

Robust Prediction of Patient-Specific Clinical Response to Unseen Drugs From in vitro Screens Using a Context-aware Deconfounding Autoencoder

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A. Supplemental Table S1

Table S1. t-Test results on gene expression differences between responsive and resistant groups per drug-target pair

Drug	Target	P-value	Avg. Expression (Responsive)	Avg. Expression (Resistant)
681640	WEE1	1.10E-22	4.0789	4.6994
681640	CHEK1	7.90E-02	3.4623	3.324
(5Z)-7-Oxozeaenol	MAP3K7	2.80E-07	3.4173	3.6632
AG-014699	PARP2	6.10E-05	4.2797	4.1018
AG-014699	PARP1	3.10E-01	6.0258	5.9679
AICAR	PRKAA1	8.50E-101	3.5251	4.8481
AMG-706	PDGFRB	6.90E-231	3.3645	6.0379
AMG-706	KDR	2.20E-46	2.1994	3.2249
AMG-706	PDGFRA	9.00E-20	2.9868	4.1865
AMG-706	RET	1.10E-06	1.655	1.17
AMG-706	KIT	7.90E-01	2.4167	2.3898
Axitinib	PDGFRB	4.00E-184	3.7331	6.1445
Axitinib	PDGFRA	5.80E-74	2.2025	4.2702
Axitinib	KDR	1.40E-24	2.5913	3.3782
Axitinib	KIT	4.50E-01	2.4023	2.4853
AZ628	BRAF	2.40E-24	2.8583	3.2854
AZD6482	PIK3CB	1.00E-03	3.8311	4.019
AZD7762	CHEK1	1.70E-185	4.1895	2.2045
AZD7762	CHEK2	5.40E-134	4.3098	2.6937
AZD8055	MTOR	1.90E-01	4.245	4.1776
BI-2536	PLK2	2.60E-143	2.8942	5.4151
BI-2536	PLK3	2.90E-41	3.1475	3.8938
BI-2536	PLK1	4.40E-04	4.1665	3.8311
BMS-536924	IGF1R	1.80E-72	2.3833	4.0068
BMS-754807	IGF1R	9.60E-29	3.8051	2.9307
Bosutinib	SRC	2.30E-94	3.4436	4.8906
Bosutinib	ABL1	4.80E-77	4.0001	5.1314
Bosutinib	TEC	1.10E-65	2.7255	1.1407
BX-795	AURKC	4.80E-35	1.163	0.6489
BX-795	TBK1	3.70E-08	3.4926	3.822
BX-795	IKBKB	2.20E-07	4.7648	4.4565
BX-795	AURKB	3.50E-01	4.8741	4.7992
BX-795	PDK1	3.70E-01	2.8806	2.9369
Camptothecin	TOP1	4.50E-111	4.4576	5.686
CEP-701	NTRK3	1.80E-40	2.3181	0.807
CEP-701	JAK2	3.10E-12	2.3605	2.8186

