

Supporting information

Caffeic acid, Quercetin and 5-Fluorocytidine functionalized Au-Fe₃O₄ Nanoheterodimers for X-Ray-Triggered drug delivery in breast tumor spheroids

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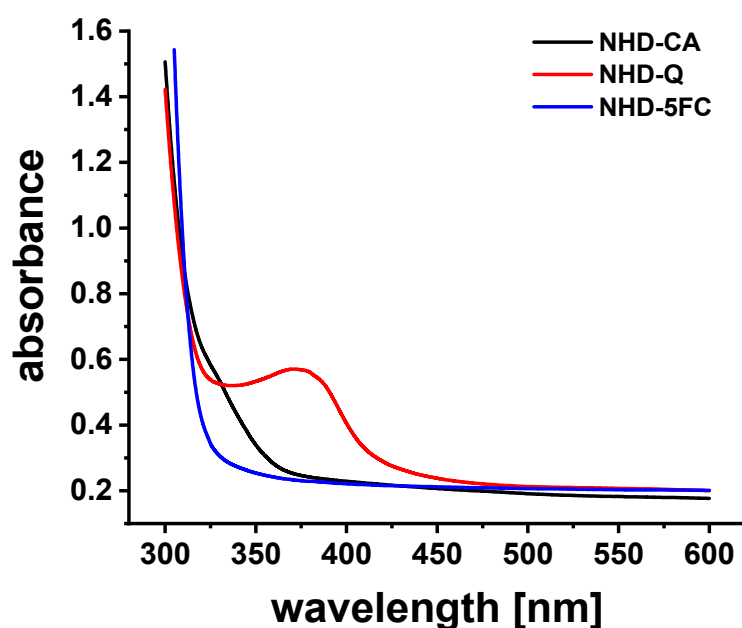


Figure S1: UV-Vis absorption spectra of the NHD-CA (black line), NHD-Q (red line) and NHD-5FC (blue line) dispersed at a concentration of 40 µg/mL.

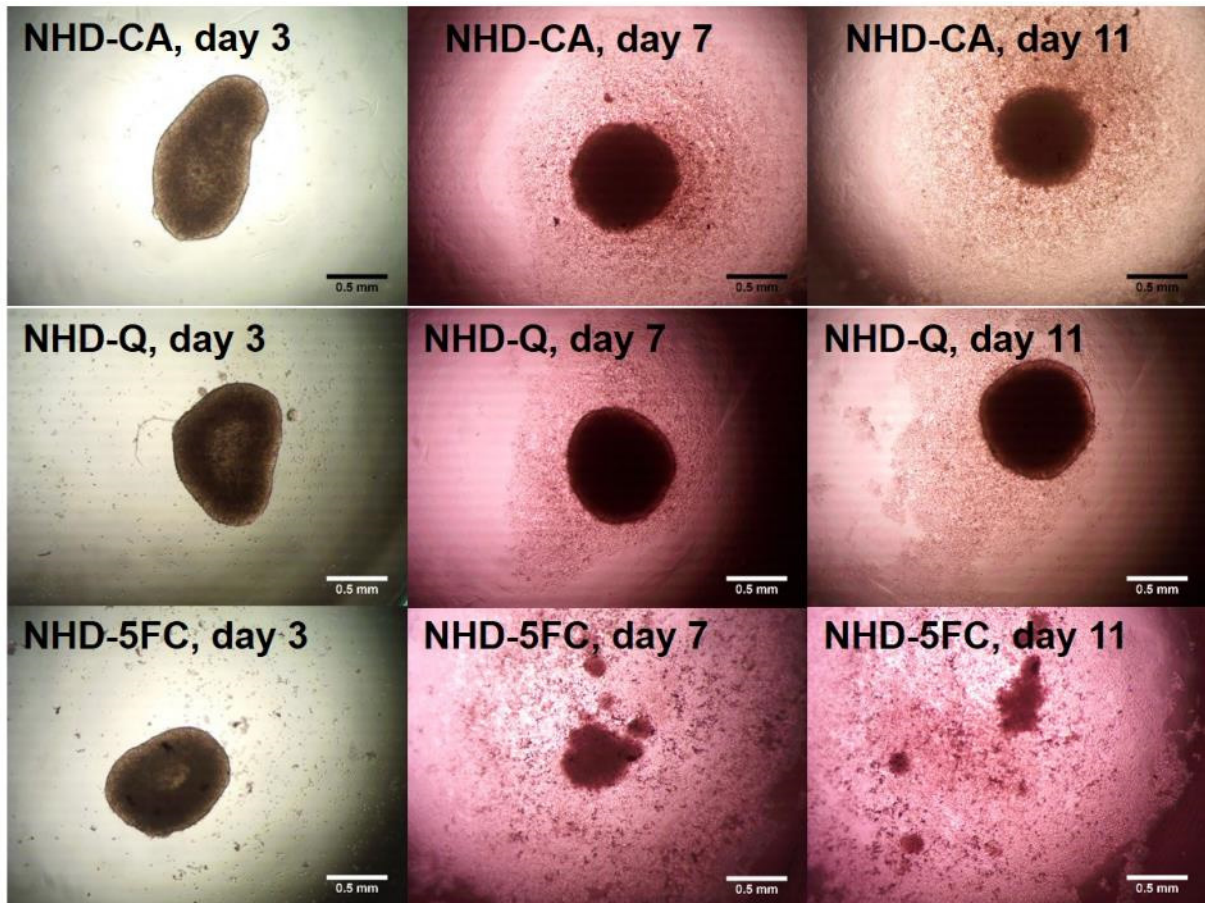


Figure S2: Microscope images of the MCF-7 MCTS incubated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) without irradiation.

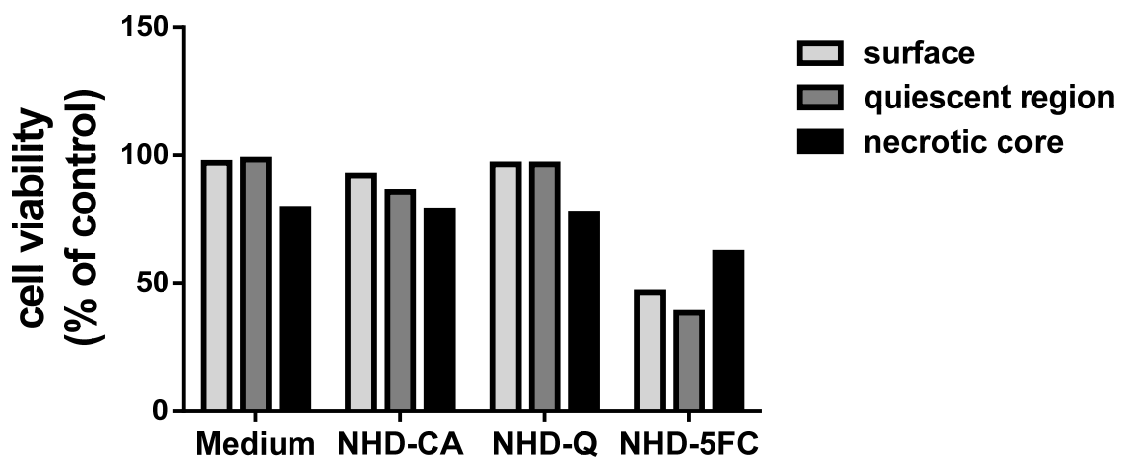


Figure S3: Cell viability of the MCF-7 MCTS after incubating for 72 h in NHD-free medium, and with NHD-CA, NHD-Q, and NHD-5FC; separated into the different spheroid regions.

