**Programmable Inhibition and Detection of RNA Viruses Using Cas13**

Freije, C. A., Myhrvold, C., Boehm, C. K., Lin, A. E., Carter, A., ... & Yozwiak, N. L. (2019).  
 Molecular cell, 76(5), 826-837.

**Presenter**: Chun-Yee, Lau  **Date/Time:** 2020/03/26, 15:10-16:00

**Commentator**: Wen-Chun, Liu **Location**: Monto Ho lecture hall

**Background**:

RNA virus is a virus that has ribonucleic acid as its genetic material, which can be single-stranded RNA or double-stranded RNA. Notable human diseases caused by RNA viruses include Ebola virus disease, SARS, influenza, hepatitis C et cetera. There are a variety of methods for diagnosis of RNA virus infection such as nucleic acid-based assays (real-time RT-PCR) and tests that detect the virus antigen and/or patient IgM/IgG (rapid detection test and ELISA). Among these diagnostic assays, the rapid detection test (RDT) is the most convenient method for diagnosis of virus infection, but has lower sensitivity compared to nucleic acid-based assays. In this paper, the author develops Cas13-assisted restriction of viral expression and readout (CARVER), a potential broad platform that uses Cas13 to utility for rapid diagnostic and antiviral drug development.

**Results:**

First the author uses computational analysis to identify Cas13 sites in >350 human-associated viral genomes and determine Cas13 can potentially be applied to target a wide range of mammalian ssRNA viruses, as measured by integrates computational screening and experimental validation. After that, author demonstrates that the Cas13 has potent antiviral activity against multiple ssRNA viruses in cell culture, and delivery of multiple crRNAs or CRISPR arrays can be used to further enhance Cas13’s antiviral effect. Last, author creates the CARVER system which can rapidly and sensitively measure viral RNA levels in specimen though combines HUDSON system, SHERLOCK system and recombinase polymerase amplification (RPA).

**Conclusion:**

These results showed that the CRISPR-Cas effector Cas13 can effectively target multiple distinct mammalian ssRNA viruses and highlighted CARVER’s broader potential for diagnosis and treatment of ssRNA viruses.

**References:**

Gootenberg, J.S., Abudayyeh, O.O., Lee, J.W., Essletzbichler, P., Dy, A.J., Joung, J., Verdine, V., Donghia, N., Daringer, N.M., Freije, C.A., et al. (2017). Nucleic acid detection with CRISPR-Cas13a/C2c2. Science 356, 438–442.