ZEBRAFISH MODEL IN THE DEVELOPMENT OF COVID-19 RAPID TEST

PEIXE PAULISTINHA NO DESENVOLVIMENTO DE TESTE RÁPIDO PARA COVID-19

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Letter to Editor

Dear Editor,

The World Health Organization (WHO) registered on January 30, 2020, that the outbreak of the disease caused by the new coronavirus (COVID-19), constitutes a Public Health Emergency of International Importance (highest level of alert from the Organization). Since then, the number of Covid-19 cases outside China has increased significantly worldwide. 1,773,084 COVID-19 cases and 111,652 deaths were confirmed by April 13, 2020 (WHO).

Some reports articles show that social isolation and the massive testing of suspected cases decrease the risk of increased COVID-19 contamination and, consequently, the risk of death (WANG et al. 2020). The numbers of confirmed cases, tests performed, and deaths reported by the WHO show an inversely positive relationship when we compare the number of deaths by Covid-19 to the number of available diagnostic tests. Countries with the highest number of tests per million inhabitants tend to have the least number of deaths from Covid-19. For this reason, it is highly recommended that countries massively test their population.

In order to identify new alternatives for rapid tests, our research group prospected a strategy to develop a rapid COVID-19 patient detection and tracking kit, using zebrafish model. Pharmacological, physiological and molecular similarities to humans have made zebrafish quickly emerge as a promising animal model for studying human diseases (MACRAE and PETERSON 2015). The comparison between zebrafish and human genomes reveals remarkable sequence and functional conservation (70% genetic similarity to humans) (BERGHMANS et al. 2005; ZON and PETERSON 2005).

In this letter, we describe a new technological invention for prospecting new antibodies against Covid-19. This same technology can be applied to detect other outbreaks that may occur in the future.

The state of the art, a COVID-19 viral protein (peptide) will be injected into two immunization sections in Zebrafish females with an interval of 7 days, with the aim of producing plasma antibodies. Passive transfer of antibodies to zebrafish eggs occur naturally as described by Wang et al. (2012). After immunization (Figure 1), the females will be stimulated to mate and generate the eggs with the antibodies, which will be collected, purified and inserted in a test strip (Figures 2 and 3).
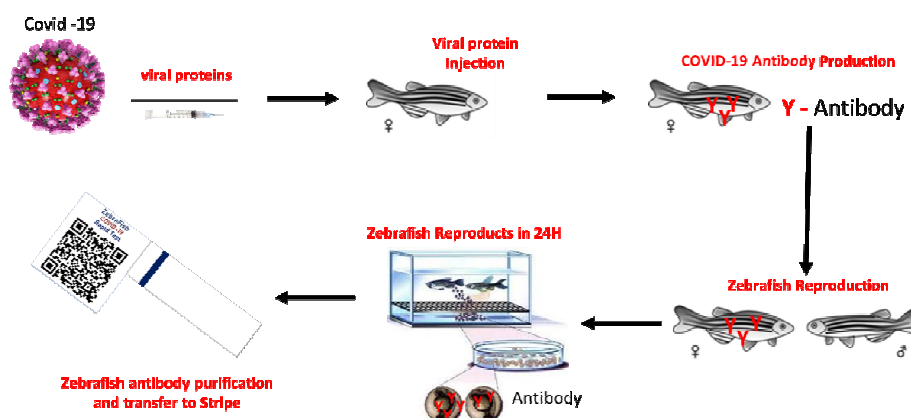

Figure 1 - Antibody collection and generation process.

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Each test strip has been designed with a QR code containing the test information and patient tracking. When testing with the Swab, the material is deposited on the test strip and the result will be displayed in contrast to the control line. The application is responsible for checking the validity of the test, recording the serial and batch number and comparing it with the current date and informing about any problems in the batch and with the user's location.

Figure 2 - Negative test for Covid19.

This information is used to record the test's demographic information in real time, guide patients and inform the authorities about positive and negative cases.
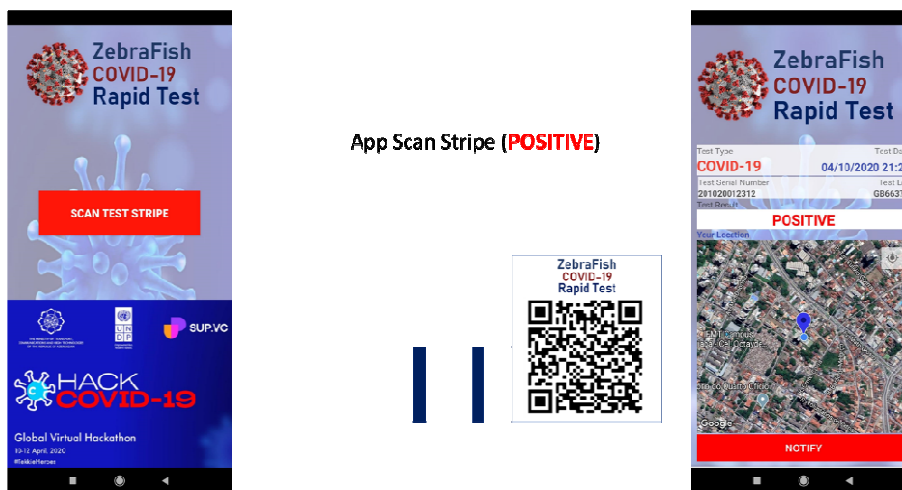

Figure 3 - Positive Test for Covid19 and App for notification of authorities.

This technique was presented on 12/04/2020 at HACK Covid 19, among 600 projects from 40 countries. This event aimed to select the best projects to help fight Covid19. This technology was developed by PhD. Ives Charlie-Silva (Team Leader) from University of São Paulo (ICB-USP); MSc. Ilo Rivero, from PUC minas (Pontifícia Universidade Católica); Bruno Nascimento Moreira, Federal University of Minas Gerais (UFMG)**;** PhD. Natalia Morais Feitosa, Federal University of Rio de Janeiro (UFRJ)**;** PhD. Leticia Lopes, University of São Paulo (ICB-USP); Matheus Sacco,

Finance and business specialist from Itaú Bank; PhD. Marco Antonio de Andrade Belo, Universidade Brasil and UNESP; PhD. Juliana Gomes, University of São Paulo (ICB-USP). Our team was just awarded 3rd place at Covid19 Hack - Azerbaijan Edition. Ware doing rapid tests for COVID19 using Zebrafish, 5x cheaper than current tests. Details is here: Web-site https://zebrafishrapidtest.com and https://www.youtube.com/watch?v=XisZ_nTrMNg

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