**Supporting Information**

**Supplementary Table 1. Information of AML patients.**

**Supplementary Fig. 1. Combination of radotinib and Ara-C inhibits HL60 cell proliferation.** Cells were stimulated with various concentrations of 0, 10, 30, 40 and 50 µM radotinib and 0, 40, 80, 120 and 160 nM Ara-C for 48 h. The cytotoxicity was then evaluated by a cell viability assay. (A) Dose-dependent responses of radotinib on cell viability. (B) Dose-dependent responses of Ara-C on cell viability. (C) Treatment of radotinib and/or Ara-C at 48 h. Representative data are shown for at least three independent experiments. These data represent the means ± SEM. Significantly different from the control (\*) or combination of radotinib and Ara-C (#); \*: *P*, 0.05; \*\*\*, ###: *P*, 0.001. C: DMSO-control, R: radotinib, A: Ara-C.

**Supplementary Fig. 2. Radotinib and Ara-C sensitize the chemotherapeutic agents including daunorubicin (DNR) or idarubicin (Idar) in AML cells.**

(A) HL60 cells were cultured with 3 µM radotinib, 10 nM Ara-C and 50 nM DNR for 48 h. The cell viability was then evaluated by an MTS assay. Triple combination of radotinib, Ara-C and DNR on cell viability is more potent. (B) HEL92.1.7 cells were cultured with 5 µM radotinib, 10 nM Ara-C and 75 nM DNR for 48 h. Triple combination of radotinib, Ara-C and DNR on cell viability is more potent (C) HEL92.1.7 cells were cultured with 5 µM radotinib, 10 nM Ara-C and 2 nM idarubicin for 48 h. Triple combination of radotinib, Ara-C and idarubicin on cell viability is more powerful. These data represent the means ± SEM. Significantly different from control (\*) or triple combination of radotinib, Ara-C and DNR/or idarubicin (#); \*\*\*, ###: *P* < 0.001.

**Supplementary Fig. 3.** **Isobologram analysis of radotinib and Ara-C combination on AML cell death.** Cell viability assay by radotinib and Ara-C was analyzed in HL60 cells. Cells were seeded (density, 2 × 104 cells/well) in 96-well plates containing 200 µl medium per well and were incubated with diverse concentration of radotinib and/or Ara-C for 48 h at 37°C. CellTiter 96 solution (20 µl; Promega, Madison, WI, USA) was added directly to each well, and the plates were incubated for 4 h in a humidified atmosphere of 5% CO2 at 37°C. Absorbance was measured at 490 nm by using SpectraMax iD3 Microplate Reader (Molecular Devices, San Jose, CA, USA). We found the strong synergism on radotinib and Ara-C combination on AML cell death. Fifty % of inhibition concentration (IC50) on AML cell death in HL60 cells: Radotinib only, 200 μM; Ara-C only, 140 nM; combination of radotinib and Ara-C = 5 μM + 70 nM. Combination Index: 0.52).

**Supplementary Fig. 4.** Original western blots used for Fig. 3C, 3D and 3E. The blots were developed using the ChemiDocTM Touch Imaging System, and analyzed with the Image LabTM Software. The red boxes indicate the cropped regions used in the representative figures.

**Supplementary Fig. 5.** Original western blots used for Fig. 4C and 4F. The blots were developed using the ChemiDocTM Touch Imaging System, and analyzed with the Image LabTM Software. The red boxes indicate the cropped regions used in the representative figures.

**Supplementary Fig. 6.** Original western blots used for Fig. 5B and 5C. The blots were developed using the ChemiDocTM Touch Imaging System, and analyzed with the Image LabTM Software. The red boxes indicate the cropped regions used in the representative figures.

**Supplementary Fig. 7.** Original western blots used for Fig. 6D and 6E. The blots were developed using the ChemiDocTM Touch Imaging System, and analyzed with the Image LabTM Software. The red boxes indicate the cropped regions used in the representative figures.

**Supplementary Table 2.** Supplementary Methods.