

Supporting Information

Competitive affinity-based proteome profiling and imaging to reveal potential cellular targets of betulinic acid

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1. General information

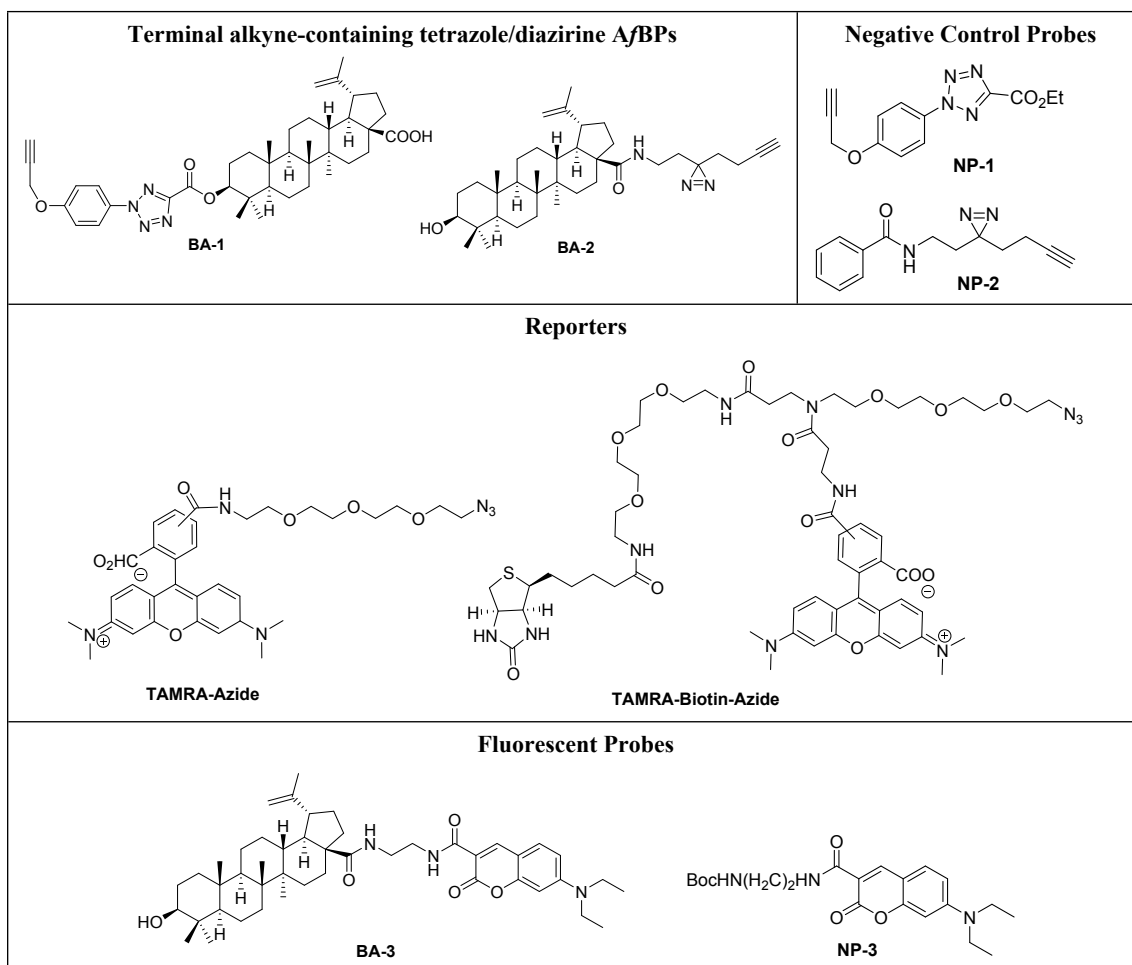
All chemicals were purchased from commercial vendors and used without further purification, unless indicated otherwise. All reactions requiring anhydrous conditions were carried out under argon or nitrogen atmosphere using oven-dried glassware. Reaction progress was monitored by TLC on pre-coated silica plates (Qingdao Huanghai F₂₅₄ nm, 0.25 μm) and spots were visualized by UV, iodine or other suitable stains. Flash column chromatography was carried out using silica gel (Qingdao Huanghai F₂₅₄ nm, 0.040-0.063 μm). All NMR spectra (¹H-NMR, ¹³C-NMR) were recorded on Bruker 300 MHz/400 MHz NMR spectrometers. Chemical shifts were reported in parts per million (ppm) referenced with respect to appropriate internal standards or residual solvent peaks (CDCl₃ = 7.26 ppm, DMSO-*d*₆ = 2.50 ppm). The following abbreviations were used in reporting spectra, br s (broad singlet), s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), dd (doublet of doublets). In-gel fluorescence scanning of the SDS-PAGE gels was carried out with Typhoon 9500 fluorescence gel scanner (Amersham Biosciences), the click chemistry ligand tris[(1-benzyl-1H-1,2,3-triazol-4-yl)methyl]amine (TBTA) were purchased from Sigma-Aldrich. TAMRA-Azide (Cat # AZ109) and TAMRA-Biotin-Azide (Cat # 1048) were purchased from Click Chemistry Tools (<https://www.clickchemistrytools.com>). Antibodies against PGK1 (ab199438), ACAT1 (ab171630), Topoisomerase (ab109374), C3 (ab181147), PFKFB1 (ab72590) and the recombinant human PGK1 protein (ab87630) were purchased from Abcam. Antibody against APOL2 (25925-1-AP) was purchased from Proteintech. Antibodies against AIF (4642) and NF-κB (8242t) were purchased from CST.

Cell culture and Western blot

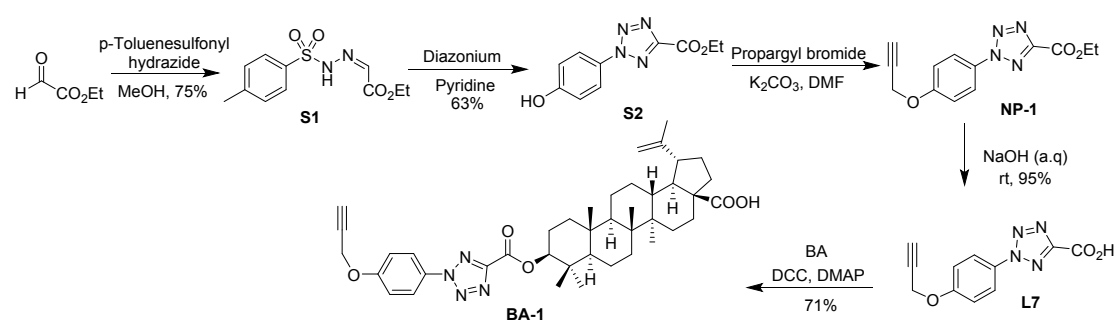
Cell lines were obtained from the National Cancer Institute Developmental Therapeutics Program (NCI-60). MCF-7 cells were cultured in Dulbecco's modified Eagle medium (DMEM, high glucose pyruvate, Thermo Scientific) containing 10% heat-inactivated fetal bovine serum (FBS; Gibico), 100 units/mL penicillin, and 100 μg/mL streptomycin (Thermo Scientific) and maintained in a humidified 37 °C incubator with 5% CO₂. To generate protein lysates, cells were washed twice with cold phosphate-buffered saline (PBS), harvested with 1× trypsin or by use of a cell scraper, and collected by centrifugation. Cell pellets were then washed with PBS and lysed with N-(2-hydroxyethyl)piperazine-N'-2-ethanesulfonic acid (HEPES) buffer (25 mM HEPES, 150 mM NaCl, and 2 mM MgCl₂, pH 7.5) containing 0.5% NP-40. Protein concentration was determined by Bradford protein assay. For Western blotting experiments, samples from MCF-7 cells were resolved by SDS-polyacrylamide gels and transferred to poly(vinylidene difluoride) membranes. Membranes were then blocked with 3% bovine serum albumin (BSA) in TBST (0.1% Tween in Tris-buffered saline) for 1 h at room temperature. After blocking, membranes were incubated with the corresponding primary antibody for another hour. After incubation, membranes were washed with TBST (4×10 min) and then incubated with an appropriate secondary antibody. Finally, blots were washed again with TBST before being developed with SuperSignal West Dura Kit (Thermo Scientific). Proteome labeling, in-gel fluorescence scanning and bioimaging experiments were

performed as previously reported.^[1,2,3]

2. Structures of probes and reporters used in the current study



3. Chemical Synthesis



Scheme S1

(**S1**). S1 was synthesized based on previously published procedures.^[4] ¹H NMR (400 MHz, CDCl₃) δ 12.11 (s, 1H), 7.83 (d, *J* = 7.6 Hz, 2H), 7.33 (d, *J* = 7.8 Hz, 2H), 6.81 (s, 1H), 4.24 (q, *J* = 7.2 Hz, 2H), 2.45 (s, 3H), 1.33 (t, *J* = 7.1 Hz, 3H). LC-MS (ESI): *m/z* [M+1]⁺ calcd: 207.11; Found : 207.13.

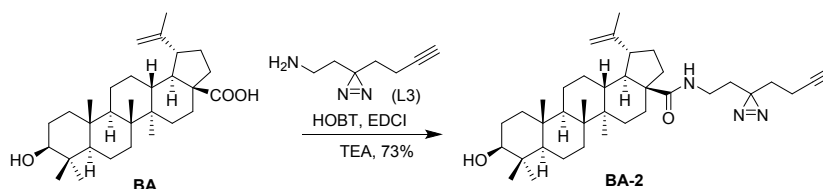
(**S2**). Synthesis of the diazonium salt was based on previously published procedures.^[5] The freshly prepared diazonium salt solution (10 mmol) was added dropwise, over a period of 30 min, to a stirred solution of phenylsulfonylhydrazine (2.7 g, 10 mmol) in 20 mL pyridine at -5 °C. The resulting mixture was stirred for 2 h at -

5 °C and then further 2 h at room temperature. The reaction mixture was diluted with 10 mL H₂O and 30 mL EtOAc. The organic phase was separated and washed with 1 N HCl (2 × 20 mL), followed by concentration *in vacuo*. The residue was purified by flash chromatography (PE:EA = 3:1) to afford the desired compound **S2** (1.47 g, 63% yield). ¹H NMR (400 MHz, CDCl₃) δ 8.08 (d, *J* = 7.7 Hz, 2H), 7.02 (d, *J* = 7.7 Hz, 2H), 5.29 (s, 1H), 4.57 (q, *J* = 6.9 Hz, 2H), 1.49 (t, *J* = 7.1 Hz, 3H). ¹³C NMR (75 MHz, MeOD) δ 160.78, 158.81, 158.24, 129.69, 122.65, 116.86, 63.16, 14.00. LC-MS (ESI): *m/z* [M+1]⁺ calcd: 235.08; Found 235.04.

(**NP-1**). To a stirred solution of **S2** (1 g, 4.3 mmol) in 20 mL DMF was added propargyl bromide (0.56 g, 4.7 mmol) and K₂CO₃ (1.16 g, 8.6 mmol). The mixture was stirred for 8 h at r.t., followed by addition of 2 mL water. The mixture was extracted with 2×10 mL ethyl acetate, and the organic phase was dried over anhydrous Na₂SO₄ and concentrated. The residue was purified by column chromatography on silica gel (PE : EtOAc = 5:1) to give the pure product **NP-1** as a white solid (1.04 g, 89%). ¹H NMR (400 MHz, CDCl₃) δ 8.14 (d, *J* = 7.8 Hz, 2H), 7.16 (d, *J* = 7.8 Hz, 2H), 4.79 (s, 2H), 4.57 (q, *J* = 7.0 Hz, 2H) 2.58 (m, 1H), 1.49 (t, *J* = 7.0 Hz, 3H). ¹³C NMR (100 MHz, MeOD) δ 161.18, 159.21, 158.64, 130.09, 123.05, 117.26, 63.56, 14.40. LC-MS (ESI): *m/z* [M+1]⁺ calcd: 273.09; Found 273.07.

(**L7**). To a solution of **NP-1** (0.54 g, 2 mmol) in 10 mL methanol was added 1.5 mL 4N NaOH. The mixture was stirred for 8 h at r.t. The mixture was acidified with aq 1 N HCl and extracted with EtOAc (3×10 mL). The combined organic layers were dried (anhydrous Na₂SO₄) and concentrated. The residue was purified by column chromatography on silica gel (PE : EA = 1:1) to give the pure product **L7** as a yellow solid (0.46 g, 95%). ¹H NMR (400 MHz, CDCl₃) δ 8.18 (d, *J* = 8.0 Hz, 2H), 7.19 (d, *J* = 8.0 Hz, 2H), 4.82 (s, 2H), 2.60 (m, 1H). ¹³C NMR (100 MHz, MeOD) δ 160.68, 160.36, 159.30, 131.69, 122.86, 117.08, 79.04, 77.49, 57.04. HR-MS (ESI): *m/z* [M+1]⁺ calcd :245.0675; Found 245.0663.

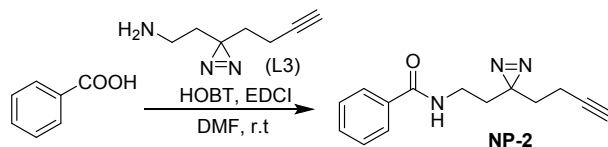
(**BA-1**). To a solution of **L7** (20 mg, 0.08 mmol) in 10 mL DMF was added DCC (16 mg, 0.08 mmol) and DMAP (20 mg, 0.08 mmol), the mixture was stirred for 30 min at r.t followed by addition of betulinic acid (19 mg , 0.04 mmol). The reaction was stirred at room temperature for another 6h. Subsequently, the reaction was quenched by addition of 10 mL water and extracted with 2 × 10 mL of ethyl acetate. The organic layers were washed with 2×10 mL brine and dried over anhydrous Na₂SO₄. Upon solvent evaporation *in vacuo*, the residue was purified by flash column (PE : EA = 4:1) to give **BA-1** as a yellow solid (19 mg, 71%). ¹H NMR (400 MHz, CDCl₃) δ 8.08 (d, *J* = 8.0, 2H), 7.14 (d, *J* = 8.0, 2H) , 4.73 (s, 1H), 4.59 (s, 1H), 4.47 (m, 1H), 4.20 (m, 1H), 3.63 (m, 1H), 3.48 (m, 1H), 3.18 (m, 1H), 2.59 (m, 1H), 2.27 (m, 2H), 1.69 (s, 3H), 1.25-1.40 (m, 14H), 1.19-1.09 (m, 7H), 0.97 (s, 6H), 0.93 (s, 3H), 0.81 (s, 3H), 0.75 (s, 3H). ¹³C NMR (100 MHz, DMSO) δ 177.35, 160.24, 158.72, 152.17, 150.42, 129.76, 121.89, 116.36, 109.76, 78.95, 78.75, 76.91, 55.53, 55.02, 50.05, 48.65, 46.74, 42.12, 38.62, 37.71, 36.84, 33.47, 31.83, 30.19, 29.33, 28.22, 27.27, 25.54, 25.46, 25.20, 24.59, 20.58, 19.06, 18.09, 16.07, 15.93, 15.85, 14.50. HR-MS (ESI): *m/z* [M+1]⁺ calcd 683.4172; Found 683.4192.



Scheme S2

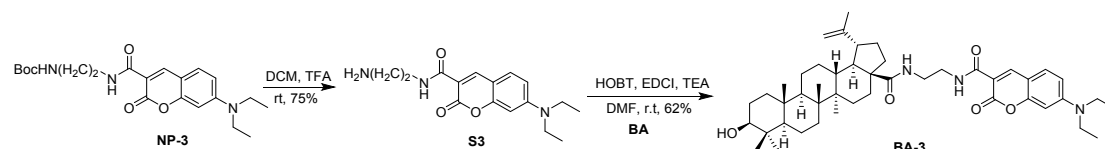
(**BA-2**). The Synthesis of **L3** was based on previously published procedures.^[1] To a stirred solution of **BA** (46 mg, 0.1 mmol) in 5 mL DMF were added HOBT (20 mg, 0.15 mmol), EDCI (29 mg, 0.15 mmol) and TEA (152 mg, 0.15 mmol). The mixture was stirred for 30 min at r.t followed by addition of **L3** (15 mg, 0.11 mmol). The reaction was then stirred at room temperature overnight in the dark. Subsequently, it was quenched by addition of

5 mL water and extracted with 2 × 10 mL of ethyl acetate. The organic layers were washed with 2×10 mL brine and dried over anhydrous Na₂SO₄. Upon solvent evaporation *in vacuo*, the residue was purified by flash column (PE : EA = 10:1) to give **BA-2** as a yellow solid (42mg, 73%). ¹H NMR (300 MHz, CDCl₃) δ 5.65 (t, *J* = 5.1Hz, 1H), 4.74 (s, 1H), 4.59 (s, 1H), 3.14 (m, 3H), 2.44 (m, 1H), 2.34 (m, 1H), 2.00 (m, 4H), 1.8 (m, 1H), 1.60 (s, 3H), 1.25-1.64 (m, 28H), 0.97 (s, 6H), 0.93 (s, 3H), 0.81 (s, 3H), 0.75 (s, 3H), 0.66 (d, *J* = 8.7 Hz, 1H). ¹³C NMR (75 MHz, DMSO) δ 175.58, 150.98, 150.41, 109.73, 109.31, 83.18, 76.90, 71.84, 55.51, 55.06, 54.89, 50.18, 49.71, 48.63, 46.71, 46.23, 42.10, 41.99, 38.60, 36.84, 33.77, 32.23, 31.30, 28.97, 28.20, 27.31, 25.32, 20.67, 19.12, 18.07, 16.07, 15.94, 15.90, 14.48, 14.41, 12.83. HR-MS (ESI): *m/z* [M+1]⁺ calcd 576.4529; Found 576.4504.



