Figure S1. yH2AX foci staining following the exposure of control MCF10A cells to ionizing radiation. Induction of yH2AX foci was assessed 30 min following exposure to ionizing radiation (2 Gy) or after mock irradiation (0 Gy). Immunostaining was performed by means of a monoclonal anti-yH2AX antibody, as previously described (34). This image gallery shows 4 cells for each experimental condition taken with Metafer 4 (Metasystems).

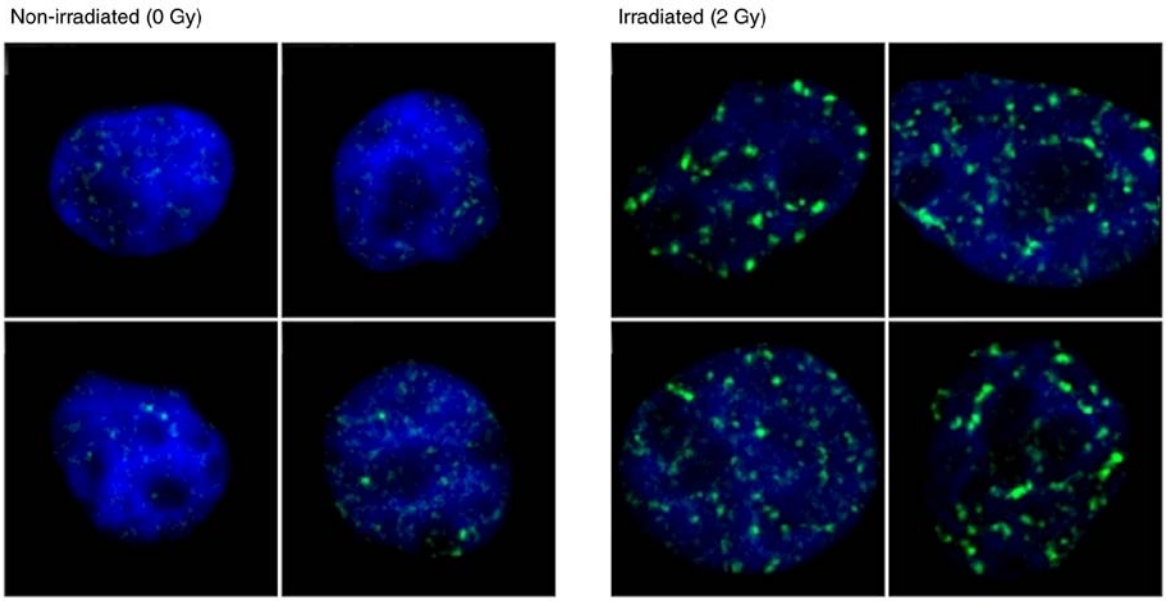

Figure S2. Evaluation of PARP inhibition by olaparib. Immunodetection for PARP activity was performed as previously described by Barazzuol *et al* (35). PARP activation was induced by H_2O_2 treatment (20 mM, 10 min, left panel). Incubation with olaparib (5 μM) 1 h prior to and during exposure to H_2O_2, resulted in the absence of PARP activity (right panel). Images were obtained with Metafer 4 (Metasystems). PARP, poly(ADP-ribose) polymerase.

