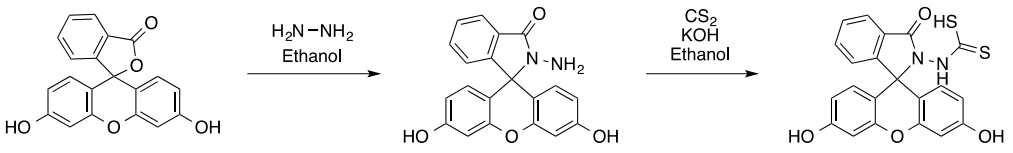
Supplementary Information

1. Instruments and materials

^{1}H-NMR spectra were recorded at 300K using a Bruker DRX 300 or Bruker Ascent 400 and 500 spectrometers at frequencies of 300 MHz, 400 MHz and 500 MHz respectively. 13C-NMR spectra were recorded on these spectrometers at frequencies of 75 MHz, 100 MHz and 125 MHz respectively. 195Pt-NMR spectra were recorded at 300K using the Bruker Ascent 500 spectrometer. Low resolution mass spectrometry was performed on a Finnigan LCQ quadrupole ion trap mass spectrometer operating in positive ion mode and Atmospheric Pressure Chemical Ionisation (APCI). High resolution mass spectrometry was performed on a Bruker Apex Qe 7T Fourier transform ion cyclotron resonance mass spectrometer operating in positive ion mode and ESI using an Apollo II ESI/MALDI dual source. Fluorescence and absorption spectroscopy were carried out on a bench top PerkinElmer Enspire Multimode Plate Reader using flat bottom clear and black sterile 96-well microplates.

All materials used were laboratory grade and used without further purification unless otherwise stated. Other reagents were purchased from Sigma Aldrich or Alfa Aesar. Potassium tetrachloroplatinate was purchased from Precious Metals online. Commercial materials were used as received unless otherwise noted.