Scheme S3

(**NP-2**). To a stirred solution of benzoic acid (122 mg, 1 mmol) in 5 mL DMF was added **L3** (150.8 mg, 1.1 mmol), HOBT (202 mg, 1.5 mmol), EDCI (289 mg, 1.5 mmol) and TEA (101 mg, 1 mmol). The mixture was stirred for 10 h at room temperature in dark. Subsequently, the reaction was quenched by water (10 mL) and extracted by 3×10 mL ethyl acetate. The organic phases were combined together and dried over with anhydrous Na₂SO₄. Upon vacuum concentration, the residue was purified by flash column chromatography (PE : EA = 3:1) to yield **NP-2** (173 mg, 72%) as a white solid. ¹H NMR (300 MHz, CDCl₃) δ 7.78 (m, 2H), 7.44 (m, 3H), 6.31 (s, 1H), 3.32 (m, 2H), 2.05 (m, 2H), 1.99 (t, *J* = 2.5 Hz, 1H), 1.83 (t, *J* = 6.7 Hz, 2H), 1.69 (t, *J* = 7.1Hz, 2H). ¹³C NMR (75 MHz, DMSO) δ 166.68, 134.93, 131.62, 128.75, 127.57, 83.62, 72.27, 34.84, 32.38, 31.74, 27.77, 13.16. HR-MS (ESI): *m/z* [M+1]⁺ calcd 242.1293; Found 242.1285.



Scheme S4

The Synthesis of **NP-3** and **S3** was according to the previously published procedures^[6] For **S3**, ¹H NMR (400 MHz, CD₃OD) δ 8.66 (s, 1H), 7.57 (d, *J* = 9.2 Hz, 1H), 6.85 (d, *J* = 9.0 Hz, 1H), 6.60 (d, *J* = 9.0 Hz, 1H), 3.68 (t, *J* = 5.6 Hz, 2H), 3.56 (q, *J* = 6.5 Hz, 4H), 3.14 (t, *J* = 5.6 Hz, 2H), 1.26 (t, *J* = 7.0 Hz, 6H). LC-MS (ESI): *m/z* [M+1]⁺ calcd: 303.16; Found :303.14.

(**BA-3**). To a stirred solution of BA (0.16 g, 0.36 mmol) in 10 mL DCM was added HOBT (39 mg, 0.54 mmol), EDCI (100 mg, 0.54 mmol) and TEA (101 mg, 1.0 mmol). The mixture was stirred for 30min at r.t followed by addition of **S3** (0.12g, 0.4 mmol). The reaction was stirred for another 24h followed by addition of 10 mL water. The mixture was extracted with 3×10 mL ethyl acetate. The organic phases were combined together and dried over with anhydrous Na₂SO₄. Upon vacuum concentration, the residue was purified by flash column chromatography (DCM : MeOH = 10:1) to yield **BA-3** (160 mg, 62%) as a yellow solid. ¹H NMR (400 MHz, CDCl₃) δ 9.03 (s, 1H), 8.60 (s, 1H), 7.37 (d, *J* = 8.9 Hz, 1H), 6.59 (d, *J* = 8.9Hz, 1H), 6.44 (s, 2H), 4.65 (s, 1H), 4.49 (s, 1H), 3.74 (m, 1H), 3.56 (m, 1H), 3.38 (q, *J* = 6.4 Hz, 4H), 3.22 (d, *J* = 11.7 Hz, 1H), 3.08 (m, 2H), 2.18 (m, 3H), 1.94 (m, 5H), 1.67 (m, 4H), 1.59 (s, 3H), 1.46 (m, 4H), 1.36-1.22 (m, 14H), 0.81 (m, 4H), 0.78 (s, 6H), 0.69 (s, 3H), 0.64 (s, 3H), 0.60 (s, 3H), 0.47 (m, 1H). ¹³C NMR (100 MHz, CDCl₃) δ 176.66, 164.66, 162.62, 157.71, 152.74, 151.22, 148.22,

131.23, 129.88, 110.03, 109.72, 109.14, 108.40, 96.53, 55.67, 55.24, 50.46, 50.24, 46.85, 45.10, 42.35, 41.15, 40.49, 38.74, 38.61, 38.41, 38.29, 37.79, 37.09, 34.16, 33.43, 31.01, 29.70, 29.33, 27.94, 27.43, 27.22, 25.53, 22.70, 20.80, 19.52, 18.03, 16.02, 15.94, 15.39, 14.60, 14.13, 12.44. HR-MS (ESI): m/z $[M+1]^+$ calcd 742.5159; Found 742.5123.

4. Cell Growth Inhibition Assay ^[7]

Cytotoxicity assays were carried out using MCF-7 cells by CCK8 assay. 5000 cells per well were seeded in a 96-well plate and incubated for 12 h in a humidified incubator for adherence. BA-1/2/3 and BA in DMSO were added to cells at the final concentrations of 0.1, 1, 2.5, 5, 10, 25, 50, and 100 μ M and further incubated for 72 h. CCK-8 reagent (10 μ L) was added to each well and incubated for 2 h. Following that, the absorbance was measured at 450 nm and 650 nm on a plate reader (Synergy HI, BioTek Instruments, Inc. Vermont, US). Cell viability rate was determined as $VR = (A - A_0)/(A_s - A_0) \times 100\%$, where A is the absorbance of the experimental group, A_s is the absorbance of the control group (DMSO was used as the control) and A_0 is the absorbance of the blank group (no cells). IC_{50} values were calculated using GraphPad Prism.

5. *In Situ* Proteome Labeling and Recombinant Protein Labeling with BA-1/2.

The procedures were based on previously published protocols with some modifications.^[1,2,3] cells were grown to 80–90% confluency in 6-well plates under conditions as described above. The medium was removed, and cells were washed twice with cold PBS and then treated with 0.5 mL DMEM containing probe in the presence or absence of excess competitor (diluted from DMSO stocks whereby DMSO never exceeded 1% in the final solution). After 5 h of incubation at 37 °C/5% CO₂, the medium was aspirated, and cells were washed gently with PBS (2 \times) to remove excessive probe, followed by UV irradiation for 30–40 min on ice (**BA-1-** and **BA-2-**treated samples were exposed to 302 nm and 365 nm UV lamp, respectively). The cells were trypsinized and pelleted by centrifugation. Eventually, the cell pellets were resuspended in HEPES buffer (200 μ L), homogenized by sonication, and diluted to 1 mg/mL with PBS. Four microliters of a freshly premixed click chemistry reaction cocktail in PBS (50 μ M TAMRA-N₃ from 2.5 mM stock solution in DMSO, 0.1 mM TBTA from 5 mM freshly prepared stock solution in DMSO, 1 mM TCEP from 50 mM freshly prepared stock solution in deionized water, and 1 mM CuSO₄ from 50 mM freshly prepared stock solution in deionized water) was added. The reaction was further incubated for 2 h with gentle mixing at room temperature, before being terminated by addition of pre-chilled acetone (0.5 mL; 30 min incubation at –20 °C). Precipitated proteins were subsequently collected by centrifugation (13000 rpm \times 10 min at 4 °C). The supernatant was discarded and the pellet was washed with 200 μ L of prechilled methanol before redissolving in 2 \times loading buffer and heated for 2 min at 90 °C. Around 10 μ g (per gel lane) of proteins were separated by SDS–PAGE (10% gel) and then visualized by in-gel fluorescence scanning (see Figure 3B).

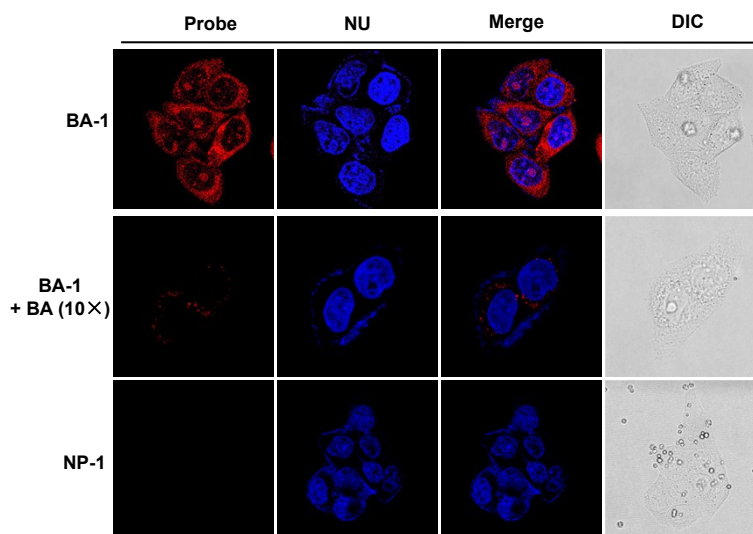
For labeling of PGK1, to 2 μ g PGK1 in 19 μ L PBS buffer was added BA-2 in different concentrations or to 19 μ L PBS buffer containing BA-2 (5 μ M final concentration) was added different amount of PGK1. The resulting mixture was incubated for 20 min at 37°C prior to UV irradiation for 20 min, followed by conjugation with TAMRA-N₃ under click chemistry conditions for 2 hours. The samples were separated by SDS–PAGE (10% gel) and then visualized by in-gel fluorescence scanning (see Figure 4D).

6. Cellular Imaging

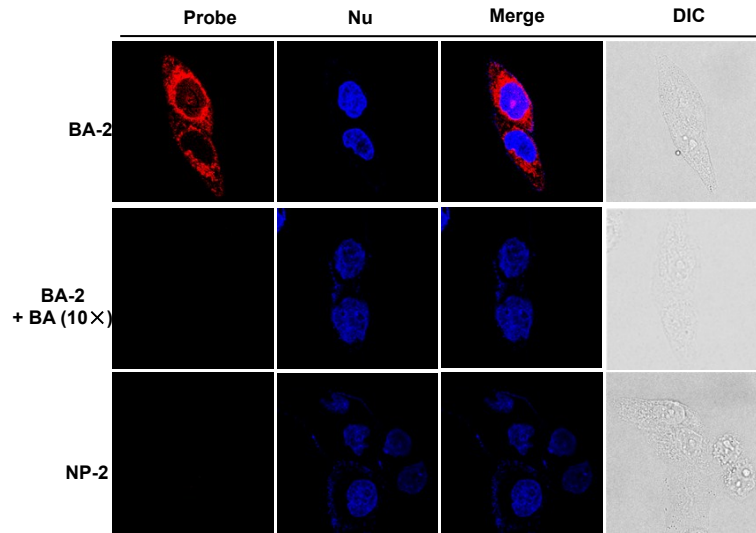
To demonstrate the utility of the cell-permeable probes for imaging of potential cellular targets, we performed fluorescence microscopy. The general procedures were similar to what was previously reported.^[1,2,3] For **BA-1** and **BA-2**, MCF-7 cells were seeded in glass bottom dishes (Mattek) and grown until 70–80% confluency. Cells were then treated with 0.5 mL DMEM with probes at different concentrations (10 μ M final concentration) in the presence or absence of BA (10 \times) as competitor. After incubation for 3 h at 37 °C, the medium was removed and

cells were gently washed twice with PBS, followed by UV irradiation (**BA-1** and **BA-2** treated samples were exposed to 302 nm and 365 nm UV lamp, respectively) for 20 min on ice. The cells were subsequently fixed for 1h at room temperature with 3.7% formaldehyde in PBS, washed twice with cold PBS again, and permeabilized with 0.1% Triton X-100 in PBS for 10 min. Cells were then treated with a freshly premixed click chemistry reaction solution in a 100 μ L volume (50 μ M TAMRA-N₃ from 2.5 mM stock solution in DMSO, 0.1 mM TBTA from 5 mM freshly prepared stock solution in DMSO, 1 mM TCEP from 50 mM freshly prepared stock solution in deionized water, and 1 mM CuSO₄ from 50 mM freshly prepared stock solution in deionized water) for 2 h at room temperature with vigorous shaking. Cells were washed with PBS three times and 0.1% Tween-20 in PBS for once. Finally, the cells were stained with Hoechst (1:5000 dilution in PBS) for 10 min at room temperature prior to image. NP-1 and NP-2 were used as controls concurrently. For co-localization experiments, cells were further incubated with anti-AIF antibody (1:100) for 1 h at room temperature (or overnight at 4 °C), washed twice with PBS, and then incubated with Goat Anti-Rabbit IgG H&L (Alexa Fluor® 488) (1:500) for 1 h, following by washing again. For live-cell imaging, cells were incubated with **BA-3** in 0.5 mL of DMEM for 3 h at 37 °C. The medium was replaced with 50 μ L PBS and then 50 μ L fresh medium and incubate for 30 min. NP-3 treated samples were used as controls. The cells were then stained with Mito tracker (10 μ M final concentration in DMEM) for 3 min at room temperature prior to image. Imaging was done with the Leica TCS SP8 confocal microscope system equipped with Leica HCX PL APO 40 \times /1.20 W CORR CS, 405 nm diode laser, white laser (470–670 nm, with 1 nm increments, with eight channels AOTF for simultaneous control of eight laser lines, each excitation wavelength provides 1.5 mV), and a photomultiplier tube (PMT) detector ranging from 410 to 700 nm for steady state fluorescence. For **BA-1/2**, λ_{ex} = 550 nm, λ_{em} = 560 -590 nm. For **BA-3**, λ_{ex} = 405 nm and λ_{em} = 420-480 nm).

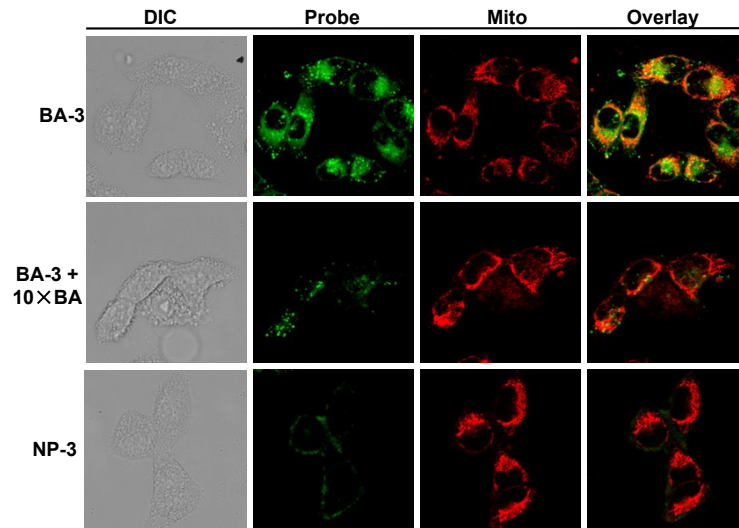
(A)



(B)



(C)



(D)

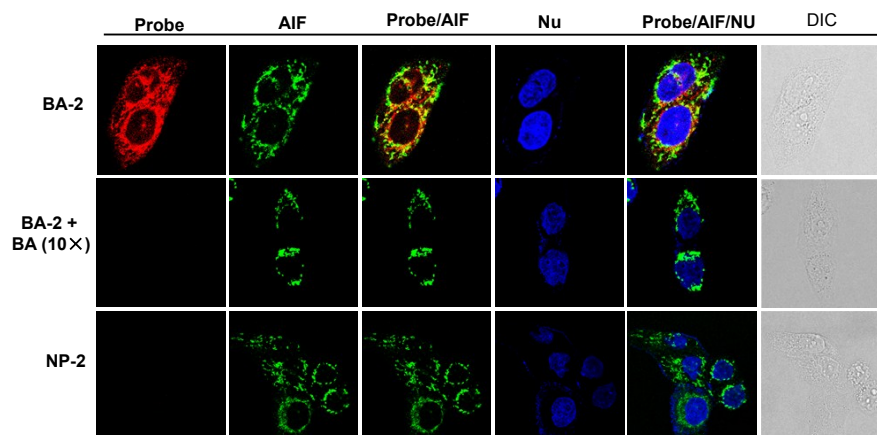


Figure S1. Cellular imaging of MCF-7 cells with different probes in the presence or absence of 10×BA; (A) **BA-1** and **NP-1** (10 μM final concentration). (B) **BA-2** and **NP-2** (10 μM). (C) **BA-3** and **NP-3** (5 μM). (D) Imaging of MCF-7 cells with **BA-3** (5 μM) and immunofluorescence (IF) against AIF (IF). Scale bar = 10 μm. Parts of the images were reproduced in the maintext (Figures 3C/3D and 4E).

7. Pull down/LC-MS/MS and Target Validation

To identify the potential cellular targets, pull-down (PD) experiments were carried out, and followed by Western blotting (WB) and LC-MS/MS, where applicable. The general pull-down procedure was based on our previously reported procedures,^[1,2,3] with the following optimizations. **BA-1** and **BA-2** (10 μM) were directly added to live cells (DMSO should never exceed 1% in the final solution). After 5 h of incubation at 37 °C/5% CO_2 , the medium was aspirated, and cells were washed twice gently with PBS to remove the excessive probe, followed by UV irradiation (**BA-1** and **BA-2** treated samples were exposed to 302 nm and 365 nm UV lamp, respectively) for 20 min on ice. The cells were then trypsinized and pelleted by centrifugation. Eventually, the cell pellets were resuspended in HEPES buffer (50 μL), homogenized by sonication, and diluted to 1 mg/mL. The labeled lysates were then subjected to click reaction with TAMRA-Biotin-Azide (50 μM final concentration from 1 mM freshly prepared stock solution in DMSO). The mixture was incubated at room temperature for 2 h with gentle mixing, acetone precipitated, and resolubilized in 1% SDS (in PBS) with brief sonication. The resuspended sample was then incubated with avidin-agarose beads (100 $\mu\text{L}/\text{mg}$ protein) at r.t. for 2h. After centrifugation, supernatant were removed and the beads were washed with 1% SDS twice and 0.1% SDS twice. After washing, the beads were boiled in 1 \times SDS loading buffer (200 mM Tris pH 6.8, 400 mM DTT, 8% SDS) for 15 min. Control PD using the negative probes (**NP-1/2**) were carried out concurrently with live cells. WB experiments were carried out as previously described using the corresponding antibodies.

PD samples were then separated on 10% SDS-PAGE gels, followed by coomassie staining. Trypsin digestion was performed with In-Gel Trypsin Digestion Kit from Pierce for the whole lane, as previously described.^[1,2,3] Digested peptides were extracted from the gel with 50% acetonitrile and 1% formic acid. Peptides were separated and analyzed on an Easy-nLC 1000 system coupled to a Q Exactive HF (both - Thermo Scientific). About 1 μg of peptides were separated in an home-made column (75 μm x 15 cm) packed with C18 AQ (5 μm , 300 \AA , Michrom BioResources, Auburn, CA, USA) at a flow rate of 300 nL/min. Mobile phase A (0.1% formic acid in 2% ACN) and mobile phase B (0.1% formic acid in 98% ACN) were used to establish a 60 min gradient comprised of 2 min of 5% B, 40 min of 5-26% B, 5 min of 26-30% B, 1 min of 30-35% B, 2 min of 35-90% B and 10 min of 90% B. Peptides were then ionized by electrospray at 1.9 kV. A full MS spectrum (375-1400 m/z range) was acquired at a resolution of 120,000 at m/z 200 and a maximum ion accumulation time of 20 ms. Dynamic exclusion was set to 30 s. Resolution for HCD MS/MS spectra was set to 30,000 at m/z 200. The AGC setting of MS and MS² were set at 3E6 and 1E5, respectively. The 20 most intense ions above a 1.0E3 counts threshold were selected for fragmentation by HCD with a maximum ion accumulation time of 60 ms. Isolation width of 1.6 m/z units was used for MS². Single and unassigned charged ions were excluded from MS/MS. For HCD, normalized collision energy was set to 25%.