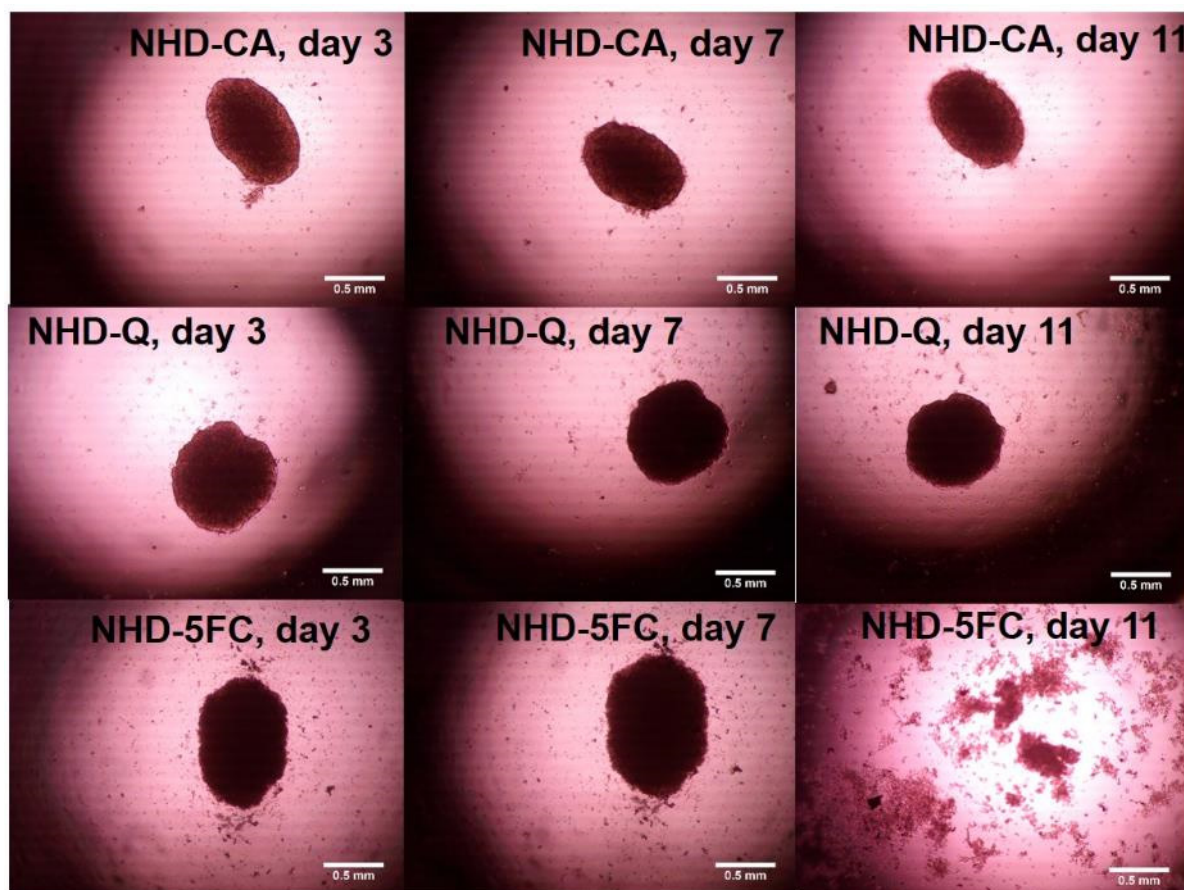


Figure S4: Microscope images of the MDA-MB-231 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) without irradiation.

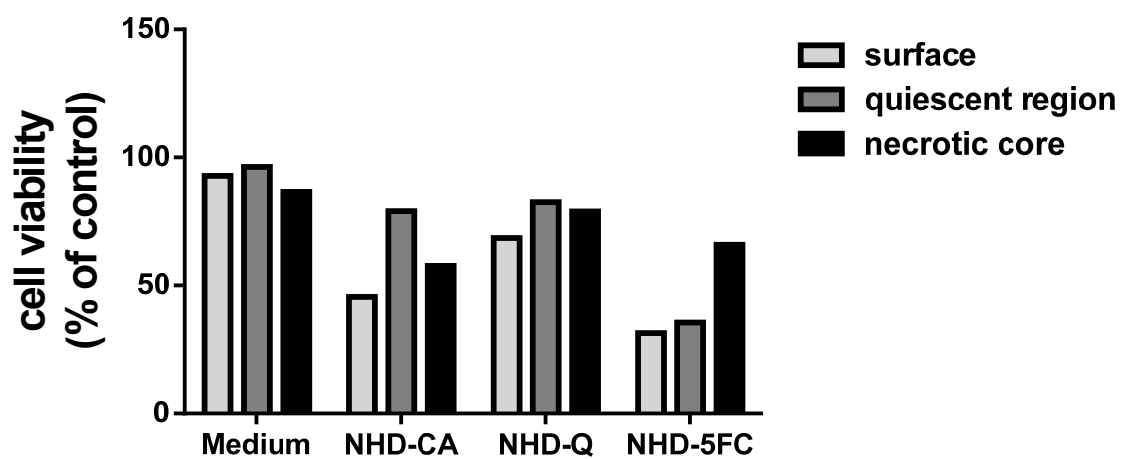


Figure S5: Cell viability of the MDA-MB-231 MCTS after incubation without and with the various NHDs for 72 h; separated into the different spheroid regions.

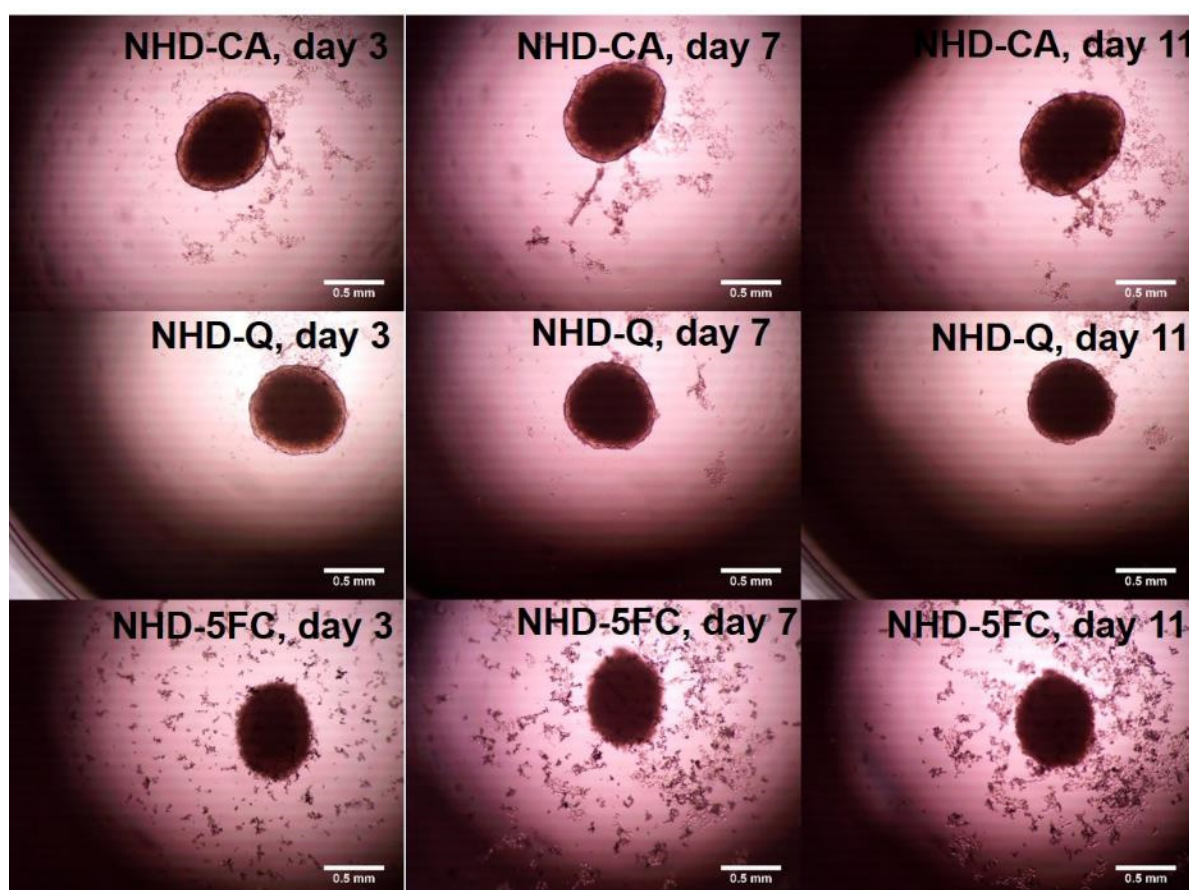


Figure S6: Microscope images of the MCF-10A MCS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) without irradiation.

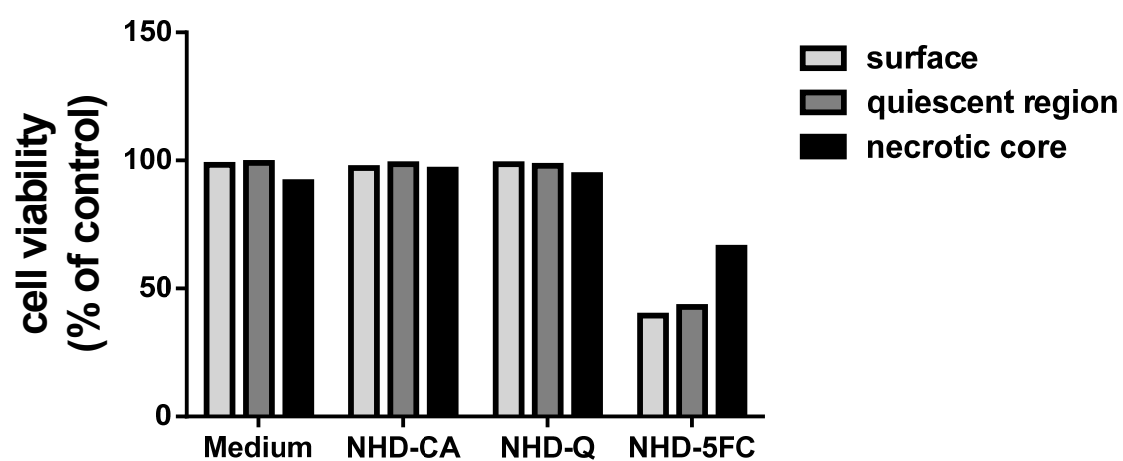


Figure S7: Cell viability of the MCF-10A MCS after incubation without and with the various NHDs for 72 h; separated into the different spheroid regions.

