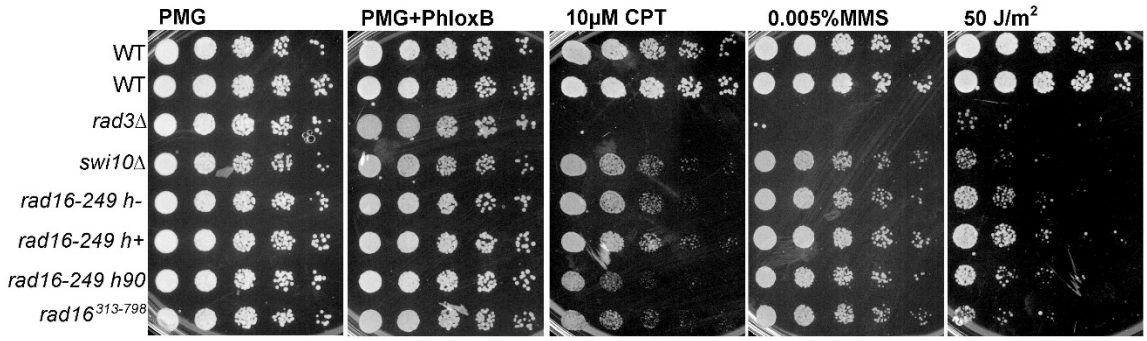

Figure S1 Long Term Viability in Presence of Drug. Representative image. Equal concentrations of cells plated in 5x serial dilutions from left to right. Drug plates supplemented with indicated concentration of drug + PhloxinB.