2. Synthesis of FDCPt1



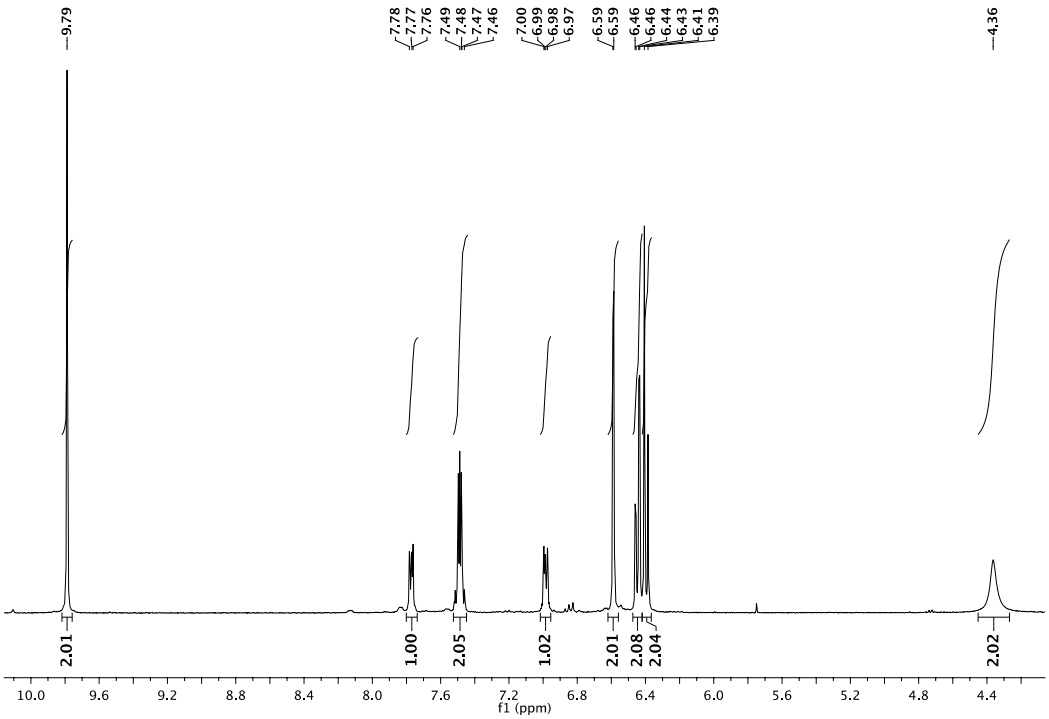
FH **FDCPt1**

2-Amino-3',6'-dihydroxyspiro[isoindoline-1,9'-xanthen]-3-one (**FH**)
To a suspension of fluorescein (6.0 g, 18.1 mmol) in 50 mL ethanol was added excess hydrazinium hydroxide (24 mL, 80% aqueous). The reaction mixture was heated to reflux and allowed to stir for 7 h, after which the solution was poured onto 400 mL of ice water and left to sit for 2 h. The resulting yellow precipitate was filtered from the aqueous suspension an washed with water and cold ethanol. Recrystallisation of the precipitate in ethanol (250 mL) yielded the title compound as a pale yellow solid (4.13 g, 54%); mp 255ºC. ^{1}H NMR (300 MHz, DMSO-d_6) 9.39 (br. s, 2 H), 7.76-7.72 (m, 1 H), 7.49-7.42 (m, 2 H), 6.98-6.95 (m, 1 H), 6.59 (d, 2 H, *J*=2.0 Hz), 6.45 (dd, 2 H, *J*=8.5, 2.0 Hz), 6.40 (d, 2 H, *J*=8.5 Hz), 4.38 (br. s, 2 H) ppm. ^{13}C NMR (75 MHz, DMSO-d_6) 165.4, 158.2, 152.4, 151.5, 132.6, 129.3, 128.4, 127.9, 122.3, 111.9, 109.9, 102.3, 64.6 ppm. *m/z* (LRAPCI): calculated for $[M+H]^+$: 347.10, found: 347.44.

(3',6'-Dihydroxy-3-oxospiro[isoindoline-1,9'-xanthen]2-yl)dithiocarbamic acid (**FDCPt1**)
FH (2.0 g, 5.80 mmol) was suspended in 40 mL ethanol. Potassium hydroxide (0.49 g, 8.70 mmol) was added to the suspension, and allowed to stir at room temperature for 0.5 h. Following this, carbon disulfide (1.94 mL, 29.0 mmol) was added dropwise and the solution was heated to reflux and stirred for 6 h. The reaction was then cooled to room temperature and the ethanol was removed *in vacuo* to give the dithiocarbamate potassium salt. The solid was suspended in water and acidified to pH 4 with 2 M HCl and extracted into ether (250 mL). The organic phase was washed thrice with water and dried (Na_2SO_4) and evaporated *in vacuo*

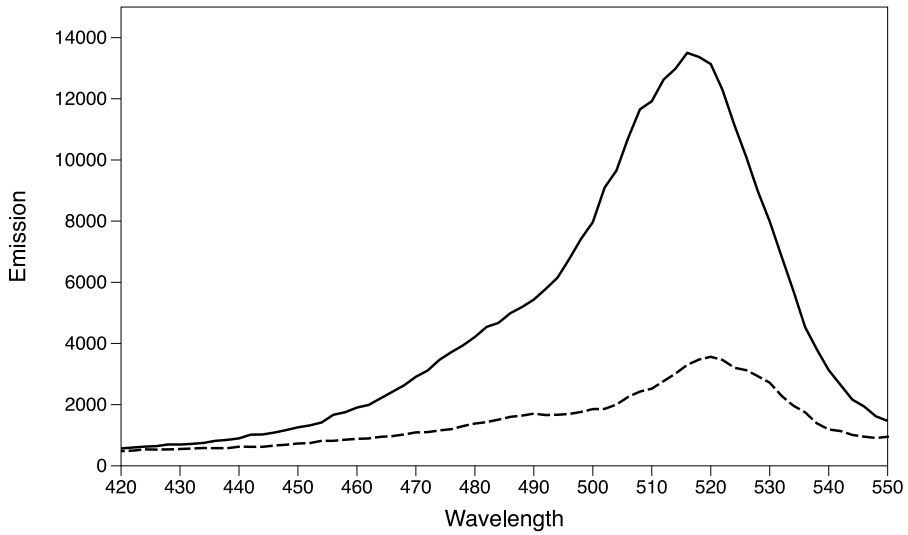
to give the title compound **FDCPt1** as a dark orange powder (2.20 g, 90%); mp 189-191ºC. ^{1}H NMR (400 MHz, DMSO-d_6) 9.79 (br. s, 2H), 7.78-7.76 (m, 1H), 7.49-7.46 (m, 2H), 7.00-6.97 (m, 1H). 6.59 (d, 2H, *J*=2.0 Hz), 6.44 (dd, 2H. *J*=9.0, 2.0 Hz), 6.39 (d, 2H, *J*=9.0 Hz), 4.37 (br. s, 1H) ppm. (Full spectrum Figure S1). ^{13}C NMR (100 MHz, DMSO-d_6) 230.2, 165.4, 158.2, 158.2, 151.5, 132.6, 129.9, 124.0, 122.3, 112.0, 109.9, 102.3, 64.9, 64.6 ppm. *m/z* (HREIMS): calculated for $[M\text{-}CS_2+K]^+$: required for $C_{20}H_{14}N_2O_4K$.: 385.0591, found: 385.0585. Elemental analysis: calcd (%) for $C_{21}H_{16}N_2O_4S_2$: C 59.42, H 3.80, N 6.60; found C 61.11, H 4.28, N 6.64.