The raw data were processed and searched with MaxQuant 1.5.4.1 with MS tolerance of 4.5 ppm, and MS/MS tolerance of 20 ppm. The UniProt human protein database (release 2016_07, 70630 sequences) and database for proteomics contaminants from MaxQuant were used for database searches. Reversed database searches were used to evaluate false discovery rate (FDR) of peptide and protein identifications. Two missed cleavage sites of trypsin were allowed. Carbamidomethylation (C) was set as a fixed modification, and oxidation (M), Acetyl (Protein N-term) and deamidation (NQ) were set as variable modifications. The FDR of both peptide identification and protein identification is set to be 1%.^[8] The options of “Second peptides”, “Match between runs” and “Dependent peptides” were enabled. Label-free quantification was used to quantify the difference of protein abundances between different samples.^[9,10]

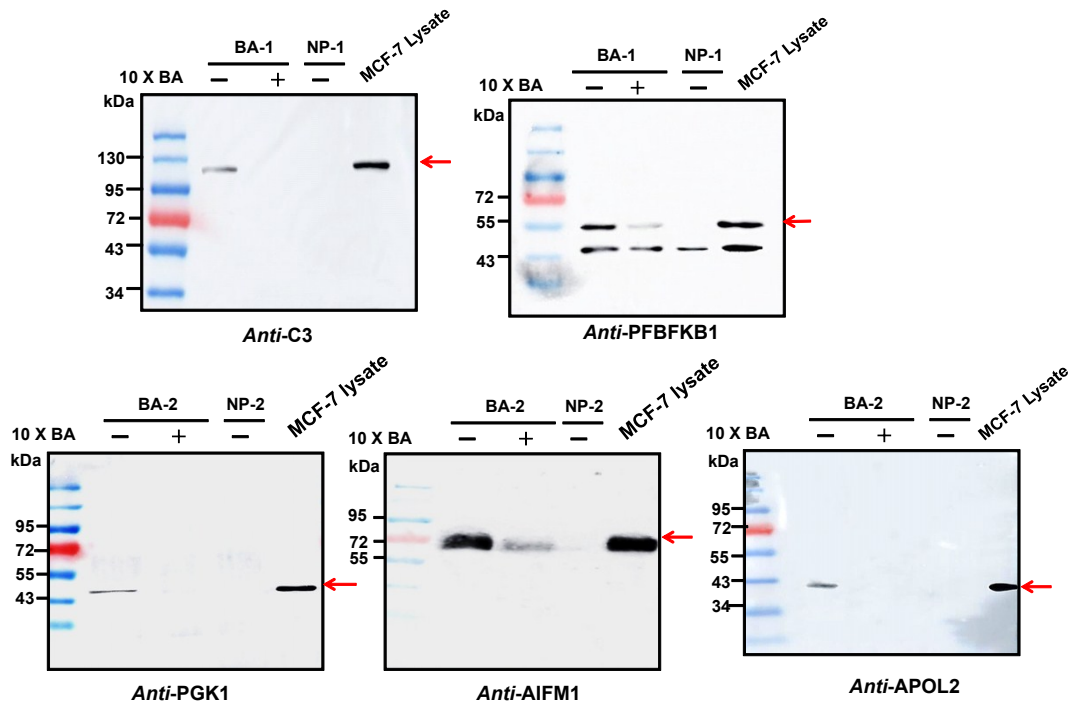


Figure S2. Validation of the protein hits with BA-1/2 (10 μ M) by Pull-down/WB.

Table S1. Protein hits identified by LC-MS/MS with BA-1 and NP-1 in the presence or absence of BA.

Protein IDs	Protein names	Gene names	Unique peptides NP-1_1	Unique peptides NP-1_2	Unique peptides BA-1_1	Unique peptides BA-1_2	Unique peptides BA-1+BA_1	Unique peptides BA-1+BA_2	Intensity NP-1_1	Intensity NP-1_2	Intensity BA-1_1	Intensity BA-1_2	Intensity BA-1+BA_1	Intensity BA-1+BA_2	Score
3L2H8;I3L1L3;Q9BQG0	Myb-binding protein 1A	MYBBP1A	0	0	1	1	0	0	0	0	1151400	438510	0	0	7.5515
O43290	U4/U6.U5 tri-snRNP-associated pr	SART1	0	0	2	1	0	0	0	0	1712900	798990	0	0	14.93
P41091;Q2VIR3	Eukaryotic translation initiation fa	EIF2S3;EIF2S	0	0	1	1	0	0	0	0	1022900	0	0	0	11.151
P69905	Hemoglobin subunit alpha	HBA1	0	0	1	1	0	0	0	0	140900000	1664700	0	0	72.418
Q15149	Plectin	PLEC	0	0	1	1	0	0	0	0	339210	195860	0	0	6.7093
M0QXZ3;P01024	Complement C3;Complement C3	C3	0	0	1	2	0	0	0	0	2497100	0	0	0	12.961
Q15424;Q14151	Scaffold attachment factor B1;Scaf	SAFB;SAFB2	0	0	1	1	0	0	0	0	2147000	397980	0	0	6.7944
Q5T6W2;P61978	Heterogeneous nuclear ribonucle	HNRNPK	0	0	2	1	0	0	0	0	2053000	248070	0	0	16.952
I1Z9G3	6-Phosphofructo-2-Kinase	PFKFB1	0	0	1	1	0	0	0	0	0	0	0	0	6.1302
A0A024R4M0;P46781;	40S ribosomal protein S9	RPS9	2	1	3	1	1	1	11676000	4680000	32039000	9286100	4259000	6312400	39.157
A0A087WUZ3;Q01082;	Spectrin beta chain, non-erythro	SPTBN1;SPT	2	2	1	2	0	1	14506000	10379000	60105000	4635500	0	8889500	11.913
A0A087WVQ9;Q5VTE0	Putative elongation factor 1-alpha	EEF1A1;EEF1	2	5	7	4	5	4	27795000	33647000	126270000	20873000	11035000	11218000	91.761
A0A087WWY3;Q5HY54	Filamin-A	FLNA	0	3	6	3	2	2	0	3425400	17148000	6309300	4887500	3808800	45.081
A0A087WXZ5;A0A087	Anthrax toxin receptor-like	ANTXRL	1	1	1	1	1	1	4748500	62803000	171830000	18420000	1235100	6527300	7.0845
A0A087WY00;G3V394;	Unconventional myosin-Vc;Uncon	MYO5A;MYO	1	0	1	0	0	0	2527700	0	3149000	0	0	0	-2
A0A087WYY6;Q13835	Plakophilin-1	PKP1	1	2	4	1	1	2	4177100	9446300	15417000	3817700	2503500	4428600	94.661
A0A087WZZ5;E9PPJ0;	Splicing factor 3B subunit 2	SF3B2	0	0	2	0	0	0	0	0	1915200	0	0	0	12.533
A0A0A0MRQ5;A0A0A0	Peroxiredoxin-1	PRDX1	1	1	1	1	0	1	4253100	5490300	22468000	2560200	0	2939100	11.887
A0A0A0MS07;A0A0A0	Ig gamma-1 chain C region	IGHG1	1	1	1	0	0	0	3060800	3010500	6956700	0	0	0	6.6705

A0A0A6YYC3;A0A0A6Y	Putative RNA-binding protein Luc	C7orf55-LUC	0	0	1	0	0	0	0	0	0	0	0	0	8.9407
A0A0B4J1R6;P29401;E	Transketolase	TKT	3	4	7	5	2	4	4682000	8105500	41014000	17346000	4462500	15571000	40.873
A0A0C4DH05;Q5JPF3	Ankyrin repeat domain-containin	ANKRD36C	1	1	1	1	0	0	2324900	2976400	10426000	1338600	0	0	-2
A0A0D9SEI8;A0A087X	Nuclease-sensitive element-bindi	YBX3;YBX1;Y	0	0	1	1	1	0	0	0	5008400	583440	177230	0	11.748
A0A0G2JIW1;P0DMV9;	Heat shock 70 kDa protein 1B;Heat	HSPA1B;HSP	2	2	4	2	0	2	2365000	2231500	13282000	2120300	0	2388500	29.376
A1YLA2		PLAGL1	1	1	1	1	0	0	3989000	3216400	3451000	3530700	0	0	-2
A2AB27;P36915	Guanine nucleotide-binding prote	GNL1	0	0	1	0	0	0	0	0	0	0	0	0	21.152
A8K2U0	Alpha-2-macroglobulin-like protei	A2ML1	1	1	1	0	0	0	1507300	1533500	2246000	0	0	0	8.6539
A8MYV2;Q9NQ29	Putative RNA-binding protein Luc	LUC7L	0	0	1	1	1	1	0	0	3039800	1633800	877160	748590	26.279
B2R4S9;U3KQK0;Q998	Histone H2B;Histone H2B type 1-L;	HIST1H2BI;H	0	1	2	2	0	2	0	0	3300500	846040	0	303400	26.685
B5MCI8;Q9UHP6	Radial spoke head 14 homolog	RSPH14	1	1	1	0	0	0	3972100	2905200	19680000	0	0	0	-2
B5MDF5;P62826;A0A0	GTP-binding nuclear protein Ran	RAN	2	2	2	1	0	1	3546500	3611700	9316400	1111600	0	512750	15.015
C9J060;C9JIU5;C9JWC5	E3 ubiquitin-protein ligase TRIM22	TRIM22	1	1	0	1	1	1	15252000	16765000	0	1321500	1529900	2797200	-2
C9J3N8;P04792	Heat shock protein beta-1	HSPB1	1	1	1	1	0	1	12891000	11170000	42913000	7707800	0	5199400	17.745
C9J4Z3;P61513	60S ribosomal protein L37a	RPL37A	0	0	1	1	1	1	0	0	3389400	1834300	738100	397470	13.956
C9JA05;D6RHJ6;D6RD1	Immunoglobulin J chain	JCHAIN;IGJ	1	1	1	0	0	1	2027300	1607300	1142300	0	0	771240	6.7656
C9JLK2;H7C393;H7C1U	Acylamino-acid-releasing enzyme	APEH	1	0	1	0	0	0	384870	0	1610000	0	0	0	8.2538
C9JVW9;H7C5C9;E7EN	Propionyl-CoA carboxylase beta c	PCCB	0	1	2	2	2	2	0	393640	4053500	2655500	1738800	1191200	12.948
C9JXB8;C9JNW5;P8373	60S ribosomal protein L24	RPL24	1	1	1	1	0	0	3505400	4826700	7244100	398540	0	0	8.1324
C9K0U8;A0A0G2JLD8;E	Single-stranded DNA-binding prot	SSBP1	1	1	1	0	0	0	747510	576320	2007900	0	0	0	10.739
CON__A2A5Y0;CON__	Keratin, type I cuticular Ha3-II	KRT33B	0	0	1	0	0	0	8886600	8546000	82224000	29581000	604280	8614900	47.951
CON__O95678;O95678	Keratin, type II cytoskeletal 75	KRT75	0	1	1	0	0	0	0	461520	2596200	0	0	0	-2
CON__P00761			3	4	3	4	4	4	6.72E+08	7.44E+08	830260000	1.93E+08	1.09E+08	2.14E+08	77.102

CON__P01966			1	1	1	1	1	1	2506000	2379300	11353000	3947600	4043600	16508000	13.81
CON__P02533;P02533;	Keratin, type I cytoskeletal 14	KRT14	3	3	2	1	2	1	4.37E+08	5.35E+08	561860000	73330000	20464000	75210000	280.42
CON__P02538;P02538;	Keratin, type II cytoskeletal 6A	KRT6A	1	1	1	1	1	1	61426000	84501000	84207000	31707000	0	14242000	106.55
CON__P02663			2	2	2	0	0	0	2829600	2309500	14537000	0	0	0	12.079
CON__P02754			0	0	1	0	0	0	0	0	566110	0	0	0	6.8897
CON__P02768-1;P0276	Serum albumin	ALB	7	8	6	3	2	1	22752000	24308000	32413000	5499500	947800	2986400	62.59
CON__P02769			39	44	47	34	25	28	4.26E+09	4.88E+09	1.273E+10	3.54E+09	1.07E+09	2.08E+09	323.31
CON__P04259			1	1	1	1	0	1	1.38E+09	1.11E+09	1.342E+09	3.09E+08	2.97E+08	5.84E+08	323.31
CON__P04264;CON__			2	2	0	2	2	2	48196000	26677000	0	29350000	1.02E+08	68501000	42.958
CON__P05787;P05787;	Keratin, type II cytoskeletal 8	KRT8	1	0	3	1	0	0	421680	0	8044400	1441800	0	0	21.914
CON__P07744			0	0	0	0	0	0	0	405250	1122600	0	0	0	6.6806
CON__P08727;P08727;	Keratin, type I cytoskeletal 19	KRT19	1	1	1	0	0	1	1569100	1706300	5557700	0	0	229790	-2
CON__P08779;P08779;	Keratin, type I cytoskeletal 16	KRT16	10	11	10	4	3	5	9.68E+08	1.31E+09	773430000	1.5E+08	86408000	2.3E+08	323.31
CON__P12035;P12035;	Keratin, type II cytoskeletal 3	KRT3	0	0	0	0	0	0	706750	1667200	5595900	18864000	0	4837700	46.166
CON__P12763			0	0	1	1	1	0	0	0	1007300	694430	300000	0	7.2827
CON__P13645;P13645;	Keratin, type I cytoskeletal 10	KRT10	24	28	31	24	20	24	2.78E+09	3.28E+09	7.52E+09	1.57E+09	5.13E+08	1.01E+09	323.31
CON__P13646-1			1	0	1	0	0	0	230320	0	884980	0	0	0	-2
CON__P13647;P13647;	Keratin, type II cytoskeletal 5	KRT5	6	6	6	5	2	5	7.7E+08	7.84E+08	1.151E+09	2.61E+08	2.2E+08	3.68E+08	282.37
CON__P20930;P20930	Filaggrin	FLG	2	0	3	2	1	4	32588000	0	54376000	21552000	18812000	32987000	44.046
CON__P34955			1	1	1	1	1	1	2202400	1695400	5222900	3472300	2930800	2378900	16.18
CON__P35527;K7EQQ3		KRT9	1	1	1	0	0	0	7033800	7999800	2687800	0	0	0	7.3519
CON__P35908;P35908;	Keratin, type II cytoskeletal 2 epid	KRT2	26	25	28	16	17	18	2.39E+09	2.66E+09	4.278E+09	1.27E+09	6.63E+08	1.06E+09	323.31
CON__Q04695;Q04695	Keratin, type I cytoskeletal 17	KRT17	2	2	3	1	1	1	74379000	82737000	88248000	24028000	27237000	39948000	100.37
CON__Q3TTY5			1	1	1	1	1	1	13684000	19345000	16795000	10039000	9513200	13194000	23.68
CON__Q5D862;Q5D86	Filaggrin-2	FLG2	7	6	7	4	3	6	33196000	29606000	61478000	28220000	18649000	26756000	83.867

CON__Q5XQN5;F8VU			0	0	0	0	0	0	1504500	1075200	4842200	2485800	0	1551900	-2
CON__Q61726;CON__			1	1	3	1	1	0	4658400	7592100	143570000	60769000	12895000	19098000	310.88
CON__Q6KB66-1;Q6K	Keratin, type II cytoskeletal 80	KRT80	2	2	1	2	1	2	12490000	12816000	6163900	11670000	7398000	11077000	15.107
CON__Q6NT21;CON__	Keratin, type II cuticular Hb3;Putat	KRT83;KRT81	0	0	0	1	1	1	4241200	3802500	8823900	3577200	2983100	7983700	29.124
CON__Q7Z794;Q7Z794	Keratin, type II cytoskeletal 1b	KRT77	4	4	4	0	0	2	21243000	27857000	52529000	2838900	817350	5316000	323.31
CON__Q86YZ3;Q86YZ3	Hornerin	HRNR	16	16	12	13	11	14	1.9E+08	2.09E+08	233670000	1.6E+08	1.54E+08	1.78E+08	323.31
CON__Q8N1N4-2;CON	Keratin, type II cytoskeletal 78	KRT78	4	4	4	2	2	2	19988000	7652700	22457000	17113000	11437000	17389000	48.405
CON__Q9C075;Q9C07	Keratin, type I cytoskeletal 23	KRT23	2	0	1	0	0	0	1528000	0	1487400	0	0	0	11.629
CON__Q9R0H5;CON__	Keratin, type II cytoskeletal 71	KRT71	0	0	1	1	0	0	0	0	18135000	8946200	0	0	-2
CON__Q9TTE1;CON__			2	2	1	1	1	0	41526000	36280000	44870000	1482400	3979600	0	12.421
CON__Q9UE12;CON__	Keratin, type I cuticular Ha1;Kerati	KRT31;KRT33	0	0	1	0	0	0	0	0	8693500	0	0	0	25.163
CON__Streptavidin			2	3	5	5	5	4	12063000	11510000	117630000	73614000	42919000	28018000	229.45
D6R992;Q01201	Transcription factor RelB	RELB	1	1	1	1	1	1	0	3522000	56745000	21181000	12857000	8995400	-2
D6RAT0;P61247;D6R9B	40S ribosomal protein S3a	RPS3A	2	2	3	2	2	2	3651300	5036900	36281000	9060800	4758700	3557400	43.203
D6RD47;P62266	40S ribosomal protein S23	RPS23	0	1	1	1	1	1	0	504010	8296400	3273000	1565000	887690	32.152
D6RDY6;O76094	Signal recognition particle subunit	SRP72	0	0	1	0	0	0	0	0	0	0	0	0	6.7248
D6RF44;H0YA96;D6RA	Heterogeneous nuclear ribonucle	HNRNPD	0	0	1	0	0	0	0	0	1168200	0	0	0	7.7677
D6RFM2;D6R904;Q5V		TPM3;DKFZp	1	1	1	1	0	0	3280000	2215700	5683000	325600	0	0	6.5591
E5RJF9;P55040	GTP-binding protein GEM	GEM	0	1	0	0	0	0	0	0	0	0	0	0	-2
E7ENN3;A0A0C4DG40;	Nesprin-1	SYNE1	1	1	1	0	0	0	2201400	2595400	4162000	0	0	0	-2
E7EQB2;E7ER44;P0278	Lactotransferrin;Lactoferricin-H;K	LTF	1	0	2	0	0	0	0	0	0	0	0	0	11.657
E7ERL0;J3KPD9;Q32Q1	Nucleoside diphosphate kinase;N	NME1;NME2	1	1	2	0	0	0	844480	1152000	9841000	0	0	0	16.276
E7ET15;O15042;U3KPT	U2 snRNP-associated SURP motif-	U2SURP	0	1	2	2	2	2	0	575390	6241900	2667800	1955700	1882500	14.832
E7ETK0;A0A087WUS0;	40S ribosomal protein S24	RPS24	0	1	2	2	0	1	0	0	3398800	2368400	0	1161800	11.663
E7EX29;P63104;E7ESK7	14-3-3 protein zeta/delta	YWHAZ	5	5	5	2	1	2	15973000	14007000	59865000	21071000	9400000	18119000	244.59