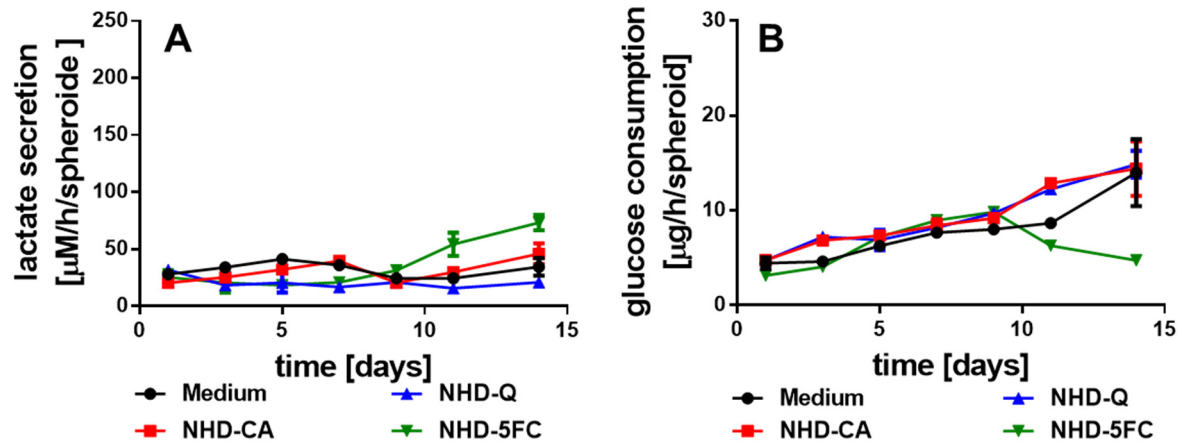


Figure S8: Lactate secretion (A) and glucose uptake (B) of the MCF-10 A MCS.

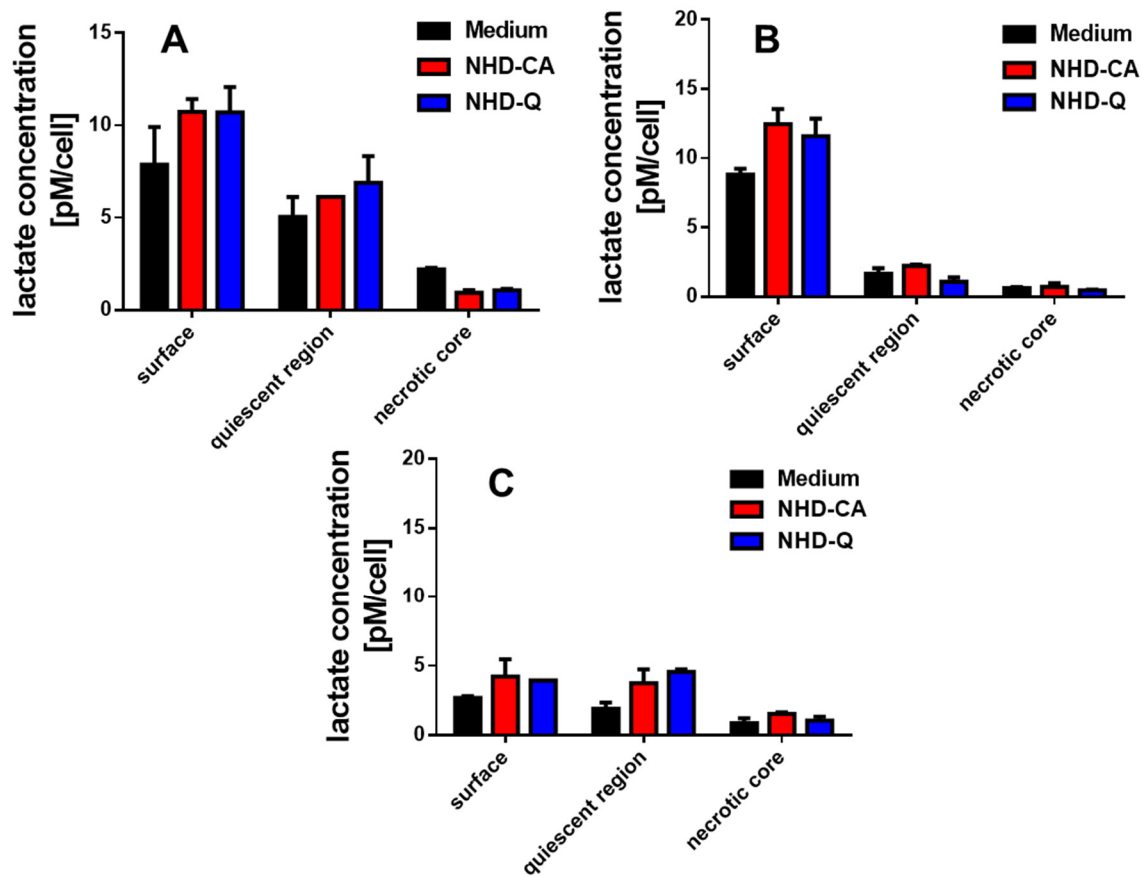


Figure S9: Intracellular lactate concentration of the different regions of the MCTS loaded with NHD-CA and NHD-Q; MCF-7 MCTS (A), MDA-MB-231 MCTS (B), MCF-10 A MCS (C).

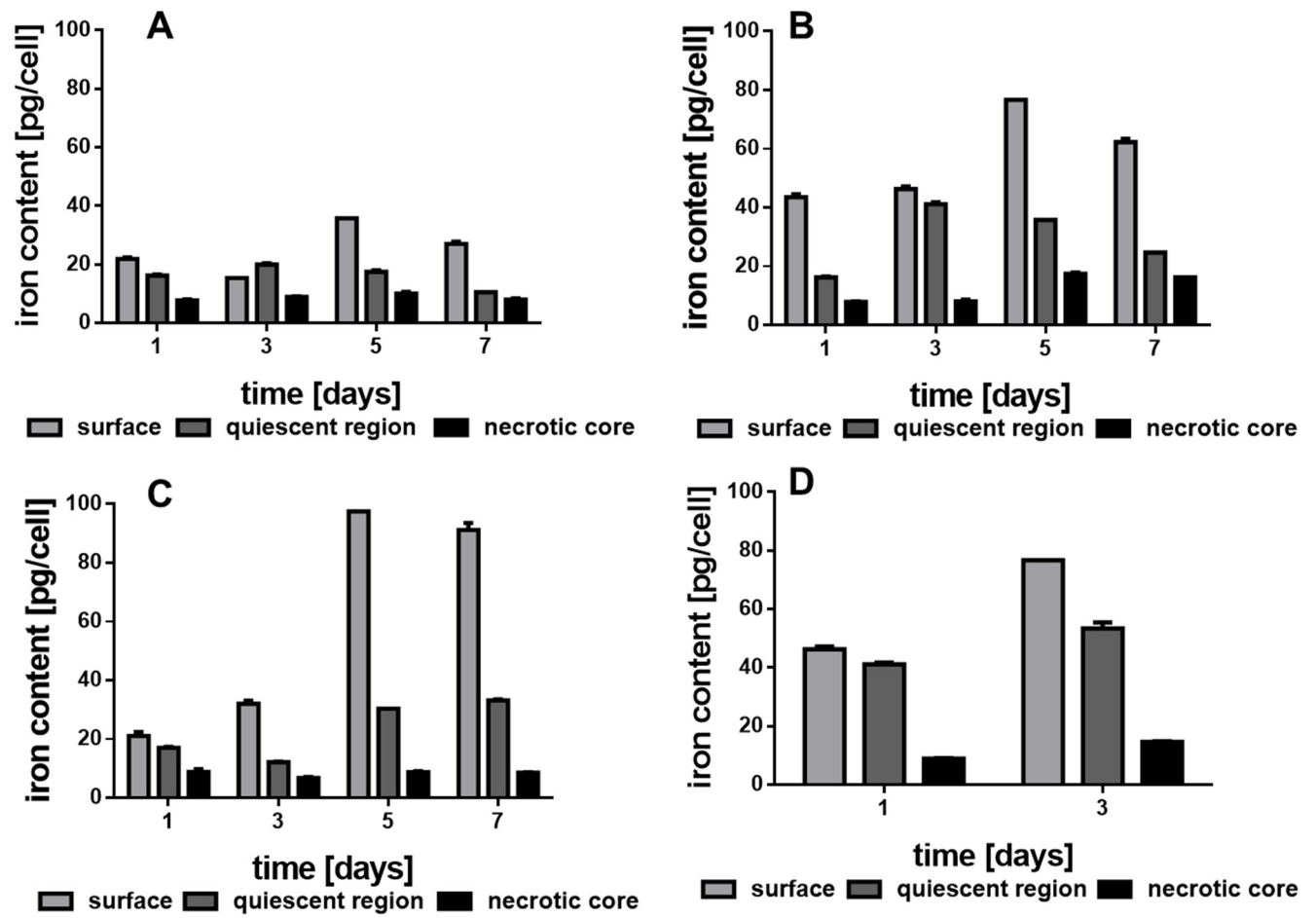


Figure S10: Iron content of the separated MCF-7 MCTS regions cultivated in medium (A) or in medium with NHD-CA (B), NHD-Q (C) and NHD-5FC (D).