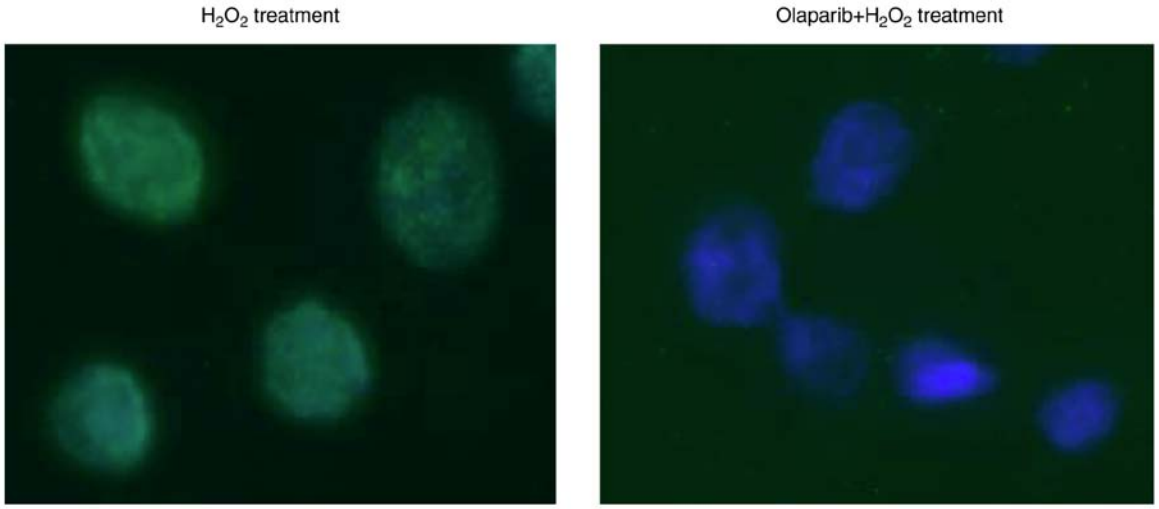

Figure S3. RT-qPCR analysis of *BRCA1* and *BRCA2* mRNA levels (± standard deviation) in control, BRCA1i and BRCA2i cell lines. For an easy comparison, the relative expression in relation to the control sample is shown for each knockdown cell line (n=3). The relative mRNA expression of *BRCA1*, but not that of *BRCA2*, was significantly decreased in the BRCA1i cells, and the relative mRNA expression of *BRCA2*, but not that of *BRCA1*, was significantly decreased in the BRCA2i cells. Statistical analysis was carried out using one-way ANOVA with Tukey's post-hoc test and the detailed results are shown in Table SI.

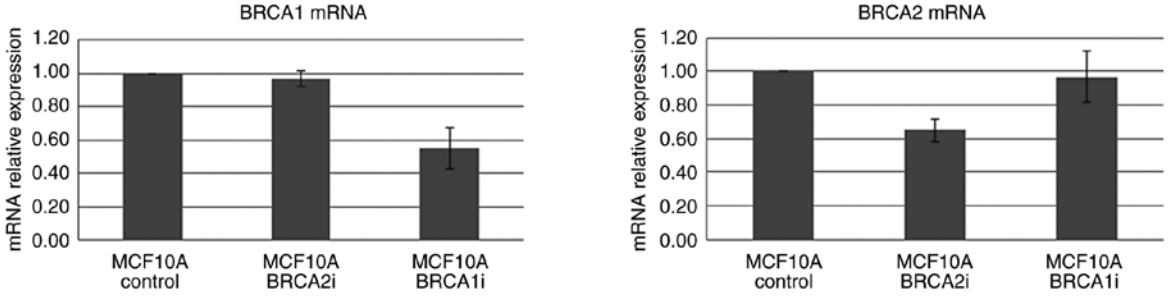

Table SI. Results of statistical analysis with one-way ANOVA and Tukey's test for post hoc significance of multiple comparisons.