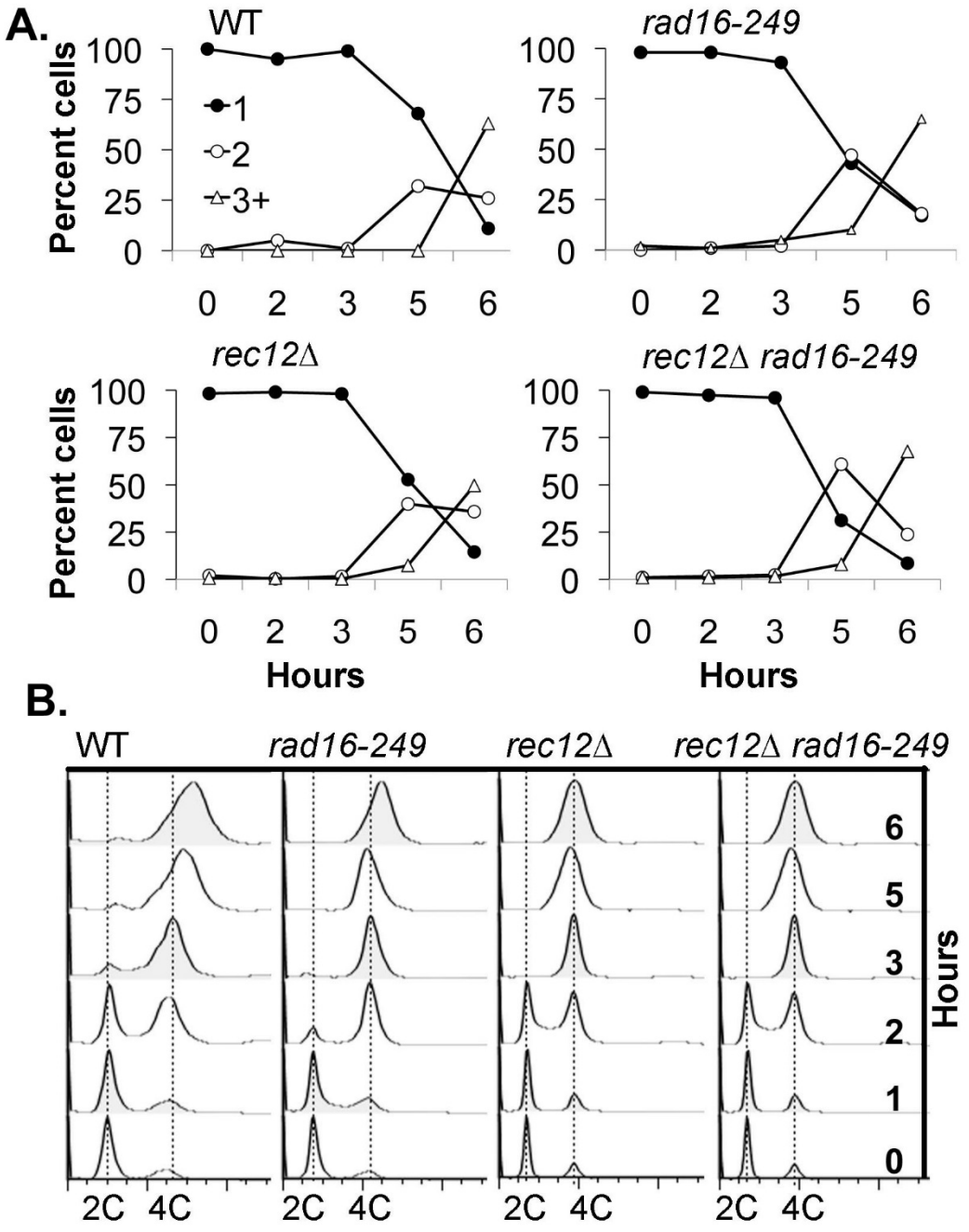

Figure S2 Timing of Synchronous Meiotic Events. (A) Nuclear counts visualized with DAPI to determine times of MI (2 signals) and MII (3+ signals) divisions. (B) FACS analysis for samples used in A, B, and C showing the timing and completion of meiotic replication as DNA content moves from 2C to 4C.