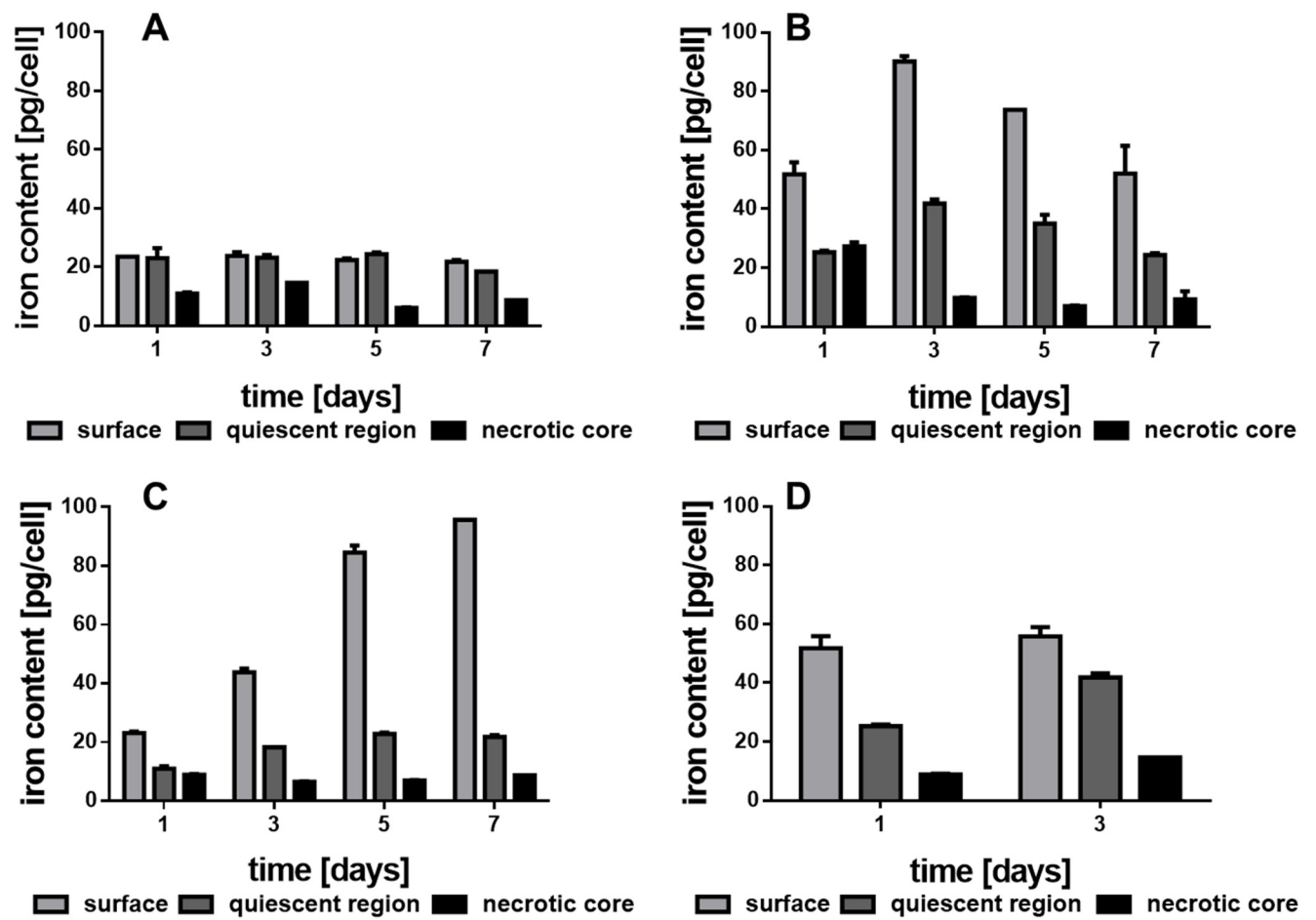


Figure S11: Iron content of the separated MCF-10 A MCS regions cultivated in medium (A) or in medium with NHD-CA (B), NHD-Q (C) and NHD-5FC (D).

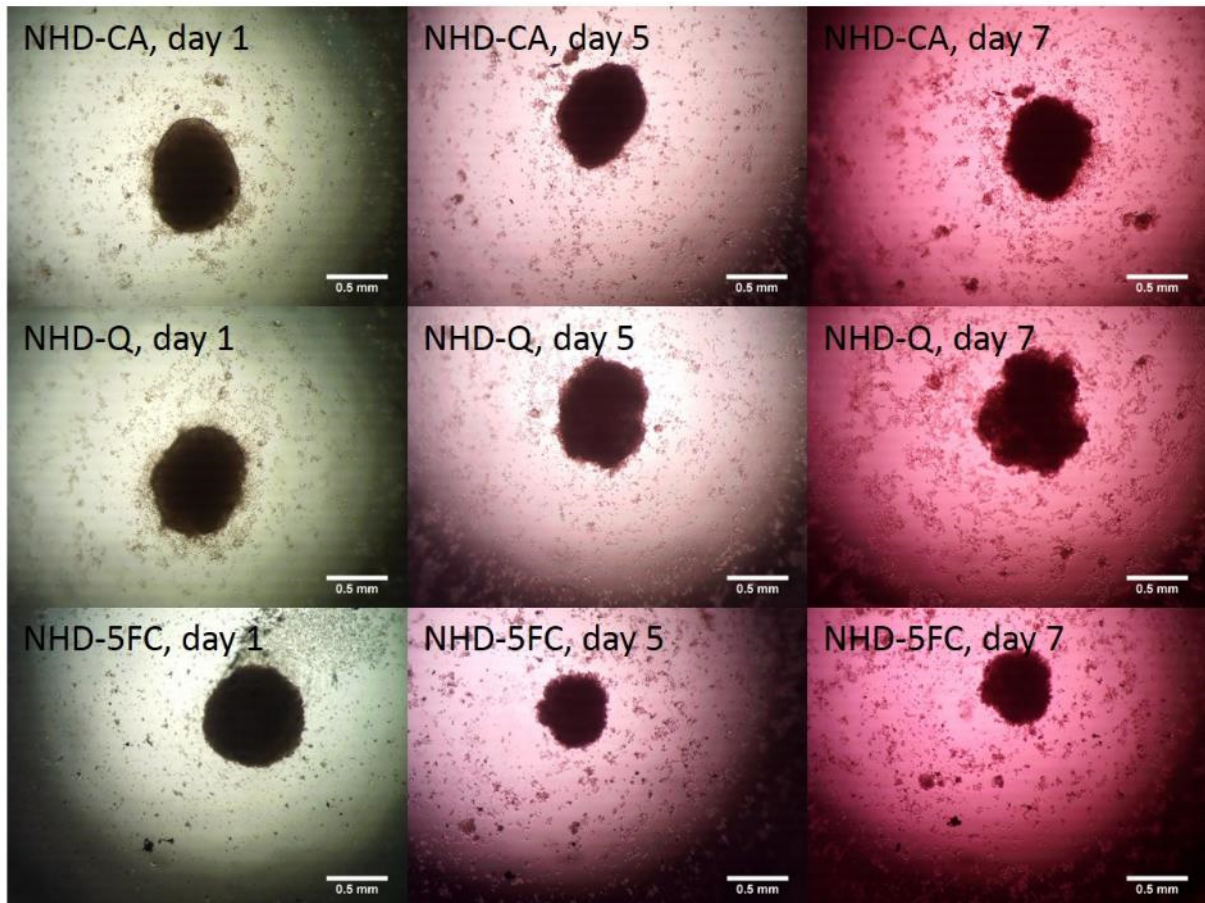


Figure S12: Microscope images of the MCF-7 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with a single dose of 10 Gy at day 1.

