

**Title: Supplementary Data 1.**

**Description:** The efficiency dataset of mutation targets for ABE

**Title: Supplementary Data 2.**

**Description:** The efficiency dataset of mutation targets for CBE.

**Title: Supplementary Data 3.**

**Description:** The GC content of ABE library.

**Title: Supplementary Data 4.**

**Description:** The GC content of CBE library.

**Title: Supplementary Data 5.**

**Description:** The independent t-test pvalue (bonferroni correction) across position in ABE.

**Title: Supplementary Data 6.**

**Description:** The independent t-test pvalue (bonferroni correction) across position in CBE

**Title: Supplementary Data 7.**

**Description:** The benchmark results of various models for ABE

**Title: Supplementary Data 8.**

**Description:** The third-party off target datasets of ABE (endogenous)

**Title: Supplementary Data 9.**

**Description:** The benchmark results of various models for CBE

**Title: Supplementary Data 10.**

**Description:** The third-party off target datasets of CBE (endogenous)

**Supplementary Data 11.** The third-party off target datasets of ABE (in vitro)

**Supplementary Data 12.** The third-party off target datasets of CBE (in vitro)

**Supplementary Data 13.** The sequences of oligonucleotides

**Supplementary Data 14.** The hyperparameters used for Tree-structured Parzen Estimator