Supporting information:

Table S1: New SKBR-3 cell targeting peptide clones recovered from landscape phage library by using an elution buffer. S: denotes cell surface binding fraction.

Cell-Targeting clones		
Clone ID	Motif sequence	Frequency
S1	DGSIPWST	13
S2	VSSTQDFP	10
S3	DNGSGISW	5
S4	DTKTAPAW	3
S5	GSTDSDLK	2
S6	ATTAPSYP	1
S7	AAATKSDL	1

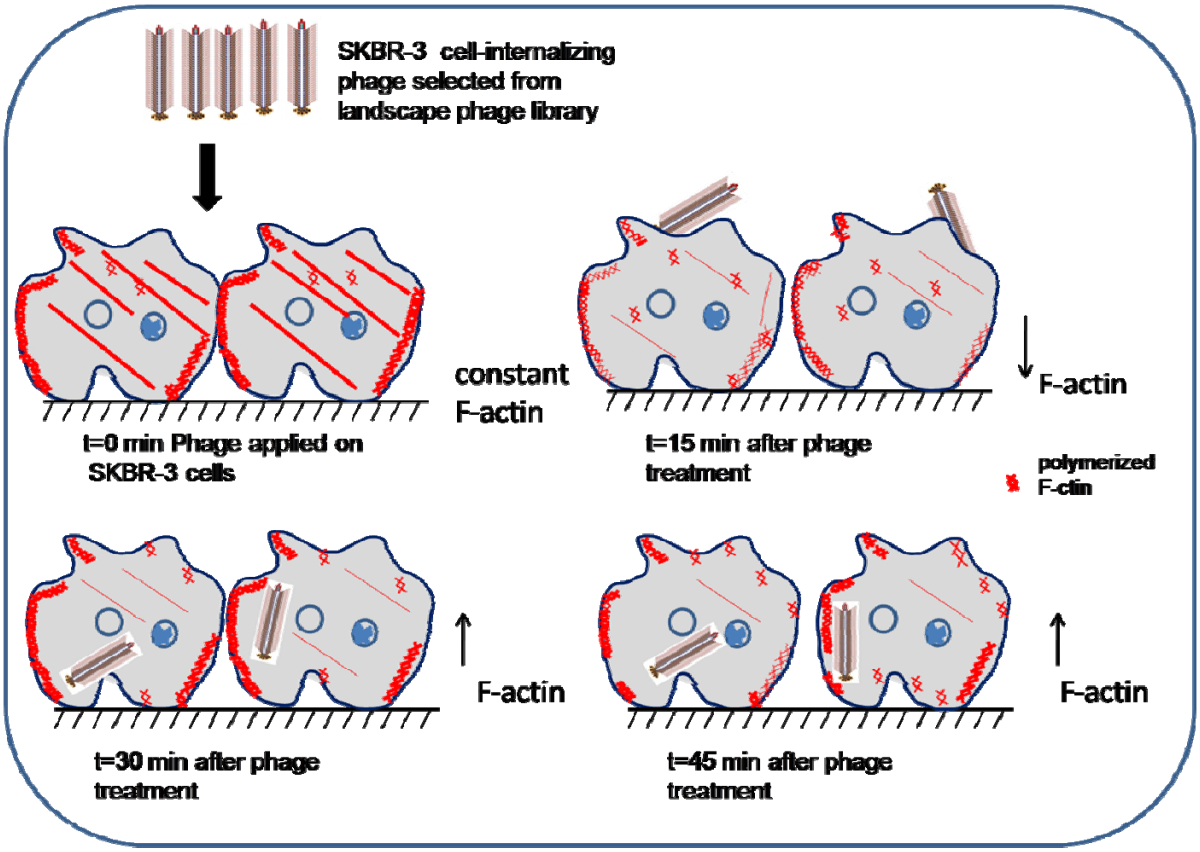

Figure S1: Schematic changes in the pool of F actin during entry of the selected phage into SKBR-3 cells proposed based on this study. Before the treatment of SKBR-3 cells with selected phage, the cells are characterized by normal F-actin level with prominently stained thin actin filaments. Incubation of selected phage with SKBR-3 cells for 15min resulted in increased depolymerization of F-actin with less intensely stained thin actin filaments. When the phage is further incubated for 30 min and 45 min there is a steady increase in the F-actin content with decreased visibility of thin actin filaments.

