



**LENGTH AND DENSITY OF HEMAGGLUTININ SPIKES ON MATURE AND  
BUDDING VIRUS-LIKE PARTICLES**

**Kelsee Todd (Faculty Mentor: Susan Bock, Ph.D.)  
Department of Biomedical Engineering**

*Abstract*

Current influenza vaccines, though generally effective, must be reformulated and re-distributed annually to accommodate mutated virulent seasonal strains. Offering a broadly protective universal influenza vaccine would eliminate the need to manufacture and update vaccines every year, thereby addressing this problem. One solution currently under investigation involves the exploitation of influenza virus-like particles (VLPs) to more efficiently identify and produce flu vaccines [1]. VLP production utilizes a baculovirus carrying a hemagglutinin (HA) gene [2]. We evaluated and compared the HA spike length measurements and interspike differences from VLPs in different developmental states. We found no significant difference between the HA spike proteins of the two forms of VLPs. This suggests that further research into different VLP forms could aid in the development of a broadly protective influenza vaccine.

*References*

- [1] K. Nerome *et al.*, “The large-scale production of an artificial influenza virus-like particle vaccine in silkworm pupae,” *Vaccine*, vol. 33, no. 1, pp. 117–125, Jan. 2015, doi: [10.1016/j.vaccine.2014.11.009](https://doi.org/10.1016/j.vaccine.2014.11.009).
- [2] D. M. McCraw *et al.*, “Structural analysis of influenza vaccine virus-like particles reveals a multicomponent organization,” *Sci Rep*, vol. 8, no. 1, p. 10342, Dec. 2018, doi: [10.1038/s41598-018-28700-7](https://doi.org/10.1038/s41598-018-28700-7).