E9PAL5;A8TX70	Collagen alpha-5(VI) chain	COL6A5	0	0	0	1	1	0	0	0	0	1.03E+08	38657000	0	-2
E9PBS1;P22234	Multifunctional protein ADE2;Pho	PAICS	1	1	1	0	0	0	3363600	3555800	14438000	0	0	0	23.115
E9PG15;P27348	14-3-3 protein theta	YWHAQ	2	2	2	2	1	1	4000500	2888000	19663000	4729600	1602900	3150600	38.595
E9PJD9;E9PLX7;P46776	60S ribosomal protein L27a	RPL27A	3	3	3	2	1	2	7530800	10554000	15229000	1288200	195350	1029800	22.39
E9PKE3;P11142;E9PQQ	Heat shock cognate 71 kDa protein	HSPA8	3	5	7	3	3	3	31736000	33491000	147660000	37488000	13807000	23343000	86.749
E9PKP7;P17480;E9PM	Nucleolar transcription factor 1	UBTF	0	1	4	3	3	3	0	524390	5124100	3580400	2870000	2420400	33.411
E9PKZ0;P62917;G3V1A	60S ribosomal protein L8	RPL8	4	4	5	1	1	3	16715000	17398000	63291000	4662600	2073400	10317000	68.535
E9PM57;A8MUE8;A8M	PHD finger protein 20-like protein	PHF20L1	0	0	1	0	0	0	0	0	0	0	0	0	-2
E9PR17;Q3C1V1	Uncharacterized protein C11orf91	CD59;C11orf	1	0	1	0	0	0	1432100	0	4087500	0	0	0	-2
F5GWX5;A0A0C4DGG9	Chromodomain-helicase-DNA-bin	CHD4	0	0	3	2	1	0	0	0	6347200	771200	197540	0	31.664
F5GYT8;E9PG35;E9PHF	Methylcrotonoyl-CoA carboxylase	MCCC1	0	0	3	2	2	1	0	0	2405300	893400	508680	156610	19.686
F5H7A5;F5GX99;H0YG	Caseinolytic peptidase B protein h	CLPB	1	1	1	1	1	1	4144400	5531900	6069900	4956000	2732900	4721000	-2
F8VRU1;F8VYE9;F8VSC	Eukaryotic translation initiation fa	EIF4B	0	0	1	1	1	0	0	0	4345300	684090	418520	0	7.7541
F8VU69		KRT5	1	1	1	0	0	0	1896200	1661000	5216300	0	0	0	-2
F8VUA6;H0YHA7;J3QQ	60S ribosomal protein L18	RPL18	3	3	4	1	0	1	14690000	10939000	36047000	0	0	1243500	27.915
F8VVM2;Q00325	Phosphate carrier protein, mitoch	SLC25A3	0	1	1	0	0	0	0	4653800	8705300	0	0	0	11.251
F8VWV4;F8VVS8;F8VQ	60S acidic ribosomal protein P0-lik	RPLP0;RPLP0	1	1	1	1	0	1	690670	1201200	4392500	844770	0	826690	29.361
F8W6I7;P09651;H0YH8	Heterogeneous nuclear ribonucle	HNRNPA1	0	0	3	0	0	1	0	0	8257300	0	0	649660	30.441
F8W6P5;P68871	Hemoglobin subunit beta;LVV-he	HBB	1	1	1	0	0	0	693000	852820	0	0	0	0	8.2081
F8W727;P62910;D3YTB	60S ribosomal protein L32	RPL32	1	2	0	0	0	0	1192500	1064100	0	0	0	0	11.521
F8WD59;C9J9K3;A0A0	40S ribosomal protein SA	RPSA	0	0	1	0	0	0	0	0	9879700	0	0	0	8.6591
G3V3B0;S4R3H4;E7EQ	Apoptotic chromatin condensatio	ACIN1	0	0	1	1	1	0	0	0	12302000	1918900	731360	0	18.591
G3V3U4;G3V3I1;G3V2	Proteasome subunit alpha type;Pr	PSMA6	1	1	1	0	0	0	958820	785240	2093600	0	0	0	6.5976
G3V5X4;A0A0A0MRE3;	Nesprin-2	SYNE2	1	2	1	1	0	0	18838000	6795300	7162800	7562100	0	0	11.457

G3XAL0;P40926	Malate dehydrogenase;Malate de	MDH2	0	1	2	1	0	0	0	1388000	5168600	901270	0	0	17.578
H0Y3S5;H0Y7Y5;E7ETR	Protein MROH8	MROH8	0	0	1	0	0	0	0	0	0	0	0	0	6.9738
H0Y4J3;Q5TH74	O(6)-methylguanine-induced apo	STPG1	1	0	1	1	1	0	1446500	0	120010000	63401000	39870000	0	-2
H0Y896;H0Y853		CFAP44	1	1	1	0	0	0	5299700	9836900	2542300	0	0	0	6.735
H0Y8B3	Adenosylhomocysteinase	AHCYL2	1	1	1	1	0	0	3066600	2700800	12842000	0	0	0	-2
H0Y9R4;D6RAN4;H0Y9	60S ribosomal protein L9	RPL9	0	0	1	1	1	1	0	0	1166000	408670	403120	164970	6.7429
H0YAE8;E7EUV9;F8W8	Histone RNA hairpin-binding prot	SLBP	0	0	1	0	1	0	0	0	829050	0	198610	0	6.6464
H0YCN3;Q6ZMY9	Zinc finger protein 517	ZNF517	1	1	0	1	0	0	0	6723900	0	298640	0	0	-2
H0YMM1;H0YNP5;H0Y	Annexin;Annexin A2;Putative ann	ANXA2;ANX	3	3	3	2	1	2	12091000	11455000	32095000	5847000	856040	4873400	46.044
H3BRU6;F8VZX2;Q153	Poly(rC)-binding protein 2;Poly(rC	PCBP2;PCBP	1	1	2	1	1	0	635940	931710	5216800	541790	383150	0	15.869
H3BTN5;P14618;B4DN	Pyruvate kinase;Pyruvate kinase P	PKM	7	6	11	5	2	1	26618000	27738000	84094000	11049000	2420300	7841500	91.478
H3BV80;H3BMM9;H3B	RNA-binding protein with serine-r	RNPS1	1	1	3	3	3	1	533150	417200	4640400	3120900	1915500	548260	25.94
H7BZ09;H0YN26;P3968	Acidic leucine-rich nuclear phosp	ANP32A	0	0	0	1	1	1	0	0	0	3261000	1554700	636460	13.022
H7BZ94;P07237;I3L0S0	Protein disulfide-isomerase	P4HB	2	2	5	2	0	1	2121000	1903300	11084000	0	0	704190	40.266
H7C1V0;P07339	Cathepsin D;Cathepsin D light chai	CTSD	1	1	1	1	1	1	0	0	13093000	0	2863600	5719600	8.4193
H7C4H2;Q9Y5M8	Signal recognition particle recept	SRPRB	0	0	1	0	0	0	0	0	0	0	0	0	6.5614
I3L1Q5;Q2NL82	Pre-rRNA-processing protein TSR1	TSR1	0	0	1	0	0	0	0	0	1342800	0	0	0	9.6143
I3L3H2;P38919	Eukaryotic initiation factor 4A-III;E	EIF4A3	1	1	1	1	1	1	1189900	1022100	5068600	2222700	1131700	2054200	19.577
J3KPS3;P04075;H3BQN	Fructose-bisphosphate aldolase;F	ALDOA	5	5	6	4	1	4	17154000	11256000	58065000	12094000	3307500	17583000	60.498
J3KRB3;A0A087WWH0	60S ribosomal protein L17	RPL17;RPL17	0	0	1	1	1	1	0	0	9930100	1716400	910030	530690	11.908
J3KRG2;Q96QA5	Gasdermin-A	GSDMA	1	1	1	1	1	1	2830500	6618200	5497800	1024700	504450	1788800	6.5496
J3QR09;J3KTE4;P84098	Ribosomal protein L19;60S riboso	RPL19	5	5	5	4	2	3	32689000	29079000	90370000	32288000	4652300	13933000	63.08
J3QR48;Q14974	Importin subunit beta-1	KPNB1	1	1	1	1	0	1	678320	431110	4664400	1071300	0	1161500	7.1879
J3QSA3;F5GZ39;M0R1	Ubiquitin-60S ribosomal protein L	UBB;UBC;UB	1	1	1	1	0	1	3972900	6490500	16896000	1632400	0	1220800	8.0539
K7EIE7;P53396	ATP-citrate synthase	ACLY	1	1	2	2	2	2	6915800	6865500	13225000	6819200	2911800	5939800	15.823

K7EL50;P27797	Calreticulin	CALR	0	0	1	0	0	0	0	0	962660	0	0	0	7.1819
K7EM61;F5H0Q6;A0A0		CLASRP	1	0	1	1	1	1	643510	0	3140300	2986200	1813900	1191200	8.3203
K7EMA7;H7BY10;K7EJ	60S ribosomal protein L23a	RPL23A	1	1	3	2	2	1	525570	373950	10944000	2094300	1029900	53227	24.078
K7EMN2;K7EM49;K7EP	6-phosphogluconate dehydrogen	PGD	0	0	1	0	0	0	0	0	684260	0	0	0	6.5496
K7EMS3		KRT19	1	1	1	1	0	0	11085000	12191000	21957000	960540	0	0	22.986
K7ENG2;P26368	Splicing factor U2AF 65 kDa subuni	U2AF2	0	0	2	2	2	0	0	0	7214800	1362200	525090	0	11.79
K7ENJ4;K7EK77;P2570	ATP synthase subunit alpha, mitoc	ATP5A1	2	2	2	1	0	1	9302200	10614000	13945000	2906500	0	1904400	11.981
K7EP41;K7ERC6;K7EN	Glucose-6-phosphate isomerase	GPI	1	1	1	1	0	0	2241800	2284500	12176000	682930	0	0	14.553
M0R0P7;M0R3D6;M0R	60S ribosomal protein L18a	RPL18A	1	1	0	0	0	0	1393500	2380400	0	0	0	0	9.4189
M0R1E7;M0QXG5;M0R	Serine/arginine repetitive matrix	SRRM1	0	0	1	1	0	1	0	0	3469400	1958900	0	594670	24.012
O00299	Chloride intracellular channel pro	CLIC1	1	0	1	1	0	1	3067400	0	17480000	775840	0	2382500	6.7056
O00635	E3 ubiquitin-protein ligase TRIM38	TRIM38	0	0	1	0	0	0	0	0	3952000	0	0	0	7.6895
O60701;D6RHF4;E9PB	UDP-glucose 6-dehydrogenase	UGDH	3	2	3	1	0	1	2425700	3908000	13279000	1561800	0	1026900	20.009
P00338;F5GXH2;F5GYU	L-lactate dehydrogenase A chain	LDHA	3	3	3	3	1	2	35158000	38685000	155780000	38533000	7643700	26995000	136.27
P00966;Q5T6L6;Q5T6L	Argininosuccinate synthase	ASS1	7	7	10	9	4	6	50637000	43316000	168330000	1.05E+08	30158000	62416000	80.045
P01876;A0A0G2JMB2;P04040	Ig alpha-1 chain C region;Ig alpha-Catalase	IGHA1;IGHA	1	2	1	0	0	0	2037100	2201200	1949100	0	0	0	12.361
P04083;Q5T3N1	Annexin A1;Annexin	ANXA1	2	2	3	0	0	0	1838500	1888400	4342900	0	0	0	17.771
P04264	Keratin, type II cytoskeletal 1	KRT1	2	2	2	2	2	2	9.27E+09	9.58E+09	1.809E+10	5E+09	2.34E+09	4.96E+09	323.31
P04406;E7EUT5	Glyceraldehyde-3-phosphate deh	GAPDH	7	7	9	7	4	7	91990000	45821000	257250000	77440000	31351000	90690000	82.905
P05089	Arginase-1	ARG1	2	2	1	0	0	1	3334000	3331800	3599900	0	0	1290800	13.275
P05109	Protein S100-A8;Protein S100-A8,	S100A8	1	1	0	0	0	0	3815400	6904500	0	0	0	0	6.5838
P05186	Alkaline phosphatase, tissue-non	ALPL	0	0	1	0	0	0	0	0	1937600	0	0	0	8.2876
P05198	Eukaryotic translation initiation fa	EIF2S1	1	1	1	1	1	1	3221100	2797600	7245300	2463900	397430	1821600	14.43

P06733;K7EM90;P1392	Alpha-enolase	ENO1	8	8	13	7	4	3	41594000	40157000	204170000	53904000	1459700	10701000	113.15
P06748	Nucleophosmin	NPM1	1	0	1	1	0	0	1436800	0	5284600	2522600	0	0	7.0278
P07195;A8MW50;F5H7	L-lactate dehydrogenase B chain;L	LDHB	3	3	4	2	0	0	37012000	41065000	172710000	23390000	2987200	14125000	135.32
P07900;G3V2J8;Q1456	Heat shock protein HSP 90-alpha	HSP90AA1	0	0	2	1	0	0	0	0	8987900	2387400	0	0	35
P08238;Q58FF7;Q58FF	Heat shock protein HSP 90-beta	HSP90AB1	2	3	5	4	3	2	11709000	14745000	84260000	20048000	6469900	11360000	97.132
P08670;B0YJC4	Vimentin	VIM	1	1	2	0	0	0	2527700	2706900	6415500	0	0	0	12.327
P0DN76;Q01081	Splicing factor U2AF 35 kDa subuni	U2AF1	0	0	1	1	1	1	0	0	3236900	1009100	547740	350730	7.2979
P10412;P16402;Q0253	Histone H1.4;Histone H1.3	HIST1H1E;HI	0	0	1	0	0	0	0	0	1414400	0	0	0	16.971
P10809;E7EXB4;E7ESH	60 kDa heat shock protein, mitoch	HSPD1	5	5	7	6	5	5	17400000	14547000	55603000	25902000	6907600	18663000	198.64
P11021	78 kDa glucose-regulated protein	HSPA5	2	1	5	3	2	3	5302000	1015000	22726000	8024500	3350100	6751900	37.652
P11498;E9PRE7;E9PS68	Pyruvate carboxylase, mitochondr	PC	11	17	30	20	15	18	82086000	84729000	250330000	65073000	29238000	33122000	323.31
P13639	Elongation factor 2	EEF2	3	3	5	2	1	2	5062600	6982800	25685000	5372400	1892600	3720600	48.974
P13667	Protein disulfide-isomerase A4	PDIA4	1	1	3	1	0	0	563210	771710	10880000	983280	0	0	24.278
P14625;Q96GW1	Endoplasmin	HSP90B1	1	3	4	2	0	3	240610	2063700	17555000	4530200	0	2682800	31.034
P14923;C9JTX4;C9J826	Junction plakoglobin	JUP	8	8	8	6	3	4	48992000	44938000	84331000	35541000	26159000	38533000	196.08
P15924	Desmoplakin	DSP	42	41	41	31	15	24	1.9E+08	1.87E+08	346330000	1.07E+08	44721000	1.03E+08	323.31
P16403	Histone H1.2	HIST1H1C	1	0	2	0	0	0	3608500	4815700	26107000	0	0	0	42.568
P17066;P48741	Heat shock 70 kDa protein 6;Putati	HSPA6;HSPA	1	1	1	1	1	1	2651500	2214500	7541200	2911900	636520	1687900	13.599
P17174	Aspartate aminotransferase, cyto	GOT1	1	1	1	0	0	0	1188300	884960	2372700	0	0	0	7.8531
P18124;A8MUD9;C9JZ	60S ribosomal protein L7	RPL7	3	2	5	1	1	1	7888300	4204000	33866000	0	1443700	1125700	46.62
P18206;Q5JQ13	Vinculin	VCL	2	2	5	1	0	1	2514700	3308900	16473000	1103500	0	930300	42.108
P19338;H7BY16	Nucleolin	NCL	0	0	5	4	3	2	0	0	17376000	3480000	1540800	541540	35.089
P22314;Q5JRS2;Q5JRR	Ubiquitin-like modifier-activating	UBA1	1	0	2	0	0	0	0	0	2837900	0	0	0	19.511
P22626	Heterogeneous nuclear ribonucle	HNRNPA2B1	1	0	1	0	0	0	1509400	0	3401600	0	0	0	15.491

