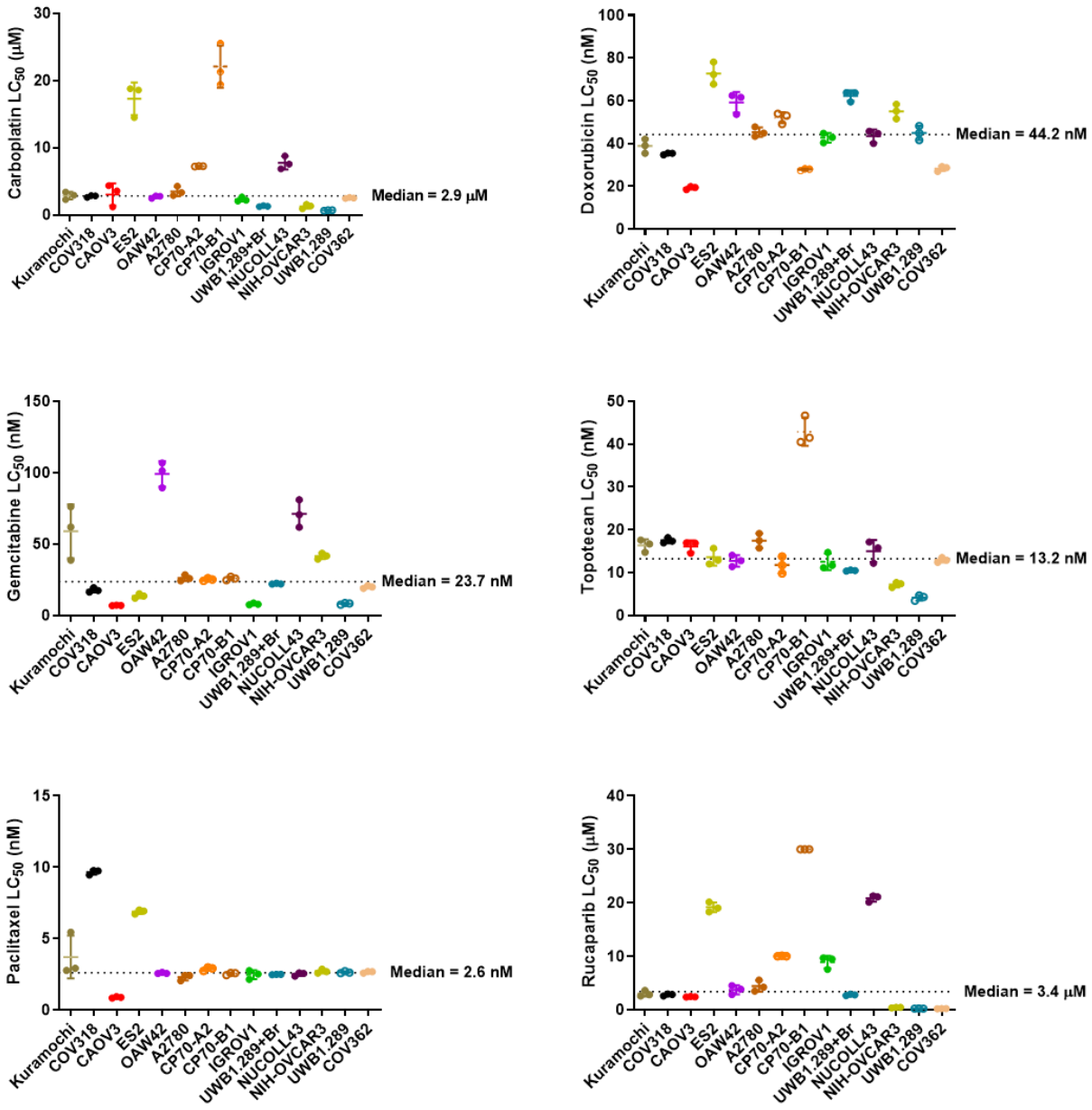
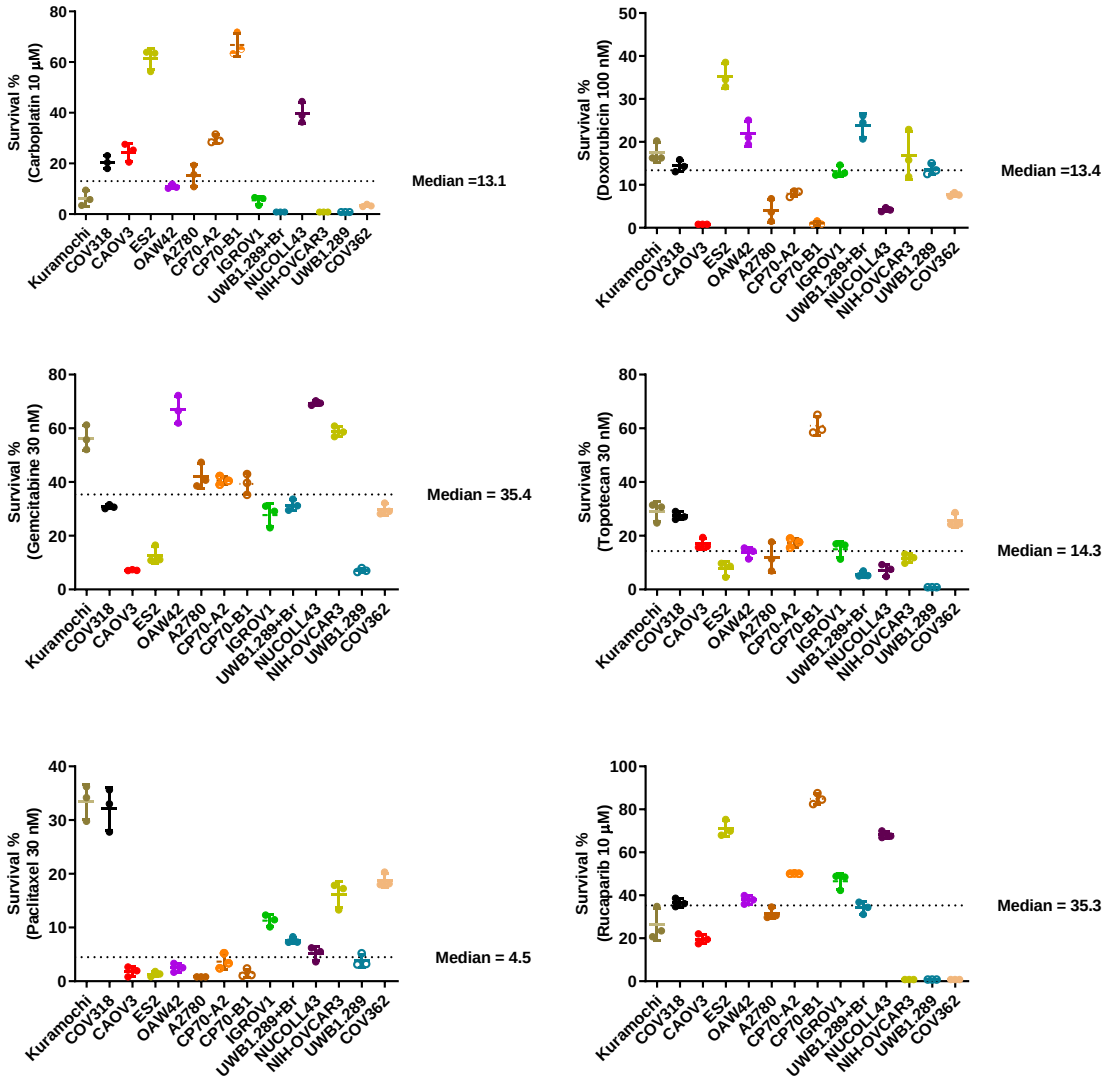
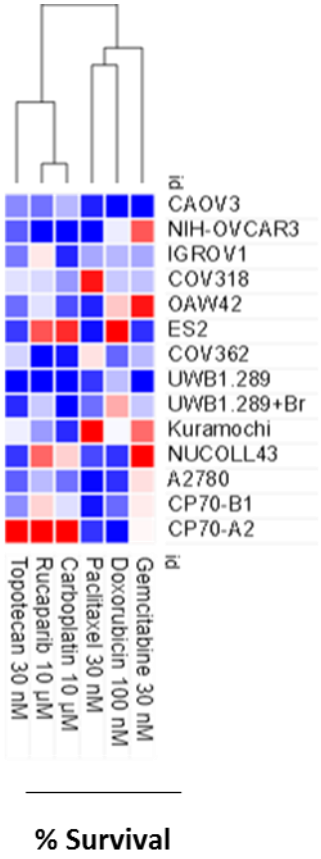