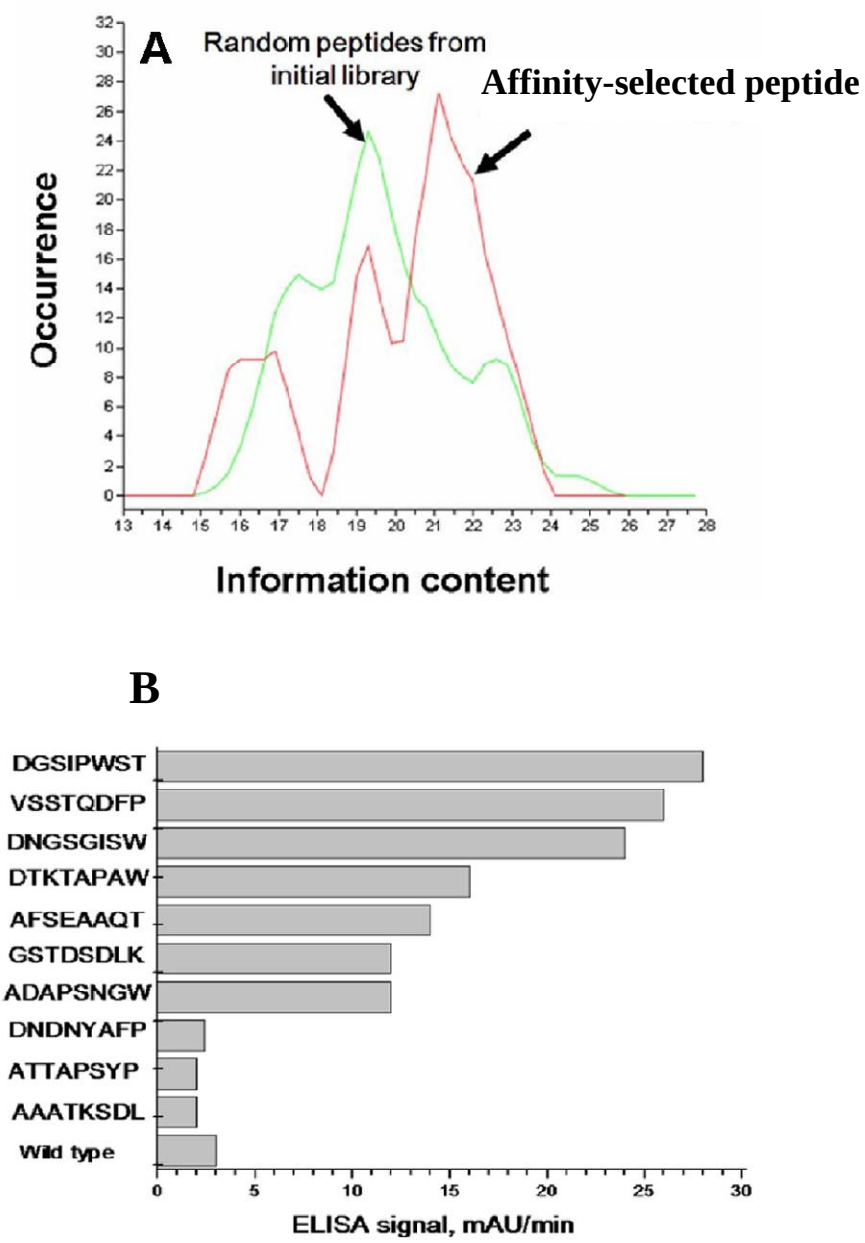

Figure S2: (A) Relative abundances of peptides plotted as a function of information content for peptides selected to SKBR-3 (RELIC/INFO analysis). (B) Binding of control phage and affinity selected phages to SKBR-3 cells immobilized on a microtiter plate (ELISA). X axis indicates the ELISA signal in milliabsorbance units (mAU)/min and Y axis shows the affinity selected peptide sequences displayed on the major coat of fd-tet phage.

