

Viruses work together to attack their hosts

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Research at the Cavanilles Institute of Biodiversity and Evolutionary Biology of the University of Valencia, led by professor Rafael Sanjuán, reveals that viruses work in groups to attack host cells more effectively. The results of this study were published in the journal *Cell Host & Microbe*.

A virus that is genetically diverse is better able to colonise new a host, evade immunity and evolve drug resistance. Diversity is typically assessed at the population level. However, the existence of cell-to-cell variations in their genetic makeup means that studying [viruses](#) at the level of the individual cell is vital to understanding how they work.

To this end, researchers at the Universitat de València (UV) combined cell isolation with other ultra-deep sequencing techniques to define the genetic structure and diversity of an RNA virus at the cellular level. What they found was that individual infectious units are made up of genetically diverse viral genomes, with viral particles that "interact functionally" (Sanjuán).

Rafael Sanjuán emphasises that the rate of spontaneous viral mutation varies from cell to cell, and early production of diversity depends on the viral yield of the very first infected cell.

The results of this study also show that natural selection "facilitates the teamwork of viruses in relation to their position in the same cell" (Sanjuán).

Understanding infections better

Traditionally, virologists have tried to expunge viruses by isolating single [cells](#). However, in the words of UV researcher Rafael Sanjuán, these research results show that this approach "is not necessarily valid, since it ignores the social dimension of viruses".

Social interactions between viruses were first discovered some years ago and have changed our view of these viral microbes. This study, together with others published recently, provides evidence that viruses establish connections, an understanding of which could help us to fight off the infections they cause.

Rafael Sanjuán is an associate professor at the Department of Genetics of Universitat de València, and a researcher in the Evolution and Health research group at the Cavanilles Institute of Biodiversity and Evolutionary Biology of the same university. The group's research focuses on the study of the mechanisms behind the creation and maintenance of genetic variation in virus like HIV or hepatitis A. Sanjuán is currently the principal investigator of three national and international research projects, and he has published more than 60 studies on evolution and viruses over the past 10 years.

More information: Marine Combe et al. Single-Cell Analysis of RNA Virus Infection Identifies Multiple Genetically Diverse Viral Genomes within Single Infectious Units, *Cell Host & Microbe* (2015). [DOI: 10.1016/j.chom.2015.09.009](https://doi.org/10.1016/j.chom.2015.09.009)

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