3. Characterisation data of FDCPt1



^{1}H NMR spectra of FDCPt1

4. Absorbance spectra of FDCPt1



5. **Figure S1** Excitation spectra of FDCPt1 (200 uM, HEPES (pH 7.4, 1:1 DMF). Dashed line: **^{195}Pt** FDCPt1. Solid line: FDCPt1 with one equivalent of 1.

NMR spectra

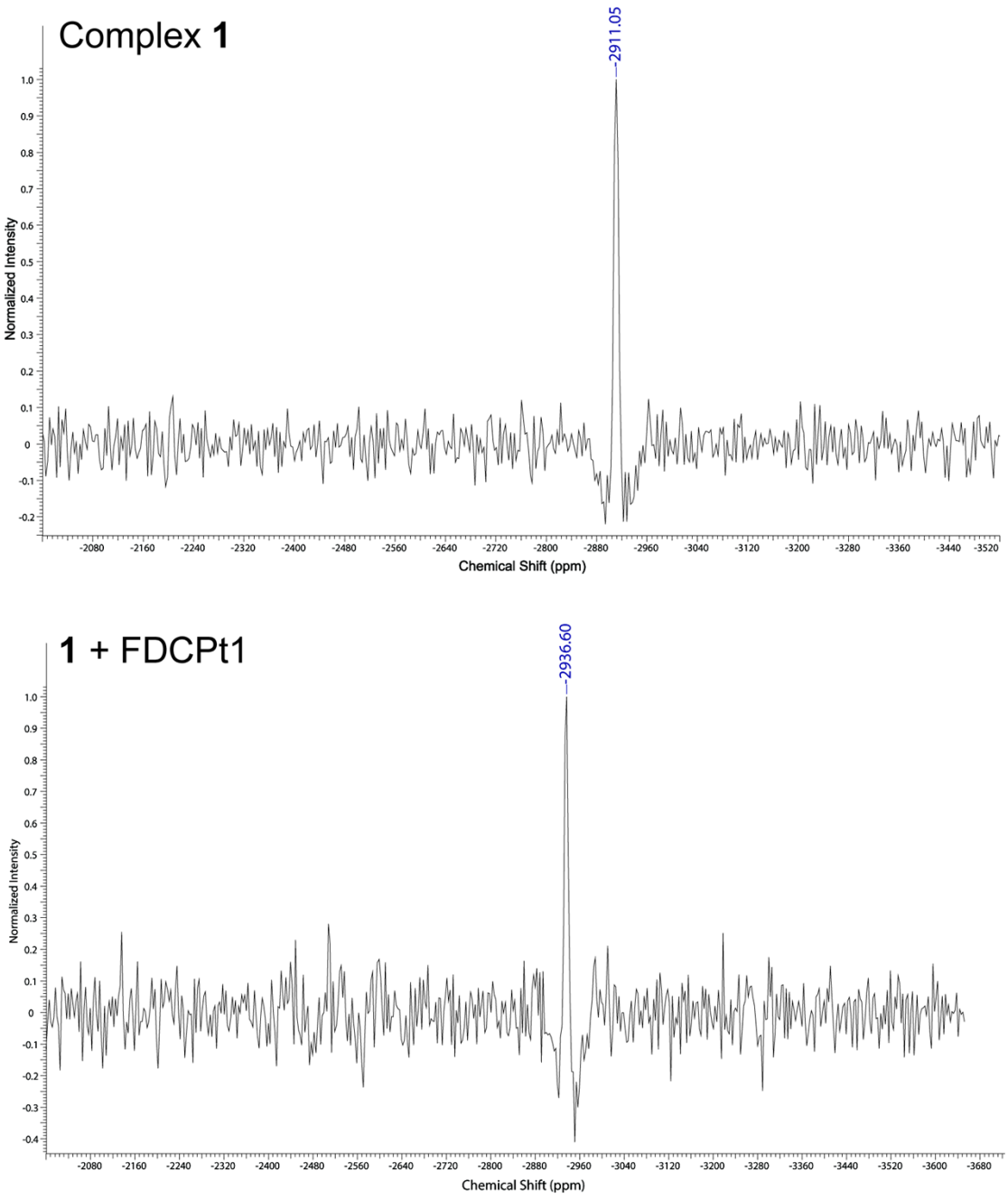


Figure S2 ^{195}Pt NMR spectra of **1** (top). One equivalent of **FDCPt1** was added and the chemical shift of ^{195}Pt of **1** was measured again (bottom).

6. Fluorescence data and Job's plot

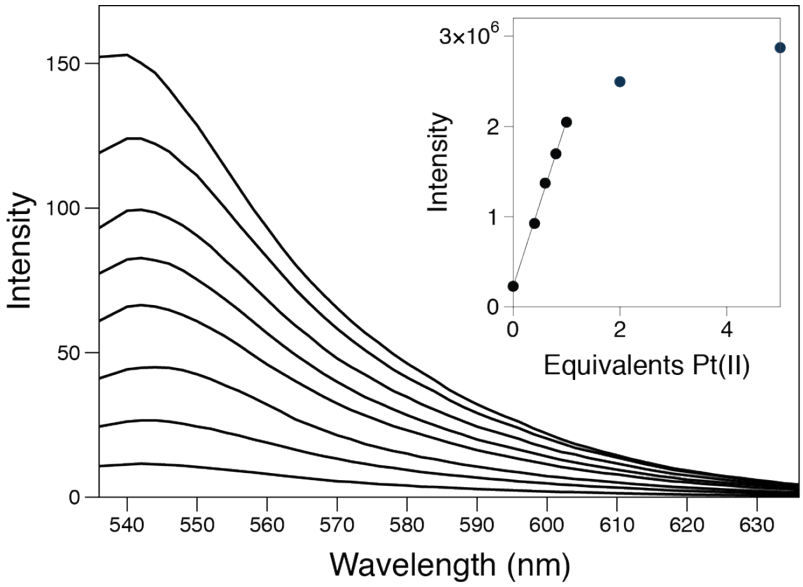