P23526	Adenosylhomocysteinase	AHCY	0	0	1	0	0	0	0	0	2445700	0	0	0	6.6715
P24752	Acetyl-CoA acetyltransferase, mit	ACAT1	1	1	1	0	0	0	1268500	0	2721500	0	0	0	13.513
P25311	Zinc-alpha-2-glycoprotein	AZGP1	1	1	1	1	0	0	1933500	1835700	3086000	1323300	0	0	6.5828
P26373;J3QSB4;J3KS98	60S ribosomal protein L13	RPL13	5	6	5	4	0	2	19569000	14697000	57586000	11448000	0	3095100	75.521
P26641	Elongation factor 1-gamma	EEF1G	1	2	3	0	0	0	443170	1366200	7886000	0	0	0	24.607
P28482	Mitogen-activated protein kinase	MAPK1	0	0	1	0	0	0	0	0	1261200	0	0	0	8.5282
P31944	Caspase-14;Caspase-14 subunit p1	CASP14	2	2	2	1	0	1	8126200	6104100	10131000	892550	0	1601800	13.357
P31947	14-3-3 protein sigma	SFN	2	1	3	2	1	1	2332200	7200900	36321000	11576000	4175300	8324400	25.433
P35527	Keratin, type I cytoskeletal 9	KRT9	2	2	2	1	1	1	4.83E+09	4.68E+09	5.439E+09	2.21E+09	1.22E+09	2.78E+09	323.31
P35998	26S protease regulatory subunit 7	PSMC2	0	0	1	0	0	0	0	0	0	0	0	0	8.2844
P36578;H3BM89;H3BT	60S ribosomal protein L4	RPL4	7	8	9	4	3	3	26386000	22261000	78253000	29325000	8461300	2612500	104.36
P38646;D6RA73;D6RJ12	Stress-70 protein, mitochondrial	HSPA9	1	2	4	1	1	1	22091000	14761000	49375000	17257000	17142000	11844000	30.799
P39023;G5E9G0;B5MC	60S ribosomal protein L3	RPL3	4	5	7	4	4	2	6063400	5145400	42961000	8624900	2578700	960810	75.755
P40227	T-complex protein 1 subunit zeta	CCT6A	1	1	2	1	1	1	3935600	1993700	4733100	400270	240640	158070	12.36
P47914	60S ribosomal protein L29	RPL29	3	2	3	2	2	2	13717000	11391000	32198000	10432000	3272100	8004100	24.38
P49711	Transcriptional repressor CTCF	CTCF	0	0	3	2	1	1	0	0	11849000	2866100	1071000	597670	54.631
P50914;E7EPB3	60S ribosomal protein L14	RPL14	5	3	5	4	3	4	6930900	14393000	37964000	15098000	15988000	24888000	45.618
P50990;H7C4C8	T-complex protein 1 subunit theta	CCT8	1	2	2	0	0	0	901510	2399100	7075400	0	0	0	26.198
P51665	26S proteasome non-ATPase regul	PSMD7	0	0	1	0	0	0	0	0	809350	0	0	0	7.5686
P55072	Transitional endoplasmic reticulu	VCP	0	1	2	0	0	0	0	381500	1919200	0	0	0	15.062
P60174;U3KPZ0	Triosephosphate isomerase	TPI1	4	4	4	4	1	3	21365000	22155000	71524000	10553000	819520	8726000	61.368
P60709;P63261;P63267	Actin, cytoplasmic 1;Actin, cytopla	ACTB;ACTG1	13	16	19	14	11	13	2.01E+08	2.19E+08	794180000	3.51E+08	1.06E+08	1.94E+08	205.12
P61313;E7EQV9;E7EX5	60S ribosomal protein L15;Riboso	RPL15	6	9	10	4	4	6	1.8E+08	2.42E+08	597500000	1.36E+08	59654000	1.13E+08	158.04
P61626;F8VV32;A0A0B	Lysozyme C;Lysozyme	LYZ	2	2	2	2	1	2	7594700	12937000	15013000	8373900	14832000	19510000	14.234
P61927;D6R9X9;D6RG1	60S ribosomal protein L37;Riboso	RPL37	2	2	2	2	2	2	19113000	7956800	11092000	10650000	16114000	20069000	12.838

P61981	14-3-3 protein gamma;14-3-3 prot	YWHAG	2	1	2	1	0	0	1158600	877880	3069700	686210	0	0	15.283
P62191	26S protease regulatory subunit 4	PSMC1	0	1	1	0	0	0	0	598460	1269600	0	0	0	8.715
P62258;B4DJF2;I3L3T1;	14-3-3 protein epsilon	YWHAE	2	2	2	1	0	1	5933100	5945800	17706000	1987000	0	654970	16.761
P62424;Q5T8U3;Q5T8	60S ribosomal protein L7a	RPL7A	7	8	9	3	2	2	23737000	44176000	125350000	37342000	9504100	17230000	71.204
P62753;A2A3R5;A2A3	40S ribosomal protein S6	RPS6	1	2	3	2	2	2	5488900	4956700	19550000	7619900	3498500	4354100	23.049
P62805	Histone H4	HIST1H4A	1	1	1	0	0	0	1172800	1108800	4056100	0	0	0	6.9499
P62995;H7BXF3	Transformer-2 protein homolog b	TRA2B	0	1	2	2	2	2	0	587340	11903000	3310300	1850100	1076000	11.445
P68363;F5H5D3;Q9BQ	Tubulin alpha-1B chain;Tubulin al	TUBA1B;TUB	1	1	4	6	3	3	6148100	6461800	32467000	5970400	1812700	2639800	52.86
P68371;Q3ZCM7;P043	Tubulin beta-4B chain;Tubulin bet	TUBB4B;TUB	0	0	2	0	0	0	2358500	0	14798000	0	0	0	26.679
P81605	Dermcidin;Survival-promoting pe	DCD	5	5	5	1	2	2	20617000	14450000	22470000	5111100	5063000	5668200	33.649
Q01469	Fatty acid-binding protein, epider	FABP5	1	1	1	1	0	1	15052000	19063000	15114000	3417000	0	5158300	6.7158
Q02413	Desmoglein-1	DSG1	4	3	5	2	2	3	20491000	15291000	24643000	9357000	4833900	8039800	68.908
Q02878;F8VZ45;U3KQ	60S ribosomal protein L6	RPL6	4	4	5	2	0	1	18621000	21618000	39139000	2957800	0	1673200	44.36
Q08188	Protein-glutamine gamma-glutam	TGM3	3	4	4	2	1	1	5830100	10888000	11309000	6357600	3576400	1570800	24.981
Q08554	Desmocollin-1	DSC1	4	4	4	1	0	1	16457000	20213000	28336000	1300600	0	1100800	36.608
Q08945;E9PPZ7;E9PM	FACT complex subunit SSRP1	SSRP1	0	1	3	3	2	2	0	1177300	1746300	7189500	5533100	3507800	23.002
Q12873;Q8TDI0;I3L229	Chromodomain-helicase-DNA-bin	CHD3;CHD5	0	0	2	0	0	0	0	0	1144200	0	0	0	12.034
Q13200	26S proteasome non-ATPase regul	PSMD2	0	0	1	0	0	0	0	0	3061900	0	0	0	10.558
Q13243	Serine/arginine-rich splicing facto	SRSF5	0	0	1	1	0	1	0	0	2955100	896170	0	225390	10.186
Q14566	DNA replication licensing factor M	MCM6	1	0	1	0	0	0	296460	0	1043100	0	0	0	6.5611
Q3BDU5;P02545	Prelamin-A/C;Lamin-A/C	LMNA	1	1	1	1	0	1	873390	1035800	6114200	2411500	0	1617800	7.948
Q569K6	Coiled-coil domain-containing pro	CCDC157	1	1	1	1	1	1	17829000	18685000	12220000	2379700	789390	2242500	-2
Q5JP53;P07437;Q9BV	Tubulin beta chain;Tubulin beta-2	TUBB;TUBB2	0	1	1	0	0	0	0	402230	1312400	0	0	0	-2
Q5JR95;P62241	40S ribosomal protein S8	RPS8	2	3	4	3	1	0	11073000	13313000	42485000	4158600	1217800	0	55.427
Q5JVH2;P05165	Propionyl-CoA carboxylase alpha	PCCA	1	1	0	1	0	1	2776300	2785500	0	1386900	0	1400900	6.8052

Q5SZ64;Q15427	Splicing factor 3B subunit 4	SF3B4	0	0	1	1	1	0	0	0	6700800	986110	493400	0	6.6016
Q5SZU1;O43175	D-3-phosphoglycerate dehydroge	PHGDH	1	1	2	0	0	0	1102900	2126800	11268000	0	0	0	37.574
Q5T749	Keratinocyte proline-rich protein	KPRP	4	4	4	3	2	3	55885000	53951000	66526000	25034000	10171000	24879000	27.482
Q5T7C4;P09429;B2RPK	High mobility group protein B1;Pu	HMGB1;HM	1	1	2	2	2	1	697780	306620	13537000	6616400	2604900	1959200	15.54
Q5VSY0	G kinase-anchoring protein 1	GKAP1	1	1	0	0	0	0	2121100	2326400	0	0	0	0	-2
Q6IS14;P63241	Eukaryotic translation initiation fa	EIF5AL1;EIF5	0	0	0	1	0	0	0	0	0	909990	0	0	9.1747
Q71DI3;K7EMV3;B4DE	Histone H3.2;Histone H3;Histone	HIST2H3A;H	1	1	2	1	1	0	11010000	13105000	18064000	1997800	348470	1888700	57.911
Q7Z4V5;M0R0J3;K7EP	Hepatoma-derived growth factor-	HDGFRP2;H	0	0	2	2	2	2	0	0	4148400	1909600	1357300	984310	22.125
Q8J015;M0QYS1;Q6NV	Putative 60S ribosomal protein L1	RPL13a;RPL1	1	1	1	1	0	0	1438600	1126400	3361100	533570	0	0	8.9014
Q8NC51	Plasminogen activator inhibitor 1	SERBP1	0	0	0	0	1	0	0	0	0	0	0	0	10.967
Q8TD47;P62701;C9JEH	40S ribosomal protein S4, Y isoform	RPS4Y2;RPS4	2	2	2	2	0	1	6806900	6723300	13005000	4774500	0	1352900	12.427
Q8TEY5	Cyclic AMP-responsive element-b	CREB3L4	1	1	1	0	0	0	29108000	28152000	9596400	0	0	0	-2
Q8TF01	Arginine/serine-rich protein PNIS	PNISR	0	1	1	1	0	1	0	2255400	5636700	5508000	0	2126200	66.779
Q8WTU0	Protein DDI1 homolog 1	DDI1	1	1	1	0	0	0	4248000	5218200	5639900	0	0	0	-2
Q8WVV4	Protein POF1B	POF1B	1	1	1	0	0	0	2861200	2676500	3949100	0	0	0	7.9291
Q92616	Translational activator GCN1	GCN1L1	0	0	1	0	0	0	0	0	1029800	0	0	0	15.51
Q96JC9	ELL-associated factor 1	EAF1	0	0	1	1	1	1	0	0	1278000	1183200	909210	319680	11.991
Q96L42	Potassium voltage-gated channel	KCNH8	1	1	1	0	0	1	10093000	10599000	15218000	0	0	1753900	-2
Q99832	T-complex protein 1 subunit eta	CCT7	0	0	1	2	1	1	0	0	2514600	1599500	656330	239890	32.128
Q9BW60	Elongation of very long chain fatty	ELOVL1	0	1	1	1	0	1	0	2405200	5781600	2212100	0	2312700	6.7259
Q9BXP5;H7C0U8	Serrate RNA effector molecule ho	SRRT	0	0	2	2	3	2	0	0	10023000	3472700	2816000	1036600	35.877
Q9H3P7;Q5JT00;H0YA	Golgi resident protein GCP60	ACBD3	0	1	5	5	4	3	0	1166900	22326000	9867700	5293200	3469900	44.753
Q9HBD4;A0A0A0MT49	Transcription activator BRG1	SMARCA4	0	0	1	0	0	0	0	0	883170	0	0	0	6.5881
Q9NZT1	Calmodulin-like protein 5	CALML5	3	2	2	1	1	1	11237000	36451000	52450000	1050200	1158000	2040000	22.925
Q9P0U3	Sentrin-specific protease 1	SENP1	1	1	1	1	0	1	8502100	0	2594000	844160	0	644900	-2

Q9P258	Protein RCC2	RCC2	0	0	2	0	2	0	0	0	1670900	0	284660	0	12.807
Q9UHB9	Signal recognition particle subunit	SRP68	0	0	1	0	0	0	0	0	624790	0	0	0	8.4664
Q9UPA5	Protein bassoon	BSN	1	1	1	0	0	0	5073100	4992200	12304000	0	0	0	-2
Q9UQ80	Proliferation-associated protein 2	PA2G4	1	1	1	1	0	1	1022600	1085300	2888200	913170	0	369820	29.119
Q9Y2A7	Nck-associated protein 1	NCKAP1	1	1	0	1	0	0	4289000	5481600	0	1523000	0	0	-2
Q9Y2T3	Guanine deaminase	GDA	0	0	1	0	0	0	0	0	1718700	0	0	0	6.6873
Q9Y2Z0	Suppressor of G2 allele of SKP1 ho	SUGT1	0	1	1	1	1	1	0	1367200	6093800	3419300	1231000	2253100	11.425
Q9Y5S9	RNA-binding protein 8A	RBM8A	0	0	2	0	1	1	0	0	28886000	0	5935200	3059900	15.222
U3KQT9;H0YI23;F8VU5	YLP motif-containing protein 1	YLPM1	0	0	1	0	0	0	0	0	869050	0	0	0	7.2368

Table S2. Protein hits identified by LC-MS/MS with BA-2 and NP-2 in the presence or absence of BA.

Protein IDs	Protein names	Gene names	Unique peptides NP-2_1	Unique peptides NP-2_2	Unique peptides BA-2_1	Unique peptides BA-2_2	Unique peptides BA-2+ BA_1	Unique peptides BA-1+ BA_2	Intensity NP-2_1	Intensity NP-2_2	Intensity BA-2_1	Intensity BA-2_2	Intensity BA-2+ BA_1	Intensity BA-2+ BA_2	Score
1A0A0U1RQ	Reticulon;Reticulon-4	RTN4	0	0	2	1	0	0	0	0	11570000	2790800	0	0	6.1043
1B5MCW2;G	60S ribosomal protein L3	RPL3	0	0	1	1	0	0	0	0	2561200	2520000	0	0	5.8111
1E7EWU0;H0	NADPH--cytochrome P450 red	POR	0	0	2	1	0	0	0	0	6905800	6140600	0	0	6.0048
1E9PMA0;O9	Apoptosis-inducing factor 1, m	AIFM1	0	0	1	1	0	0	0	0	2108500	2001400	0	0	5.7787
1E9PMM3;Q	Peroxisomal membrane protei	PEX16	0	0	1	2	0	0	0	0	531820	1109000	0	0	11.576
1H0YB56;E5R	Protein LYRIC	MTDH	0	0	1	1	0	0	0	0	2473700	2497700	0	0	6.4224
1J3KQL8;Q9	Apolipoprotein L2	APOL2	0	0	3	2	0	0	0	0	12545000	5569400	0	0	13.994
1K7EMN5;Q	Dynactin-associated protein	DYNAP	0	0	1	1	0	0	0	0	8413000	1588000	0	0	-2

1K7ER39;K7E	Perilipin-3	PLIN3	0	0	1	1	0	0	0	0	9237000	2609500	0	0	9.1721
1P00558;P07	Phosphoglycerate kinase 1;Ph	PGK1;PGK	0	0	2	1	0	0	0	0	7048700	485080	0	0	13.797
1P51857	3-oxo-5-beta-steroid 4-dehydr	AKR1D1	0	0	1	1	0	0	0	0	4294400	3436300	0	0	5.8604
1Q8TDB6	E3 ubiquitin-protein ligase DTX	DTX3L	0	0	1	1	0	0	0	0	22045000	7703300	0	0	5.9463
1Q96AG4	Leucine-rich repeat-containing	LRRC59	0	0	2	1	0	0	0	0	1340400	1391500	0	0	6.0113
1Q96KC8	DnaJ homolog subfamily C me	DNAJC1	0	0	1	0	0	0	0	0	0	0	0	0	5.9734
A0A075B6L0;	Ig lambda-3 chain C regions;Ig l	IGLC3;IGLC	2	2	2	0	1	1	6763500	14853000	1698400	0	1784600	9792200	13.35
A0A087WVQ	Putative elongation factor 1-al	EEF1A1;EE	2	2	3	3	2	3	31715000	35547000	67493000	34781000	29403000	39552000	19.506
A0A087WYY	Plakophilin-1	PKP1	1	2	2	1	1	1	2637000	9828400	7048200	1742800	749650	1923800	11.712
A0A087X106	Keratin, type II cuticular Hb6;K	KRT81;KRT	1	1	1	1	0	1	4866500	1185900	10648000	3417600	0	835660	6.2786
A0A0A0MS01		TRGV10	0	1	0	1	0	1	0	60532000	0	167580000	0	66518000	-2
A0A0A0MS0	Ig gamma-1 chain C region;Ig g	IGHG1;IGH	3	3	3	3	2	2	10070000	16248000	33132000	25826000	4576300	3903900	18.067
A0A0A0MSJ	Serine/threonine-protein pho	PPP6R2	1	1	1	1	0	1	0	245380000	124750000	0	0	1.14E+08	6.3915
A0A0B4J1R6;	Transketolase	TKT	0	1	1	1	0	1	0	5611300	8298300	1368300	0	1808100	5.9677
A0A0G2JMB	Ig alpha-2 chain C region;Ig alp	IGHA2;IGH	1	1	2	1	1	1	45469000	46461000	16755000	3511800	2821400	4451300	13.819
A0A0J9YXM6	WD repeat-containing protein	WDR81	0	0	1	0	0	0	0	0	3039500	0	0	0	6.8273
A6H900;F5G	Axonemal dynein light chain d	C1orf125;	1	1	1	0	1	1	31863000	11944000	4338200	0	4962600	9322600	5.937
B0YJC5;B0YJ	Vimentin	VIM	1	0	0	0	1	1	2732900	0	0	0	3065700	4579900	6.5666
B4DK69;A0A	Aldo-keto reductase family 1	AKR1C2;A	0	0	1	1	1	0	0	0	21393000	6118400	1560500	0	-2
B4DR61;P61	Protein transport protein Sec6	SEC61A1	1	0	3	3	2	1	360000	0	9547100	4957300	4168900	562660	17.484
B7Z4L4;P048	Dolichyl-diphosphooligosacch	RPN1	0	0	3	3	2	3	0	0	19133000	9500000	2902100	3791300	18.836
B7Z5J4;Q9UI	Carboxypeptidase A4	CPA4	1	1	0	0	0	0	0	0	0	0	0	0	11.961
B8ZZZ9;F8W	Testis-specific gene 10 protein	TSGA10	0	1	0	0	0	0	0	358410000	0	0	0	0	6.1245
C9J0E4;P010	Cystatin-A;Cystatin-A, N-termi	CSTA	0	0	0	0	0	1	0	0	0	0	0	0	5.9064
C9J2B5;P093	Villin-1	VIL1	1	0	1	1	1	1	4581200	0	1715100	1862600	2522700	869480	6.2888