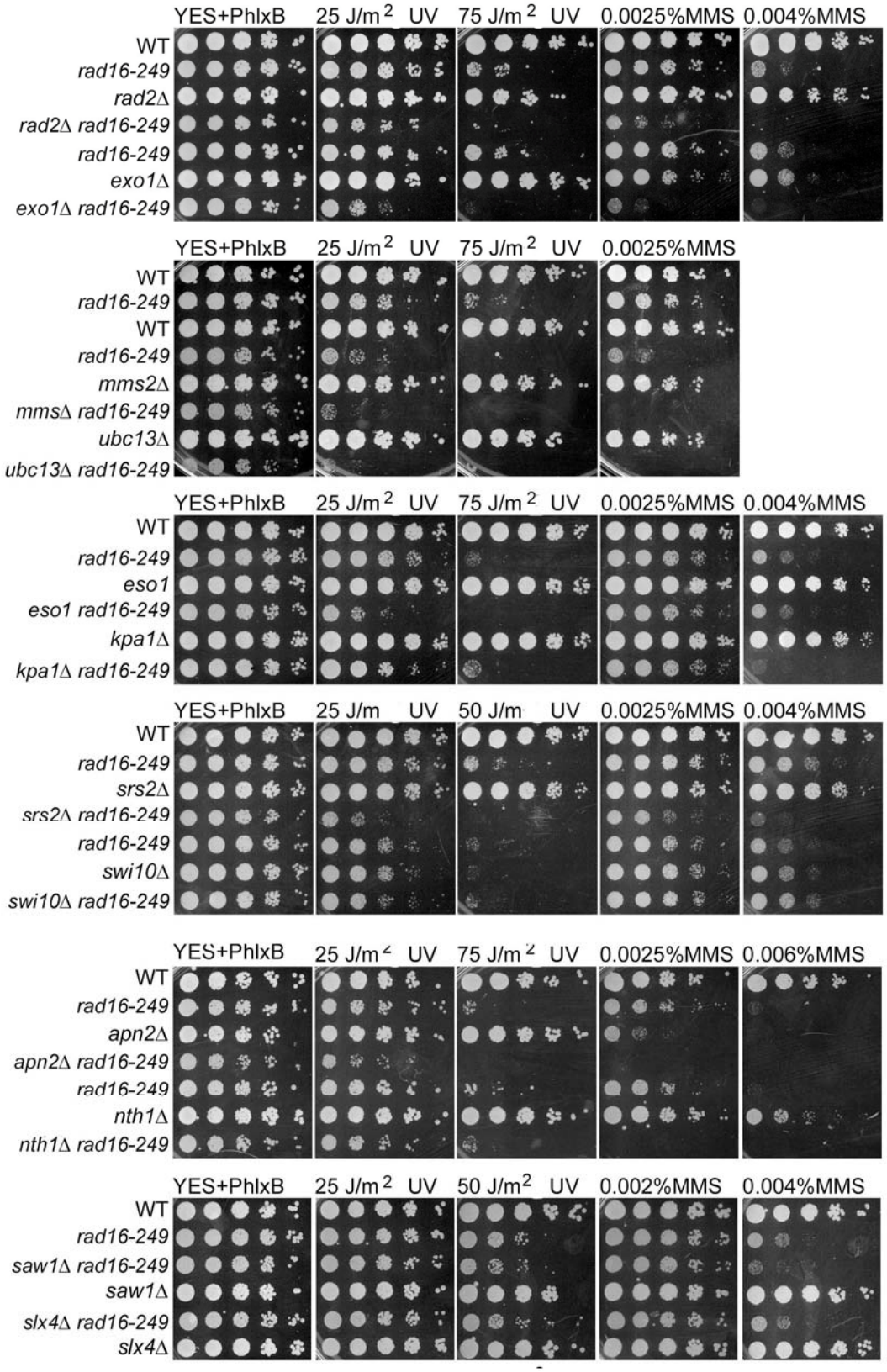

Figure S3 Growth Rates and Drug Sensitivity for *rad16-249* Double Mutants. Representative images of cells were plated in 5x serial dilutions from equal starting concentrations on YES plates containing PhloxinB and noted drug concentrations.

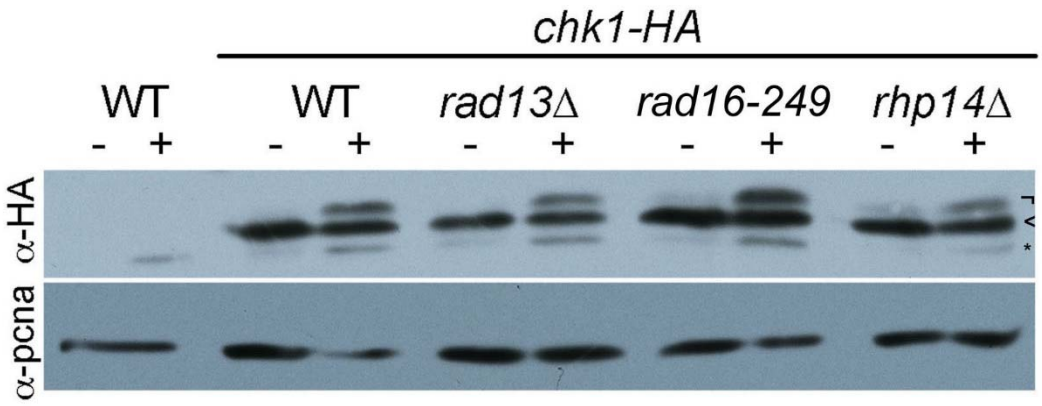

Figure S4 Western blot of Chk1-HA using 16B12 anti-HA antibody. Lanes (+) 2,4,6,8,10 from cultures exposed to 0.01%MMS for 4 hours; lanes (-) 1,3,5,7,9 from cultures not exposed to drug. * indicates non specific bands, > is Chk1-HA specific band, ¬ indicates modified Chk1-HA band.

Files S1-S8

Available for download as .mov files at http://www.genetics.org/lookup/suppl/doi:10.1534/genetics.114.171355/-/DC1

File S1: Representative of live cell imaging of WT using H3-mRFP (Magenta) and Taz1-GFP (cyan) to view meiotic progression.

File S2: Representative of live cell imaging of *rad16-249* using H3-mRFP (magenta) and Taz1-GFP (cyan) to view meiotic progression.

File S3: Representative of live cell imaging of *rhp14Δ* using H3-mRFP (magenta) and Taz1-GFP (cyan) to view meiotic progression.

File S4: Representative of live cell imaging of *rad13Δ* using H3-mRFP (magenta) and Taz1-GFP (cyan) to view meiotic progression.