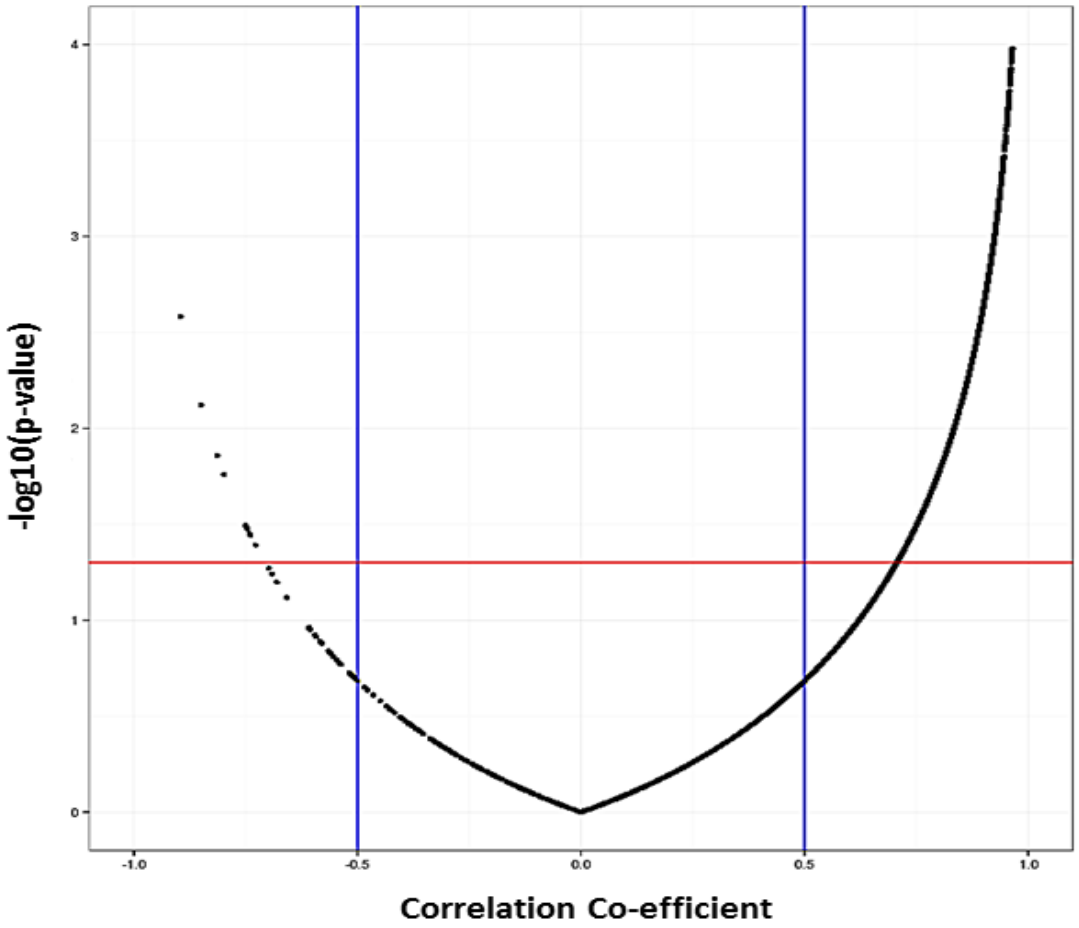
Supplementary Figure S1: Distribution of LC_{50} values for (a) Carboplatin, (b) Doxorubicin, (c) Gemcitabine, (d) Topotecan, (e) Paclitaxel, and (f) Rucaparib, across the cell line panel. The dotted line represents the median LC_{50} value. Each data point represents Mean ± SD LC_{50} for that cell line.