CEP-701	NTRK2	7.10E-12	3.8394	2.4591
CEP-701	FLT3	1.10E-06	1.2452	0.7004
CEP-701	NTRK1	1.30E-05	0.8474	0.5553
CHIR-99021	GSK3A	3.30E-03	5.9035	6.0019
CHIR-99021	GSK3B	5.60E-01	4.1111	4.0846
Embelin	XIAP	5.00E-72	3.5752	4.2196
FK866	NAMPT	3.60E-169	4.4288	6.6042
GDC0941	PIK3CA	2.20E-69	2.7288	3.5768
GDC0941	PIK3CD	9.00E-29	1.6778	2.2801
Gefitinib	EGFR	4.80E-47	3.9776	5.7095
GSK1904529A	IGF1R	2.90E-100	2.4047	3.9939
GSK269962A	ROCK2	3.20E-20	3.2141	3.7583
GSK269962A	ROCK1	2.10E-02	3.6288	3.469
GW 441756	NTRK1	1.50E-10	0.3287	0.6309
JNJ-26854165	MDM2	4.50E-07	5.7871	5.4236
JNK Inhibitor VIII	MAPK8	2.50E-46	3.6722	4.5588
JQ1	BRD2	1.70E-08	6.9069	7.1648
JQ1	BRD4	2.70E-08	4.5332	4.7908
JQ1	BRDT	4.00E-03	0.1288	0.255
JQ1	BRD3	1.90E-02	3.7328	3.8674
KU-55933	ATM	3.00E-02	3.5916	3.4025
LY317615	PRKCB	4.10E-10	3.6947	2.8402
MK-2206	AKT1	2.90E-106	5.5111	6.7304
MK-2206	AKT2	5.00E-39	5.5542	6.3624
Nilotinib	ABL1	6.90E-87	3.7639	4.9984
NU-7441	PRKDC	3.20E-01	5.5597	5.4917
Obatoclox Mesylate	BCL2L2	1.50E-138	3.3805	4.8422
Obatoclox Mesylate	BCL2L1	3.10E-88	5.5934	6.6164
Obatoclox Mesylate	BCL2	1.60E-25	2.7184	3.7067
Obatoclox Mesylate	MCL1	1.20E-15	6.8187	7.3133
PAC-1	CASP7	1.50E-173	3.3918	5.0627
PAC-1	CASP3	1.10E-70	3.709	4.6999
PD-0325901	MAP2K1	1.30E-17	4.5549	5.0474
PD-0325901	MAP2K2	5.70E-05	6.7388	6.9083
PD-0332991	CDK4	2.40E-43	6.4158	7.1613
PD-0332991	CDK6	2.60E-12	3.271	2.4058
PD-173074	FGFR1	1.80E-18	4.1757	4.9268
PD-173074	FGFR2	5.40E-11	3.1222	3.8407
PD-173074	FGFR3	3.10E-09	2.9842	3.7217
PF-4708671	RPS6KB1	2.10E-02	3.6593	3.5448
PF-562271	PTK2B	3.10E-07	4.3494	4.0449
PF-562271	PTK2	8.50E-04	5.769	5.6216
PLX4720	BRAF	1.80E-08	2.9273	3.2625
RO-3306	CDK1	2.30E-01	4.6398	4.737
SB 216763	GSK3A	4.70E-44	5.4215	6.0307
SB 216763	GSK3B	2.30E-11	3.7463	4.084
SL 0101-1	PIM3	5.10E-61	4.7294	5.7019
SL 0101-1	RPS6KA1	3.00E-11	4.5357	4.9659
SL 0101-1	PIM1	1.40E-05	4.7857	4.4367
SL 0101-1	AURKB	4.10E-04	4.2786	3.9083
Sorafenib	PDGFRB	2.30E-222	2.6129	5.6893
Sorafenib	PDGFRA	1.20E-166	1.0217	3.7956
Sorafenib	KDR	5.70E-58	1.6047	2.8772
Sorafenib	KIT	2.10E-12	2.8686	2.0071

Sorafenib	RAF1	2.00E-10	5.0648	5.4119
Tamoxifen	ESR1	2.20E-09	0.8943	1.5082
TW 37	MCL1	4.10E-106	6.7557	7.6602
TW 37	BCL2	3.80E-55	3.1667	1.9914
TW 37	BCL2L1	1.90E-17	6.3134	6.6994
Vorinostat	HDAC1	1.90E-66	5.5303	6.6089
Vorinostat	HDAC2	1.50E-44	5.1935	6.1185
Vorinostat	HDAC6	2.70E-16	5.1075	4.7073
Vorinostat	HDAC3	1.30E-15	5.1247	5.4736
YK 4-279	DHX9	1.20E-06	6.2476	6.4496
ZM-447439	AURKB	3.00E-133	5.1265	2.8614
ZM-447439	AURKA	5.10E-11	3.732	3.2247

B. Supplemental Table S2

Table S2. TCGA tissue samples clustering results based on their drug responses towards 50 target drug therapies

