Supplement

Supplementary Table 1. **Drug Names, Synonyms, and Properties**

Drug names	**Synonyms**	**Properties**
AZD6244	Selumetinib, ARRY-142886	Inhibitor of MEK or MAPK/ERK kinases 1 and 2 Inhibition of cell proliferation
Bortezomib	PS-341, Velcade, LDP 341, MLN341	Inhibition of the 26S proteasome Disruption of signaling pathways, induction of cell cycle arrest, apoptosis, and inhibition of angiogenesis
DMAG	17-DMAG HCL, alvespimycin hydrochloride, KOS-1022	Inhibition of HSP90 Chaperone protein Destabilization and degradation of oncogenes, kinases, transcription factors and other client proteins involved in cell proliferation and survival
Erlotinib	Tarceva, CP-358,744, OSI-744	ATP-competitive inhibition of EGFR signal transduction
Gefitinib	Iressa, ZD 1839	ATP-competitive inhibition of tyrosine kinases, including EGFR Inhibition of EGFR signal transduction
Lapatinib	Tykerb, GSK572016, GW2016, GW-572016	Blocks phosphorylation of EGFR, ErbB2, and Erk-1 and -2 and AKT kinases

Oxaliplatin	--	Forms inter- and intra-strand platinum-DNA crosslinks Inhibition of DNA replication and transcription Cell-cycle independent cytotoxicity
Lipoxal™	Oxaliplatin-encapsulated Tf-conjugated NGPE liposome	Liposomal formulation of oxaliplatin (see above)
Sunitinib	Sutent, SU11248, SU011248	Tyrosine kinase inhibitor of VEGFR2, PDGFRβ, FLT3 and c-kit Inhibition of angiogenesis and cell proliferation
Thalidomide	Alpha-phthalimidoglutarimide, N-phthaloylglutamimide, N-phthalylglutamic acid imide, Synovir, Thalomid, Contergan, Distaval, Kevadon, Neurosedyn,	A synthetic derivative of glutamic acid active through immunomodulatory, anti-inflammatory and anti-angiogenic properties

	Pantosediv, Sedoval K-17, Softenon, Talimol	

Supplementary Table 2. Papers Surveyed (N=125)

Drug	**References; see below**
AZD6244	[1-4]
Bortezomib	[5-17]
17-DMAG	[18-21]
Erlotinib	[22-34]
Gefitinib	[35-70]
Lapatinib	[71-76]
Oxaliplatin/ Lipoxal™	[77-93]
Sunitinib	[94-103]
Thalidomide	[104-107]
Vorinostat	[108-125]

Supplementary Table 3. ***In vitro*** **schedules.** Note: some papers used more than one schedule; some schedules were used in more than one paper. D=drug, R=radiation. The time of drug removal or replating is indicated if reported by the authors.

Drug	**Schedule; D=Drug, R=radiation, min=minutes, h=hours, d=days**	**References; see below**
AZD6244	D-immediate-R-48h-D removed (replated)	[3]
	D-2h-R	[4]
	D-16h-R	[1, 2]
	D-48h-R	[3]
Bortezomib	D24h-R simultaneous (exact timing not given)	[9, 13]
	D-1h-R	[16]
	D-4h-R	[12, 14]
	D-16h-R	[8]
	D-16h-washed out-R	[6]
	D-24-R	[5, 10]
	D-24h-R-replated	[13]
	R-24h-D-24h-replated	[13]
	R-24h-D-48h	[7]
	R-48h-D-(duration not reported)	[9]
	(D duration, D+R schedule not reported)	[15]
DMAG	D-R simultaneous (D duration, exact timing not given)	[21]
	D-6h-R	[19]
	D-8h-R	[19, 21]
	D-16h-R	[18, 21]