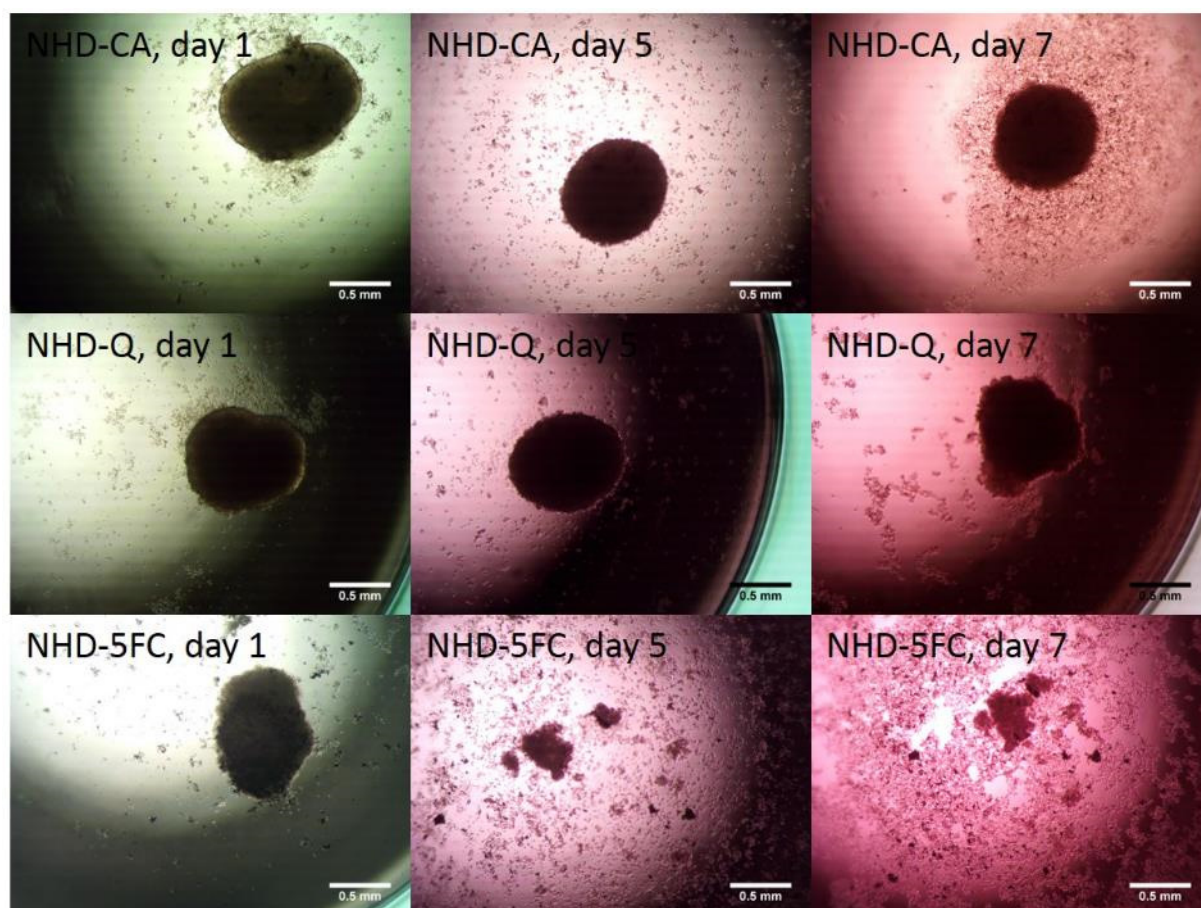


Figure S13: Microscope images of the MCF-7 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 2 single 5 Gy doses.

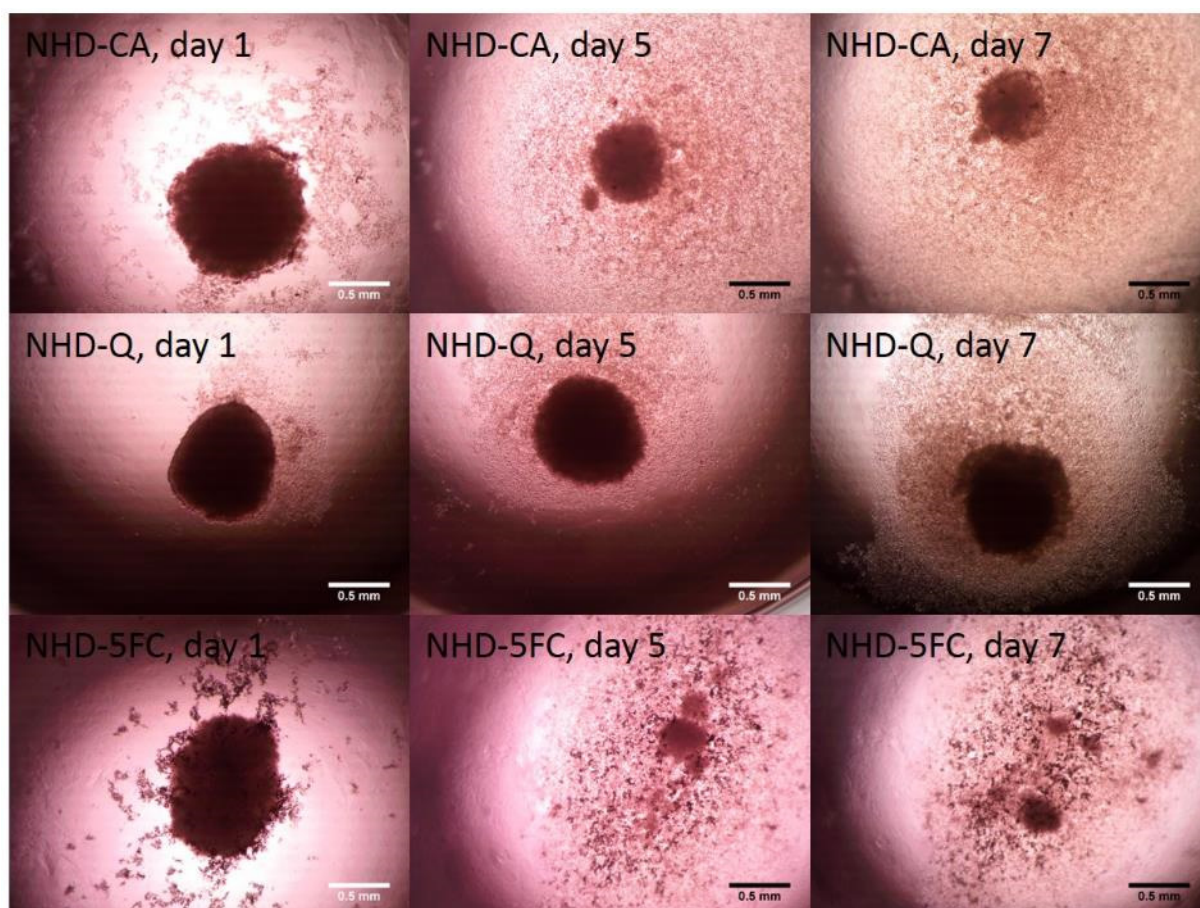


Figure S14: Microscope images of the MCF-7 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 5 single 2 Gy doses.

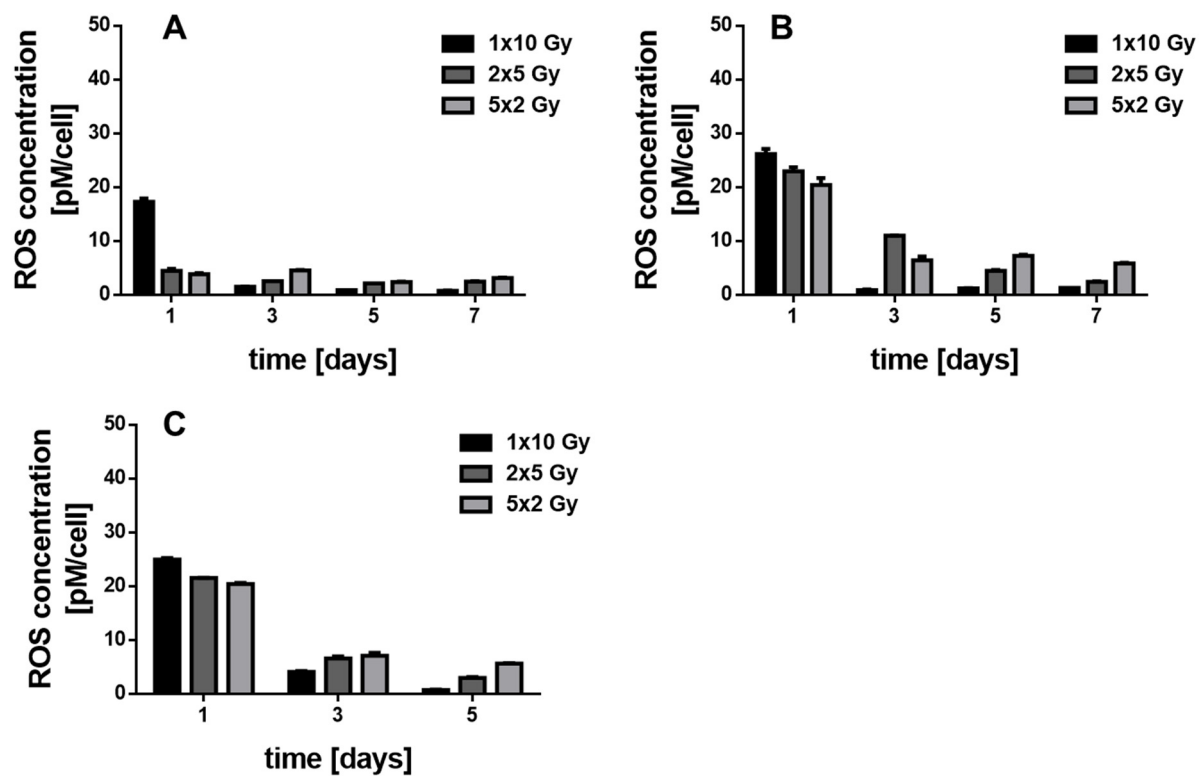


Figure S15: Intracellular ROS concentration in MCF-7 MCTS in medium (A) or loaded with NHD-Q (B) or NHD-5FC (C) after irradiation with a single dose of 10 Gy, 2 single 5 Gy doses, or 5 single 2 Gy doses.