Drug	Tissue	Avg. Response Score	# of tissue samples / # of total samples within cluster
PD-173074	brain lower grade glioma	0.907573	351/372
PD-173074	pheochromocytoma & paraganglioma	0.902569	105/214
PD-173074	liver hepatocellular carcinoma	0.898942	197/382
PD-173074	acute myeloid leukemia	0.883491	173/354
PD-173074	ovarian serous cystadenocarcinoma	0.882003	55/190
Camptothecin	liver hepatocellular carcinoma	0.819653	84/289
PD-0332991	acute myeloid leukemia	0.81628	173/354
Camptothecin	acute myeloid leukemia	0.814718	173/354
Nilotinib	acute myeloid leukemia	0.814684	173/354
Camptothecin	pheochromocytoma & paraganglioma	0.813179	105/214
Camptothecin	brain lower grade glioma	0.812126	351/372
Vorinostat	acute myeloid leukemia	0.80762	173/354
Sorafenib	acute myeloid leukemia	0.807489	173/354
AICAR	head & neck squamous cell carcinoma	0.804343	63/203
Camptothecin	ovarian serous cystadenocarcinoma	0.803714	55/190
Sorafenib	pheochromocytoma & paraganglioma	0.801101	105/214
AICAR	acute myeloid leukemia	0.795736	173/354
Vorinostat	liver hepatocellular carcinoma	0.795261	84/289
Gefitinib	head & neck squamous cell carcinoma	0.790417	63/203
FK866	brain lower grade glioma	0.788069	351/372
Sorafenib	liver hepatocellular carcinoma	0.787842	84/289
FK866	liver hepatocellular carcinoma	0.783162	197/382
FK866	pheochromocytoma & paraganglioma	0.780261	105/214
Vorinostat	ovarian serous cystadenocarcinoma	0.780091	55/190
FK866	ovarian serous cystadenocarcinoma	0.773476	55/190
Sorafenib	brain lower grade glioma	0.77254	351/372
Tamoxifen	acute myeloid leukemia	0.769454	173/354
FK866	acute myeloid leukemia	0.767409	173/354
Tamoxifen	ovarian serous cystadenocarcinoma	0.748258	55/190
PD-173074	skin cutaneous melanoma	0.747967	123/207
Sorafenib	skin cutaneous melanoma	0.74644	123/207
PD-173074	thyroid carcinoma	0.744752	77/250
PD-0332991	liver hepatocellular carcinoma	0.744704	84/289
Gefitinib	acute myeloid leukemia	0.74298	173/354
AZD7762	acute myeloid leukemia	0.742207	173/354
Vorinostat	pheochromocytoma & paraganglioma	0.741767	105/214
Sorafenib	testicular germ cell tumor	0.741199	59/162
Tamoxifen	liver hepatocellular carcinoma	0.734867	84/289
GSK1904529A	acute myeloid leukemia	0.734821	173/354
CHIR-99021	sarcoma	0.73268	183/352
Nilotinib	liver hepatocellular carcinoma	0.73167	84/289
Embelin	head & neck squamous cell carcinoma	0.725261	221/349
Gefitinib	lung squamous cell carcinoma	0.723799	204/471
Sorafenib	glioblastoma multiforme	0.722459	115/252
AICAR	lung squamous cell carcinoma	0.717723	204/471
PD-173074	testicular germ cell tumor	0.717293	59/162
PD-0325901	thyroid carcinoma	0.716933	145/225
LY317615	acute myeloid leukemia	0.712712	173/354
Nilotinib	testicular germ cell tumor	0.711886	59/162
YK 4-279	acute myeloid leukemia	0.711052	173/354
Vorinostat	testicular germ cell tumor	0.70557	59/162
AICAR	testicular germ cell tumor	0.704625	59/162
Vorinostat	brain lower grade glioma	0.701899	351/372
PD-173074	colon adenocarcinoma	0.701831	45/149