Experiment	Group(s)	One-way ANOVA P-value	Tukey's post-hoc test Comparison, P-value
Mean number of RAD51 foci per cell (Fig. 4)	Control, BRCA1i, BRCA2i no radiation, no olaparib	0.12	Control vs. BRCA1, P=0.7987 Control vs. BRCA2i, P=0.1154 BRCA1i vs. BRCA2i, P=0.3339
	Control, BRCA1i, BRCA2i no radiation, yes olaparib	0.53	Control vs. BRCA1i, P=0.5058 Control vs. BRCA2i, P=0.9159 BRCA1i vs. BRCA2i, P=0.7477
	Control, BRCA1i, BRCA2i yes radiation, no olaparib	<0.00001	Control vs. BRCA1i, P<0.00001 Control vs. BRCA2i, P<0.00001 BRCA1i vs. BRCA2i, P=0.7216
	Control, BRCA1i, BRCA2i yes radiation, yes olaparib	<0.00001	Control vs. BRCA1i, P=0.0001 Control vs. BRCA2i, P<0.00001 BRCA1i vs. BRCA2i, P=0.4456
	Controls, all experimental conditions (yes/no radiation, yes/no olaparib)	<0.00001	no IR no olaparib vs. no IR yes olaparib, P=0.9777 no IR no olaparib vs. yes IR no olaparib, P<0.00001 no IR no olaparib vs. yes IR yes olaparib, P<0.00001 no IR yes olaparib vs. yes IR no olaparib, P=0.0001 no IR yes olaparib vs. yes IR yes olaparib, P<0.00001 yes IR no olaparib vs. yes IR yes olaparib, P=0.0487
	BRCA1i, all experimental conditions (yes/no radiation, yes/no olaparib)	0.24	no IR no olaparib vs. no IR yes olaparib, P=0.9943 no IR no olaparib vs. yes IR no olaparib, P=0.9620 no IR no olaparib vs. yes IR yes olaparib, P=0.4949 no IR yes olaparib vs. yes IR no olaparib, P=0.9954 no IR yes olaparib v.s yes IR yes olaparib, P=0.3546 yes IR no olaparib vs. yes IR yes olaparib, P=0.2472
	BRCA2i, all experimental conditions (yes/no radiation, yes/no olaparib)	0.19	no IR no olaparib vs. no IR yes olaparib, P=0.3271 no IR no olaparib vs. yes IR no olaparib, P=0.9994 no IR no olaparib vs. yes IR yes olaparib, P=0.5897 no IR yes olaparib vs. yes IR no olaparib, P=0.2724 no IR yes olaparib vs. yes IR yes olaparib, P=0.9666 yes IR no olaparib vs. yes IR yes olaparib, P=0.5176
Radiation dose vs. mean number of micronuclei per 1000 binucleated cells (Fig. 5)	Dose: 0 Gy	0.015	Control vs. BRCA1i, P=0.1262 Control vs. BRCA2i, P=0.4615 BRCA1i vs. BRCA2i, P=0.0126
	Dose: 0.25 Gy	<0.00001	Control vs. BRCA1i, P<0.00001 Control vs. BRCA2i, P=0.1454 BRCA1i vs. BRCA2i, P<0.00001
	Dose: 0.5 Gy	<0.00001	Control vs. BRCA1i, P<0.00001

Table SI. Continued.

Experiment	Group(s)	One-way ANOVA P-value	Tukey's post-hoc test Comparison, P-value
			Control vs. BRCA2i, P=0.0002
			BRCA1i vs. BRCA2i, P=0.0002
	Dose: 1 Gy	<0.00001	Control vs. BRCA1i, P<0.0001
			Control vs. BRCA2i, P=0.0007
			BRCA1i vs. BRCA2i, P<0.0001
	Dose: 2 Gy	<0.00001	Control vs. BRCA1i, P<0.0001
			Control vs. BRCA2i, P=0.0002
			BRCA1i vs. BRCA2i, P<0.0001
	Dose: 4 Gy	<0.00001	Control vs. BRCA1i, P<0.0001
			Control vs. BRCA2i, P=0.0002
			BRCA1i vs. BRCA2i, P=0.0018
Radiation dose vs. fraction of surviving cells (Fig. 6)	Dose: 0 Gy	Reference	Reference value
	Dose: 0.5 Gy	<0.00001	Control vs. BRCA1i, P=0.0080
			Control vs. BRCA2i, P=0.0011
			BRCA1i vs. BRCA2i, P<00001
	Dose: 1 Gy	<0.00001	Control vs. BRCA1i, P<0.00001
			Control vs. BRCA2i, P=0.0001
			BRCA1i vs. BRCA2i, P<0.00001
	Dose: 2 Gy	<0.00001	Control vs. BRCA1i, P<0.00001
			Control vs. BRCA2i, P=0.0609
			BRCA1i vs. BRCA2i, P<0.00001
	Dose: 3 Gy	<0.00001	Control vs. BRCA1i, P<0.00001
			Control vs. BRCA2i, P=0.0146
			BRCA1i vs. BRCA2i, P<0.00001
	Dose: 4 Gy	<0.00001	Control vs. BRCA1i, P<0.00001
			Control vs. BRCA2i, P=0.0440
			BRCA1i vs. BRCA2i, P=0.0007
	Dose: 6 Gy	0.0421	Control vs. BRCA2i, P=0.0421
	Dose: 8 Gy	0.1886	Control vs. BRCA2i, P=0.1886
BRCA1 mRNA relative expression (Fig. S3)		<0.00001	Control vs. BRCA1i, P=0.0001
			Control vs. BRCA2i, P=0.9172
			BRCA1i vs. BRCA2i, P=0.0002
BRCA2 mRNA relative expression (Fig. S3)		<0.00001	Control vs. BRCA2i, P=0.0061
			Control vs. BRCA1i, P=0.9472
			BRCA1i vs. BRCA2i, P=0.0114