

**Table S3 An analysis of the drug sensitivity of non-essential helicase mutants**

Group	genotype	orthologs	growth	HU	MMS	UV	CPT
1: MMS specific	$\Delta rhp26$	hXRCC3 ScRad26	-	-	↓	-	↓
	$\Delta rad8$	HLTF, SHPRH ScRad8	-	-	↓↓	↓	-
2: response to protein barriers	$\Delta hrp1$	hCHD1, 2 ScChd1	-	-	-	-	↓↓
	$\Delta swr1$	hEP400, hSRCAP ScSwr1	-	-	-	-	↓↓
	$\Delta SPBC15C4.05\#$	hDHX29	-	-	-	-	↓↓↓
3: regulates HR	$\Delta snf22$	hSMARCA4 ScSth1, ScSnf2	-	↓↓	-	-	↓
	$\Delta srs2$	ScSrs2	-	↓	-	-	↓
	$\Delta SPAC694.02^*$	hDDX60, hDDX60L	-	↓↓	-	-	↓↓↓
4: HR- associated	$\Delta chl1$	hFANCI ScChl1	-	↓	↓	↓	↓
	$\Delta fml1$	hFANCM ScMph1	-	↓	↓↓	↓	↓
	$\Delta fbh1$	hFBXO18	-	↓	↓↓	↓↓	↓
	$\Delta rqh1$	hWRN, hBLM ScSgs1	-	↓↓	↓↓	↓↓↓	↓↓↓
	$\Delta rad54$	hRAD54L ScRad54	↓	↓↓	↓↓↓	↓↓	↓↓↓
	$\Delta rad57$	hXRCC3 ScRad57	-	↓	↓↓	↓	↓↓↓
5: no phenotype	$\Delta hrp3$	hCHD1, hCHD2 ScChd1	-	-	-	-	-
	$\Delta fml2$	hFANCM ScMph1	-	-	-	-	-
	$\Delta rrp1$	hTTF2 ScUls1	-	-	-	-	-
	$\Delta rrp2$	hHLTF ScUls1	-	-	-	-	-
	$\Delta SPBC3B8.12^*$	ScIrc3	-	-	-	-	-
	$\Delta SPBC582.10C$	ScRad16	-	-	-	-	-
	$\Delta rdh54$	hRAD54B ScRdh54	-	-	-	-	-
	$\Delta SPCC737.07c$	hIGHMBP2 ScHcs1	-	-	-	-	-
	$\Delta tlh2$	NA	-	-	-	-	-
	$\Delta SPAC144.05$	hSHPRH ScIRC20	-	-	-	-	-
$\Delta rad55$	hRAD51B ScRad55	-	-	-	-	-	

The level of sensitivity is scored by the fitness on the drug plates. No difference from wildtype is labeled as “-”. The level of sickness is scored by number of “↓”. NA = not available. h = Homo sapiens. Sc = *Saccharomyces cerevisiae*. HR = Homologous recombination. # RNA/DNA helicase. \* RNA helicase. SPBC3B8.12 = SPBC11C11.11c.