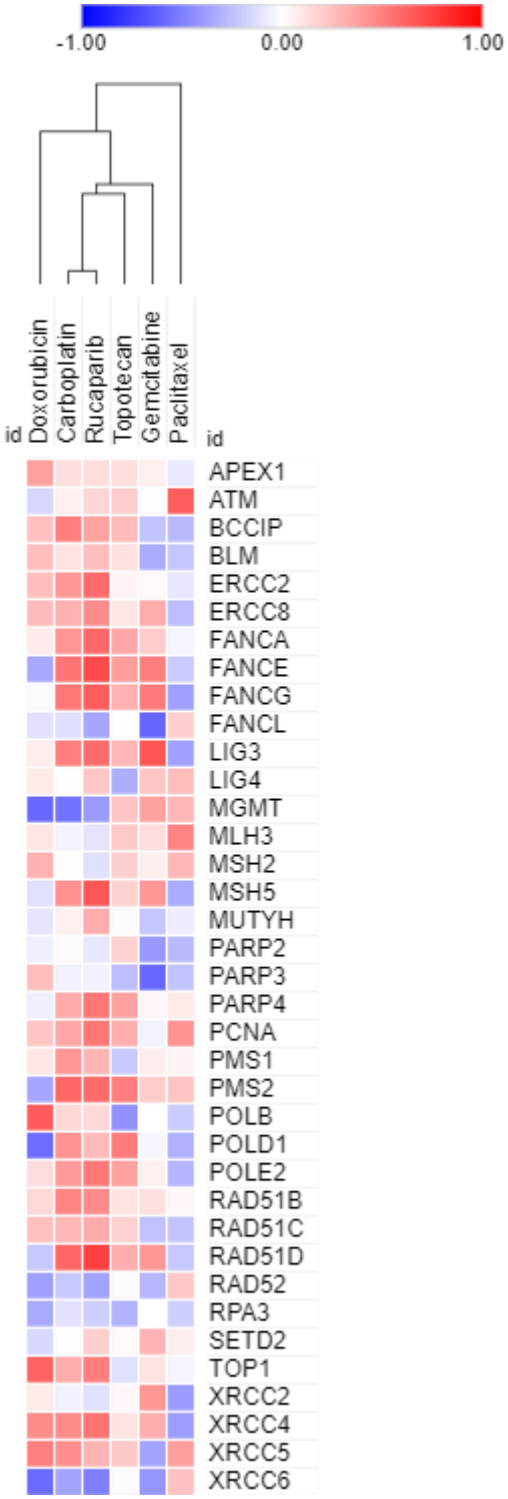
Supplementary Figure 2: Distribution of survival % at given concentration of (a) Carboplatin, (b) Doxorubicin, (c) Gemcitabine, (d) Topotecan, (e) Paclitaxel, and (f) Rucaparib, across the cell line panel. The dotted line represents the median survival % value of the cell lines. Each data represents Mean ± SEM of the survival % of 3 independent experiments for that cell line.