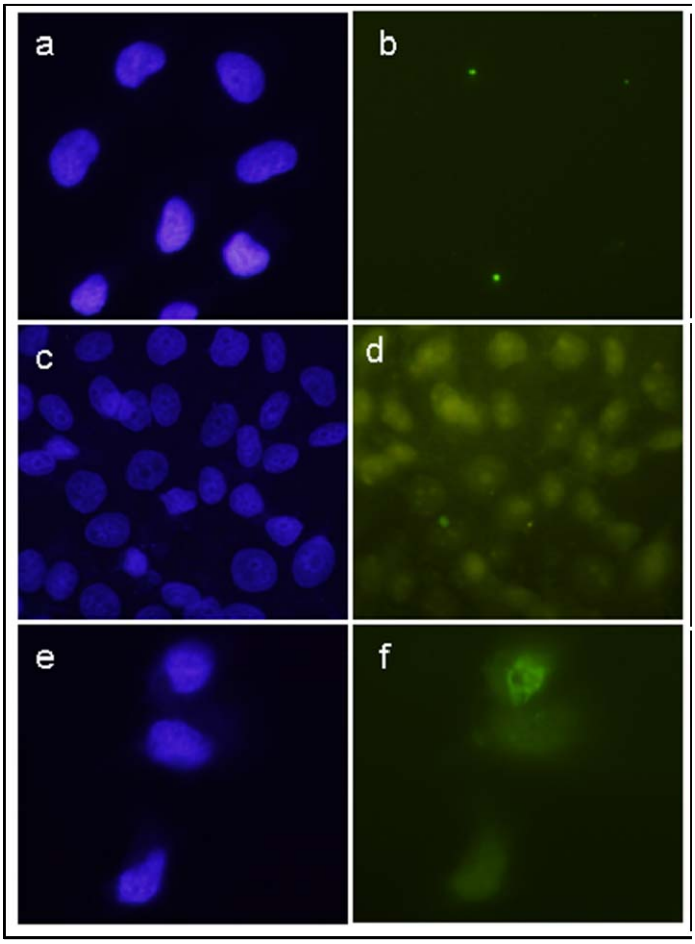

Figure S3. Detection of internalized phage particles in SKBR-3 cells using immunoflourescence microscopy (a-f). (a) DAPI-stained cells with treatment with wild type fd-tet phage, showing fluorescence associated with nuclei. (b) SKBR-3 cells treated with wild type fd-tet phage and labeled with anti-phage antibody conjugated to Alexa Flour. (c,d) Cells treated with identified cell-internalizing phage (displaying peptide **S1, L2**) and stained with DAPI and anti-phage antibody-labeled Alexa flour fluorescently, showing the corresponding blue fluorescence from nuclei and green fluorescence resulting from the internalization of phage. (e,f) Cells treated with identified cell-internalizing phage (displaying peptide **S2, L1**) and stained with DAPI and anti-phage antibody-Alexa flour.