	D-16h-R-washout	[20]
Erlotinib	D-1h-R; D on for duration of experiment	[30, 31]
	D-1h-R (D duration unclear)	[32]
	D-1h-R-3h-washout	[22]
	D-2h-R	[25, 27, 29]
	D-R (D duration, D+R schedule not reported)	[34]
	DR simultaneous (D duration, exact timing not given)	[34]
	D-overnight-R (D duration not clear)	[34]
	D-24h-replated, allowed to adhere-R	[22]
	D-24h-R; D on for duration of experiment	[30]
	D-72-R	[23, 26]
	D-72h-washout-24h-R	[26]
	R-D-72h-washout	[26]
	R-D (D duration, D+R schedule not reported)	[34]
Gefitinib	D-R simultaneous (D duration, D+R schedule not reported)	[69, 70]
	D-5min-R	[64]
	D≤30min-R-24h-washout	[61]
	D-30min-R-4h-washout	[64]
	D-30min-R-6h-washout	[64]
	D-30min-R-8h-washout	[64]
	D-30min-R-24h-washout	[64]
	D-30min-R-6d-washout	[35]
	D-30min-R-24h-R-24h-R; fresh D before final R and every 48h during 5d incubation	[67]

	D-1h-R	[65]
	D-1h-R-24h-washout	[54]
	D-2h-R	[42, 59]
	D-3h-R-6h-washout	[45]
	D-4h-R-68h washout	[56]
	D-12h-R-6h-replated	[48]
	D-12h-washed-12h-R	[69]
	D-16h-R-replated	[39]
	D-18h-R	[49]
	D-24h-R	[36, 44, 51, 52, 63, 66, 68]
	D-24h-R-washout	[35, 53, 57]
	D-24h-R-24h-washout	[40]
	D-24h-R-7d-fresh D	[37]
	D-48h-R-washout	[53]
	D-48h-R	[43, 61]
	D-48h-R-24h-R-24h-R (duration of D exposure not given)	[55]
	D-72h-R	[52]
	D-72h-R-replated	[47]
	D-144h-R	[52]
	R-D-2h	[35]
	R-D-4h	[35]
	R-D-8h	[35]
	R-D-12h	[35]

	R-D-24h	[35]
	R-D-24h-washout	[38, 53]
	R-replated-D-96h	[37]
	R-replated-D-288h (12d)	[63]
	R-24h-D-12h	[69]
	R-24h-D-48h	[50]
Lapatinib	D-1h-R-10min-washout	[76]
	D-2h-R-2h-washout	[72, 74]
	D-24h-R-replated	[73]
Oxaliplatin	D-1h-R-24h-washout	[77, 79]
	D-2h-R	[85, 90]
	D-2h-washout-R	[87, 93]
	D-2h-washout-12h-R	[88]
	D-2h-washout-24h-R	[87, 88]
	D-2h-R; medium changed at time of exposure and at 48h	[85]
	D-3h-R	[89]
	D-3h-washout-48h-R	[89]
	D-4h-washout-R	[80]
	D-8h-R	[91]
	D-24h-R	[90]
	D-24h-R-washout	[86]
	D-24h-removed all but1mm medium over cells-R-replated	[84]
	D-48h-R	[91]
	R-D-2h	[85]

	R-2h-D-2h	[85, 88]
	R-24h-D-2h	[85]
Sunitinib	D-1h-R-washout	[97]
	D-1h-washout-R-washed-replated	[99]
	D-24h-R	[103]
	D-24h-R-replated	[94, 100]
	[schedule not given]	[102]
Thalidomide	D-30min-R-washout	[107]
	D-1h-R, D in medium after R, duration not given	[105]
	D-1h-R	[104]
	D-R-D, exact timing and total D duration not clear	[105]
	R-D1h	[105]
Vorinostat	D-2h-R	[122]
	D-2h-R-D throughout incubation	[110]
	D-3h-R	[117]
	D-4h-R	[124]
	D-6h-R-(66h-washout?)	[116]
	D-16h-R-3h-replated	[111]
	D-16h-R-D throughout incubation	[108]
	D-18h-R	[121]
	D-18h-R-washout	[114]
	D-18h-washout-R	[115]
	D-18h-washout-3h-R	[115]
	D-18h-washout-6h-R	[115]

	D-24h-R	[119]
	D-24h-washout-R	[123]
	D-24h-R-washout	[118]
	D-24h-R-(10-12d)-washout	[109]
	D-48h-R	[113]
	D-48h-washout-30min-R	[120]
	D-48h-washout-24h-R	[120]
	[schedule not clear]	[112]

