Zika Virus Vaccine

Since the rapid rise and spread of the Zika virus, search for a vaccine has ensued. While the virus causes mild symptoms in most, its association with severe birth defects in pregnant women, notably abnormal fetal brain development and microcephaly, to Guillain-Barré syndrome in adults (an autoimmune disorder that causes paralysis) has a vaccine imperative (Racaniello, 2016). Previous viral control endeavors only prevented vector exposure - the mosquito for Zika - so a vaccine would provide an essential, effective attempt to eradicate the virus.

Efforts to manufacture a working vaccine bear results, but a new study suggests a radical approach. Annie Elong Ngono at La Jolla Institute for Allergy and Immunology demonstrated the specific significance of certain immune cells as an intermediary to producing the defensive Zika response, and named them as targets for future vaccine development. These cells, known as CD4+ T cells or T helper cells, “contribute to the generation of [antibody] responses… and to the control of viral infection,” in intravaginally infected mice, with researchers concluding the “dominant feature of the protective role of CD4+ T cells during primary ZIKV infection” is in antibody production (Elong Ngono et al. 2019). While CD4+ T cells are not needed to control intravenous infections in mice, the memory they conferred in intravaginally infected mice led to immunity against lethal Zika doses. Research by Amelia Pinto previously showed T helper cells make the CD4 protein found to prevent neurological symptoms in Zika-infected mice by halting brain and spinal cord invasion and thus the severe associated symptoms (Pinto et al. 2018).

Besides other roles in the immune system, T helper cells contribute to adaptive immunity. After initial pathogen exposure, the system creates a response that remains in the body as immunological memory, meaning subsequent infections are less severe and removed quicker (Clem 2011). Adaptive immunity is the basis of vaccinations, and this link between T helper cells, antibody production, and Zika could be the missing key to a vaccination. T helper cells are one of the most vital aspects of immunity, and unsurprisingly they could be the answer for a cure. Researchers can narrow attempts to finding an “efficient” vaccine to specifically “promote CD4+ T cell activation,” rather than wasting time on other immune cells (Elong Ngono et al. 2019).

Previously, Zika viral immunity was attributed to another T cell - cytotoxic or CD8+ T cells (Elong Ngono et al. 2017). This research highlights the value in a multifaceted approach to questions and exploring new ideas. Research is built upon through collaboration, exemplified by the progression of the Zika vaccine. Furthermore, in today’s day and age it is difficult to keep public interest on a topic for long making timely, immediate vaccine development critical. The public loses interest as infection rates decrease or epidemics are geographically constricted. Scientists and pharmaceutical companies are unable or unwilling to work on drugs and vaccines. Companies face major financial losses for their research: after the recent Ebola virus outbreak, by the time a vaccine was developed for human trials there were too few infections and absence of public interest, leading to wasted time and resources (Sifferlin, 2016). While Ebola is more severe than Zika, it is not mosquito-borne meaning it can easily be controlled with quarantine. Mosquito-borne diseases such as Zika are predicted to increase in upcoming years as temperatures rise and their habitation zones increase (Diuk-Wasser, n.d.). This means

without a vaccination, it is hard to eliminate. While it has mild symptoms for now, the volatility of viruses and their tendency to mutate and develop new deadlier symptoms. It is urgent to find a vaccine before it becomes a more dangerous disease, and before the public forgets about it all together.