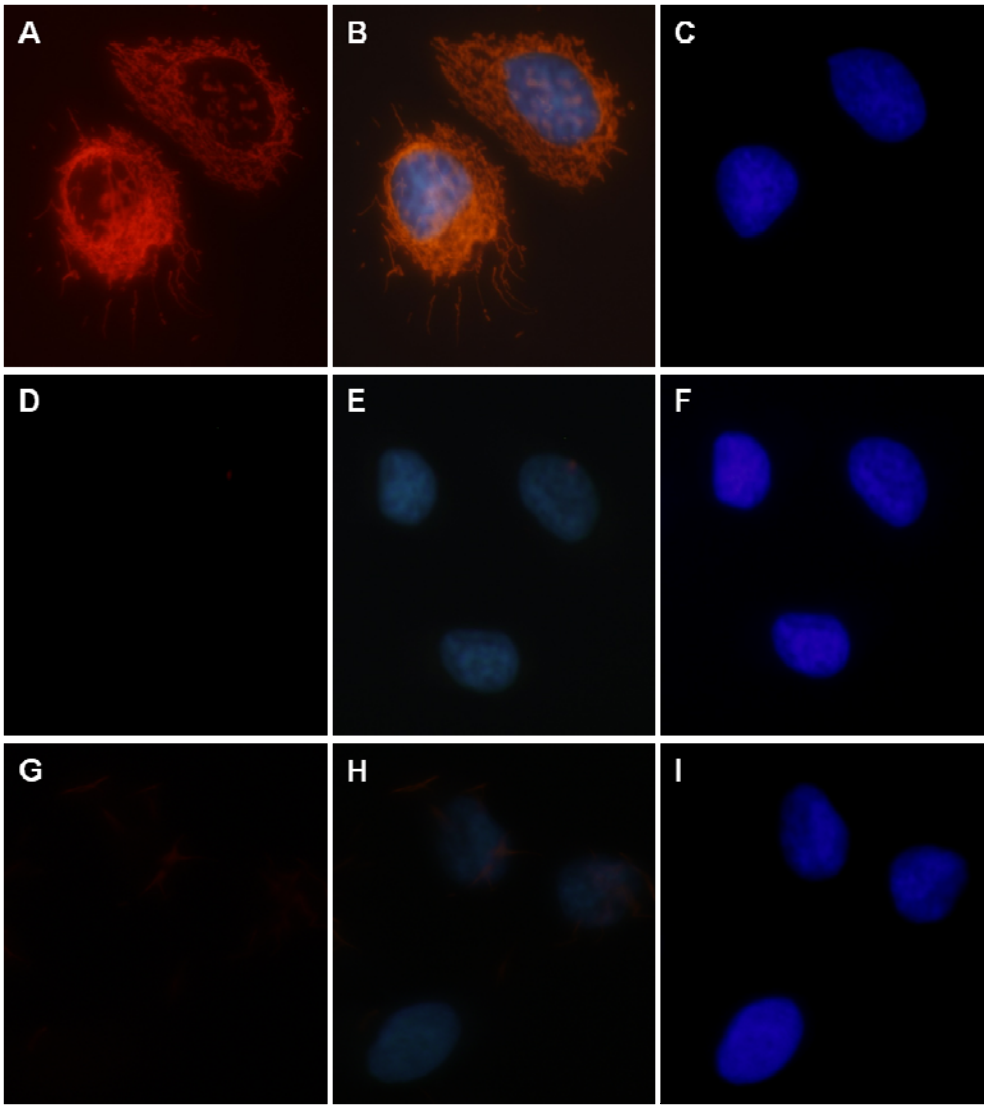

Figure S4. Detection of energy dependency of L1 phage entry in SKBR-3 cells using immune fluorescence (A-C) Rhodamine and DAPI fluorescence at 37^{o}C in absence of ATP inhibitors. (D-F) Rhodamine and DAPI fluorescence at 4^{o}C and (G-I) Rhodamine and DAPI flourescence at 37^{o}C in presence of ATP inhibitors (sucrose and sodium azide). [A,D,G-rhodamine specific filter; B,E,H- rhodamine and DAPI specific filters; C,F,I- DAPI specific filter.

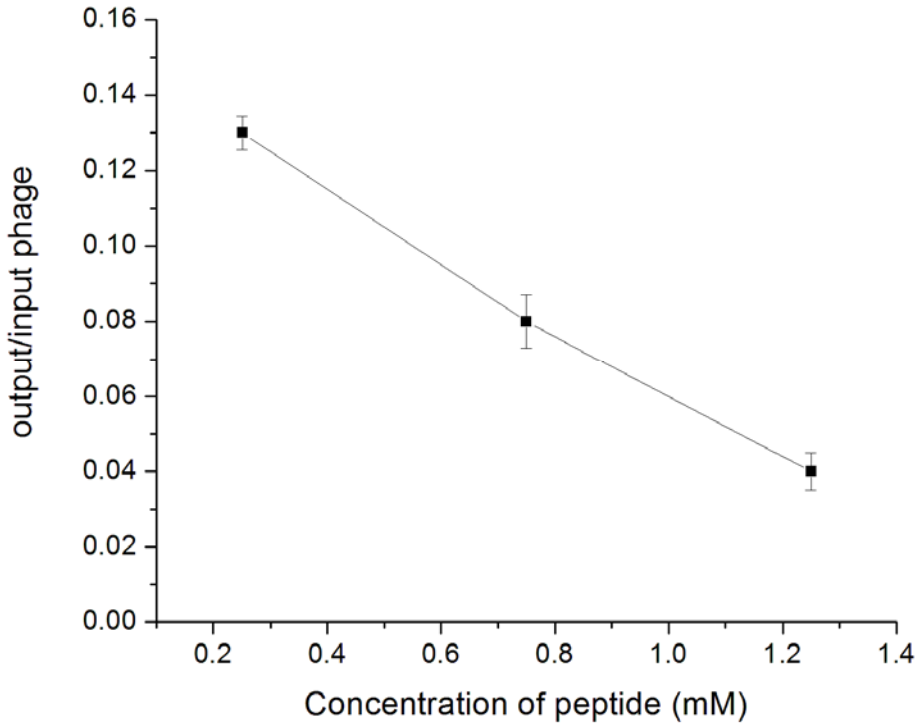

Figure S5. Blocking of L1 phage binding to SKBR-3 cells in presence of VSSTQDFPDPAK synthetic peptide. SKBR-3 cells were incubated with different concentrations of the VSSTQDFPDPAK peptide followed by L1 phage incubation. Phage bound to the cells was quantified via titering and is presented here as an output to input ratio (y-axis) versus peptide concentration (x-axis). Data presented here is mean of three independent experiments (±sd).