ssDNA aptamer selection and inhibition to the binding of 2019-nCoV S1 protein to ACE2

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Gold statement

- The ssDNA aptamers against the 2019-nCoV S1 protein under the human serum background were selected by CE, which were all at the nanomole level.
- The ELISA competitive experiments and simulated interaction model showed that aptamer nCoV-S1-A1 could bind to the RBD domain of S1 protein and inhibit the binding activity of S1 protein to ACE2 (IC50=80.12nmol/L).

Introduction

2019-nCoV infection has spread to many countries and has become a public health threat to people all over the world. All the time, development of potential drugs to treat COVID-19 is being paid close attention. An ideal ssDNA aptamer has binding specificity and high tissue penetration. A variety of therapeutic strategies can be developed according to aptamer-based targeted therapies, for instance, directly used as agents to block functions, or introduced as targeted elements to form delivery carriers for multifarious therapeutic agents.

Body

In this study, we designed the aptamers selection strategy against the 2019-nCoV S1 protein containing receptor binding domain (RBD), and selected ssDNA aptamers under the human serum background based on high efficiency CE-SELEX. The affinity of 6 candidate aptamers were all at the nanomole level. The ELISA competitive experiments and simulated interaction model showed the aptamer nCoV-S1-A1 could bind to the RBD domain and inhibit the binding activity of S1 protein to ACE2 (IC50=80.12nmol/L).

Conclusion

The ssDNA aptamers of 2019-nCoV S1 protein may provide a novel clue for understanding or treatment of COVID-19, and for further study of the mechanism behind 2019-nCoV infection.