transporting the HIV mRNA to processing-bodies (P-bodies), where they are stored or destroyed. This results in a reduction of viral replication and infectivity. The study also showed that inhibition of miR29 enhances viral replication and infectivity. The scientists further demonstrated that strains of HIV-1 with mutations in the region of the genome that interact with miR29 are not inhibited by miR29.

"We think the virus may use this mechanism to modulate its own lifecycle, and we may be able to use this to our advantage in developing new drugs for HIV," said Dr. Rana. "Retroviral therapies greatly reduce viral load but cannot entirely eliminate it. This interaction between HIV and miR29 may contribute to that inability. Perhaps, by targeting miR29, we can force HIV into a more active state and improve our ability to eliminate it."

Rana's team looked at miR29 expression levels in infected and uninfected cells and found that miR29 expression was enhanced by HIV-1 infection. Blocking the activity of miR29 with interfering RNA resulted in increased replication and infectivity of the virus. The scientists tested the association of miR29 and HIV-1 by mutating both miR29 and its target region on the HIV virus. When either was altered, miR29s suppression of HIV replication and infectivity was reduced or eliminated. In addition, the team suppressed P-bodies in the cells and noted a similar effect. This suggests that HIV may use miRNAs to become dormant and escape immune response.

Source: Burnham Institute (news : web)