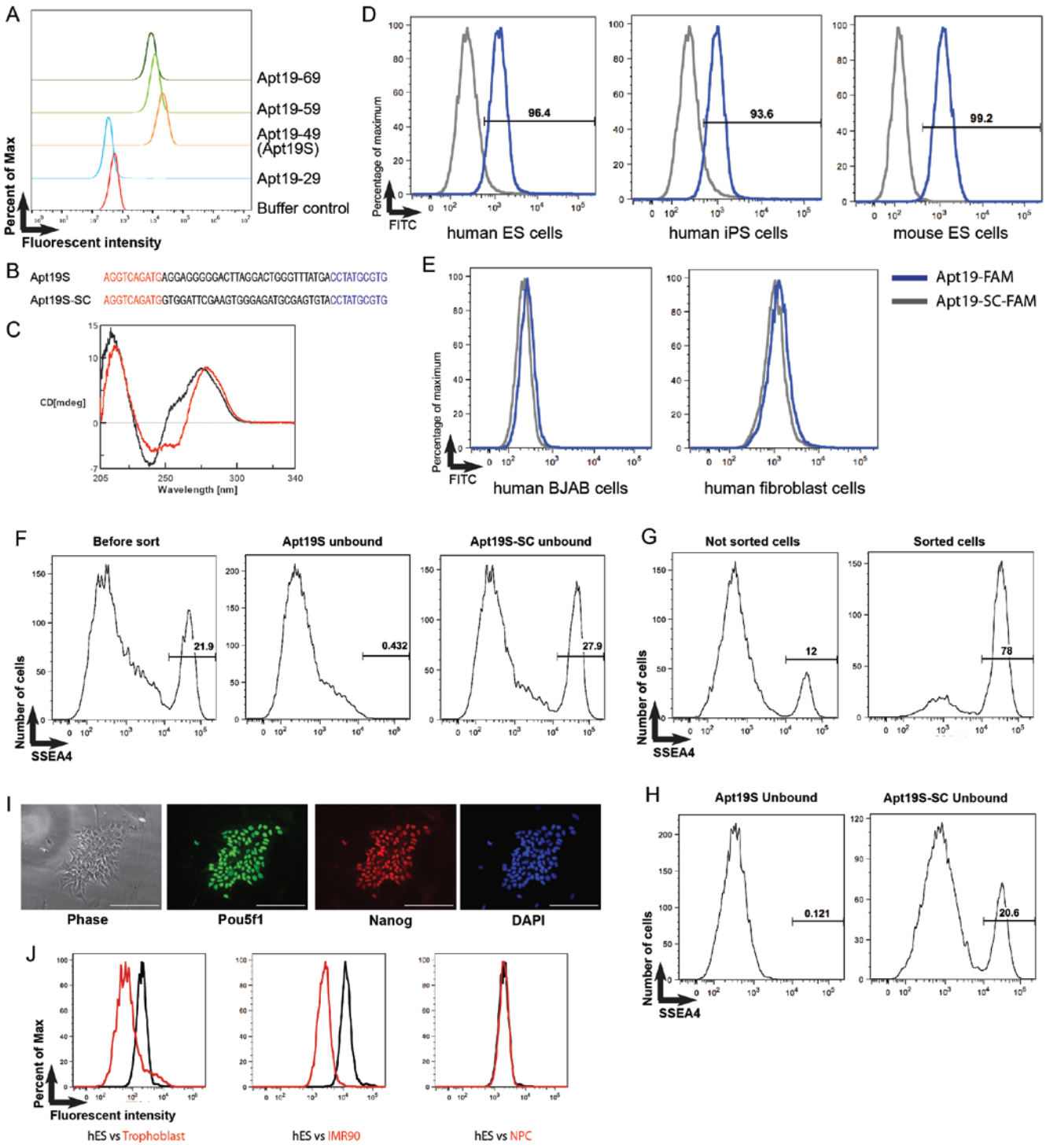

Supplementary information, Figure S1 (A) Flow cytometry histogram showing the binding of Apt19 with different truncations to human ES cells. **(B)** Sequences of Apt19S and Apt19S-SC. Constant regions on the 5' and 3' of the aptamers were colored red and blue respectively. **(C)** CD spectrum of Apt19S (black) and Apt19S-SC (red). **(D)** Different types of PSCs were incubated with fluorescently labeled full length Apt19 (blue) or Apt19SC (grey), a scrambled version of

APT19. The fluorescent intensities of the cells were then measured by flow cytometry. **(E)** Two lines of differentiated human cells were incubated with fluorescently labeled full length Apt19 (blue) or Apt19SC (grey) and analyzed by flow cytometry. **(F)** A mixture of hESCs and foreskin fibroblast cells were incubated with either biotin labeled Apt19S or Apt19S-SC and FITC labeled SSEA4 antibody. After incubation, the aptamers were separated from unbound cells by streptavidin labeled magnetic beads. The fluorescence profile of the cell mixture before separation and the unbound cell fractions of Apt19S and Apt19S-SC after separation were analyzed by flow cytometry. The number in each plot shows the percentage of SSEA4+ hESCs in the cell mixture. **(G)** Flow cytometry histogram showing the SSEA4 staining profile of cells in a reprogramming experiment with or without Apt19S mediated sorting. **(H)** Flow cytometry histogram showing the SSEA4 staining profile of unbound cells after Apt19S or Apt19S-SC mediated sorting. The same reprogramed cell culture as in **G** was used. **(I)** iPS cells enriched by Apt19S in **G** form colonies and express pluripotency markers POU5F1 and NANOG as shown by immunostaining (scale bar: 200μm). **(J)** Flow cytometry histograms comparing the staining profiles of Apt19S on hESC with those on trophoblast cells, IMR90 cells and NPC.