



# Study finds Zika and covid-19 may be correlated with neuropsychiatric disorders and complications during pregnancy

Jornal da Universidade, Thiago Rodrigues Müller / 25 de julho de 2024 / In English

## Health | Doctoral dissertation used host genetic characterization to study late and unknown clinical manifestations of diseases

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\*Photo: Badge indicates stage of Zika research, in the animal experiment phase (Flávia Dutra/JU)

In 2015, a new virus dominated the headlines: Zika, associated to a raise in cases of microcephaly, led the Ministry of Health to declare a state of Public Health Emergency of National Importance, lasting until 2017. Between 2019 and 2020, another virus, SARS-CoV-2, spread worldwide and prompted the World Health Organization to declare a pandemic. Even after the end of the Public Health Emergency and pandemic, numerous uncertainties persist, such as the long-term effects they may have on future generations.

At UFRGS, a doctoral dissertation from the Graduate Program in Cellular and Molecular Biology, conducted by researcher Rafael Lopes da Rosa, aimed to characterize the genetic expression changes in hosts caused by the two infections. The study established a correlation between Zika and neurological outcomes, such as Alzheimer's, multiple sclerosis, and Autism Spectrum Disorder (ASD). Regarding COVID-19, in addition to neuropsychiatric impacts, a correlation was found between the pre-eclampsia syndrome in pregnant women, causing an increase in uterine pressure and, eventually, miscarriages. The study/dissertation, resulting in ten articles published in scientific journals, influenced legislative recommendations and technical reports to promote priority vaccination for pregnant women against COVID-19 in 2021, a measure which indicates the impact of the science produced at the University.

### Unknown Effects Unveiled

The viral analysis methodology analyzed host genes that would not be expressed without infection or are expressed in abnormal amounts, aiding the understanding of these diseases, and predicting late and unknown manifestations.

Rosa explains that this analysis studies the virus' establishment in the body, inducing the infected individual to express proteins that are beneficial to the pathogen for its multiplication and maintenance. Cells in our body can express certain proteins normally, so there is an abnormal increase – at the virus' command – in the expression of these proteins. These are called Differentially Expressed Genes (DEGs). Clinical correlations drawn from these DEGs enhance understanding of infectious diseases.

All these molecular data from DEGs were compiled from other works to form two public databases: ZIKAVID and SARSCOVDB. In addition to storing the data, the databases allow comparative cross-referencing by different strains, hosts, sample types, among others.

In the study, human mesenchymal stem cells, which can differentiate into neural cells useful for analyzing neurodevelopmental processes, were infected with Zika. This led to the discovery of proteins related to brain diseases, such as Alzheimer's, ASD, amyotrophic lateral sclerosis, and Parkinson's disease. The researcher clarified that this does not imply Zika causes these diseases but "has a correlation that could worsen a condition or even initiate one."

The dissertation also showed, for the first time, the clinical correlation between the Zika virus and ASD, focusing on a mother diagnosed with the virus during pregnancy and her child diagnosed with autism. Rosa explains that most autism cases are related to genetics. In this case, however, even though the child fits all the parameters of this diagnosis, there was no genetic variation that determined the disease. Thus, through the reconstruction of the mother's past medical history, the only correlation found was Zika infection during pregnancy. The researcher emphasizes that, even though the study shows indications, it is not a definitive statement. "It's an article that fosters discussion about it. We're not hammering it down," he adds.

In the field of COVID-19, the same methodology was applied, but using the SARSCOVDB database. It was identified that, in addition to factors associated with the social aspect of the pandemic, the infection can result in molecular changes with neuropsychiatric outcomes. A set of DEGs related to alcohol dependence, autism, bipolar disorder, depression, panic disorder, schizophrenia, and sleep disorder was found. "Later, several studies together demonstrated that people with COVID have a tendency to develop an aggravated condition that goes beyond the impact expected for the infection itself. A viral infection could also worsen the psychiatric condition," he adds.

Furthermore, the thesis presented evidence of the risk for pregnant women, who contract COVID-19, to develop pre-eclampsia. "It's an increase in intrauterine pressure – it increases pressure with the fetus inside and can lead to a miscarriage," explains Rosa, adding that this finding led to social and political developments.

### Social Importance

The discovery linking SARS-CoV-2 and pre-eclampsia emerged at a time when the effects caused by the infection were poorly understood, and no special attention used to be given to pregnant women, a group more vulnerable to viral infections. Therefore, a detailed description of this correlation had consequences such as Law Nr. 14,151, of May 2021, which determined the removal of pregnant employees from on-site activities, and Legislative Indication Nr. 2139/2021, from the City Council of Rio de Janeiro, prioritizing COVID-19 vaccination for pregnant women.

Regarding Zika, congenital malformations were substantially reduced over time. According to the study, as most research focuses on apparent congenital defects, the importance of studying the asymptomatic infection tends to be neglected.

"Our studies show that [ZIKV] has an impact, and it ceased being talked about because it lost notoriety."

— Rafael Lopes da Rosa

However, evidence indicates a compromise to the future neurodevelopment of affected individuals. According to him, it is known that the virus has a cognitive impact on infected children, such as cognitive and speech deficits, and neural inflammation, but how this process occurs is still unknown. "How can the virus cause this? is a question that needs to be answered," he concludes.

Translated into English by **Rafaela Alexandre de Oliveira**, undergraduate student enrolled in the course "Supervised Translation Training II (English)" of the Undergraduate Program in Language and Literature, under the supervision and translation revision of Professor Elizamari R. Becker (P.h.D.) – IL/UFRGS.

### :: Read in portuguese

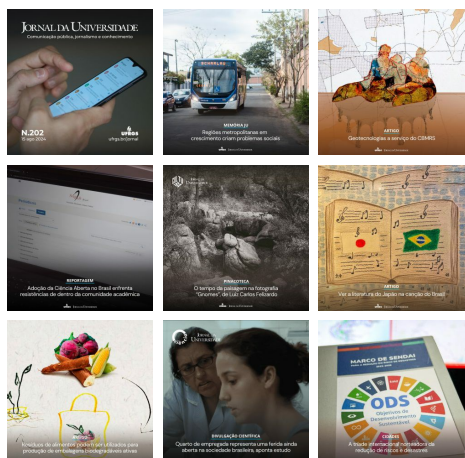
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