Files S5 and S6: Representative of live cell imaging of *mus81Δ* using H3-mRFP (magenta) and Taz1-GFP (cyan) to view meiotic progression. Movie 5 shows *mus81Δ* that complete an MI division and Movie 6 shows MI division failure.

File S7: Representative of live cell imaging of *rec12Δ* using H3-mRFP (magenta) and Taz1-GFP (cyan) to view meiotic progression.

File S8: Representative of live cell imaging of *rad16-249* using H3-mRFP (red) and Taz1-GFP (green) to view mitosis.

Table S1 Strains used in this study.

Strains		
6	*h- leu1-32 ade6-704 ura4-294*	Our Stock
118	*h90 ura4-D18 leu1-32 ade6-M216*	Our Stock
168	*h+ ade6-704 leu1-32*	Our Stock
416	*h- ade6-704 leu1-32 ura4-D18 rad13::ura4*	Our Stock
421	*h- ade6-704 leu1-32 ura4-D18 ∆chk1::ura4*	Tony Carr
527	*h- his3-D1 ade6-M216 ura4-D18 leu1-32*	Our Stock
528	*h+ his3-D1 ade6-M210 ura4-D18 leu1-32*	Our Stock
865	*h- ∆cds1::ura4 ura4-D18 leu1-32*	Tony Carr
915	*h- leu1-32 ade6-M210*	Our Stock
941	*h- ∆rad2::ura4+ leu1-32 ade6-704 ura4-D18*	Our Stock
1107	*h- ∆rad3::ura4+ ura4-D18 leu1-32 ade6-M216*	Our Stock
1251	*h+ ade6-M26 his4-239*	Gerry Smith
1256	*h- mad2∆::ura4+ ade6-M210 leu1-32 ura4-D18*	Our Stock
1893	*h- ade6-M375-M210 leu1-32 ura4-D18 his3-D1*	(Catlett and Forsburg 2003)
1898	*h- rdh54∆::ura4+ ade6-L469/pUC8/his3+/ade6-M375 ura4-D18 leu1-32*	(Catlett and Forsburg 2003)
1902	*h+ ade6-L469/pUC8/his3+/ade6-M375 ura4-D18 leu1-32 his3-D1*	(Catlett and Forsburg 2003)
1942	*h+ rdh54∆::ura4+ ade6-M375-M210 leu1-32 ura4-D18 his3-D1*	(Catlett and Forsburg 2003)
2057	*h- pat1-114 ade6-M216 can1-1*	Our Stock
2111	*h- pat1-114 rec12∆::ura4+ ura4-D18 ade6-M216*	Our Stock
2170	*h90 mat2-102 pat1-114 rec12∆::ura4+ ura4-D18 ade6-M210*	Our Stock
3490	*h- ∆swi10::kanMX ura4-D18 leu1-32 ade6-704*	Tony Carr
3500	*h90 mat2-102 pat1-114 ade6-M210*	Our Stock
3766	*h- ∆swi5::his3+ ade6-M210 ura4-D18 leu1-32 his3-D1*	Our Stock
3767	*h+ ∆swi5::his3+ ade6-M210 ura4-D18 leu1-32 his3-D1*	Our Stock
3769	*h+ ∆rhp57::ura4+ ade6-M210 ura4-D18 leu1-32 his3-D1*	Our Stock