C. Supplemental Figure S1

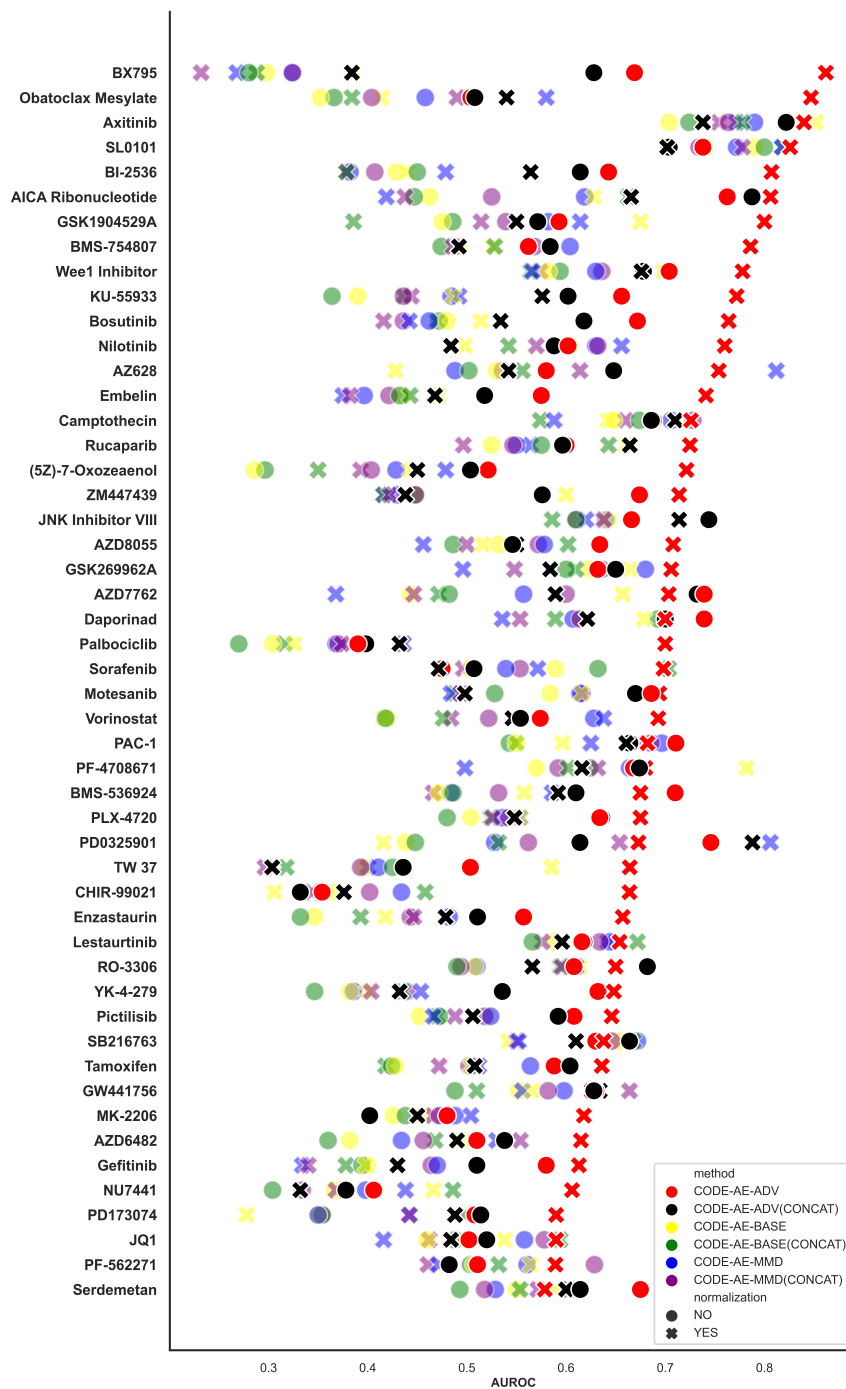


Fig. S1. PDTC drug response classification performance comparison of CODE-AE variants

