Supplementary Materials

Figure S1: Optimization routine accurately identifies simulated death rates. Eqs. (6) – (8) were simulated over a range of co-culture conditions using the death model assumed in Eq. (9). The death rate of each cell line was estimated using the optimization routine in Section 2.6. Model estimates and 95% confidence intervals are shown for the parental (left) and resistant (right) cell lines. The legends in each figure panel denote the percentage of resistant cells present at the beginning of the simulation. The death rate for each cell line can be accurately recovered.

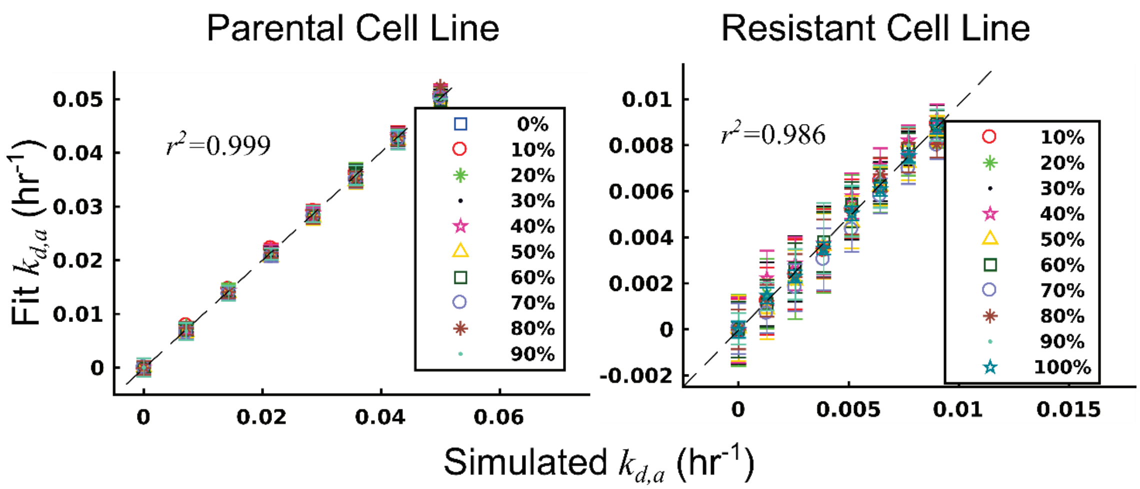

Figure S2: Optimization routine accurately identifies simulated proliferation rates. Eqs. (6) – (8) were simulated over a range of co-culture conditions. The proliferation rate of each cell line was estimated using the optimization routine in Section 2.6. Model estimates and 95% confidence intervals are shown for the parental (red) and resistant (blue) cell lines. For these simulations, the proliferation rate of the parental and resistant lines were fixed at 0.02 hr^{-1} and 0.015 hr^{-1}, respectively. These are illustrated by the red and blue dashed lines. The proliferation rate for each cell line can be accurately recovered.

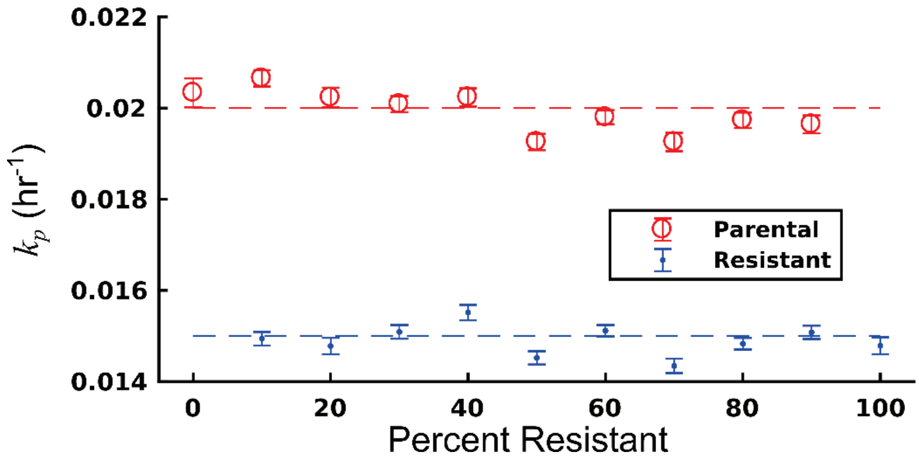

Figure S3: Optimization routine accurately identifies simulated death rates. Eqs. (6) – (8) were simulated over a range of co-culture conditions using the death model assumed in Eq. (10). The death rate of each cell line was estimated using the optimization routine in Section 2.6. Model estimates and 95% confidence intervals are shown for the parental (left) and resistant (right) cell lines. For these simulations, r was fixed to 0.02 hr^{-1} for both cell lines to avoid the variability observed in $k_{d,b}$ at low values of r previously reported (McKenna et al., 2017). The legends in each figure panel denote the percentage of resistant cells present at the beginning of the simulation. The death rate for each cell line can be accurately recovered.