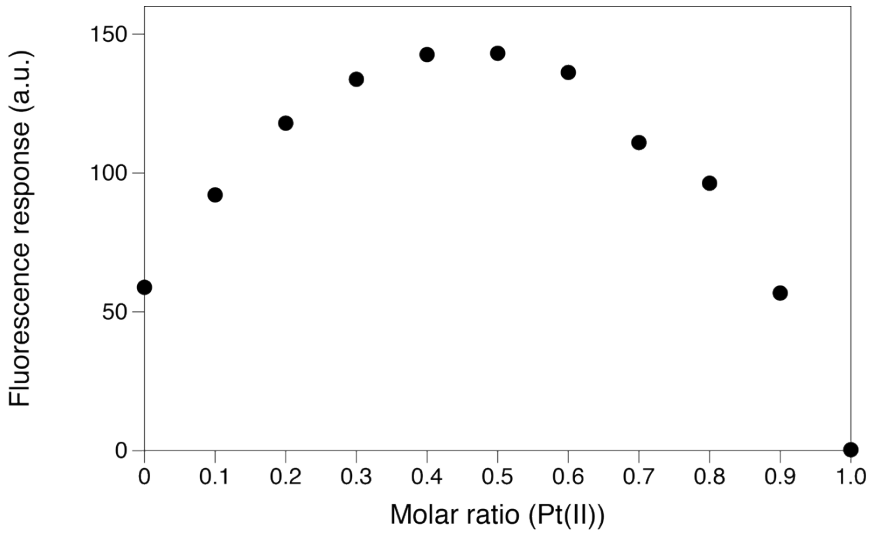


Figure S3 Fluorescence increase with addition of **1** to **FDCPt1**. Inset: Integrated emission response of FDCPt1 to equivalents of **1**. Fluorescence was measured at a concentration of 200

Figure S4 Job's plot of **FDCPt1** and **1**. Increasing molar ratio of **1** to **FDCPt1** is plotted against the integrated fluorescence response, showing a maxima at 0.5 molar equivalents. Fluorescence was measured at a concentration of 200 uM in HEPES buffer (pH 7.4, 1:1 DMF).