D. Supplemental Figure S2

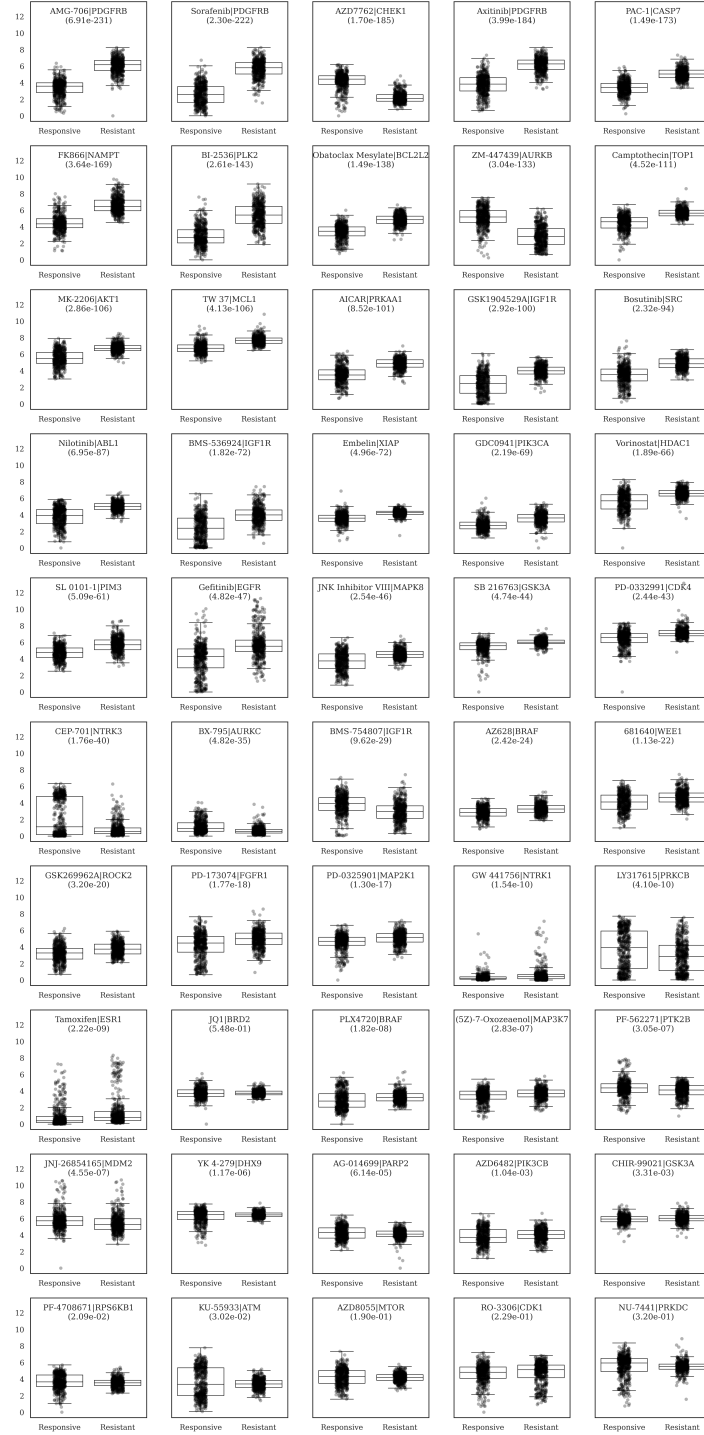


Fig. S2. Significant target gene expression value differences shown between responsive and resistant groups of 47 out of 50 target therapy agents

E. Supplemental Figure S3

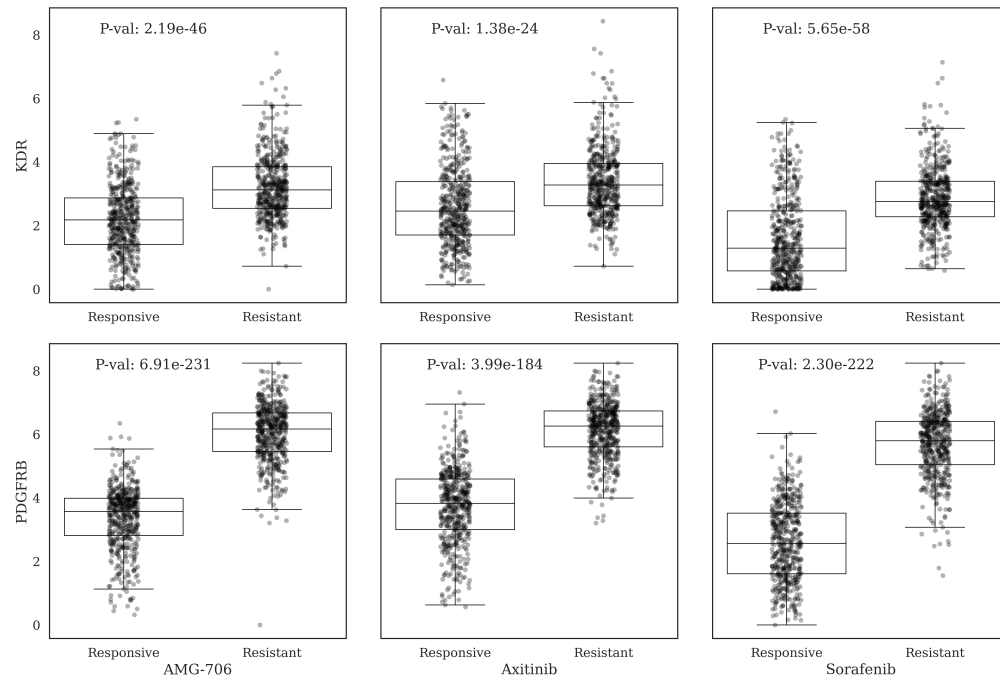


Fig. S3. Significant target gene (KDR and PDGFRB) expression value differences shown between responsive and resistant groups of drug Sorafenib, AMG-706 and Axitinib.