3770	*h- ∆rhp57::ura4+ smt0 ade6-M210 ura4-D18 leu1-32 his3-D1*	Our Stock
3876	*h- apn2::kanMX6 ura4-D18 leu1-32 his3-D1*	Mathew O'Connell
3877	*h+ nth1::ura4 ura4-D18 leu1-32 his3-D1 arg3-D1*	Mathew O'Connell
3884	*h- exo1::ura4 ura4-D18*	Mathew O'Connell
3887	*h- rhp14::kanMX6 ade6-704 leu1-32 ura4-D18*	Mathew O'Connell
3958	*h- rad35-271 ura4-D18 leu1-32*	Our Stock
4415	*h+ ∆reb1::kanMX ade6-M216 ura4-D18 leu1-32*	Our Stock
4504	*h+ rad16-249 ura4-D18 leu1-32*	This Study
4505	*h+rad16-249 his3-D1 ura4-D18 leu1-32 ade6-M210 =rad16*	This Study
4561	*h+ Delta-rec12::ura4+ ura4-D18 his4-239 ade6-M26*	This Study
4562	*h- rad16-249 ura4-D18 ade6-M210*	This Study
4661	*h- rad16-249 his3-D1 ura4-D18 leu1-32 ade6-M216*	This Study
4707	*h- rad16-249 leu1-32 ade6-M210*	This Study
4707	*h- rad16-249 leu1-32 ade6-M210*	This Study
4708	*h+ rad16-249 leu1-32 ade6-M210*	This Study
4839	h90 Rad16-249 Hht2-GFP-ura4+ ura4-D18 leu1-32 ade6-M216	This Study
4941	*h90 ura4-D18 rad16::ura4+*	Henning Schmidt
4983	*h+ ∆mms2::LEU2+ rad16-249 leu1-32? ura4-D18 ade6-52*	This Study
4984	*h+ ∆srs2::KanMX6 rad16-249 ura4-D18 ade6-M210*	This Study
4985	*h- ∆kpa1::bleMX6 ura4-D18*	This Study
4986	*h- rad16-249 rad35-271 ura4-D18 leu1-32*	This Study
4987	*h- rad16-249 ∆ubc13::ura4+ ura4-D18 ade6-52*	This Study
5136	*h- ∆swi10::kanMX rad16-249 ura4-D18 ade6-704*	This Study
5146	*h- eso1::kanMX6 rad16-249 ura4-D18 ade6-*	This Study
5147	*h- ∆kpa1::bleoMX6 rad16-249 ura4-D18 ade6-*	This Study
5165	*h- apn2::kanMX6 rad16-249 ura4-D18 leu1-32 his3-D1*	This Study
5166	*h- nth1::ura4+ ura4-D18 rad16-249 ade6-52*	This Study

5172	*h- rad16-249 exo1::ura4 ura4-D18*	This Study
5176	*h- ∆rec12::ura4+ ura4-D18 rad16-249 lys4-95 ade6-52*	This Study
5180	*h+ ∆rec12::ura4+ siw9-249 ura4-D18 his4-239 ade6-M26*	This Study
5181	*h- ∆rad2::ura4+ rad16-249 ura4-D18 leu1-32 ade6-*	This Study
5182	*h+ ∆srs2::kanMX6 ura4-D18 ade6-M210*	This Study
5186	*h- ∆ubc13::ura4+ ura4-D18 ade6-M210*	This Study
5191	*h+ ∆mms2::leu2 ura4-D18 ade6-M210*	This Study
5192	*h+ rad16-249 his4-239 ade6-M26*	This Study
5193	*h- ∆slx4::kanMX4 his3-D1 leu1-32 ura4-D18 ade6-M216*	This Study
5194	*h+ rad16-249 ura4-D18 ade6-M210*	This Study
5204	*h- ∆swi10::kanMX ura4-D18 ade6-704*	This Study
5205	*h- rad16-249 lys4-95 ade6-52*	This Study
5206	*h- eso1::kanMX6 ura4-D18 ade6-704*	This Study
5207	*h- lys4-95 ade6-52*	This Study
5208	*h- rad16-249 ade6-M210*	This Study
5221	*h90 mat2-102 pat1-114 rad16-249 ade6-M216*	This Study
5241	*h- rad16-249 ∆chk1::ura4 ade6-704 leu1-32 ura4-D18*	This Study
5243	*h- rad16-249 ∆cds1::ura4 ura4-D18 leu1-32*	This Study
5245	*h- rad16-249 ∆slx4::kanMX4 his3-D1 leu1-32 ura4-D18 ade6-M210*	This Study
5247	*h- rad16-249 mad2∆::ura4+ ura4-D18 leu1-32*	This Study
5257	*h- ∆saw1::kanMX4 his3-D1 ura4-D18 leu1-32 ade6-M216*	This Study-Bioneer derived
5268	*h- ∆rec12::ura4+ ura4-D18 ade6-52 lys4-95*	This Study
5287	*h- ∆saw1::kanMX4 rad16-249 his3-D1 ura4-D18 leu1-32 ade6-M216/210?*	This Study-Bioneer derived
5497	*h- pat1-114 rad16-249 Drec12::ura4+ ura4-D18 ade6-M216*	This Study
5530	*h+ rad16-249 ∆reb1::kanMX ade6-M210 leu1-32 ura4-D18*	This Study
5580	*h- rhp14::kanMX6 rad16-249 ura4-D18 leu1-32*	This Study
5600	*h90 mat2-102 pat1-114 rad16-249 Drec12::ura4+ ura4-D18 ade6-M210*	This Study

