

# NS1 binds PKR

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## Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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## Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics*, 18, 142. [↗](#)

Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)

Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res*, 46, D649-D655. [↗](#)

Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology*, 14, e1005968. [↗](#)

Reactome database release: 88

This document contains 1 reaction ([see Table of Contents](#))

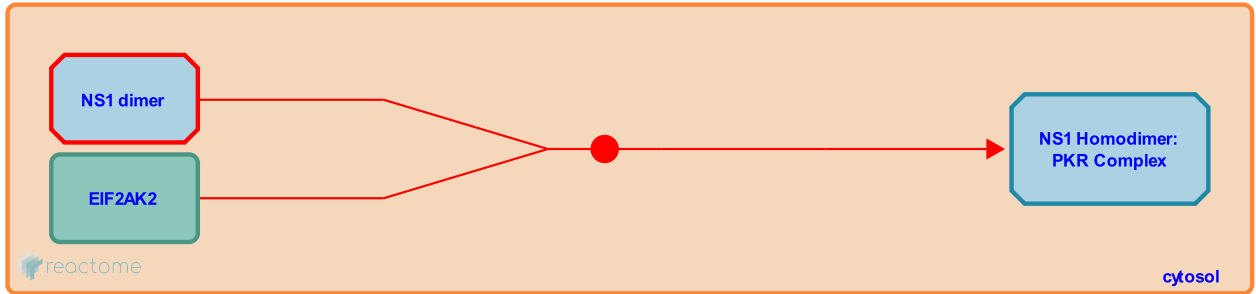
**NS1 binds PKR** ↗

**Stable identifier:** R-HSA-168896

**Type:** binding

**Compartments:** cytosol

**Diseases:** influenza



Influenza virus inhibits the host double-stranded-RNA-activated protein kinase (PKR) in several steps. First, PKR binds the viral non-structural protein NS1, an interaction in which the NS1 N terminus is critical. This interaction inhibits PKR dimerization and autophosphorylation, resulting in sustained general protein translation despite the presence of dsRNA. The inhibition of PKR is an indispensable contribution of NS1 to the viral life cycle (Tan & Katze, 1998; Hatada et al, 1999; Bergmann et al, 2000; Li et al, 2006; Dauber et al, 2006; Schierhorn et al, 2017).

**Literature references**

Sen, GC., Krug, RM., Min, JY., Li, S. (2006). Binding of the influenza A virus NS1 protein to PKR mediates the inhibition of its activation by either PACT or double-stranded RNA. *Virology*, 349, 13-21. ↗

Schneider, J., Dauber, B., Wolff, T. (2006). Double-stranded RNA binding of influenza B virus nonstructural NS1 protein inhibits protein kinase R but is not essential to antagonize production of alpha/beta interferon. *J Virol*, 80, 11667-77. ↗

Pleschka, S., Jolmes, F., Budt, M., Herold, S., Herrmann, A., Peteranderl, C. et al. (2017). Influenza A Virus Virulence Depends on Two Amino Acids in the N-Terminal Domain of Its NS1 Protein To Facilitate Inhibition of the RNA-Dependent Protein Kinase PKR. *J Virol*, 91. ↗

Bergmann, M., Pehamberger, H., Carnero, E., Wolff, K., Muster, T., Garcia-Sastre, A. et al. (2000). Influenza virus NS1 protein counteracts PKR-mediated inhibition of replication. *J. Virol.*, 74, 6203-6. ↗

Saito, S., Fukuda, R., Hatada, E. (1999). Mutant influenza viruses with a defective NS1 protein cannot block the activation of PKR in infected cells. *J Virol*, 73, 2425-33. ↗

**Editions**

2004-05-12	Reviewed	Gale M, Jr.
2013-11-18	Authored	Gillespie, ME.
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