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Custom Oligos & Predefined DNA/RNA

Application Note

INHIBITION OF INFLUENZA VIRUS REPLICATION BY DNA APTAMERS

DNA aptamers custom labeled by IBA

The genetic diversity of the influenza virus hinders the use of broad spectrum antiviral drugs and favors the appearance of resistant strains. Intracellular targets are difficult to address in living cells and the problem becomes even harder for the delivery of DNA/RNA molecules in vivo. Hence, there is still an urgent need for novel approaches to recognize and prevent this disease in its early stages. Single-stranded DNA aptamers represent such an approach with potential application as antiviral compounds.

The mRNAs of influenza virus possess a 5'cap structure and a 3'poly(A) tail that makes them structurally indistinguishable from cellular mRNAs. However, selective translation of viral mRNAs occurs in infected cells through a discriminatory mechanism. Viral polymerase and NS1 influenza protein interact with components of the host cell's translation initiation complex, such as the eIF4GI and PABP1 proteins. Rodriguez and coworkers have studied the potential of two specific aptamers, custom manufactured by IBA and labeled with Digoxigenin or Alexa Fluor® 488, that recognize PABP1. Both aptamers act as anti-influenza drugs since they hinder the interaction of viral polymerase with the eIF4GI translation initiation factor thus reducing viral genome expression and the production of infective influenza virus particles.

The results indicate that aptamers potentially have a broad therapeutic spectrum and enlarge the list of the available anti-influenza drugs. These novel drugs may help to reduce the spread of this virus and to decrease annual hospitalizations or deaths caused by influenza viruses.

References

Rodriguez, P.; Pérez-Morgado, M.I.; Gonzalez, V.M.; Martín, M.E.; Nieto, A. Molecular Therapy Nucleic Acids (2016) 5, e308; doi:10.1038/mtna.2016.20

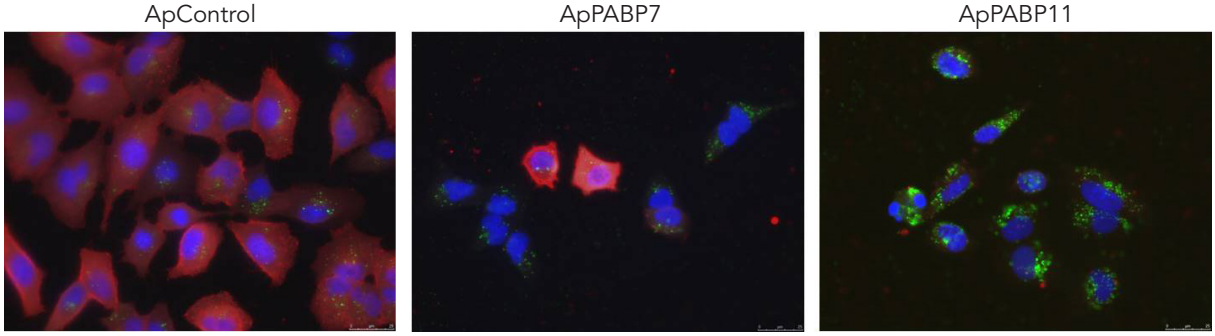

Figure 1: The effect of the PABP1 aptamers on influenza virus protein expression and distribution. A549 cells were transfected with 140 nmol/l of the indicated Alexa-488-labeled aptamers and at 12 hpt, the aptamers were washed out and the cells were infected with A/Victoria/3/75 strain at 2 plaque forming units/cell. At 9 hpi, immunofluorescence assays were performed using antibodies against HA protein: Green, Aptamers-Alexa-488; Red, HA protein. The experiment was performed twice and a representative image is shown. ApPABP7 and ApPABP11 transfection was associated with an important reduction in the number of influenza-infected cells relative to the cells transfected with the control aptamer.

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