5800	*h- rad16-249 pat1-114 ade6-M210*	This Study
5809	*h+ rad16-249 ∆rdh54::ura4+ ade6-M375-M210 leu1-32 ura4-D18 his3-D1*	This Study
5811	*h+ rad16-249 ade6-M375-M210 leu1-32 ura4-D18 his3-D1*	This Study
5814	*h- rad16-249 ade6-L469/pUC8/his3+/ade6-M375 ura4-D18 leu1-32 his3-D1*	This Study
5816	*h- rad16-249 ∆rdh54::ura4+ ade6-L469/pUC8/his3+/ade6-M375 ura4-D18 leu1-32 his3-D1*	This Study
5825	*h- rad16-249 ade6-704 leu1-32 ura4-D18 rad13::ura4*	This Study
6257	*h- ∆fml1::natMX4 ura4-D18 his3-D1 leu1-32 ade6-M216*	Our Stock
6258	*h+ ∆fml1::natMX4 ura4-D18 his3-D1 leu1-32 ade6-M216*	Our Stock
6915	*h- rad16-249 leu2-120*	This Study
6917	*h+ leu2-120 ade6-M210*	This Study
6919	*h- his7-36 ade6-*	This Study
6921	*h- rad16-249 his7-36 ade6-*	This Study
6923	*h- ura2-10 ade6-*	This Study
6924	*h+ rad16-249 ura2-10 ade6-*	This Study
7376	*h- ∆rhp57::ura4+ rad16-249 ade6-M210 ura4-D18 leu1-32 his3-D1*	This Study
7377	*h+ ∆rhp57::ura4+ rad16-249 ade6-M210 ura4-D18 leu1-32 his3-D1*	This Study
7378	*h- ∆swi5::his3+ rad16-249 ade6-M210 ura4-D18 leu1-32 his3-D1*	This Study
7379	*h+ ∆swi5::his3+ rad16-249 ade6-M210 ura4-D18 leu1-32 his3-D1*	This Study
7467	*h- rad16-249 ∆fml1::natMX4 ura4-D18 his3-D1 leu1-32*	This Study
7468	*h+ rad16-249 ∆fml1::natMX4 ura4-D18 his3-D1 leu1-32*	This Study
7475	*h- lys4∆::kanMX ura4-D18 leu1-32 ade6-*	This Study-Bioneer derived
7515	*h- lys4∆::kanMX rad16-249 ura4-D18 leu1-32 ade6-*	This Study-Bioneer derived

Table S2 Tetrad analysis of recombination between His4 and Lys4.

Viable Spores/Tetrad	**WT**	***rad16-249***
0.00	0.40%	5.66%
1.00	4.37%	4.31%
2.00	15.48%	15.90%
3.00	7.94%	35.04%
4.00	71.83%	39.08%
cM	7.18	11.73
Relative Viability	100.00%	85.90%
Ratios of Colony Types 4 Spore Tetrads		
his+lys-	224.00	207.00
his+lys-	231.00	205.00
his-lys-	28.00	38.00
his+lys+	28.00	36.00

Table S3 Recombination and spore viability between His4-239 and Lys4-95, and Ade6.