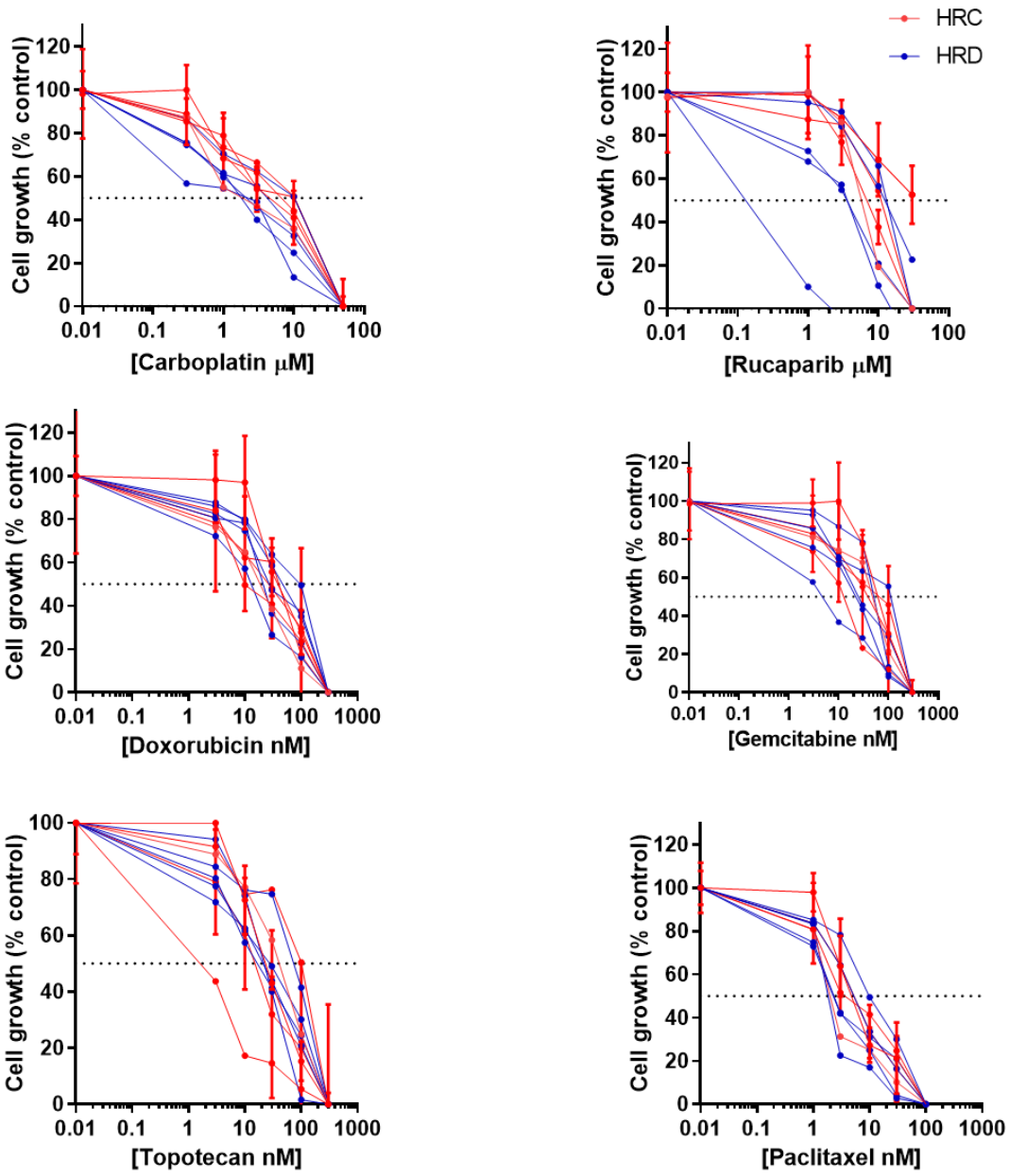
Supplementary Figure S3: Hierarchical clustering of % Survival at fixed drug concentration for each of the14 cell lines in the panel.