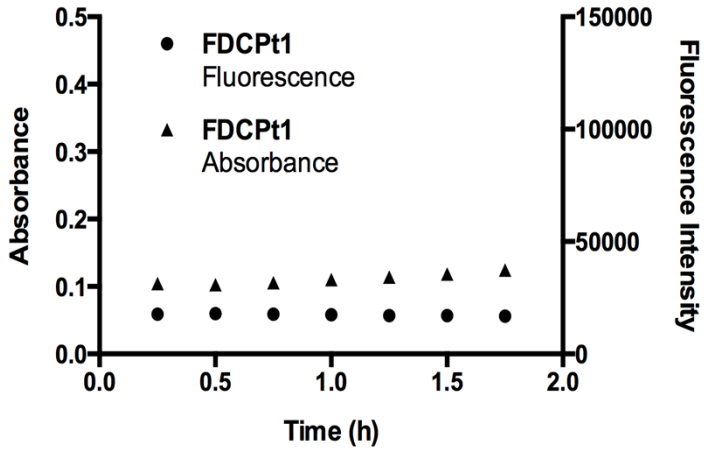


Figure S5 Stability of FDCPt1.

7. Cell culture and *in vitro* platinum sensing experiments

Caco-2 (Cell Bank Australia) cells were cultured in Dulbecco's modified Eagle's medium (DMEM; Life Technologies) with 10 % foetal bovine serum (FBS; Life Technologies) and 1 % non-essential amino acids (Life Technologies). HT-29 (Cell Bank Australia) and A-549 (ATCC) cells were cultured in DMEM with 10 % FBS. All cell lines were incubated at 37°C in 5% CO_2.

For *in vitro* experiments caco-2, HT-29 and A-549 cells were seeded onto coverslips in 24-well plates at 5 x 10^4, 2 x 10^5 and 1 x 10^5 cells/well respectively. Cells were left to adhere overnight and treated wells were incubated with oxaliplatin, carboplatin or cisplatin (Sigma) at 20 μM for 1, 2, 6 or 24 h at 37°C in 5% CO_2. After incubation cells were washed with PBS followed by addition of **FDCPt1** diluted in PBS (100 μM) for 30 min at 37°C in 5% CO_2. Cells were washed again with PBS and fixed with -20°C methanol for 15 min. After fixation, cells were washed three times with PBS. Coverslips were removed and mounted (ProLong Gold Antifade Reagent with DAPI; Life Technologies) onto slides and sealed. Cells were imaged with a Zeiss Axio Imager.M2 upright microscope using DAPI (365, 395LP, 420LP) and Alexa 488 filters (480/40, 505LP, 535/50). Images were captured with a Zeiss AxioCam HRm digital monochrome CCD camera with a plan apochromatic 63x oil immersion objective. Images were edited and deconvoluted using the constrained iterative algorithm with Zen software (Zeiss).

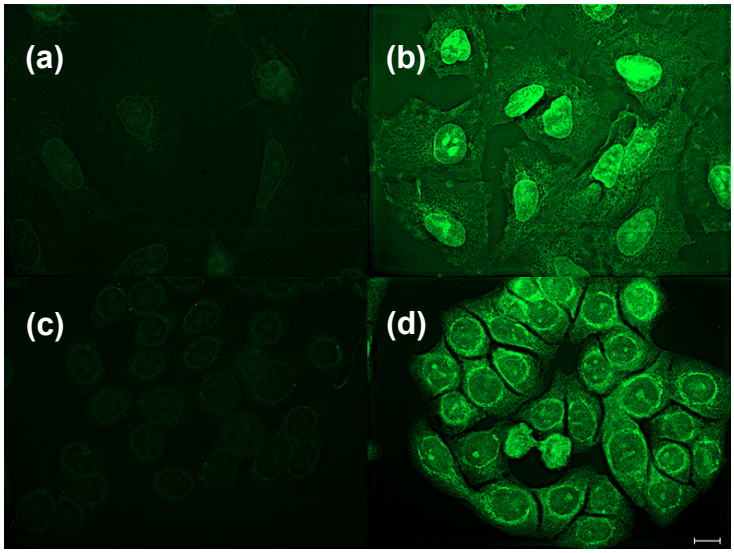


Figure S6 Deconvoluted fluorescence images of A-549 (top row) and HT-29 (bottom row) cells treated with **FDCPt1** (100 μM) for 30 min alone (a,c) or after 2 h incubation with oxaliplatin (20 μM) (b,d). Scale bar represents 10 μm.