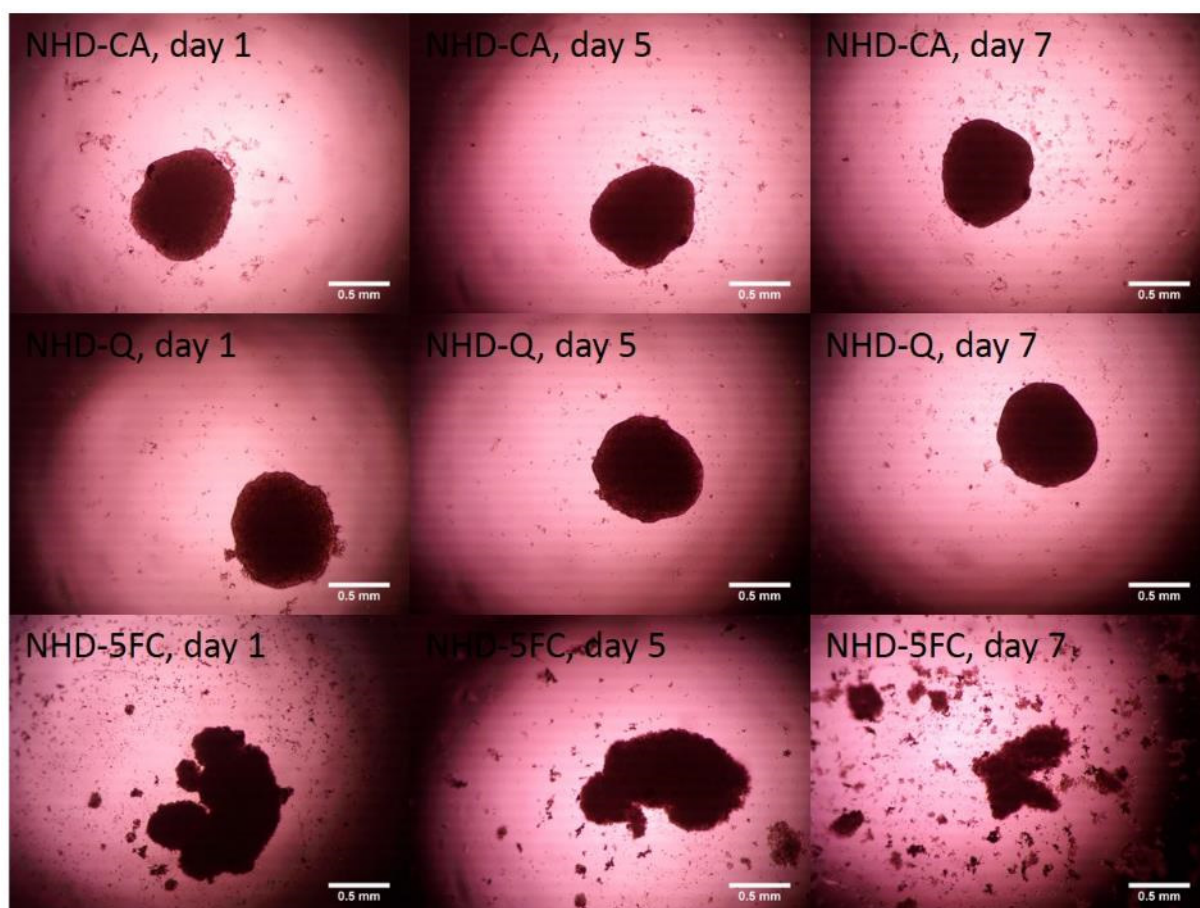


Figure S16: Microscope images of the MDA-MB-231 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with a single dose of 10 Gy at day 1.

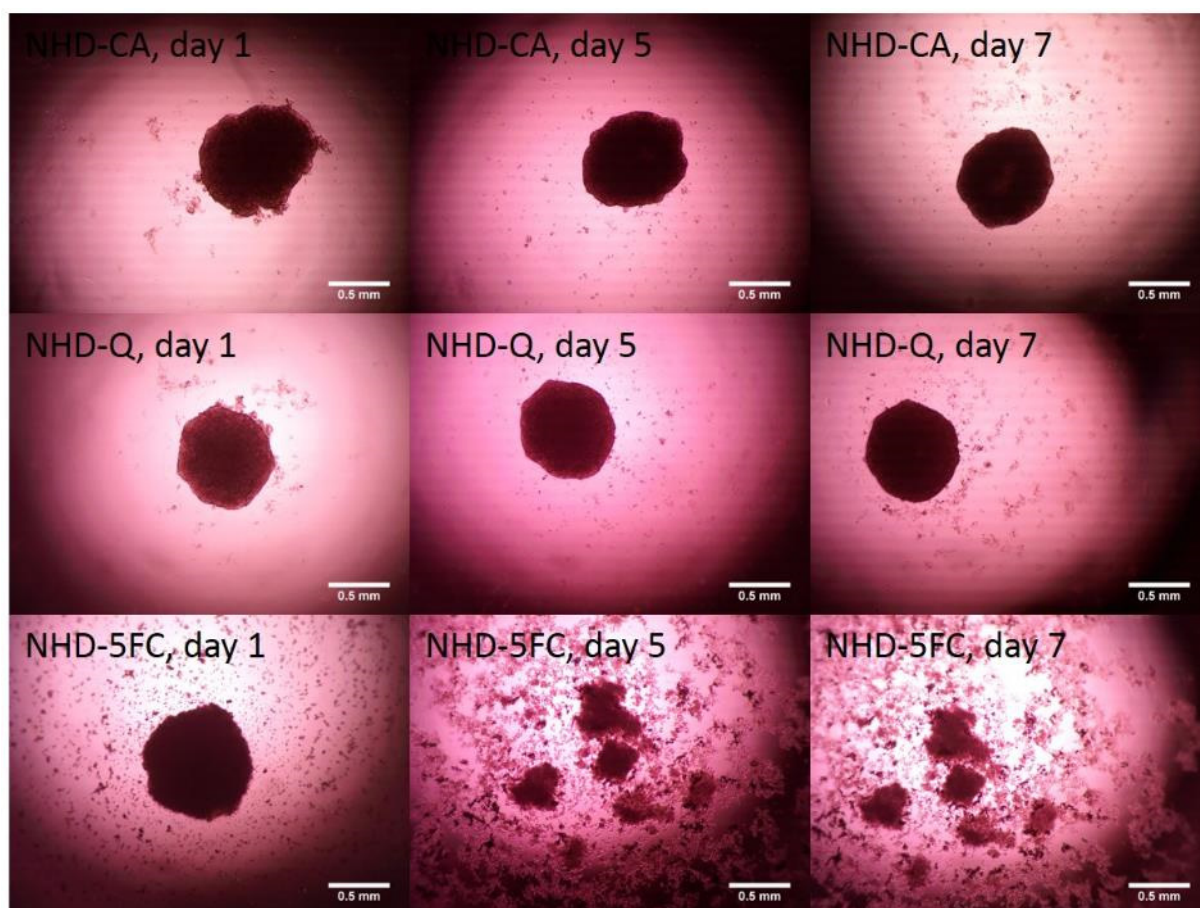


Figure S17: Microscope images of the MDA-MB-231 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 2 single 5Gy doses from day 1 to 2.