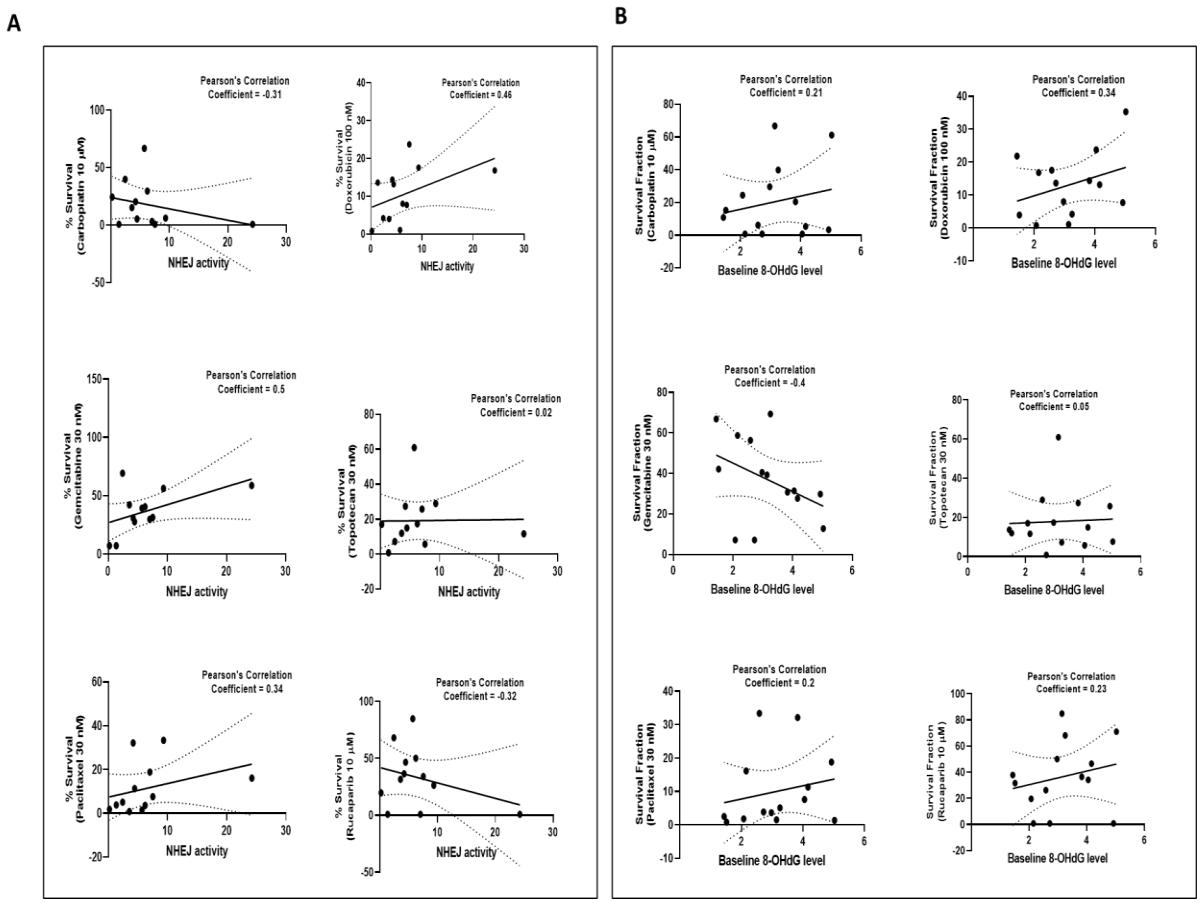
Supplementary Figure S4: Correlation between in-house RNA-Seq data and published data on 9 ovarian cancer cell lines to confirm the identity of the cell lines. Pearson's correlation coefficients and the corresponding p-values between the two datasets for 2495 genes used to generate the volcano plot shows a positive correlation for most genes. The average Pearson's correlation coefficient across all genes was 0.58. [The red line indicates p-value of 0.05 and the blue line indicates an r-value of 0.5].