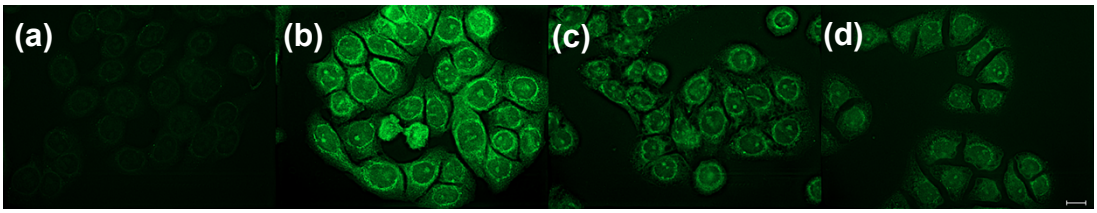


Figure S7 Deconvoluted fluorescence images of HT29 cells treated with **FDCPt1** (100 μM) alone (a) or after 2 h incubation with oxaliplatin (b), carboplatin (c) or cisplatin (d) (all 20μM). Scale bar represents 10 μm.

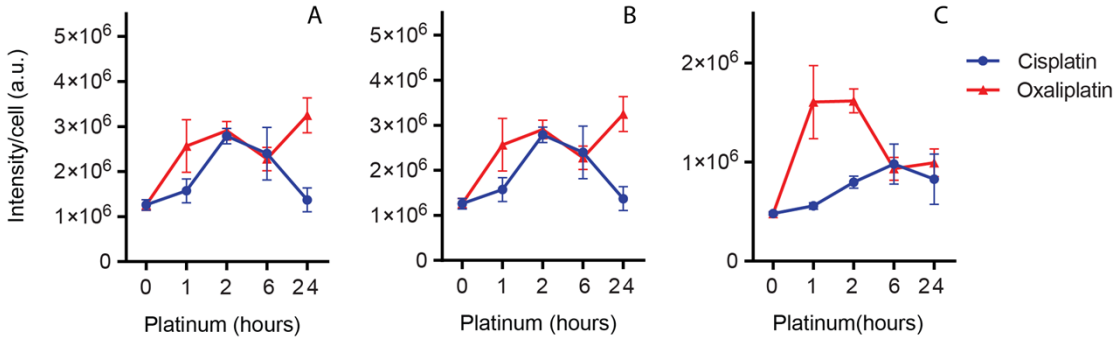


Figure S8 Fluorescence intensity time course of HT-29 cells treated with oxaliplatin or cisplatin (20 μM) for 0, 1, 2, 6 or 24 h followed by 30 min incubation with **FDCPt1** (100 μM) in the whole cell (a), cytoplasmic (b) or (c) nuclear regions). Data presented as mean ± SEM.

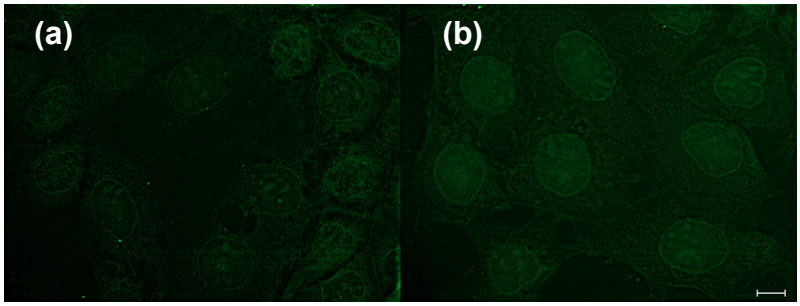


Figure S9 Deconvoluted fluorescence images of Caco-2 cells with no treatment (a) and after 30 min incubation with **FDCPt1** (100 μM) (b). Scale bar represents 10 μm.