Strains	Genotype	Total germinated	Spores Plated	Mean Viability Relative to WT	Average cM His4 Lys4	Average cM Leu2 Ura2	Average cM His7 Leu1	Average %ade+
1251 x 5107	WT	8940	24600	100.00 %	9.07	__	__	0.40%
5192 x 5205	*rad16-249*	7158	38600	58.87%	11.03	__	__	0.19%
5268 x 4561	*rec12*Δ	1041	15600	14.19%	0	__	__	0
5176 x 5180	*rec12*Δ *rad16-249*	782	15600	11.35%	0			0
6917 x 6923	WT	19314	__	__	__	1.84	__	__
6915 x 6924	*rad16-249*	11409	__	__	__	5.24	__	__
168 x 6919	WT	8011	__	__	__	__	4.75	__
4707 x 6921	*rad16-249*	5307	__	__	__	__	7.73	__

Table S4 Recombination and spore viability of Ade6 heteroallele.

	WT	*rad16-249*	*rdh54*Δ	*radh54 rad16-249*
Total spores counted	1399	1863	2270	1754
Total ade+ colonies recovered	104	41	478	256
STDEV	12.43	11.54	5.92	5.18
STError	6.21	5.77	2.96	2.59
Total plated	7000	22000	20000	20000
Relative Viability to WT	100.00	42.37	56.79	43.88
Average %ade6+	.48	.23	1.58	1.0
Fold Δ		1.9	3.5	2.2
p-value Ade+		0.028	0.016	0.068
Average % his+ ade+	13.07	64.32	18.06	18.24
Fold Δ		4.9	1.4	1.4
p-value His+Ade+		0.067	0.163	0.210

Table S5 Distribution of cell length measurements binned.

	WT	***rad16-249***	***chk1*Δ *rad16-249***
5 - 9.99 µm	60	16	69
10 – 14 µm	38	39	27
> 14 µm	2	45	4
Average	9.52	14.08	9.22
N	102	127	100

Table S6 Analysis of H3-MRFP Taz1-GFP mitotic live cell movies.

	WT		***rad16-249***		***rhp14*Δ**	
	counted	%	counted	%	counted	%
Total scored	132		156		97	
Normal	131	99.24	141	90.36	88	90.72
Included fragment w/ 1 Taz1 signal	0	0.00	5	3.21	1	1.03
Excluded fragment w/out Taz1 signal	0	0.00	1	0.64	3	3.09
Included fragment w/ 2 Taz1 signals	0	0.00	6	3.85	0	0.00
Anaphase bridging	1	0.76	3	1.92	4	4.12
Total abnormal	1	0.76	15	9.62	8	8.25

Table S7 Analysis of Rad52 and RPA.

	Percent Nuclei with Rad11 foci				Standard Error				95% Confidence Interval			
	1	2	3+	Any	1	2	3+	Any	1	2	3+	Any
WT	28	3	0	31	1.04	0.39	0.15	1.08	2.04	0.76	0.30	2.11
***rad13*Δ**	26	4	0	31	1.02	0.48	0.09	1.07	2.00	0.94	0.17	2.10
rad16-249	42	14	4	60	1.14	0.81	0.46	1.13	2.24	1.58	0.91	2.22
***rhp14*Δ**	44	15	2	61	1.15	0.84	0.29	1.13	2.26	1.64	0.58	2.21
rhp14*Δ *rad16-249	48	10	3	60	1.16	0.69	0.39	1.13	2.27	1.35	0.76	2.22
	Percent Nuclei with Rad52 foci				**Standard Error**				**95% Confidence Interval**			
	1	2	3+	Any	1	2	3+	Any	1	2	3+	Any
WT	25	2	0	28	1.01	0.34	0.11	1.04	1.98	0.67	0.21	2.04
***rad13*Δ**	30	5	0	36	1.07	0.52	0.12	1.83	2.09	1.02	0.24	3.58
rad16-249	41	11	2	54	1.14	0.74	0.30	1.48	2.24	1.44	0.58	2.09
***rhp14*Δ**	42	19	9	71	1.14	0.92	0.67	1.55	2.24	1.80	1.32	3.04
rhp14*Δ *rad16-249	43	12	5	61	1.15	0.76	0.52	1.68	2.25	1.49	1.02	3.29

Table S8 Mitotic recombination events in heteroallele spore germination.

	Total Spores	Ade+	Sectored	% of Total Sectored	% of Ade+ Sectored
WT	4175	20	2	0.048	10
rad16-249	1625	4	2	0.12	50