Supporting Information

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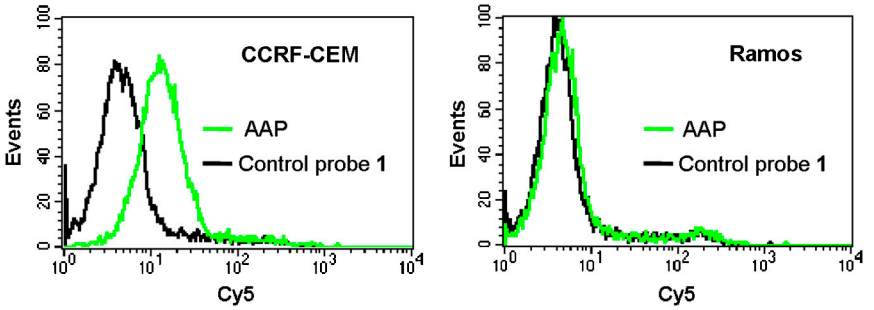

Fig. S1. Activation of the AAP by target CCRF-CEM cancer cells in mouse serum. Cells were incubated with the probes (25 nM) in spiked mouse serum for 30 min on ice, and then flow cytometry assays were performed immediately by counting 10,000 events.

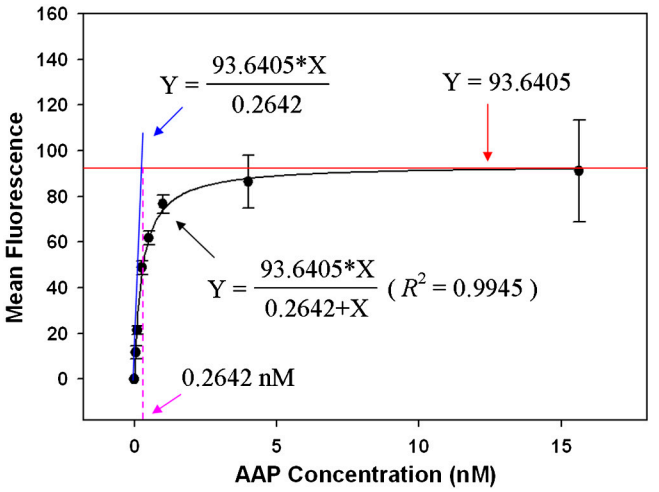

Fig. S2. Flow cytometry assays to determine the binding affinity of the AAP to CCRF-CEM cells.

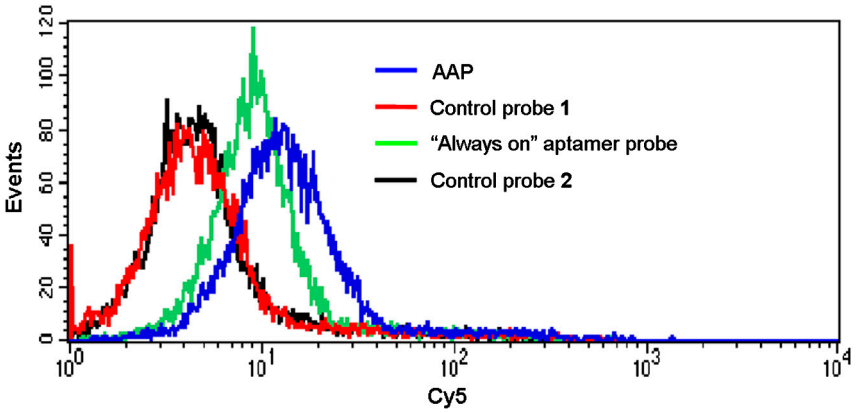

Fig. S3. Contrast-enhanced detection of CCRF-CEM cells in spiked mouse serum using the AAP, in comparison with the results obtained by the "always-on" aptamer probe. Cells were incubated with the probes (25 nM) in spiked mouse serum for 30 min on ice, and then flow cytometry assays were performed immediately by counting 10,000 events. The detector voltage used for control probe **1** and the AAP was 482. The detector voltage used for control probe **2** and the always-on probe was 435.