Supplementary Table 4. **Radiation sources**

Radiation source	***In vitro*, of 104 papers**	***In vivo*, of 51 papers**
X rays	28*	17
^{137}Cs	24*, *	6*
^{60}Co	16*	2
Linear accelerator, photons (X rays)	5	4*
Linear accelerator, electrons	1	5
Linear accelerator, beam type not given	4	1
Neutrons	2	0
Heavy ions, not identified	1	0
Manufacturer name and/or model reported, but not radiation type	10	9
Not reported or unclear	15	8

*Papers using 2 different radiation sources were counted twice

Supplementary Table 5. ***In vivo*** **schedules**

Single fraction irradiation				
Drug	**Schedule** **D=Drug, R=radiation;** **min=minutes, h=hours, d=days,** **w=weeks**	**R dose/fraction x # of fractions=Total, Gy**	**D dose/fraction x # doses; d=days, w=weeks**	**References; see below**
AZD6244	D-4h-R	3 x 1 = 3	50 mg/kg x 1	[1]
Bortezomib	D-4h-R	6 x 1 = 6	1 mg/kg x 1	[14]
	R-5h-D + D 2x/w, duration not given	10 x 1 = 10	1.3mg/m^2 x 2/w x ?w	[17]
DMAG	D-12h-D-12h-R	5 x 1 = 5	50mg/kg x 1	[19]
Erlotinib	D in feed for 4d-R	6 x 1 = 5	50mg/kg/d, duration not given	[22]
	D daily x 15d, R x 1, timing not given	8 x 1 = 8	1.6mg/d x 15d	[33]
Gefitinib	(D+R) + 9 more daily D in 2w; exact timing, schedule not given	5 x 1	50mg/kg/d x 5d/w x 2w	[42]
	D-1d-R + 4 more daily D-2d off-+5 more daily D; exact timing not given	10 x 1	75mg/kg x 5d/w x 2w	[63]

	R-2h-D + 4 more daily D	5 x 1	100mg/kg/d x 5d	[46]
	D-2h-R + 13 more daily D	5 x 1	50mg/kg/d x 14d	[67]
	D-2h-R + 2 more daily D	10 x 1	50mg/kg x 3d	[38]
Lapatinib	[none]	--	--	--
Oxaliplatin	D-1h-R	10 x 1 = 10 or 20 x 1 = 20	6 or 10mg/kg x 1	[83]
	D-2h-R	4 x 1 = 4 (neutrons)	10mg/kg x 1	[78]
	D-4h-R	10 x 1 = 10	6 or 10mg/kg x 1	[83]
	D-4h-R	15 x 1 = 15	10mg/kg x 1	[92]
	D- 24h-R	10 x 1 = 10	6 or 10mg/kg x 1	[83]
	D-24-R	15 x 1 = 15	10mg/kg x 1	[92]
	D-48h-R	15 x 1 = 15	10mg/kg x 1	[92]
	R-1h-D	10 x 1 = 10	6 or 10mg/kg x 1	[83]
	R-4h-D	10 x 1 = 10	6 or 10mg/kg x 1	[83]
	R- 24h-D	10 x 1 = 10	6 or 10mg/kg x 1	[83]
Lipoxal™	D-24h-R	15 x 1 = 15	Equivalent to 3mg/rat of oxaliplatin x 1	[81, 82]
Sunitinib	(D-1d-R-1d) x 3, then 14 more daily	8 x 1 = 8	20mg/kg/d x 17d	[100]

	D			
	D + R, exact timing not given, + 8 more daily D	15 x 1 = 15	40mg/kg/d x 9d	[103]
	D + R, exact timing not given, + 6 more daily D, weekend off	8 x 1 = 8	40mg/kg/d x 7/1.5w	[96]
	D daily x 14d-1d?-R	2, 4, 8, or 16	30mg/kg/d x 14d	[99]
Thalidomide	D daily x 3d, R on 3rd d, exact timing of D & R not given	20 (tumor periphery) or 18 (center)	4mg/rat x 3d	[106]
	D just before R	20 x 1 = 20	200mg/kg x1	[104]
	(D daily x 2d)-R; exact timing D & R not given	20 x 1 = 20	200mg/kg/d x 2d	[104]
	(D i.p. x 1/d x 4d)-R exact timing D & R not given	20 x 1 = 20	200mg/kg/d x 4d	[104]
	R-(D daily x 2d) exact timing D & R not given	20 x 1 = 20	200mg/kg/d x 2d	[104]
Vorinostat	D-6h-R	3 x 1 = 3	50mg/kg	[108]
	D-6h-R	5 x 1 = 5	75mg/kg x 1	[108]

	D-24h-(R+D; exact timing not given) + 6 more daily D	10 x 1 = 10	100mg/kg/d x 8 (5/w x 1.5w)	[125]
	R-immediate-D	4 x 1 = 4	25mg/kg x 3/w x 3w	[112]
Multifraction irradiation; fx=fractions				
AZD6244	(D-2h-R-6h-D) x 5d - (D-8h-D) for 5 more days	2x5=10	25mg/kg x 2/d x 10d	[3]
	(D-8h-D) x 5d - (D-2h-R-6h-D) for 5 more days	2x5=10	25mg/kg x 2/d x 10d	[3]
Bortezomib	(R+D) x 3/w x 2w; exact timing of R & D not given	1.5x6=9	0.1mg/kg x 3/w x 2w	[15]
	(D-4h-R) x 1/w x 2w	10x2=20	0.9 mg/kg x 1/w x 2w	[11]
	R x 5fx/w x 2w; (D-4h-R on d 1, 4, 8, 11)	2x10=20	0.45mg/kg x 2/w x 1.5w	[11]
	R x 4d; D 2x/w for duration of study; exact timing of D & R not given	5x4=20	0.5mg/kg/d x 2d/w for duration of study	[9]
DMAG	[none]	--	--	--

Erlotinib	R x 5/w x 2w; D-4h-R on d1-5 & 8-12; exact timing of D & R not given	1x10=10	100 mg/kg/d x 2/w x 2w	[26]
	R x 3/w x 2w; D 5x/w x 2w; exact timing of D & R not given	2x6=12	100 mg/kg/d x 5/w x 2w	[28]
	R x 2/w x 3w; D 1x/d during course of R; exact timing of D & R not given	2x6=12	0.8mg/mouse/d x 3w	[23]
	R x 2/d x 5d; D daily M-F until death; exact timing of D & R not given	2x10=20	150 mg/kg/d x 5/w for duration of study	[28]
	R on d4, 7, 9, 11, D 1x/d x 10d starting d1; exact timing of D & R not given	(2, 4, 6, 8, or 10)x4=8, 16, 24, 32, or 40	100 mg/kg/d x 10d	[32]
	R x 5/w x 6w; D 1x/d on d0-42; exact timing of D & R not given	(range of doses)x30= (~25-150 for TCD50)	50 mg/kg/d x 43d	[24]
Gefitinib	(D-2h-R) x 5d	1x5=5	100 mg/kg/d x 5d	[46]
	R x 4d; D 5x/w x 2w, starting 1d	2.5x4=10	75 mg/kg/d x 5/w x 2w	[63]

	before first R; exact timing of D & R not given			
	R x 2/w x 2w; D daily x 5d/w x 2w; exact timing of D & R not given	4x4=16	100mg/kg/d x 5d/w x 2w	[58]
	R x 2/w, total 7 fractions; D 1 x/d x 12; exact schedule, timing of D & R not given	3x7=21	0.5mg/mouse/d x 5/w x 2.5w	[47]
	[(R+D)-1d-D 4d/w] x 3w; exact timing of D & R not given	8x3=24	100 mg/kg/d x 5/w x 3w	[62]
	(R+D) x 5d/w x 2w; exact timing of D & R not given	(1, 2, or 4) x10=10, 20, or 40	150 mg/kg/d x 5/w x 2w	[60]
	R x 4d; D 1 x/d x 5d/w x 4w; exact schedule, timing of D & R not given	10x4=40	100 mg/kg/d x 5/w x 4w	[37]
	R x 5/w x 3w; D every other day throughout; exact timing of D & R not given	4x15=60	100 mg/kg/d every other day for duration	[41]
	(D-2h-R)/d x 3d + 11 more daily D	2x3=6	100mg/kg/d x 14d	[67]

Lapatinib	(D-6h-D) x 6d-(R+D-6h-D) x 3d-(D-6h-D); exact timing of D & R not given	2x3=6	100 mg/kg x 2/d x 10d	[75]
	D daily x 1w-(R+D) x 2w-D daily x 1w; exact timing of D & R not given	8x2=16	100 mg/kg/d x 4w	[71]
Oxaliplatin	(D+R) daily x 10d; timing not given	2x10=20	1mg/kg/d x 10d	[83]
	(D-4d-D); R x 10d; schedule, timing not given	2x10=20	4, 5, 6, or 7 mg/kg/d x 2d (4d apart)	[83]
Sunitinib	(D-2h-R) x 5 over 7d: exact schedule not clear	2x5=10	40 mg/kg/d x 5d	[97]
	D x 3d-(D, R)d 4 & 5 + 7 more D (daily)	10x2=20	40mg/kg/d x 12d	[102]
	(D-1h-R) x 5d	1x5=5	1.3mg/mouse/d x 5d	[94]
	(R x 1/d x 5d)-24h-(D x 1/d x 5d)	3 x 5=15	1.2mg/mouse/d x 5d	[94]
	(D-1h-R) x 1/d x 5d	3 x 5=15	1.2mg/mouse/d x 5d	[94]
	(D ≤ 30min-R)/d on d1-5, 7, 8 (7 fx)	3x7=21	40 mg/kg/d x 7 (d1-5, 7, 8)	[101]
	(D-2h-R)/d x 5d	2x5=10	40mg/kg/d x 5d	[97]

	(D≤30min-R daily on d1-6)-(D-8h-D) on d9-12, 15-17, 21 and thereafter	3x6=18	40 mg/kg /d x 6d, then 20 mg/kg x 2/d on d9-12, 15-17, 21 and for duration of study	[101]
	R x 5 on d1-5; D x 1/d on d 1-7; timing of D & R on d1-5 not given	5x5=25	40 mg/kg/d x 7d	[95]
	(D≥ 30min-R) x 5/w x 3w	2x15=30	60 mg/kg/d x 5/w for duration	[98]
	(D ≥ 30min-R) x 5/w x 2w "or until onset of symptoms"	6x10=60	60 mg/kg/d x 5/w for duration	[98]
Thalidomide	[none]	--	--	--
Vorinostat	(D-1h-R) on d 1, 3, 5	1x3=3	150 mg/kg/d x 3d	[117]
	(D-3h-R) x 4d	2x4=8	100 mg/kg/d x 4d	[115, 121]
	(D-12h-R) x 4d	2x4=8	100 mg/kg/d x 4d	[115]
	D-24h-(D, R)/d x 3d-11 more D; D x 5/w x 3w; exact schedule, timing not given for days when R given	3x3=9	100 mg/kg x 15 (5x/w x 3w)	[125]
	(D-3h-R) x 5d	2x5=10	100 mg/kg/d x 5d	[115]
	(D-12h-R) x 5d	2x5=10	100 mg/kg/d x 5d	[115]

Supplementary Table 6. **Effectiveness of 10 drugs in combination with radiation.** Drug dose and schedule were not considered here, but were subsequently examined for Supplementary Table 7 (below).

Drug	**# Tumor lines studied *in vitro* &/or *in vivo****	**Total # Experiments, *in vitro* and *in vivo***	**Results *in vitro*, useable expts. Positive (+) / negative(-)**			**Results *in vivo*, useable expts.**
			# with DMF, +/ –**	**# additional with subjective results, +/- ****	**Total, +/-**	**# +/- *****
AZD6244	7	16	11/1	0/0	11/1	1/3
Bortezomib	26	51	7/3	5/1	12/4	3/4
DMAG	11	25	14/3	7/0	21/3	1/0
Erlotinib	73	84	10/8	0/0	10/8	1/9
Gefitinib	74	146	18/1	18/1	36/2	3/7
Lapatinib	15	20	4/3	0/0	4/3	1/2
Oxaliplatin	19	54	0/0	0/0	0/0	4/6
Lipoxal™	2	8	0/0	1/0	1/0	3/2
Sunitinib	16	30	0/1	0/0	0/0	1/15
Thalidomide	6	18	3/0	0/0	3/0	1/4
Vorinostat	33	65	0/0	0/0	0/0	7/5
Totals	282 Drug-tumor line combinations	517	67/20	31/2	98/21	26/57

* Note: the numbers in Fig. 1 did not break down the data by tumor line: some papers used more than one tumor line.

** "Useable" was defined for *in vitro* experiments as those conducted using clonogenic assays and having drug concentrations at or below those achievable in patients (≤Cmax or ≤serum concentrations at the MTD). Experiments with missing or unclear information on drug or radiation doses or schedules or with uninterpretable data were not included. DMF > 1.1 = +; DMF ≤ 1.1 = -. Experiments quantified by other measures or other estimates of results were included in "additional subjective results." Likely enhancement or sensitization = +; likely additive at most = -.

*** "Useable" was defined for *in vivo* experiments as those with calculated and estimated enhancement from growth delay or survival studies and those with DMFs from TCD50 experiments. Experiments with missing or unclear information on drug or radiation doses or schedules or uninterpretable data were not included. Those with multi-day schedules in which exact timing was not given for the days of combined treatment were considered acceptable for this count.

Supplementary Table 7. Summary of findings

Drug	**# Tumor lines with *in vitro* & *in vivo* data in agreement/# with both *in vitro* & *in vivo* data**	**Summary of findings; "Both *in vitro* & *in vivo*", below, indicates tumor lines for which *both in vitro* and *in vivo* data were available and useable**
AZD6244	1/4	I*n vitro:* DMFs 1.13-2.0, varied with tumor line, drug dose & schedule; "simultaneous" drug and irradiation negative; Both *in vitro* and *in vivo:* only 1 of 4 was positive in both, with *in vitro* DMFs 1.9-2.0; all *in vivo* studies had *in vitro* studies with the same tumor lines
Bortezomib	1/1	*In vitro:* DMFs = 2.25 with 100nM, ≤1.55 with ≤10nM; Both *in vitro* & *in vivo:* one tumor line only: DMF *in vitro* = 1.16, positive *in vivo* *In vivo:* in 2 studies, enhancement with 2 fractions, but not with 10 fractions; in other cases, drug doses and schedules varied, no clear pattern emerged
DMAG	1/1	*In vitro:* DMFs 1.3-1.9 with 10-50nM; "enhancement" also with 100nM (not quantified); Both *in vitro* & *in vivo*: one study: enhancement suggested
Erlotinib	2/2	*In vitro*: Of 9 cell lines tested identically (2μM, D-1h-R schedule), 6 had DMFs of 1.15-1.44, and 3 were negative (DMF≤1.1); no *in vivo* data available on these lines

		Both *in vitro* & *in vivo*: 2 tumor lines tested, all negative *In vivo:* 1 with DMF=1.13 in TCD50 assay, 6 others negative
Gefitinib	1/4	*In vitro:* DMFs=1.12-3.4 @ drug doses 0.01-0.10μM, various schedules and tumor lines; in 2 of 3 cell lines, DMFs varied with schedule; in 6 of 7 cell lines tested at multiple drug doses, no DMFs were available; in 1 cell line, DMFs=1.30-1.56 @ drug doses 0.01-0.10μM Both *in vitro* & *in vivo*: 1 line: positive in both; 3 lines, both positives and negatives *In vivo:* More negative results than positive
Lapatinib	0/0	*In vitro:* one line tested @ 0.6 & 2.4μM, DMFs=1.13- & 1.30, respectively; 5 other lines tested at single drug doses & schedules, 2 with DMFs of 1.16 and 1.4, respectively, and 3 negative. *In vivo:* mixed results may be cell line-specific
Oxaliplatin	0/0	*In vitro:* All experiments carried out at concentrations above those clinically achievable *In vivo:* mixed results; may be schedule-dependent
Lipoxal™	0/1	*In vitro:* one study, in glioblastoma, suggests enhancement; other studies uninterpretable *In vivo:* little or no increase of survival time in above line; 3 schedules in colorectal line: all probably >additive growth delay
Sunitinib	0/0	*In vitro:* one study, a breast cancer line: negative *In vivo:* 15 studies negative; 1 positive: a glioma line: large effect on tumor size 5 days after

		treatment
Thalidomide	0/0	*In vitro:* esophageal tumor line: DMFs 1.15-1.7 @ 2-6µM, all with same schedule *In vivo:* glioma line: large effect; mouse fibrosarcoma: intratumoral injection negative in 4 schedules
Vorinostat	0/0	*In vitro:* All experiments carried out at concentrations above those clinically achievable *In vivo:* 2 colorectal lines: with similar drug doses & schedules, each had 2+ and 1- studies; other lines about evenly divided with + and – studies with various drug doses & schedules
Totals	6/13	

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