C9JA05;D6R	Immunoglobulin J chain	JCHAIN;IG	1	0	0	1	1	0	2418100	0	0	2015500	2296600	0	5.8393
C9JI87;P2179	Voltage-dependent anion-sele	VDAC1	0	0	1	1	0	1	0	0	258340000	60230000	0	59902000	5.9515
CON__O760	Keratin, type I cuticular Ha6	KRT36	0	0	7	7	1	1	0	0	85136000	38865000	4563600	5679700	51.546
CON__P02754			3	3	3	3	3	2	96406000	94602000	32539000	15330000	23237000	13028000	18.172
CON__P0276	Serum albumin	ALB	7	5	5	7	5	6	111340000	61443000	17625000	18718000	20713000	40962000	64.39
CON__P02769			27	27	29	28	25	29	2.13E+10	1.4969E+10	1.425E+10	7.898E+09	1.93E+10	2.71E+10	323.31
CON__P0877	Keratin, type I cytoskeletal 16	KRT16	8	6	10	10	8	8	199630000	72907000	646110000	200420000	91964000	1.38E+08	78.73
CON__P1364	Keratin, type I cytoskeletal 10	KRT10	12	12	13	13	10	13	2.101E+10	1.6888E+10	1.599E+10	1.189E+10	1.38E+10	9.63E+09	214.23
CON__P1364	Keratin, type II cytoskeletal 5	KRT5	4	5	5	4	4	4	1.012E+09	1495300000	1.39E+09	581710000	3.59E+08	7.09E+08	164.67
CON__P2093	Filaggrin	FLG	2	3	2	1	2	0	3744400	8310400	4495600	2946500	4132000	0	17.563
CON__P3552	Keratin, type I cytoskeletal 9	KRT9	14	14	13	12	12	13	6.098E+09	6040700000	4.619E+09	2.925E+09	3.19E+09	4.27E+09	213.43
CON__P3590	Keratin, type II cytoskeletal 2 e	KRT2	16	15	18	17	16	17	1.136E+10	1.3385E+10	9.593E+09	6.815E+09	5.35E+09	6.65E+09	323.31
CON__Q6KB	Keratin, type II cytoskeletal 80	KRT80	5	5	5	5	3	4	63721000	24304000	36531000	26594000	14240000	19477000	33.148
CON__Q7Z7	Keratin, type II cytoskeletal 1b	KRT77	4	4	4	4	3	4	23373000	35992000	55424000	24883000	10365000	22885000	37.635
CON__Q86Y	Hornerin	HRNR	6	10	9	9	3	10	335200000	257570000	283410000	78551000	43292000	2.8E+08	176.48
CON__Q9NS	Keratin, type II cuticular Hb4	KRT84	0	2	10	11	0	1	0	9067800	130370000	118050000	6601200	4928400	91.524
D6RCP8;O43	Lipoyl synthase, mitochondrial	LIAS	1	1	1	1	1	0	998330	12922000	6673400	3791200	4280500	0	6.3818
D6RFM5;P31	Succinate dehydrogenase [ubi	SDHA	0	1	1	1	1	1	0	268230	1884200	554800	1752000	1741700	8.9033
D6RHF4;E9P	UDP-glucose 6-dehydrogenase	UGDH	1	1	1	0	1	1	3040500	1411600	2838200	0	2960400	2136700	6.1298
E7ENZ3;B7Z	T-complex protein 1 subunit e	CCT5	0	1	1	1	1	1	0	1185700	807810	637920	2613500	2673200	5.9649
E7EX53;E7EQ	Ribosomal protein L15;60S ribo	RPL15	0	0	1	1	1	0	0	0	2489200	1683500	2065900	0	6.6006
E9PKE3;P111	Heat shock cognate 71 kDa prot	HSPA8;HS	4	4	5	5	4	4	60794000	58470000	81253000	32477000	55946000	63535000	56.579
F5H5D3;Q9B	Tubulin alpha-1C chain;Tubulin	TUBA1C;T	3	4	4	2	4	3	47646000	24822000	54800000	8605000	34237000	34301000	48.794
F5H6R4;P170	Zinc finger protein 26	ZNF26	1	1	1	1	0	1	11977000	20107000	16369000	8623300	0	5262900	6.7395
F8VWV4;F8	60S acidic ribosomal protein P0	RPLP0;RPL	1	0	1	1	1	1	1402000	0	5799800	1062700	1656600	1713800	7.5233

F8VXU8;F8V	Transmembrane and TPR repe	TMTC1	0	0	1	0	0	0	0	0	0	0	0	0	6.1182
F8WAM2;Q9	T-complex protein 1 subunit et	CCT7	1	0	1	1	1	1	1889700	0	1982900	558930	1744700	2616800	6.2373
F8WCU7;F8WB54		IL17RE	0	0	1	0	1	0	0	0	2405200	0	6478200	0	5.9225
F8WE98;A0A	Filamin-A	FLNA	0	0	0	0	1	1	0	0	0	0	4419900	2707400	7.3214
G5E9X5;F5G	Methylcrotonoyl-CoA carboxyl	MCCC1	0	0	1	1	1	1	0	0	6152400	4303200	13712000	7529300	6.3038
H0Y3Z3;H7B	Protein disulfide-isomerase	P4HB	2	2	3	3	2	3	2704400	4112700	24388000	11697000	5712800	6743100	18.545
H0YGI8;P319	Stress-induced-phosphoprotei	STIP1	0	0	1	0	0	0	0	0	0	0	0	0	5.7915
H0YJS4;G3V4	Eukaryotic translation initiatio	EIF2S1	1	1	0	0	1	1	2541900	0	0	0	8468200	4209500	6.0213
H0YLE8;A0A	Ras GTPase-activating-like prot	IQGAP1;IQ	1	0	1	1	2	2	159920	0	0	2303900	5893800	6510500	11.507
H0YMD0;H0Y	Annexin;Annexin A2;Putative	ANXA2;A	4	4	4	3	3	3	29397000	50741000	63995000	45764000	40065000	25756000	27.494
H3BTN5;P14	Pyruvate kinase;Pyruvate kina	PKM;PKLR	2	2	2	2	1	2	14835000	6216200	14180000	8310900	5252000	6579100	14.17
H7C144;F5G	Alpha-actinin-4	ACTN4	0	0	0	0	0	1	0	0	0	0	0	0	5.8887
H7C1V0;P07	Cathepsin D;Cathepsin D light	CTSD	1	1	1	0	1	1	6227500	11347000	11414000	0	2295700	6374900	5.8227
H7C4C8;P50	T-complex protein 1 subunit th	CCT8	0	0	1	1	0	1	0	0	3478300	1903600	0	3217700	6.2499
H7C597;Q7K	Staphylococcal nuclease domai	SND1	1	1	1	0	1	1	18433000	1118100	3207400	0	3263100	6011700	7.6038
I3L192;A0A0	Basigin	BSG	0	0	2	2	2	2	0	0	68002000	54820000	7751900	5526300	15.919
I3L2V2		DGKE	0	1	1	0	0	1	0	4093700	808600	0	0	4256000	-2
I6L8B7;Q014	Fatty acid-binding protein, epi	FABP5	0	0	1	1	1	1	0	0	2529700	874580	1414300	2662500	6.375
J3KPS3;P040	Fructose-bisphosphate aldolas	ALDOA	3	3	3	4	5	6	7636000	9257000	8924500	10842000	19135000	36705000	38.984
J3KTM9;Q14	Importin subunit beta-1	KPNB1	0	0	1	1	1	0	0	0	7189000	1608700	839430	0	14.997
J3QRD1;P51	Fatty aldehyde dehydrogenase	ALDH3A2	0	0	2	1	0	1	0	0	8573500	5686700	0	1557600	12.325
K7EMV3;K7E	Histone H3;Histone H3.3C;Hist	H3F3B;H3F	1	1	1	1	1	1	4185000	12313000	18306000	13363000	2492900	3019300	6.7416
K7ENJ4;K7ER	ATP synthase subunit alpha, m	ATP5A1	1	1	1	1	1	1	8057200	9287300	934860	1096900	768040	495760	5.8091
K7ERE3;CON	Keratin, type I cytoskeletal 13	KRT13	2	2	2	2	1	1	10473000	18321000	3181300	2232400	1757600	3889600	15.539
M0R1V3;M0	Amino acid transporter;Excitat	SLC1A6	0	1	0	0	0	0	0	0	0	0	0	0	6.4565

M0R1V7;J3Q	Ubiquitin-60S ribosomal protei	UBA52;UB	2	1	2	2	2	2	46177000	17982000	26376000	23765000	11452000	11454000	12.759
O00522	Krev interaction trapped prote	KRIT1	0	0	1	0	0	1	0	0	35328000	0	0	19708000	-2
O14556	Glyceraldehyde-3-phosphate d	GAPDHS	1	1	1	1	1	1	15410000	6061500	4725900	4387400	2824600	2673600	8.3602
O75844	CAAX prenyl protease 1 homol	ZMPSTE24	0	0	1	1	0	1	0	0	4200200	1197900	0	1144200	8.1821
P00338;F5GX	L-lactate dehydrogenase A cha	LDHA	1	2	2	2	1	2	3164700	7405900	43562000	19045000	4846700	21663000	25.196
P00966;Q5T6	Argininosuccinate synthase	ASS1	4	3	5	3	5	5	18697000	27221000	46757000	30639000	52283000	26326000	35.369
P04259	Keratin, type II cytoskeletal 6B	KRT6B	1	1	1	1	1	1	16703000	19072000	33301000	28300000	14880000	8303500	6.0078
P04264;CON	Keratin, type II cytoskeletal 1	KRT1	15	15	15	15	13	15	1.88E+10	1.7004E+10	1.577E+10	1.161E+10	1.47E+10	1.31E+10	323.31
P04406;E7EU	Glyceraldehyde-3-phosphate d	GAPDH	3	3	3	3	2	3	138030000	140300000	123480000	102470000	69063000	61098000	24.033
P05089	Arginase-1	ARG1	1	1	1	1	0	0	1000300	1469500	2970000	1160800	0	0	7.8575
P05109	Protein S100-A8;Protein S100-	S100A8	1	1	1	1	1	0	8553400	0	5936900	10052000	1293200	0	12.193
P06702	Protein S100-A9	S100A9	1	1	1	1	1	1	32856000	15157000	22302000	21028000	14713000	7352300	11.634
P06733;K7E	Alpha-enolase;Enolase	ENO1	3	3	3	3	2	3	57126000	57396000	52599000	21544000	27497000	28297000	24.55
P06748	Nucleophosmin	NPM1	1	1	1	1	1	1	3647200	1840300	8509600	2570200	5099000	5606000	6.3643
P06756	Integrin alpha-V;Integrin alpha	ITGAV	1	0	0	0	1	0	4036500	0	0	0	3688400	0	-2
P07099	Epoxide hydrolase 1	EPHX1	0	0	2	2	1	0	0	0	21599000	13780000	2474800	0	12.304
P07195	L-lactate dehydrogenase B chai	LDHB	1	0	1	1	1	1	2309400	0	6450200	7838900	5448200	2720100	6.424
P07814;V9G	Bifunctional glutamate/prolin	EPRS	0	0	2	2	3	3	0	0	2633700	1286200	6396600	7138300	17.534
P07900;Q58F	Heat shock protein HSP 90-alp	HSP90AA1	3	4	5	5	4	5	20657000	8652400	123490000	83933000	1.09E+08	97610000	52.381
P08238;Q58F	Heat shock protein HSP 90-bet	HSP90AB1	1	2	2	2	1	3	25644000	7765100	35388000	3463900	10689000	38607000	45.375
P10599	Thioredoxin	TXN	1	2	1	2	1	2	15045000	6556800	9514000	3414900	8817900	8023500	12.238
P10809	60 kDa heat shock protein, mit	HSPD1	1	1	1	1	1	1	4883400	1491500	2502600	3332900	6567400	8115600	6.1154
P11021	78 kDa glucose-regulated prot	HSPA5	1	1	1	1	1	1	11643000	1068400	304160	6953000	5427800	5830500	6.1736
P11498;E9PR	Pyruvate carboxylase, mitocho	PC	2	0	6	9	10	11	1383500	0	35277000	20032000	93898000	1.56E+08	90.622
P12273	Prolactin-inducible protein	PIP	1	0	0	1	1	0	5830200	0	0	4726000	3661900	0	7.1373

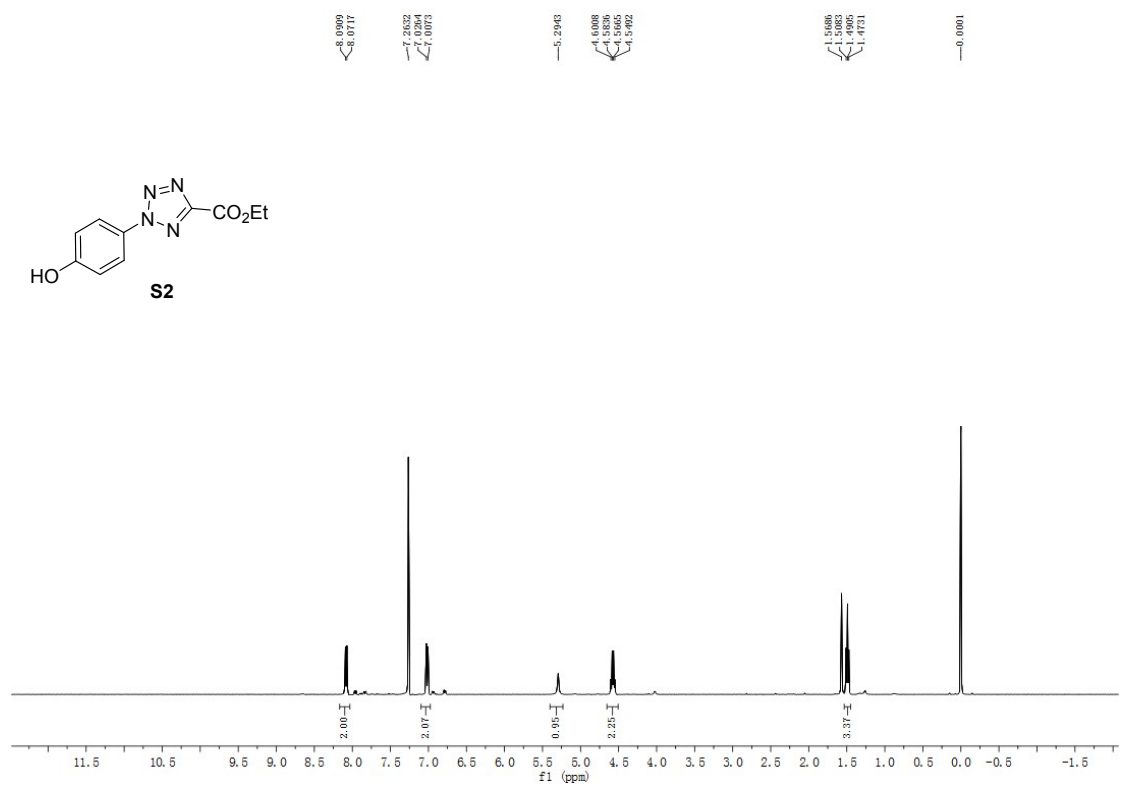
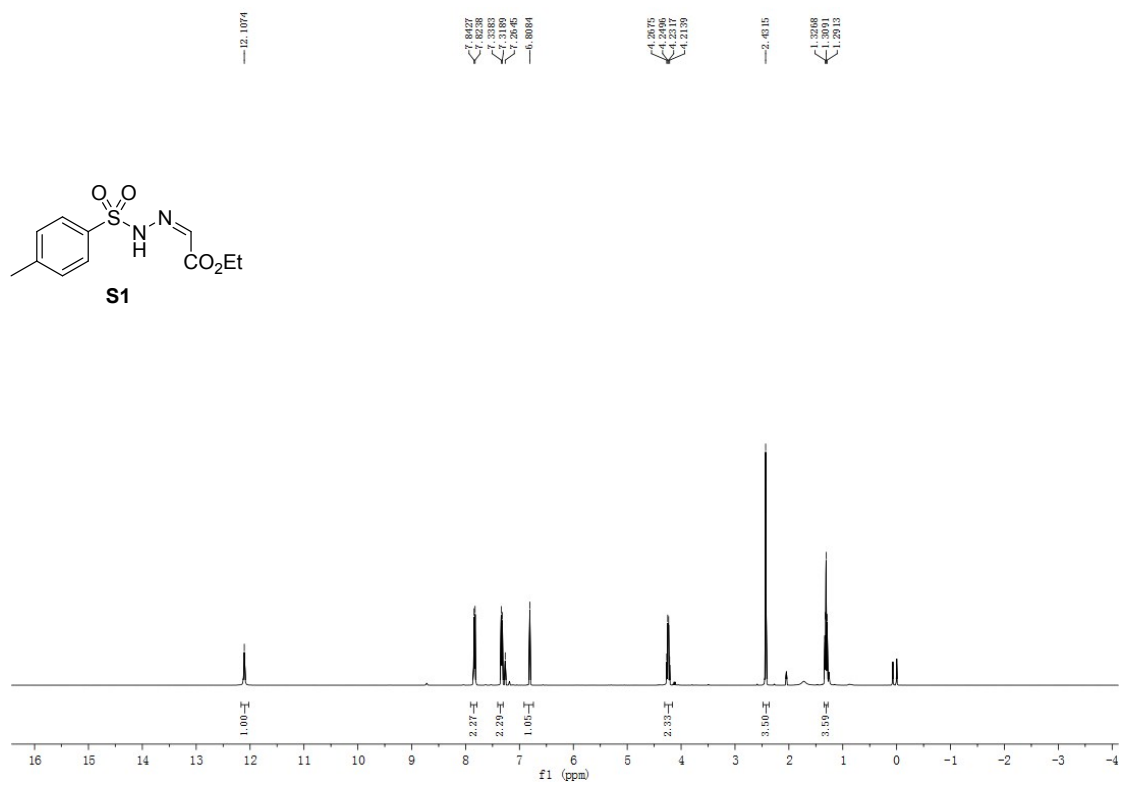
P13639	Elongation factor 2	EEF2	3	3	4	3	3	3	9320800	3960900	23269000	17121000	25731000	22304000	23.768
P13667	Protein disulfide-isomerase A4	PDIA4	0	0	1	0	0	0	0	0	0	0	0	0	5.8367
P14625;F8VP	Endoplasmin	HSP90B1	0	2	3	4	4	5	0	2283900	12133000	10816000	12574000	10474000	29.621
P14923;C9J8	Junction plakoglobin	JUP	5	6	7	7	3	5	45953000	56974000	12599000	21543000	17235000	45671000	53.098
P15924	Desmoplakin	DSP	27	26	27	27	22	24	271520000	237730000	217960000	90815000	1.19E+08	1.82E+08	246.72
P16403;P104	Histone H1.2;Histone H1.4;Hist	HIST1H1C;	2	3	3	3	3	3	12629000	34729000	44874000	23044000	17373000	46449000	19.056
P17066;Q53F	Heat shock 70 kDa protein 6;He	HSPA6;HS	1	1	1	1	1	1	6520500	13198000	22149000	23936000	12395000	10524000	7.427
P20248	Cyclin-A2	CCNA2	1	1	1	1	1	1	20603000	19626000	5800700	6710500	7265300	5316700	6.8413
P22735	Protein-glutamine gamma-glut	TGM1	2	2	3	2	1	2	6009400	3727200	5197000	4135200	1570700	2553100	17.827
P23490	Loricrin	LOR	1	1	1	1	1	0	3037100	4651100	5771300	1355100	1505900	0	6.2985
P25311	Zinc-alpha-2-glycoprotein	AZGP1	1	1	1	1	1	1	18646000	14987000	6752500	7406700	6977700	4638000	7.8529
P26639	Threonine--tRNA ligase, cytopl	TARS	0	0	1	0	0	0	0	0	0	0	0	0	6.505
P31327	Carbamoyl-phosphate synthas	CPS1	0	0	1	1	1	1	0	0	6060000	2021900	6478700	2477200	5.9865
P31512	Dimethylaniline monooxygena	FMO4	0	1	1	1	1	1	0	0	3114000	1885400	816330	1947600	6.3974
P31944	Caspase-14;Caspase-14 subuni	CASP14	2	3	3	3	3	3	20361000	15298000	26428000	10258000	10678000	15003000	30.053
P32119	Peroxiredoxin-2	PRDX2	0	1	1	1	2	1	0	2608800	1801700	1744300	5873300	4300100	11.649
P35321;P225	Cornifin-A;Cornifin-B	SPRR1A;S	1	1	1	1	1	1	22175000	2253800	8586200	2819900	3746400	4135900	5.8848
P37837	Transaldolase	TALDO1	1	0	1	1	0	1	3492400	0	5191000	1721500	0	1879600	6.5089
P47929	Galectin-7	LGALS7	1	1	1	1	1	1	4390000	3300600	3962200	3395700	3033700	1039900	5.928
P52179	Myomesin-1	MYOM1	1	1	1	0	0	1	5145300	2694800	1026200	0	0	2030100	6.0104
P55060	Exportin-2	CSE1L	1	1	2	2	2	2	2687400	4441600	12262000	8558400	6646600	5557900	12.822
P55072	Transitional endoplasmic retic	VCP	0	0	0	0	0	1	0	0	0	0	0	0	6.3811
P61626;F8V	Lysozyme C;Lysozyme	LYZ	2	3	2	2	3	2	150250000	103620000	12687000	7816300	32595000	39050000	20.202
P62805	Histone H4	HIST1H4A	2	2	2	2	2	2	20159000	7656600	5299800	2431500	5821000	4440900	13.239
P63261;P607	Actin, cytoplasmic 2;Actin, cyto	ACTG1;AC	2	2	2	2	2	2	367640000	223950000	335800000	284630000	3.05E+08	3.84E+08	70.995