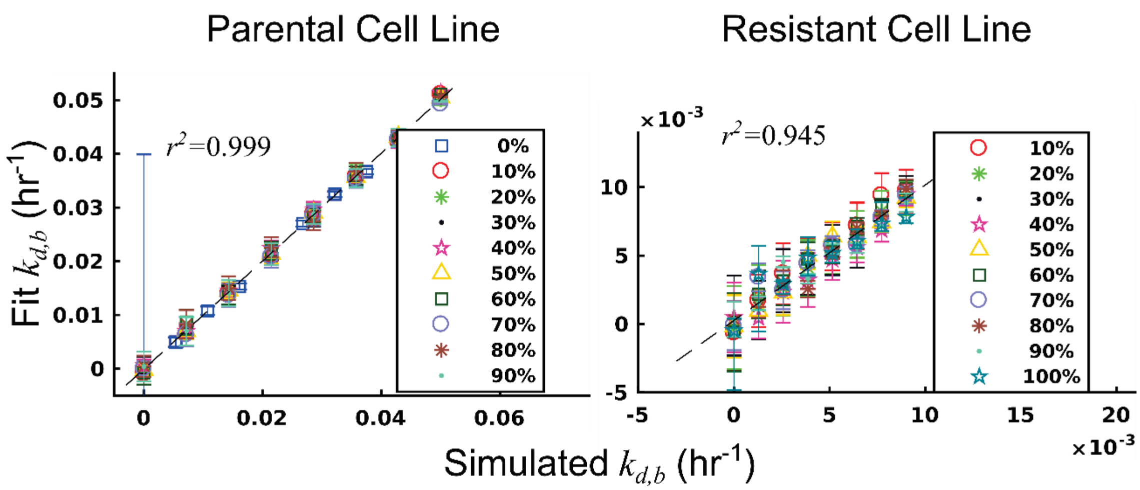

Table S1: Model parameter fits for parental cell line (error represents 95% confidence interval)

	Concentration (nM)	$k_{d,a}$ (×10^{-2} hr^{-1}) 0	100	500	2500	$k_{d,b}$ (×10^{-2} hr^{-1}) 0	100	500	2500	r (×10^{-2} hr^{-1}) 0	100	500	2500
Parental:Resistant	100:0	-0.03 (±0.55)	0.64 (±0.22)	2.11 (±0.23)	1.88 (±0.31)	-0.28 (±5.35)	0.98 (±0.65)	2.57 (±0.49)	2.15 (±0.11)	5.00 (±64.2)	0.58 (±0.36)	0.86 (±0.12)	0.58 (±0.07)
	80:20	-0.36 (±0.44)	0.63 (±0.25)	2.07 (±0.30)	1.66 (±0.31)	-0.98 (±1.51)	2.07 (±1.65)	2.44 (±0.27)	1.92 (±0.25)	4.53 (±6.38)	0.15 (±0.24)	0.87 (±0.03)	0.54 (±0.05)
	60:40	-0.37 (±0.72)	0.69 (±0.37)	2.08 (±0.35)	1.62 (±0.38)	-0.99 (±3.41)	2.91 (±0.44)	2.42 (±0.28)	1.98 (±0.31)	4.45 (±13.6)	0.10 (±1.28)	0.62 (±0.02)	0.46 (±0.06)
	40:60	-0.32 (±0.86)	1.13 (±0.34)	1.87 (±0.32)	1.64 (±0.37)	-1.12 (±3.53)	3.62 (±0.16)	2.31 (±0.31)	1.89 (±0.32)	5.00 (±14.5)	0.10 (±0.82)	0.72 (±0.03)	0.51 (±0.05)
	20:80	-0.10 (±1.30)	1.35 (±0.54)	1.87 (±0.56)	1.39 (±0.47)	-1.02 (±3.62)	4.20 (±0.20)	2.26 (±0.48)	1.63 (±0.50)	5.00 (±18.5)	0.10 (±1.01)	0.48 (±0.04)	0.54 (±0.07)

Table S2: Model parameter fits for resistant cell line (error represents 95% confidence interval)

	Concentration (nM)	$k_{d,a}$ (×10^{-2} hr^{-1}) 0	100	500	2500	$k_{d,b}$ (×10^{-2} hr^{-1}) 0	100	500	2500	r (×10^{-2} hr^{-1}) 0	100	500	2500
Parental:Resistant	80:20	-0.51 (±0.87)	-0.17 (±0.45)	0.44 (±0.38)	0.75 (±0.57)	-1.39 (±2.03)	1.82 (±4.34)	0.51 (±0.41)	1.10 (±1.41)	0.19 (±5.40)	0.10 (±1.44)	0.62 (±1.13)	0.33 (±0.35)
	60:40	-0.52 (±0.91)	-0.22 (±0.47)	0.59 (±0.36)	0.89 (±0.57)	-1.72 (±3.42)	1.82 (±3.27)	0.68 (±0.40)	1.06 (±0.61)	0.16 (±4.75)	0.10 (±1.37)	0.56 (±0.72)	0.45 (±0.43)
	40:60	-0.37 (±0.73)	-0.20 (±0.53)	0.54 (±0.35)	0.65 (±0.51)	-1.61 (±3.68)	1.60 (±2.14)	0.60 (±0.66)	1.03 (±0.85)	0.10 (±3.58)	0.10 (±1.38)	2.05 (±1.34)	0.34 (±0.59)
	20:80	-0.10 (±0.60)	0.16 (±0.61)	0.49 (±0.48)	0.77 (±0.71)	-0.94 (±2.22)	0.88 (±1.37)	0.63 (±0.72)	0.97 (±0.83)	0.10 (±6.69)	0.11 (±3.03)	1.24 (±1.21)	0.39 (±0.52)
	0:100	0.00 (±0.37)	0.31 (±0.20)	0.25 (±0.20)	0.69 (±0.40)	0.05 (±5.08)	1.50 (±2.84)	0.36 (±0.17)	0.88 (±0.31)	4.98 (±292)	5.00 (±5.59)	1.39 (±1.78)	0.39 (±0.49)