Midterm II

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I decided to focus on the paper looking at anti-influenza aptamers [3].

Musafia *et al* examined a new way of fighting the influenza virus. Influenza is a particularly common viral disease that millions of people each year. It's particularly dangerous to adults over 65 [1]. The primary mechanism of spreading by coughing or sneezing [4]. Expelled viral particles then bind to the victim's respiratory epithelium, a lining in the respiratory tract.

Musafia *et al* study using an aptamer to block the virus from attaching to the respiratory epithelium, inhibiting inflection. Aptamers are a type of molecule called oligonucleotides. These molecules are single-stranded DNA or RNA of approximately 15-45 nucleotides in length. Aptamers are highly discriminating and can be created to bind to very specific targets, while not binding to closely related "targets."[1]

The process of generating aptamers is called "systematic evolution of ligands by exonential enrichment," or SELEX. This process generates a library of 10^{13} to 10^{15} random oligonucleotides, each 20-100 nucleotides long. The library is searched for sequences that can interact with the target; those few are chosen for the enrichment process.

This paper examines a DNA aptamer called BV02 and compares it to generated aptamers of similar length and other properties. BV02 had been previously shown to be effective at preventing influenza infection by blocking the viral hemagglutinin [2]. This aptamer was chosen by Musafia *et al* as the starting point and base comparison to the other aptamers created by the authors.

The method description involves a lengthy description of preparation for biochemical experiments. I won't pretend to understand the specifics, but this process describes how Musafia *et al* created their solutions and how a scientist[2] could recreate it.

The experiment itself was conducted on mice. The aptamers were applied to the mice premixed with the influenza virus.

Their methods and models seem to be fairly effective. Method found better sequences Model is okay

Might have been better to compare to aptamers that were closely related as well, simulating a slight mutation.

[1] As far as I understand it.

[2] Unfortunate grad student.

References

[1] Centers for Disease Control, Prevention (CDC, et al. Estimates of deaths associated with seasonal influenza—united states, 1976-2007. *MMWR. Morbidity and mortality weekly report*, 59(33):1057, 2010.

[2] Sung Ho Jeon, Basak Kayhan, Tamar Ben-Yedidia, and Ruth Arnon. A dna aptamer prevents influenza infection by blocking the receptor binding region of the viral hemagglutinin. *Journal of Biological Chemistry*, 279(46):48410–48419, 2004.

[3] Boaz Musafia, Rony Oren-Banaroya, and Silvia Noiman. Designing anti-influenza aptamers: Novel quantitative structure activity relationship approach gives insights into aptamer–virus interaction. *PloS one*, 9(5):e97696, 2014.

[4] I Stephenson and M Zambon. The epidemiology of influenza. *Occupational medicine*, 52(5):241–247, 2002.