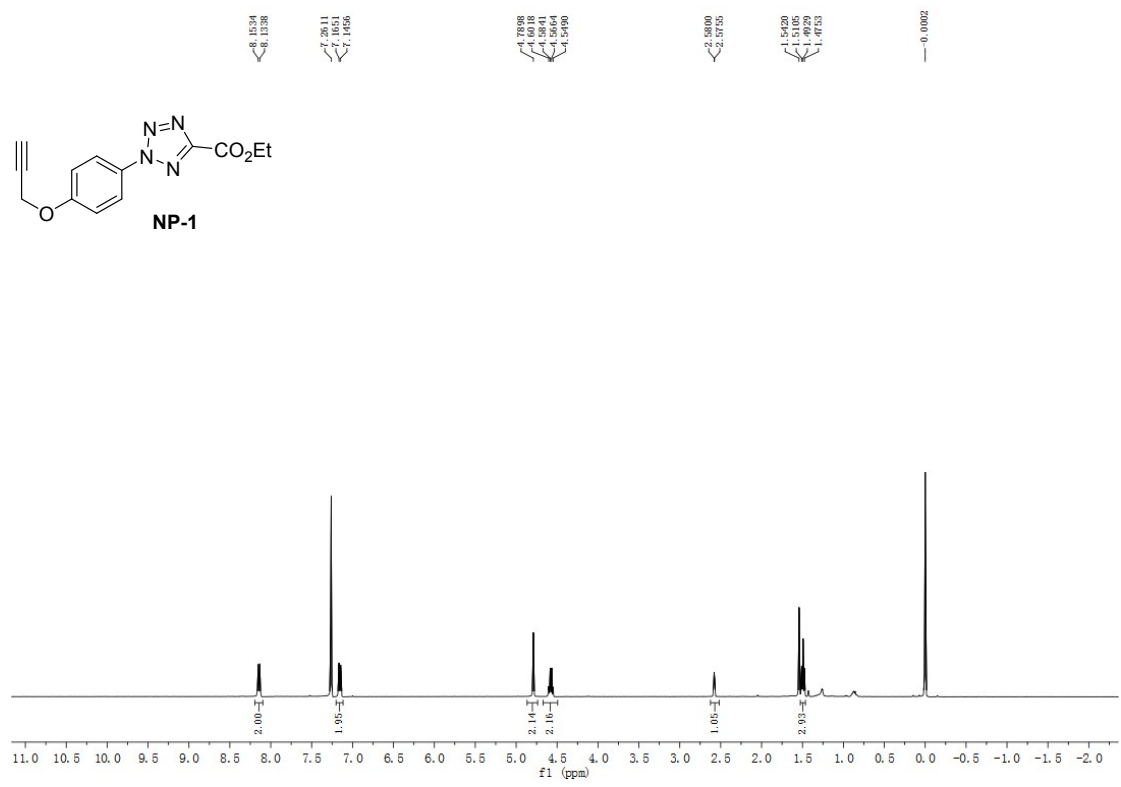
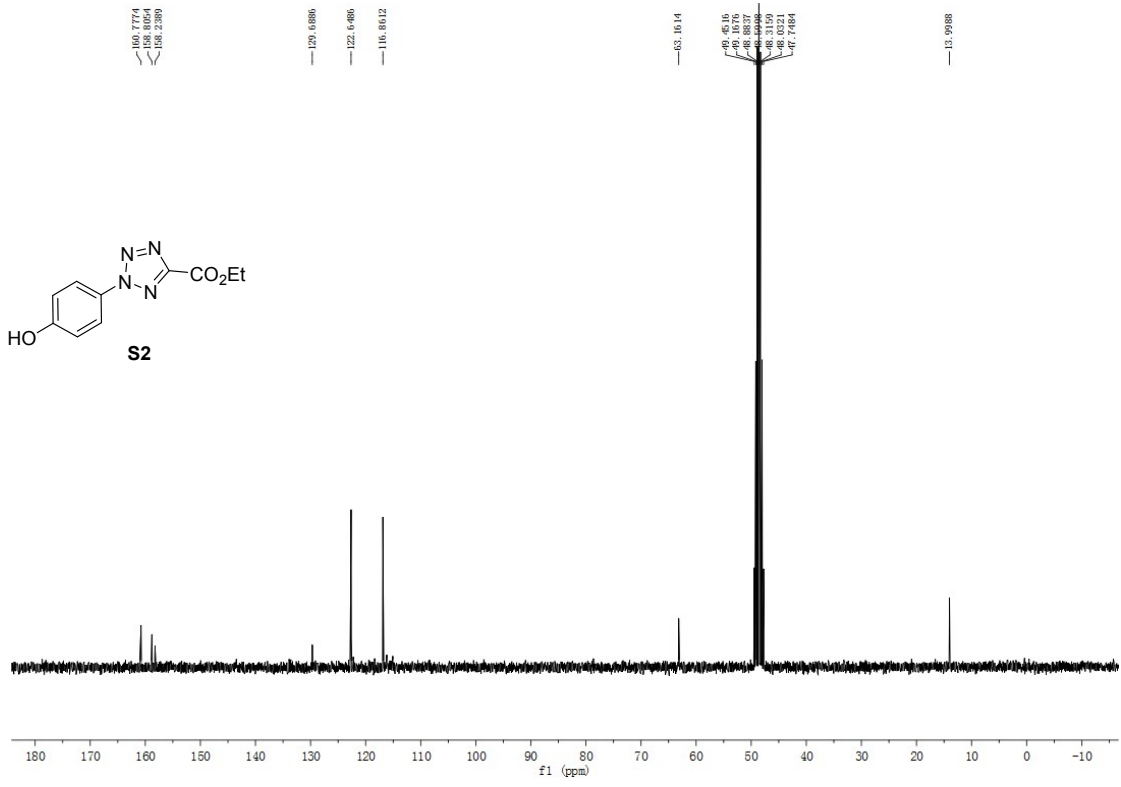
P63267;P681	Actin, gamma-enteric smooth	ACTG2;AC	1	1	1	1	0	0	63006000	31017000	677630	503720	0	0	5.8587
P81605	Dermcidin;Survival-promoting	DCD	1	1	1	1	1	0	320970000	54964000	99085000	62960000	1.96E+08	0	7.9618
Q02413	Desmoglein-1	DSG1	6	6	4	5	6	5	53739000	44790000	18733000	15693000	25740000	23349000	40.812
Q08188	Protein-glutamine gamma-glut	TGM3	2	2	2	2	2	2	19092000	24313000	25059000	11100000	14459000	9896300	14.284
Q08554	Desmocollin-1	DSC1	3	3	3	3	3	3	27877000	24858000	22028000	18428000	22833000	12809000	29.498
Q13520	Aquaporin-6	AQP6	1	1	1	1	1	1	14686000	12225000	10065000	5631200	9562900	3830900	5.9887
Q16658;C9JF	Fascin	FSCN1	1	1	2	2	2	2	2250000	1085200	3632700	1044300	7484800	8255900	11.781
Q3BDU5;P02	Prelamin-A/C;Lamin-A/C	LMNA	5	2	7	6	5	5	10310000	5182300	24023000	19074000	12157000	16104000	43.945
Q5BQ95		KLK13	1	1	1	1	1	1	150570000	116010000	15643000	12113000	20134000	9156100	6.0928
Q5H8X8;O95	Urotensin-2	UTS2	1	1	1	1	1	0	0	7339800	8357800	5641500	5845900	0	6.1458
Q5JQ13;P18	Vinculin	VCL	3	3	3	4	3	2	128320000	93315000	136550000	28714000	4032900	1.3E+08	28.659
Q5JSD2;Q5JS	Voltage-dependent anion-sele	VDAC2	0	0	2	2	2	2	0	0	109120000	39821000	31636000	38123000	14.065
Q5JVH2;P05	Propionyl-CoA carboxylase alp	PCCA	0	0	0	1	1	1	0	0	0	1415600	3952300	3960500	6.9789
Q5K684;P48	Serpin B4;Serpin B3	SERPINB3;	2	2	3	3	2	2	8444100	17718000	62058000	26349000	5306400	7009200	20.195
Q5ST81;A0A	Tubulin beta-8 chain;Tubulin b	TUBB;TUB	1	2	2	2	2	2	31184000	7388000	19281000	6174000	14417000	42636000	12.308
Q5T749	Keratinocyte proline-rich prot	KPRP	3	2	3	2	3	2	111470000	60095000	29626000	37390000	45529000	18530000	21.892
Q5T750	Skin-specific protein 32	XP32	1	1	1	0	0	0	12861000	11798000	7106500	0	0	0	6.5716
Q5W0Q7	SUMO-specific isopeptidase U	USPL1	1	1	0	0	0	0	11386000	2223100	0	0	0	0	6.5064
Q6ULP2	Aftiphilin	AFTPH	1	1	1	1	1	0	5809000	3708800	2228400	425620	2306800	0	6.2246
Q86T24	Transcriptional regulator Kaiso	ZBTB33	0	1	0	1	0	1	0	5673600	0	1255900	0	2597600	6.1741
Q8IWZ4	Tripartite motif-containing pro	TRIM48	1	1	0	1	1	1	11726000	2159500	0	773520	6762200	7045800	5.9824
Q8N5V2	Ephexin-1	NGEF	1	1	1	1	1	0	1990700	6254800	4526700	846060	890740	0	-2
Q8N7G0	POU domain, class 5, transcript	POU5F2	1	1	1	1	1	1	29591000	8978300	279750	10427000	27696000	25621000	-2
Q8TF72	Protein Shroom3	SHROOM3	1	1	1	1	1	1	183010000	81307000	24869000	7792400	2.37E+08	2.04E+08	6.3338
Q9NY15	Stabilin-1	STAB1	0	1	1	0	1	1	0	6005700	2730000	0	1837900	1271500	6.482

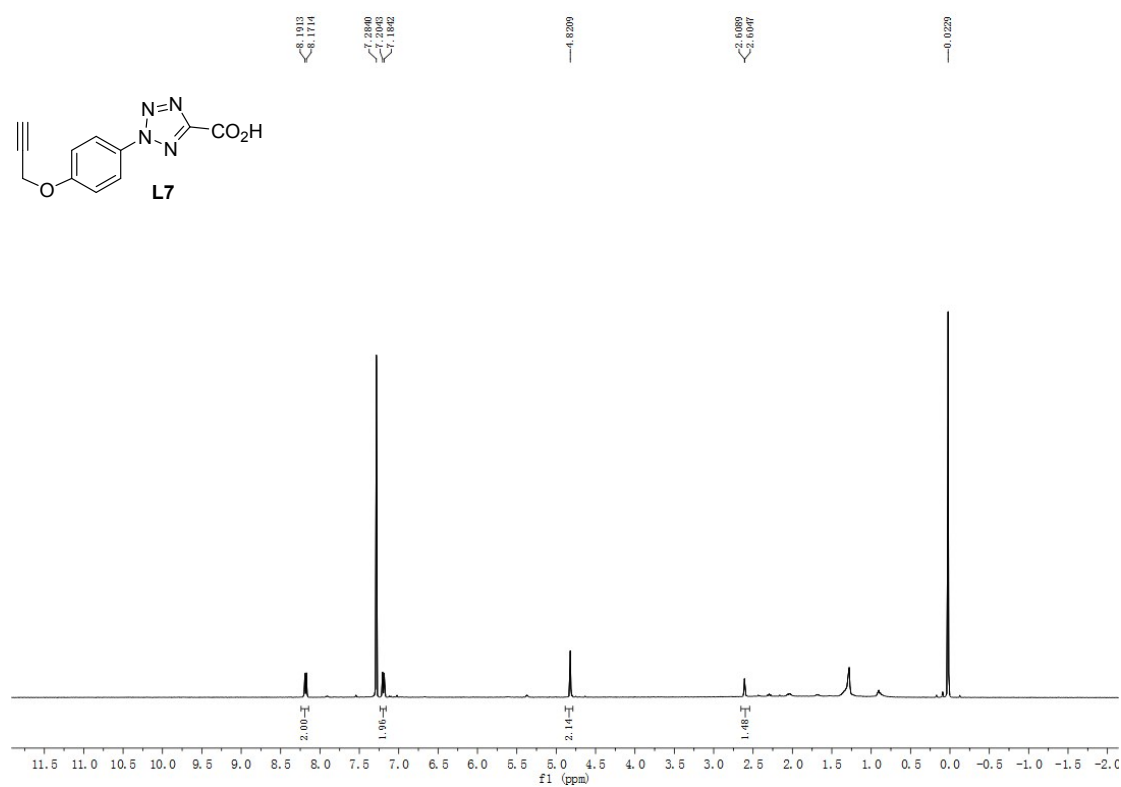
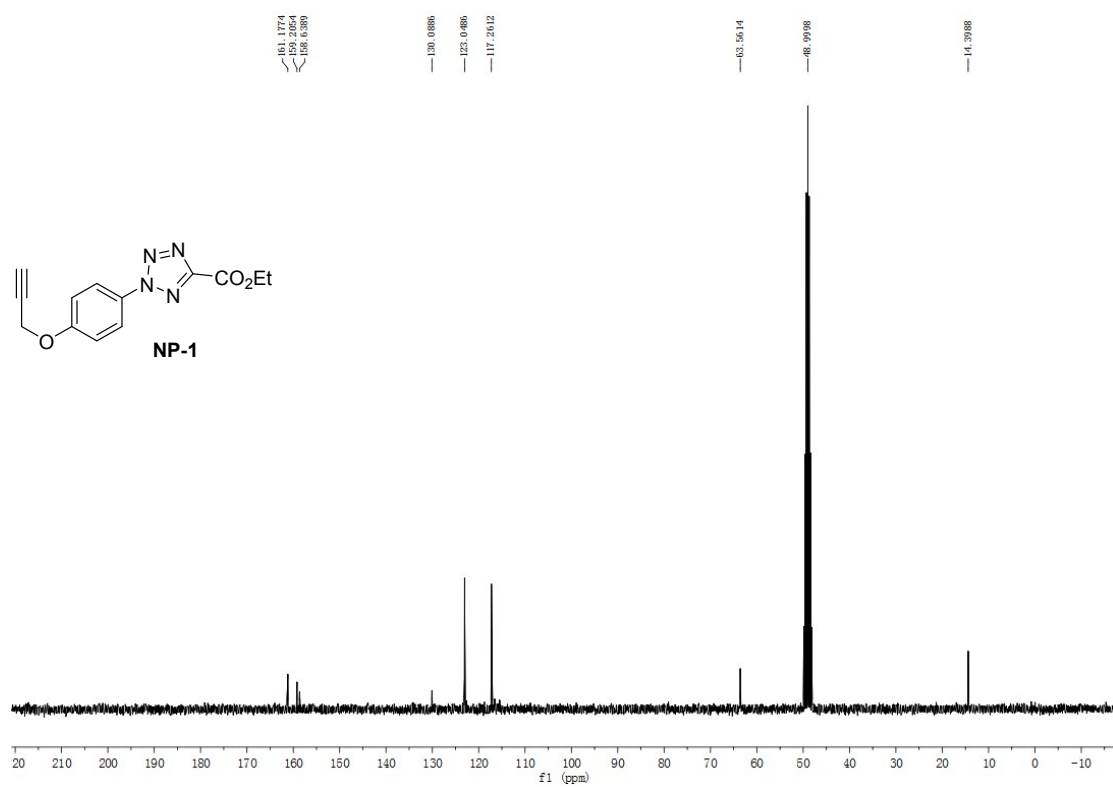
Q9NY74	Ewings tumor-associated antigen	ETAA1	1	1	1	1	1	0	10733000	3115400	2913000	204890	1474300	0	6.0458
Q9NZT1	Calmodulin-like protein 5	CALML5	1	1	1	1	1	1	8044800	12102000	9004100	7667500	4019200	5527000	6.2622
R4GN62;A0A	Partitioning defective 3 homolog	PARD3B	1	1	1	1	1	1	9279300	6568300	5611900	6606400	3258500	18481000	6.7918
V9GZ37;A0A	Heat shock 70 kDa protein 1B;H	HSPA1A;H	1	1	1	1	1	1	11909000	8482400	18515000	12840000	22970000	9851700	18.546

