

The structure analysis of the aptamer for sialic acid and its applications as competitors from sialidase

Bo-Rahm Lee², Suhyung Cho¹, Byung-Gee Kim^{1,2}

Interdisciplinary program for biochemical engineering and biotechnology¹,
School of Chemical and Biological Engineering², Seoul National University,
Seoul, South Korea

TEL: +82-2-880-8945, FAX: +82-2-876-8945

Sialic acids located on cell surface are related in spreading, or metastasis of various cancer cells and infection of pathogen. In the study, RNA aptamer for *N*-acetyl neuraminic acid (NANA) among sialic acids was developed by in vitro selection procedure for 10 cycles, after immobilizing the NANA on agarose beads by enzymatic method. The aptamer had high affinity of $K_d = 1.35$ nM for NANA and it could recognize sialic acid regardless of next carbohydrate linkage such as 2, 3 or 2, 6 linkage with galactose. To identify the minimum binding site, the binding region of NANA with developed aptamer was characterized by RNase footprinting assay and we could recognize the result of footprint analysis and the predicted secondary structure are very similar. When the aptamer and sialidase were reacted together with NANA linked glycoconjugate, sialidase activity was surprisingly decreased over 95 % at sialic acid concentration of same amount with substrate. Generated sialic acid aptamer will be applied to competitor for sialidase.

References

1. Ciccotosto S, Kiefel M.J., Abo S., Stewart W., Quelch K., von Itzstein M., Synthesis and evaluation of *N*-acetylneuraminic acid-based affinity matrices for the purification of sialic acid-recognizing proteins(1998), *Glycoconjugate Journal*, 15, 663-669.

2. Koizumi, M., Soukup, G.A., Kerr, J.N. and Breaker, R.R., Allosteric selection of ribozymes that respond to the second messengers cGMP and cAMP(1999), *Nat. Struct. Biol.* 6, 1062-1071.
3. Hwang B, Cho JS, Yeo HJ, Kim JH, Chung KM, Han K, Jang SK, Lee SW, Isolation of specific and high-affinity RNA aptamers against NS3 helicase domain of hepatitis C virus(2004), *RNA*, 10(8), 1277-1290.