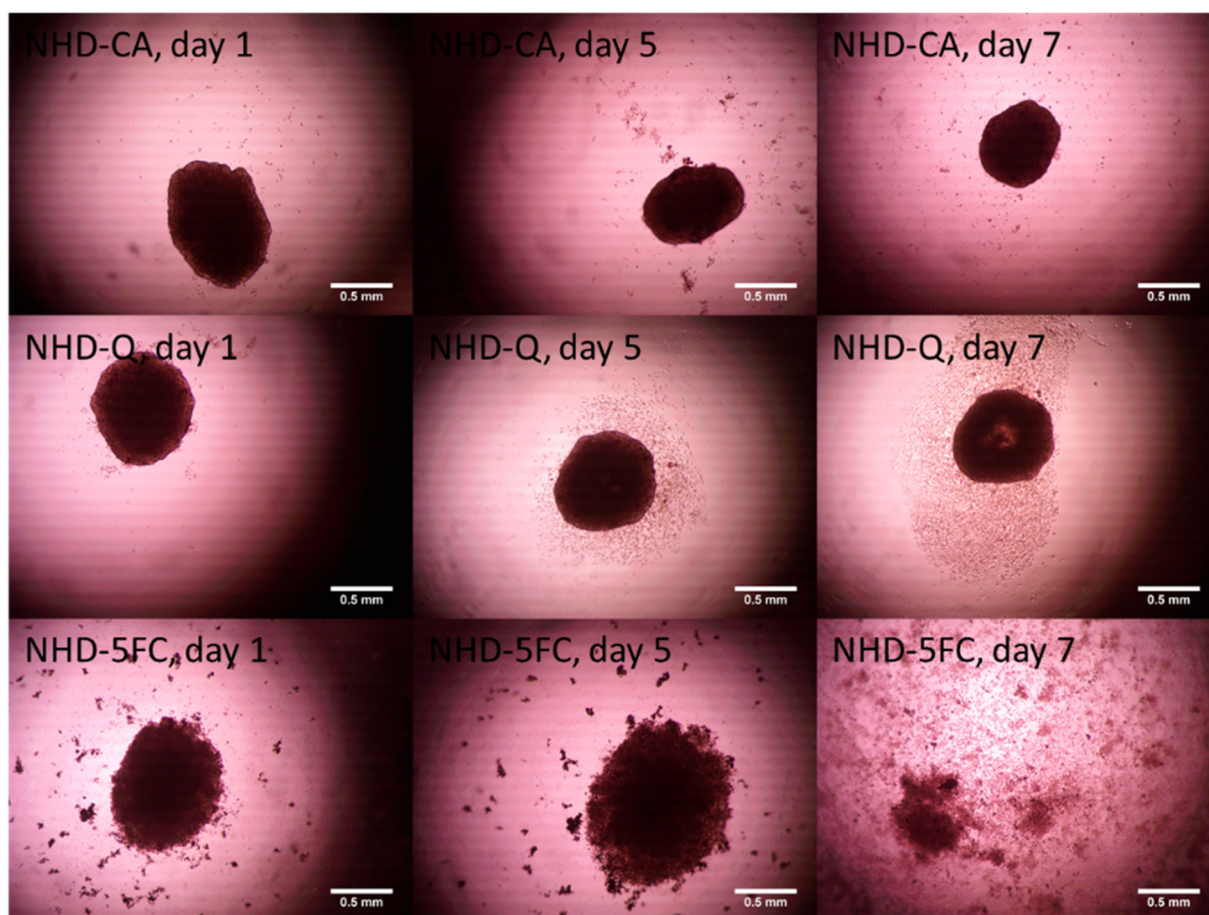


Figure S18: Microscope images of the MDA-MB-231 MCTS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 5 single 2 Gy doses from day 1 to 5.

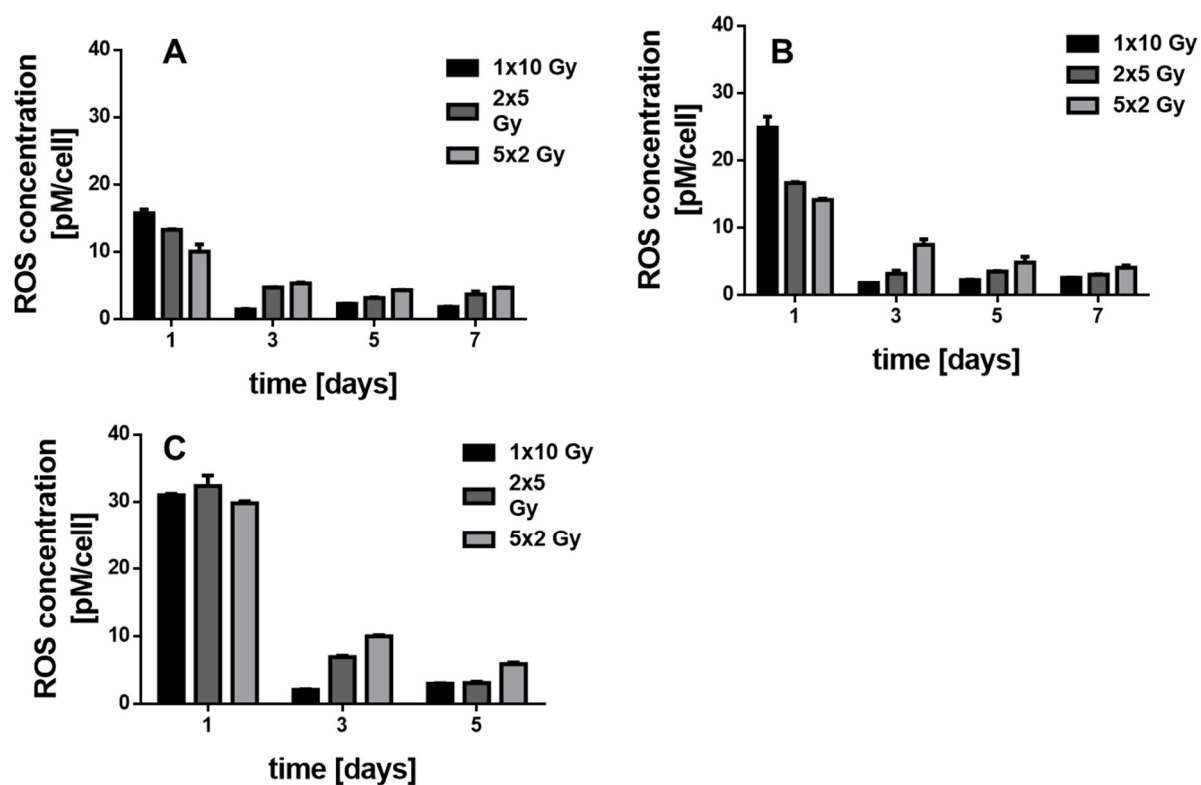


Figure S19: Intracellular ROS concentration in MDA-MD-231 MCTS in medium (A) or loaded with NHD-Q (B) or NHD-5FC (C) after irradiation with a single dose of 10 Gy, 2 single 5 Gy doses, or 5 single 2 Gy doses.