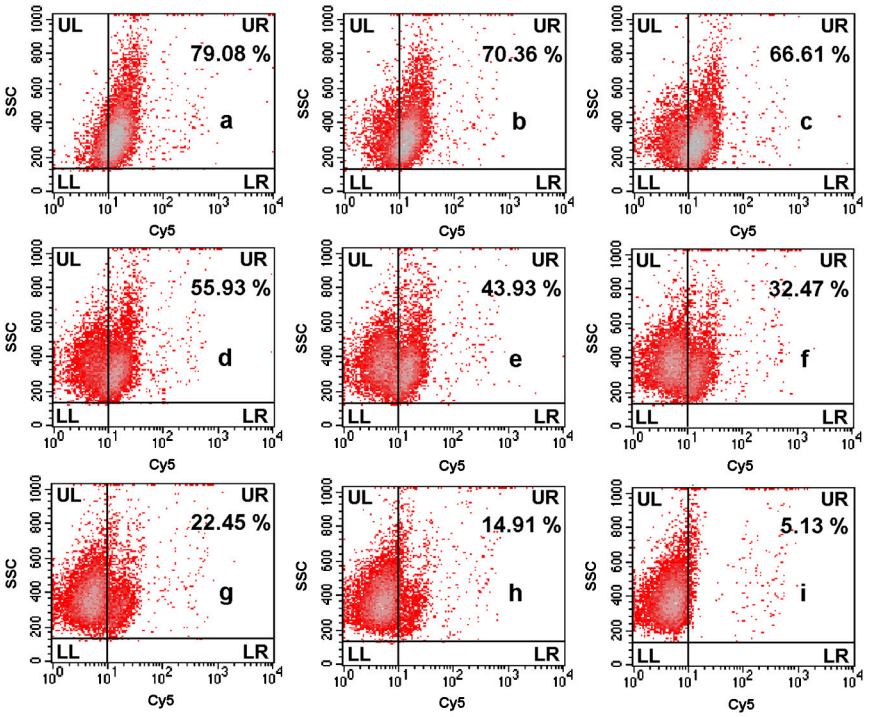

Fig. S4. Specific detection of CCRF-CEM cells in mixed cell samples with the AAP. The mixed cell samples were prepared with different concentration ratios of CCRF-CEM cells to Ramos cells (*a–i*: 1:0, 9:1, 4:1, 2:1, 1:1, 1:2, 1:4, 1:9, 0:1) and then incubated with 25 nM AAP in binding buffer for 15 min at normal temperature. Flow cytometry assays were immediately performed by counting 10,000 events. The inserted percentage numbers showed the percentage of positive signals obtained using the AAP for each cell sample.

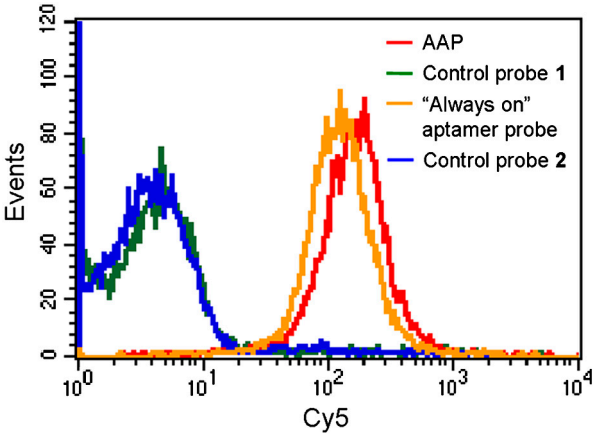

Fig. S5. Flow cytometry assays of CCRF-CEM cells detected by the AAP, in comparison with the results achieved by the always-on aptamer probe. 2×10^5 CCRF-CEM cells were incubated with 25 nM probes in 200 μl binding buffer at normal temperature for 15 min in the dark. Cells were then washed twice, suspended in 0.2 ml of binding buffer, and subjected to flow-cytometric analysis. The detector voltage used for control probe **1** and the AAP was 680. The detector voltage used for control probe **2** and the always-on probe was 612.