Supplementary Figure S5: Hierarchical clustering of Pearson's correlation co-efficient of normalized gene expression values and % survival at a fixed concentration of drug (Carboplatin: 10 μM; Doxorubicin: 100 nM; Gemcitabine: 30 nM; Topotecan: 30 nM; Paclitaxel: 30 nM and Rucaparib: 10 μM)



Supplementary Figure S6: Growth inhibition analysis of the patient ascites-derived primary cultures following treatment with carboplatin, rucaparib, doxorubicin, gemcitabine, topotecan and paclitaxel. Dotted line represents the concentration corresponding to the GI_{50} value for each sample and the corresponding drug. The samples are classified into HRR competent (HRC, red lines) and HRR defective (HRD, blue lines) identified using functional γH2AX-RAD51 foci formation assay (data not shown).



Supplementary Figure S7: Correlation of functional activity of (A) NHEJ pathway and (B) intrinsic oxidative stress with sensitivity to the different drugs

Table S1: Culture media used for the maintenance of the cell lines

Cell Line	Original Histopathological Classification	Ranking as HGSOC/non-HGSOC	Morphology	Tumour Source	Pre-culture clinical treatment status	Culture Media	Doubling Time (Hrs)
Kuramochi	Undifferentiated adenocarcinoma	HGSOC	Epithelial	Peritoneal ascites	Unknown	RPMI 1640, 10% FBS	40
COV318	HGS	HGSOC	Epithelial	Peritoneal ascites	Unknown	DMEM, 10% FBS	67
CAOV3	Adenocarcinoma	HGSOC	Epithelial	Ovarian solid tumour	Unknown	DMEM, 10% FBS	73
ES2	Clear Cell	HGSOC	Spindle	Ovarian solid tumour	Unknown [The cells exhibit low to moderate resistance to a number of chemotherapeutic agents including doxorubicin, cisplatin, carmustine, etoposide and cyanomorpholinodoxorubicin (MRA-CN)]	RPMI 1640, 10% FBS	21
OAW42	Cystadenocarcinoma	Non-HGSOC	Epithelial	Peritoneal ascites	At passage 4 the cell line showed resistance to doxorubicin [adriamycin (ADM)], phosphoramide mustard (PM), and cisplatin [cis-dichlorodiammineplatinum(II)] (CIS) but rapidly reverted to CIS sensitivity. At passage 25 the cell line was still resistant to ADM and PM (Wilson et al, 1984)	RPMI 1640, 10% FBS	49
A2780	Adenocarcinoma	Non-HGSOC	Round	Ovarian solid tumour	Untreated	RPMI 1640, 10 % FBS	21
CP70-B1	N/A	Non-HGSOC	Round	Derivative of CP70 which are derivatives of A2780	Derivative of CP70 which are derivatives of A2780	RPMI 1640, 10 % FBS + 200 µg/ml Hygromycin B	27
CP70-A2	N/A	Non-HGSOC	Round	Derivative of CP70 which are derivatives of A2780	Derivative of CP70 which are derivatives of A2780	RPMI 1640, 10 % FBS + 200 µg/ml Hygromycin B	20

IGROV1	Mixed endometrioid, serous, cell cell, undifferentiated	Non-HGSOC	Epithelial	Ovarian solid tumour	Untreated	RPMI 1640, 10 % FBS	33
UWB1.289+BRCA1	HGS	HGSOC	Epithelial	Recurrent Ovarian Cancer (earlier Breast Cancer)	Treated	50% RPMI-1640 + 50% MEGM Bullet Kit medium + 200 μg/ml G-418	51
NUCOLL43	Clear Cell	Non-HGSOC	Epithelial	Peritoneal acsites	Untreated	RPMI 1640, 20 % FBS	54
NIH-OVCAR3	Adenocarcinoma	HGSOC	Epithelial	Peritoneal acsites	Combination chemotherapy with Cyclophosphamide, Adriamycin, and cisplatin	RPMI 1640, 10 % FBS	53
UWB1.289	Serous	Non-HGSOC	Epithelial	Recurrent Ovarian Cancer (earlier Breast Cancer)	Treated	50% RPMI-1640 + 50% MEGM Bullet Kit medium	52
COV362	Endometriod	HGSOC	Spindle	Pleural effusion	Unknown	DMEM, 10% FBS	73

HGSOC: High Grade Serous Ovarian Cancer; FBS: Fetal Bovine Serum

Table S2: Cell line panel mutation or amplification status of frequent genomic alterations reported in High Grade Serous Ovarian Cancers (cbioportal)

