



## Ancient viruses come to Frascati in Italy

Once upon a time there was a group of viruses that infected the animals that lived on our planet long ago. These viruses were also transmitted to humans, known as Human Endogenous Retroviruses (HERVs), and after evolutionary processes became part of the human genome and sometimes contributing to its functions. But one of these HERVs, about three years ago, jumped to the attention of researchers who found that it was activated in severe patients during the COVID-19 pandemic.

Retroviruses have infected animals and humans for millions of years. These viruses have the ability to integrate into the genome of their hosts and, under certain circumstances, can be passed from generation to generation. In the course of evolution, these original remnants of viral sequences became multicopy families of genes. Some HERVs play physiological roles, others are inactivated or kept silenced, but only a few retain pathogenic activity that can be awakened by environmental triggers such as viral infections. SARS-CoV-2 has been shown to activate production of the immuno- and neuro-toxic HERV-W envelope protein. In patients with COVID-19, the expression of the envelope protein from the HERV-W family it was also clearly associated with the severity of COVID-19 or with a post-COVID disabling syndrome. All in all, the scientific and medical data make this HERV a target for an innovative diagnostic-driven therapeutic strategy.

On June 9 in Frascati, human endogenous retroviruses will be the main theme of a day dedicated to scientific dissemination, during which it will be possible to put in the shoes of scientists and discover, together with the main research players, the advances, the technologies involved and the expected results from the common EU project named HERVCOV.

### HERVCOV Project

The name of the project is HERVCOV, and it was funded by the European Commission with almost 7 million euros, involving organizations and companies from Italy, Croatia, France, Greece and Spain. The research consortium has been collaborating since almost one year in the study of the protein derived from the ENV sequence of human endogenous retrovirus W (HERV-W ENV).

Human endogenous retroviruses (HERVs) currently account for 8% of the human genome. Activation of some HERV sequences has been linked to various physiological and pathological conditions. Consortium research groups have shown that activation of the HERV-W-ENV protein by SARS-CoV-2 is associated with severe forms of COVID-19. On



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This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No 101057302.



May 5, the World Health Organization declared the end of the health emergency caused by the COVID-19 pandemic. However, there are still many inflammatory, cognitive and neurological consequences due to SARS-CoV-2 infection, known as Post COVID-19 syndromes.

### What is Post COVID-19

The World Health Organization defines “Post COVID-19” as a set of medium- and long-term effects after the initial illness. Symptoms can be different between different people, adults or children. Overall, the most common symptoms of the Post COVID-19 condition include: fatigue, difficulty breathing, memory, concentration or sleep problems, persistent cough, chest pain, difficulty speaking, body aches, loss of sense of smell or taste, depression or anxiety.

These symptoms could be related to persistent inflammation also due to the possibility, not yet clarified, that the SARS-CoV-2 infection may remain in reservoirs located in different parts of the body even for a longer period than the primary infection.

### Research progression

The study on which the HERVCOV project is based demonstrated in COVID-19 patients the high expression of the HERV-W-ENV protein not only in the blood, but also at the entry site of SARS-CoV-2, i.e. in the nasopharyngeal tract. In fact, HERV-W has already been detected in molecular swabs. Moreover, HERV-W ENV is persistently expressed even several weeks/months/years after infection in people with Post COVID-19 syndrome. In healthy individuals who have never encountered SARS-CoV-2 and in those who have contracted the virus but have completely recovered, however, the protein is not expressed.

### June 8 and 9, Annual Meeting in Rome

On June 8 and 9 there was the first Annual Meeting of the project, during which the researchers of the partnership gathered for conference activities at the Rectorate of the University of Rome "Tor Vergata".

On June 9 there also was an afternoon dedicated to dissemination hosted in Frascati. Here it was possible, in addition to visiting the places in the HERVCOV Metaverse, to meet associations involved in scientific dissemination, put on the lab coat and extract DNA from the fruit, or reproduce the double helix model and discover the differences with RNA. Researchers of the HERVCOV project were available to answer all questions, furthermore they presented laboratories and quizzes to illustrate how human endogenous retroviruses work.



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## THE PARTNERS

HERVCOV, “SARS-CoV-2-induced activation of pathogenic endogenous retrovirus envelope HERV-W: towards personalized treatment of COVID-19 patients” is funded under the HORIZON-HLTH-2021-DISEASE call (Personalised medicine and infectious disease: understanding the individual host response to viruses) of the European Commission under the Horizon Europe Framework Programme and it will involve the following partners: Institut National de la Santé et de la Recherche Médicale (France), Ethniko Kai Kapodistriako Panepistimio Athinon (Greece), Rome Tor Vergata University (Italy), Instituto Aragonés de Ciencias de la Salud (Spain), Fundación Agencia Aragonesa para la Investigación y el Desarrollo (Spain), Geneuro Innovation SAS (France), Inserm Transfert (France), Klinicki Bolnicki Centar Rijeka (Croatia) and Frascati Scienza (Italy).

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