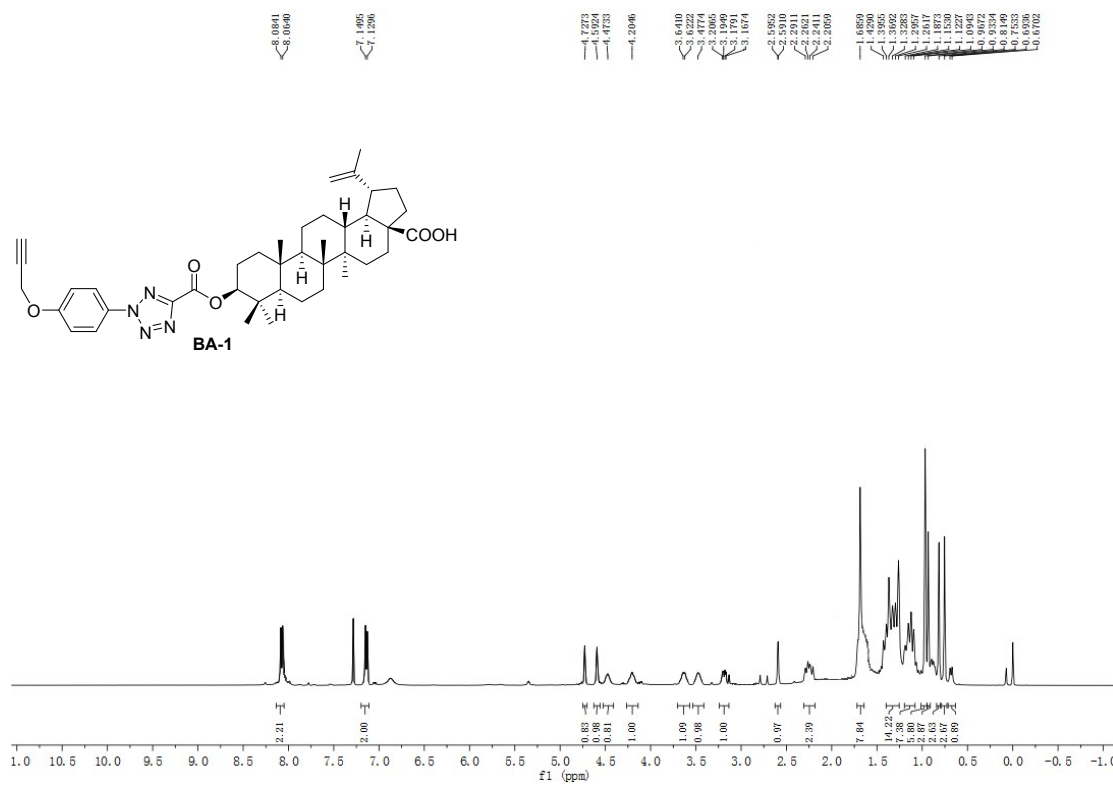
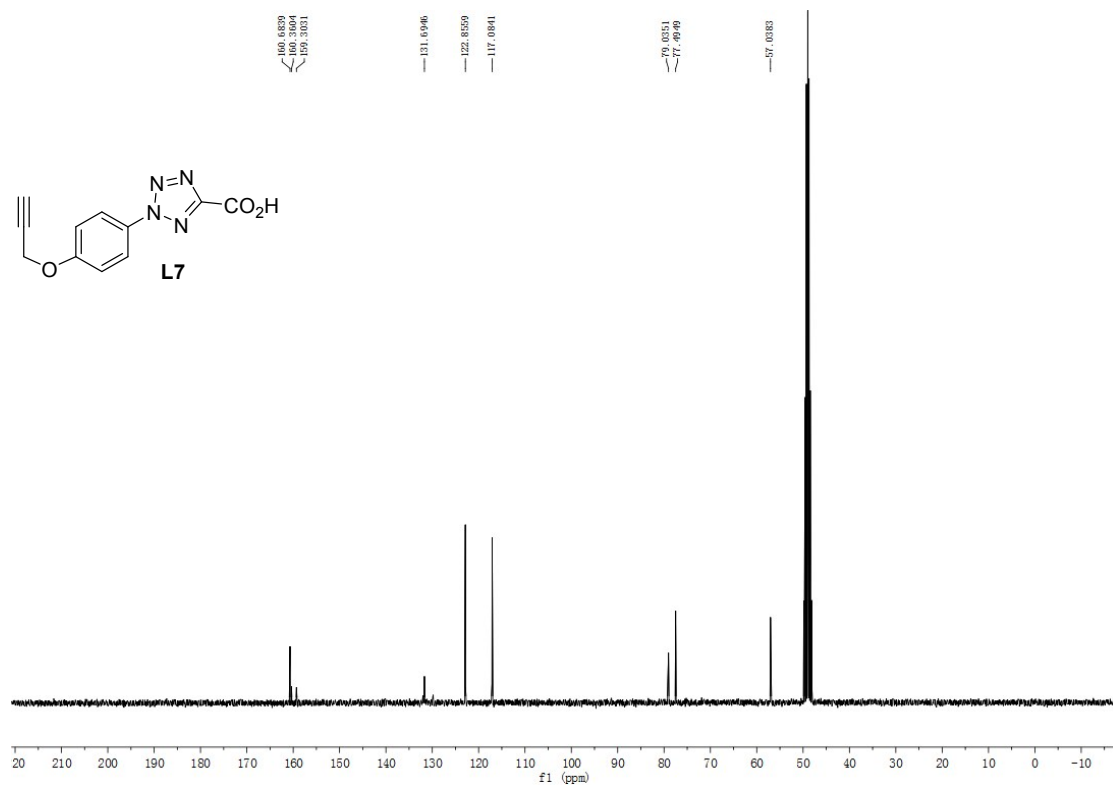
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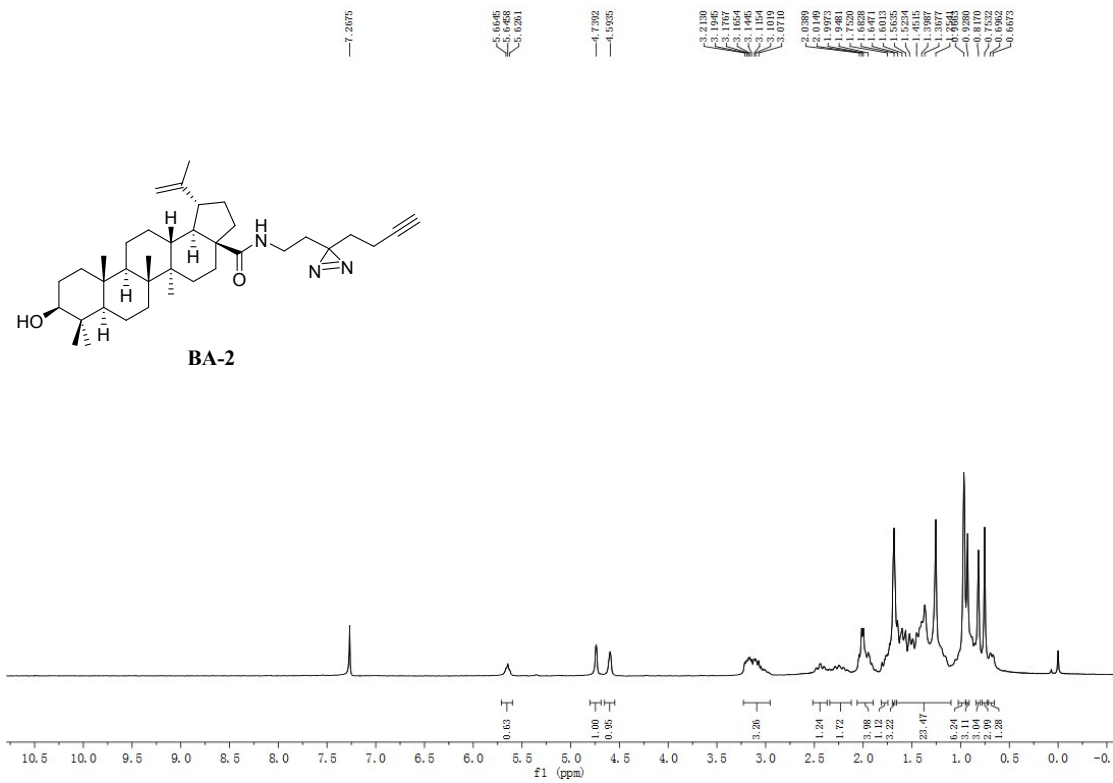
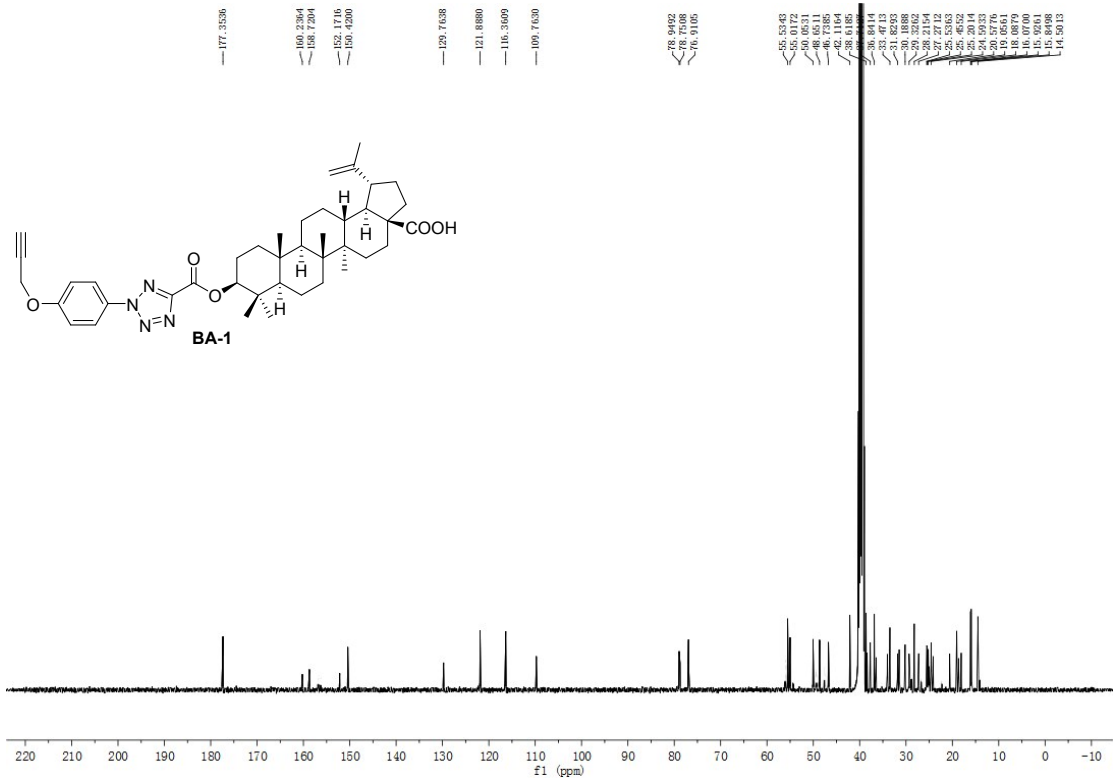
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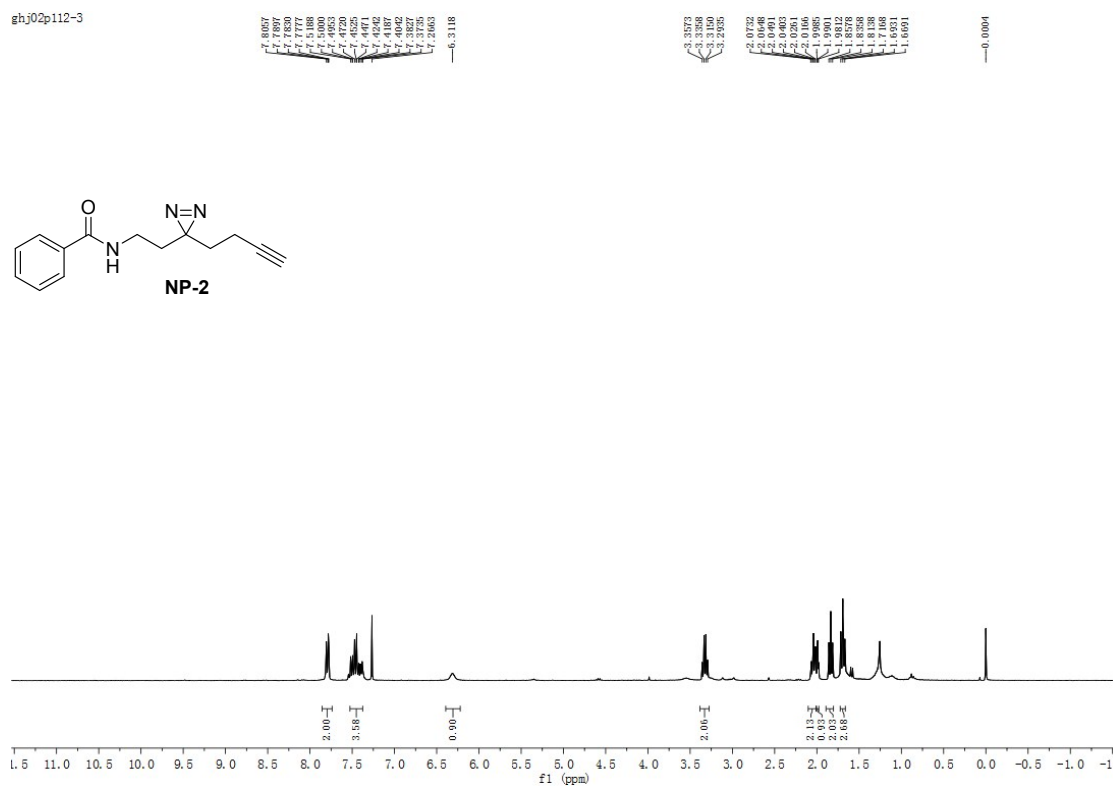
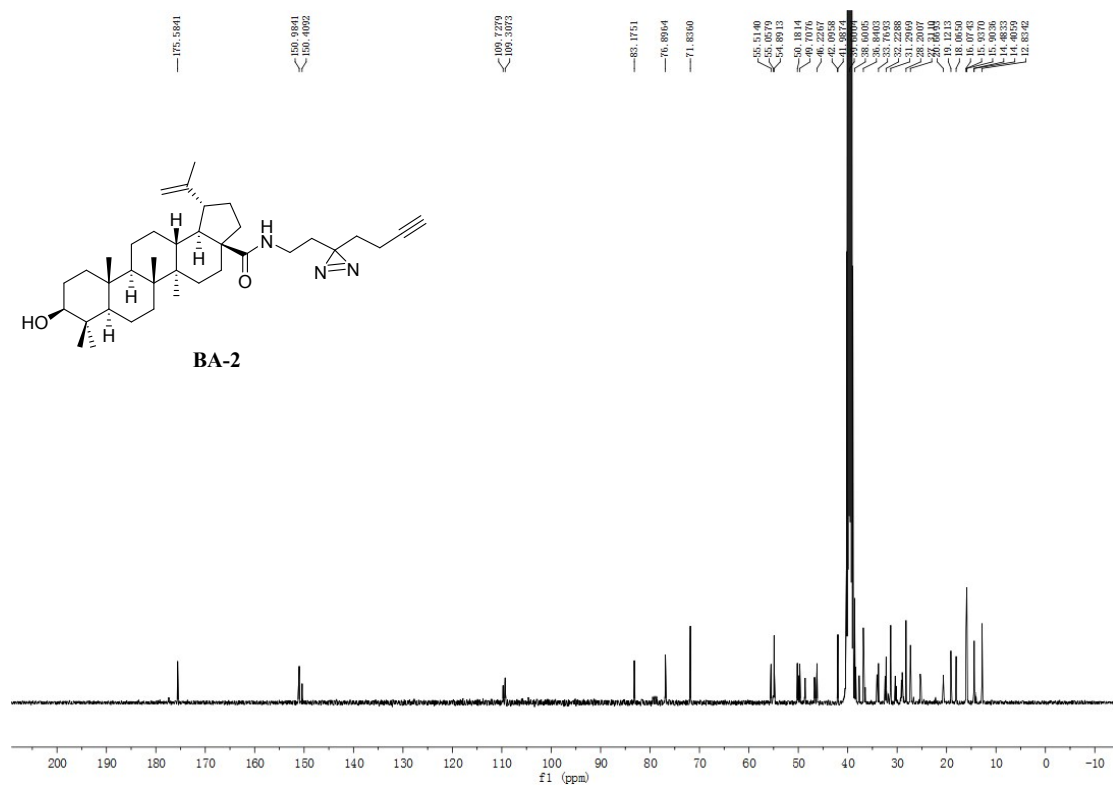












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