Cell line	TP53	BRCA 1	BRCA 2	CCNE 1	RB1	MMR	MYC	ARID 1A	EMS Y
Kuramochi	Mut		Mut				Amp		
COV318	Mut	Low Exp		Amp					
CAOV3	Mut		Amp		Low Exp				
ES2	Mut								
OAW42	WT	Mut			High Exp		Amp	Mut	
A2780	WT				High Exp	Comp		Mut	
CP70-B1	Mut					Comp			
CP70-A2	Mut					Def			
IGROV1	Mut	Mut	Mut				Mut		
UWB1.289+BRCA1	Mut	WT							
NUCOLL43	Null								
NIH-OVCAR3	Mut			Amp					Amp
UWB1.289	Mut	Mut							
COV36	Mut	Mut			Low Exp		Amp		Amp

Mut: Mutated; WT: Wild-type; Amp: Amplification; Low Exp: Low mRNA Expression; High Exp: High mRNA expression; Comp: Competent; Def: Defective

Table S3: Correlation between % Survival at fixed drug concentration and Area Under the Curve (AUC) of the survival curves of the 14 cell lines for each drug

	Carboplatin	Doxorubicin	Gemcitabine	Topotecan	Paclitaxel	Rucaparib
Pearson's Correlation coefficient	0.992393	0.95823	0.858857	0.763185	0.951332	0.993379
p-val	<0.0001	<0.0001	<0.0001	0.0015	<0.0001	<0.0001

Table S4: Homologous Recombination Repair defect (BRCA mutation and functional HRR status) and the chemosensitivity to six chemotherapy drugs for the patient ascites-derived primary cultures

Sample List	BRCA status	HRR Status	Carboplatin GI50 (μM)	Rucaparib GI50 (μM)	Doxorubicin GI50 (nM)	Gemcitabine GI50 (nM)	Paclitaxel GI50 (nM)	Topotecan GI50 (nM)
NEOCATS-A-003	gBRCA wildtype	HRD	2.4	4	97.6	24.4	2.1	23.5
NEOCATS-A-005	gBRCA wildtype	HRC	10.5	>30	27.6	44.6	6.2	17.4
NEOCATS-A-014	gBRCA wildtype	HRD	2.5	4	55.6	60.6	2.5	24.1
NEOCATS-A-017	Unknown	HRD	10.6	14	23.5	26.5	6.2	19.2
NEOCATS-A-018	gBRCA wildtype	HRC	7.7	>30	10	14.2	2.7	4.1
NEOCATS-A-022	Unknown	HRD	4.9	0.56	14.7	5.6	2.5	28.5
NEOCATS-A-023	gBRCA1 mutant	HRC	2.1	7	21.3	57.1	2.2	47.5
NEOCATS-A-026	gBRCA wildtype	HRC	5.4	7.8	44.2	71.3	5.6	25.3
NEOCATS-A-029	Unknown	HRC	10.6	11.7	48.7	75.2	4.1	101.7
NEOCATS-A-030	somatic BRCA mutant	HRD	2.1	14.8	28.1	119.6	9.9	82.1

Table S5: Pearson's correlation analysis between %NHEJ activity and % survival at given concentrations of the drugs

Drug	Correlation coefficient	Outliers (ES2 and OAW42) removed
Carboplatin 10 μM	-0.31	-0.31
Doxorubicin 100 nM	0.11	0.46
Gemcitabine 30 nM	0.36	0.5
Topotecan 30 nM	0.08	0.02
Paclitaxel 30 nM	0.4	0.34
Rucaparib 10 μM	-0.35	-0.32

Table S6: Pearson's correlation analysis between Baseline 8-OHdG levels and % survival at given concentrations of the drugs

Drug	**Correlation co-efficient**
Carboplatin 10 μM	0.21
Doxorubicin 100 nM	0.34
Gemcitabine 30 nM	-0.4
Topotecan 30 nM	0.05
Paclitaxel 30 nM	0.2
Rucaparib 10 μM	0.23