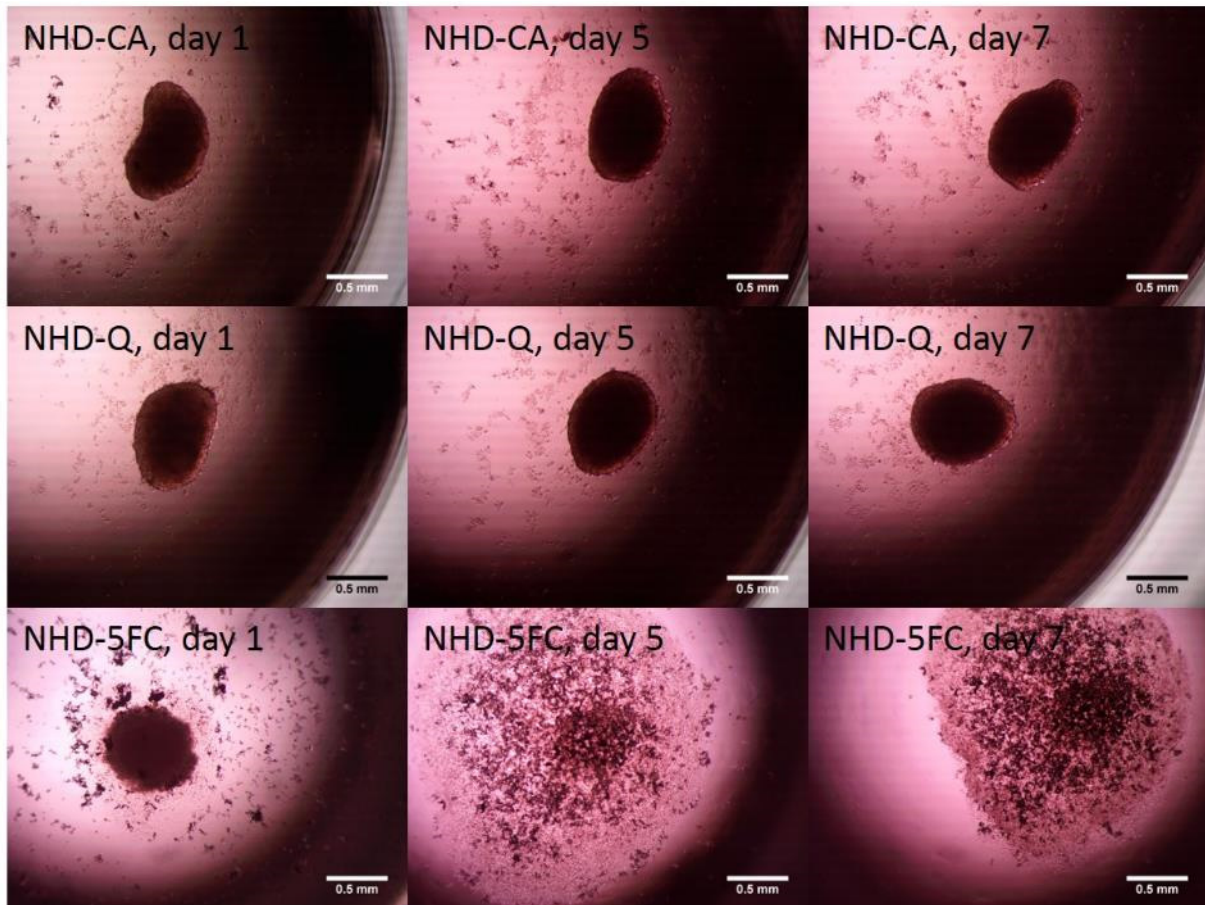


Figure S20: Microscope images of the MCF-10 A MCS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with a single dose of 10 Gy at day 1.

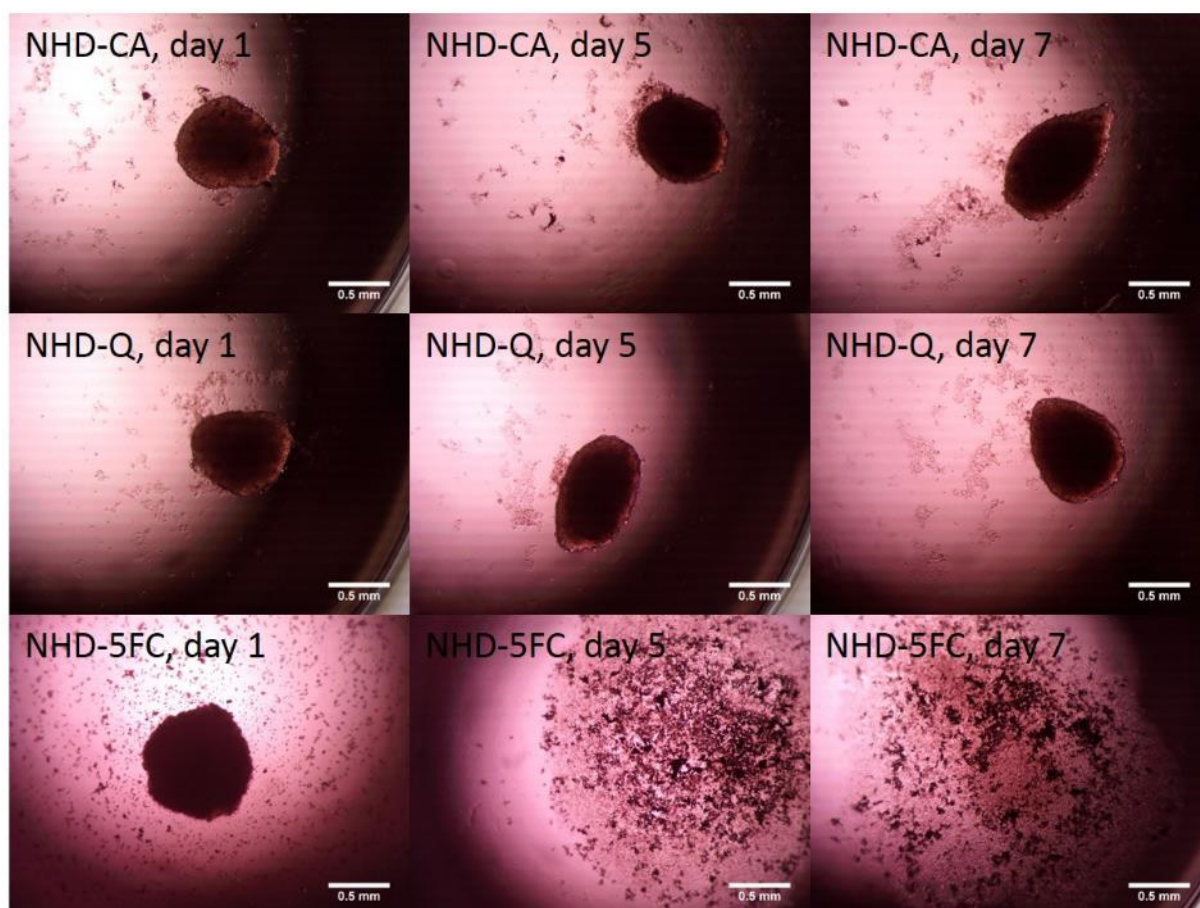


Figure S21: Microscope images of the MCF-10 A MCS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 5 single doses of 2 Gy from day 1 to 2.

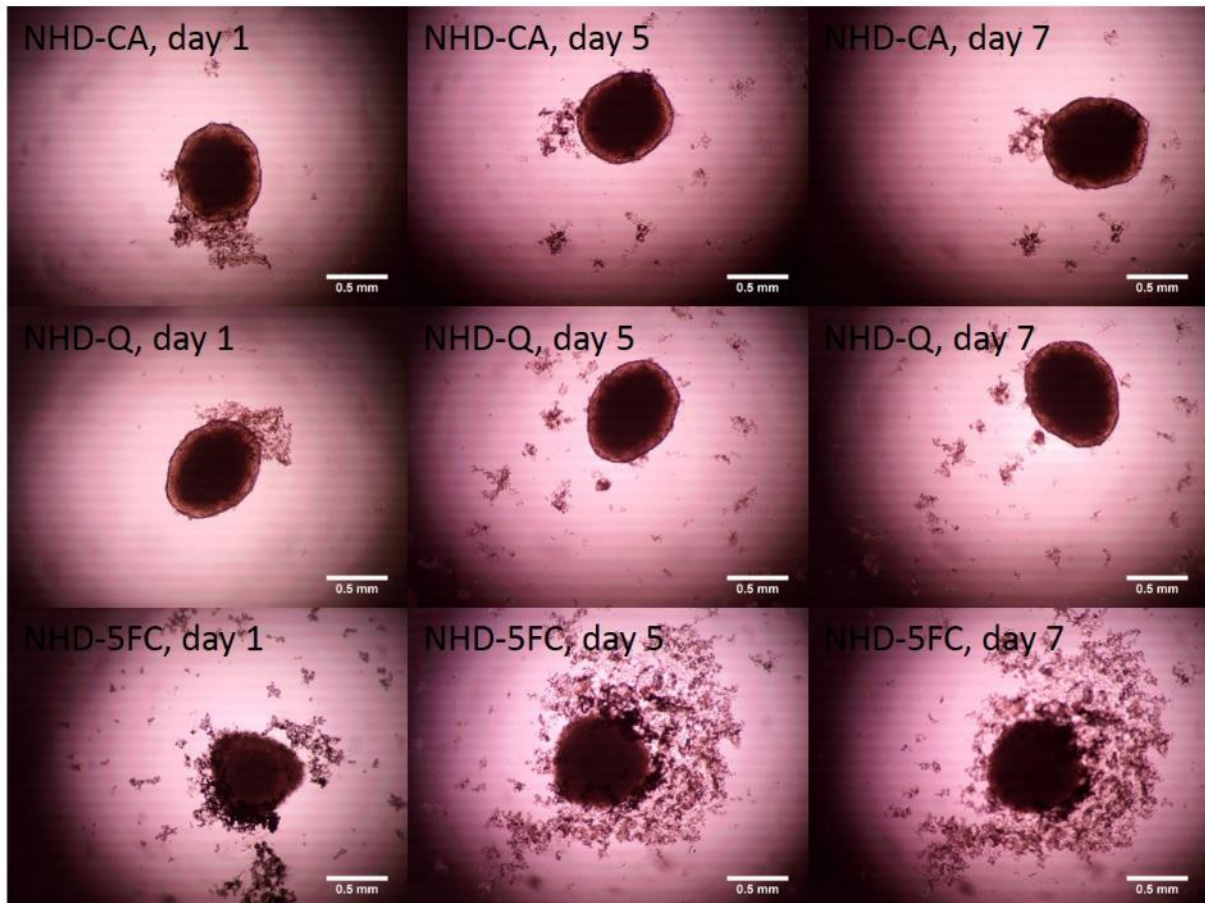


Figure S22: Microscope images of the MCF-10 A MCS treated with NHD-CA (first row), NHD-Q (second row) and NHD-5FC (third row) irradiated with 5 single doses of 2 Gy from day 1 to 5.