Exosomes as Vaccine Candidates for Flavivirus Including Zika Virus

Rubonal, Floyd

The overall objective of this research is to define the viral proteins composed in the exosomes and demonstrate that flavivirus proteins are present in the exosomes. The ongoing epidemic caused by flaviviruses highlight the enormous threat to global public health. West Nile Virus (WNV) and Zika virus (ZIKV) characterize neurological diseases. Due to the lack of clinically approved therapeutics against these flaviviruses, it necessitates the development of novel vaccines that can prevent flavivirus infection. Exosomes could be considered as novel vaccine candidates. Exosomes are small extracellular vesicles that have been implicated in immune cell-cell communication, and have been found to potentially incorporate viral proteins and present them to the immune system. As a result, I hypothesized that exosomes derived from flavivirus infected cells will possess viral proteins that can stimulate immune responses. To assess this hypothesis, immunofluorescent studies were done on exosomes for both infected and transfected Human Embryonic Kidney (HEK) cells. In the exosomes derived from infected cells, it shows that viral protein NS1 co-localizes with the exosome markers CD63 and CD9, demonstrating that NS1 viral protein is in the exosome. Furthermore, exosomes derived from HEK cells transfected with NS1 plasmids further validated that the viral protein is in the exosomes. Western blotting was also used to confirm WNV NS1 within the exosomes. My research supports viral proteins' presence on exosomes. This research can be used as a basis for Zika Virus research, as well as a development for a vaccine.

Awards Won: