Supplementary Table 1: AML Patient Demographics					
Patient #	**Age**	**Sex**	**Diagnosis/Relapse**	**Cytogenetics**	**Mutations**
Patient 1	65	Male	Relapse	Monosomy 7, Deletion 5q	ETV6, NRAS, SF3B1
Patient 2	66	Male	Diagnosis	Trisomy 8	DNMT3A, FLT3-TKD, NPM1, IDH1
Patient 3	67	Male	Relapse	Normal cytogenetics	ASXL1, TET2, 2RSR2
Patient 4	33	Male	Relapse	Deletion 12p	None detected
Patient 5	70	Female	Relapse	t(8,18), t(11,13)	E2H2, TET2

Supplementary Table 2: Summary of targets identified in DARTS screen

SC-Spectral count; LFQ-Label-free quantification; Proteins enriched atleast 2-fold with medium abundance (SC>=10) are only shown.

SC >= 10 medium abundance proteins				LFQ intensity			Spectral Count	
Accession	**Gene ID**	**Protein Name**	**MW [kDa**	**DMSO+**	**S-250+**	**250+/DMS**	**DMSO+**	**S-250+**
Q01469	FABP5	Fatty acid-binding protein, epidermal	15.16	146960000	336670000	2.29	51	77
P37802	TAGL2	Transgelin-2	22.39	123040000	277630000	2.26	54	80
Q06830	PRDX1	Peroxiredoxin-1	22.11	112050000	238990000	2.13	33	55
P04040	CATA	Catalase	59.76	46377000	197220000	4.25	35	67
P10599	THIO	Thioredoxin	11.74	67884000	180200000	2.65	24	37
P40926	MDHM	Malate dehydrogenase, mitochondrial	35.50	87967000	179350000	2.04	56	59
Q15084	PDIA6	Protein disulfide-isomerase A6	48.12	29999000	71084000	2.37	24	30
Q9HB71	CYBP	Calcyclin-binding protein	26.21	28564000	58067000	2.03	21	22
P61769	B2MG	Beta-2-microglobulin	13.71	21218000	54376000	2.56	11	19
P84090	ERH	Enhancer of rudimentary homolog	12.26	20356000	53987000	2.65	14	19
P62314	SMD1	Small nuclear ribonucleoprotein Sm D1	13.28	22721000	52950000	2.33	12	10
Q15181	IPYR	Inorganic pyrophosphatase	32.66	20097000	50126000	2.49	26	24
P61981	1433G	14-3-3 protein gamma	28.30	20896000	49693000	2.38		15
P62993	GRB2	Growth factor receptor-bound protein 2	25.21	18530000	41578000	2.24	20	24
Q8NBS9	TXND5	Thioredoxin domain-containing protein 5	47.63	6146400	36801000	5.99	10	17
P14174	MIF	Macrophage migration inhibitory factor	12.48	17414000	35634000	2.05	9	11
P35613	BASI	Basigin	42.20	11808000	31137000	2.64	18	14
Q9UKK9	NUDT5	ADP-sugar pyrophosphatase	24.33	12383000	31023000	2.51	24	27
P26196	DDX6	Probable ATP-dependent RNA helicase DDX6	54.42	11634000	26915000	2.31	12	14
P18206	VINC	Vinculin	123.80	8436500	22422000	2.66	13	37
Q96C19	EFHD2	EF-hand domain-containing protein D2	26.70	9466200	21110000	2.23	17	19
Q6IBS0	TWF2	Twinfilin-2	39.55	4944200	20196000	4.08	11	18
Q5JPE7	NOMO2	Nodal modulator 2	139.44	9107900	19589000	2.15	14	29
P06396	GELS	Gelsolin	85.70	6661300	16368000	2.46	9	25
P42126	ECI1	Enoyl-CoA delta isomerase 1, mitochondrial	32.82	6636600	14741000	2.22	11	12
Q9HB07	MYG1	UPF0160 protein MYG1, mitochondrial	42.45	6042400	12421000	2.06	10	11
P16930	FAAA	Fumarylacetoacetase	46.37	4823200	12266000	2.54	4	16
P55263	ADK	Adenosine kinase	40.55	5748100	11616000	2.02	5	15
P83731	RL24	60S ribosomal protein L24	17.78	3740400	8818000	2.36	7	10
Q9NX46	ARHL2	Poly(ADP-ribose) glycohydrolase ARH3	38.95	1934600	8449500	4.37	7	10
Q9NTZ6	RBM12	RNA-binding protein 12	97.39	3447300	8126500	2.36	4	16
P06132	DCUP	Uroporphyrinogen decarboxylase	40.79	2945300	7651900	2.60	5	11
O75368	SH3L1	SH3 domain-binding glutamic acid-rich-like protein	12.77	2110700	7528700	3.57	3	12
P28676	GRAN	Grancalcin	24.01	795040	4944700	6.22	3	10
Q13685	AAMP	Angio-associated migratory cell protein	46.75	1990800	4569100	2.30	9	13
Q9NZL9	MAT2B	Methionine adenosyltransferase 2 subunit beta	37.55	772300	4341300	5.62	2	10
P31151	S10A7	Protein S100-A7	11.47	0	3937600	**S-250+ onl**	0	10
P42566	EPS15	Epidermal growth factor receptor substrate 15	98.66	862900	1862500	2.16	2	11

Supplementary Table 3: Summary of results from screening enzymes

Enzyme	S-250 inhibition at dose upto 10μM
MDH1	No
MDH2	No
LDHA	No
GAPDH	No
GR	No
GPX	No
PDIA1/6	No
TrxR1	Yes

Supplementary Table 4: Summary of results from CEREP safetyscreen-44

Assay name	Species	Repeats	Concentration	% Inhibition
Cholinesterase, Acetyl, ACES	Human	2	10 µM	0
Cyclooxygenase COX-1	Human	2	10 µM	2
Cyclooxygenase COX-2	Human	2	10 µM	-17
Monoamine Oxidase MAO-A	Human	2	10 µM	3
Phosphodiesterase PDE3A	Human	2	10 µM	0
Phosphodiesterase PDE4D2	Human	2	10 µM	16
Protein Tyrosine Kinase, LCK	Human	2	10 µM	-17
Adenosine A2A	Human	2	10 µM	4
Adrenergic α1A	Rat	2	10 µM	24
Adrenergic α2A	Human	2	10 µM	35
Adrenergic β1	Human	2	10 µM	5
Adrenergic β2	Human	2	10 µM	-6
Androgen (Testosterone)	Human	2	10 µM	53
Calcium Channel L-Type,	Rat	2	10 µM	10
Cannabinoid CB1	Human	2	10 µM	13
Cannabinoid CB2	Human	2	10 µM	-12
Dopamine D1	Human	2	10 µM	14
Dopamine D2S	Human	2	10 µM	16
Endothelin ETA	Human	2	10 µM	-3
GABAA, Flunitrazepam, Central	Rat	2	10 µM	14
Glucocorticoid	Human	2	10 µM	94
Glutamate, NMDA, Agonism	Rat	2	10 µM	-10
Histamine H1	Human	2	10 µM	47
Histamine H2	Human	2	10 µM	31
Muscarinic M1	Human	2	10 µM	3
Muscarinic M2	Human	2	10 µM	1
Muscarinic M3	Human	2	10 µM	-3
Nicotinic Acetylcholine α4β2, Cytisine	Human	2	10 µM	1
Opiate δ1 (OP1, DOP)	Human	2	10 µM	-3
Opiate κ(OP2, KOP)	Human	2	10 µM	30
Opiate µ(OP3, MOP)	Human	2	10 µM	17
Potassium Channel [KA]	Rat	2	10 µM	-3
Potassium Channel hERG, [3H]Dofetilide	Human	2	10 µM	28
Serotonin (5-Hydroxytryptamine) 5-	Human	2	10 µM	9
Serotonin (5-Hydroxytryptamine) 5-	Human	2	10 µM	-5
Serotonin (5-Hydroxytryptamine) 5-	Human	2	10 µM	14
Serotonin (5-Hydroxytryptamine) 5-	Human	2	10 µM	5
Transporter, Dopamine (DAT)	Human	2	10 µM	-10
Transporter, Norepinephrine (NET)	Human	2	10 µM	8
Vasopressin V1A	Human	2	10 µM	-24

Supplementary Table 5: Mouse Cpmplete Blood Counts					
	Vehicle (Day 0)	**Vehicle (Day 14)**	**[a]S-250 (Day 0)**	**[a]S-250 (Day 14)**	**Normal range**
WBC (K/ul)	10.14 ± 0.91	5.41 ± 1.27	9.81 ± 0.64	5.48 ± 1.01	1.8-10.7
RBC (M/uL)	10.0 ± 0.10	9.67 ± 0.07	10.16 ±0.04	8.98 ± 0.39	6.36-9.42
Hb (g/dL)	15.7 ± 0.3	14.83 ± 0.08	15.73 ± 0.41	13.83 ± 0.52	11.0-15.1
Platelet (K/uL)	706.66 ± 61.79	707 ± 93.29	621 ± 55.29	635.33 ± 45.72	592-2972

[a]S-250 was injected at 12.5mg/kg intraperitoneally twice a day, thrice a week for two weeks and blood was tested on day 14.