Antiviral Immune responses are the first line of defense against the invading viral pathogens. These responses are initiated by a defined set of Pattern-Recognition Receptors (PRRs). These receptors are triggered by specific viral DNA/RNA or structural components. These components are termed as Pathogen-Associated Molecular Patterns (PAMPs) [1,2].

There are two main families of PRRs have been described: Toll-Like receptors and Rig-I like receptors. TLRs are found primarily in the membrane of endosomes. Double stranded DNA of invading virus particles was primarily detected by TLR3 while single stranded RNA of incoming virions was detected by TLR7/8 of these TLR family of PRRs. RIG-I (retinoic acid-inducible gene-I) was identified by Yoneyama et al in 2004, that sense cytosolic double stranded RNA [3]. Later on two other members of Rig-I like receptors were identified. These are termed as Melanoma Differentiation-Associated protein 5 (MDA5) and LGP2 (Laboratory of Genetics and Physiology 2). Retinoic Acid-Inducible Gene 1 (RIG-I) mediated innate immune response triggers robust interferon response that followed by expression of Interferon Stimulated Genes (ISGs). These ISGs encodes, chemokines, cytokines, and antiviral restriction factors and also triggers adaptive immunity. All of these events work together to eliminate virus particle for the cells. RIG-I activation occurs upstream for a very important adaptor of this pathway termed as Induced by phosphate starvation 1 (IPS1) also known as MAVS, VISA or Cardif. IPS1 leads to activation of NF-kB, Interferon Regulatory Factor 3 (IRF3), and Interferon Regulatory Factor 7 (IRF7). These molecules are translocated to nucleus upon activation where they lead to activate of IFN-β response [1,2].

Many viruses like hepatitis B, hepatitis A, Influenza A, SARS, Poliovirus and Ebola virus have been reported that activate RIG-I mediated innate immune signaling pathway. Kumar et al showed the activation of RIG-I pathway by double stranded DNA to show the mechanism of IFN-β activation by Hepatitis B virus. They have shown the interaction of a Hepatitis B protein named X (Hbx) with IPS1 [3]. In another interesting report a PDZ was shown to be involved in regulation of IFN-β activation by Influenza A virus [4]. The PDZ proteins consist of domains of approximately 90 amino acid residues that adopt a structure composed of six β-strands and two α-helices. The term PDZ is an abbreviation for the first three proteins found to share this structural domain: PSD-95, Dlg, and ZO-1. This is the only report that showed a PDZ protein (MAGI-1) which could regulate INF-β response in in-vitro conditions [5].

There are increasing numbers of reports in this field and I would like to take this opportunity to increase awareness among readers by this short editorial. Although lots of viruses have shown to regulate this antiviral immune response, there is a lot to be achieved. Several mechanisms have been shown by different virus to overcome the innate immune response. These studies lead to many question unanswered. It has been well established that virus have developed strategies to overcome host defense by several mechanisms. Is there a common regulator that regulate most of these mechanism acquired by different virus? These studies will help to understand drug development process and also autoimmune diseases.

References