Fig 1

A Trainning dataset (TCGA-SKCM) n=378

Survival probability

n=230

n=148

p < 0.0001

Time(years)

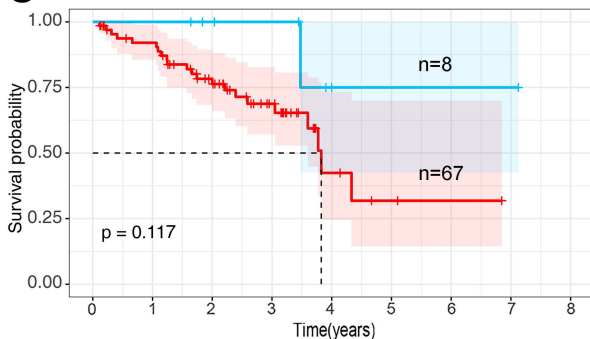|	0	1	2	3	4	5	6	7	8	9	10
High risk	148	116	73	47	35	25	19	15	12	12	7
Low risk	230	194	177	152	130	107	92	80	72	60	56

B Validation dataset (GSE65904) n=186

Survival probability

n=76

n=110

p = 0.0021

Time(years)

	0	1	2	3	4	5	6	7	8	9	10
High risk	110	75	39	29	15	14	11	11	8	7	5
Low risk	76	60	43	35	21	16	15	10	7	5	4

C Validation dataset (TCGA-UVM) n=75

Survival probability

n=8

n=67

p = 0.117

Time(years)

High risk — Low risk

	0	1	2	3	4	5	6	7	8
High risk	67	56	39	21	5	2	1	0	0
Low risk	8	8	6	5	1	1	1	1	0

Fig 2

A Trainning dataset (TCGA-SKCM)   n=378

Univariate analyses

	P-value	HR(95%CI)
Age	0.005	1.023(1.007–1.039)
Gender	0.328	1.297(0.770–2.185)
Stage	<0.001	1.538(1.205–1.962)
T_stage	<0.001	1.826(1.431–2.337)
N_stage	<0.001	1.546(1.212–1.973)
Clark_level	0.006	1.506(1.128–2.011)
RiskScore	<0.001	3.831(2.726–5.383)

Multivariate analyses

	P-value	HR(95%CI)
Age	0.129	1.012(0.997–1.028)
Gender	0.697	1.115(0.645–1.926)
Stage	0.630	1.210(0.557–2.625)
T_stage	0.145	1.428(0.885–2.305)
N_stage	0.923	0.970(0.526–1.791)
Clark_level	0.293	0.819(0.565–1.188)
RiskScore	<0.001	3.453(2.392–4.985)

HR(95%CI)

B   Validation dataset (GSE65904)   n=186

Univariate analyses

	P-value	HR(95%CI)
Gender	0.249	1.302(0.832–2.039)
Age	0.713	0.997(0.982–1.012)
Stage	<0.001	1.405(1.167–1.692)
RiskScore	0.002	1.723(1.226–2.423)

Multivariate analyses

	P-value	HR(95%CI)
Gender	0.233	1.316(0.838–2.065)
Age	0.986	1.000(0.985–1.015)
Stage	<0.001	1.457(1.211–1.754)
RiskScore	<0.001	1.902(1.319–2.744)

HR(95%CI)

C   Validation dataset (TCGA-UVM)   n=75

Univariate analyses

	P-value	HR(95%CI)
Age	0.019	1.046(1.008–1.085)
Gender	0.325	1.542(0.651–3.652)
Stage	0.234	1.311(0.839–2.048)
T stage	0.195	1.941(0.712–5.294)
RiskScore	0.004	5.213(1.686–16.120)

Multivariate analyses

	P-value	HR(95%CI)
Age	0.010	1.051(1.012–1.092)
Gender	0.484	1.376(0.563–3.366)
Stage	0.176	1.392(0.862–2.246)
T stage	0.443	1.506(0.529–4.291)
RiskScore	0.002	7.645(2.054–28.452)

HR(95%CI)

Fig 3

A TCGA-SKCM (*BRAF*-mutated) n=156

n=102

n=54

p < 0.0001

| High risk | 54 | 40 | 24 | 13 | 10 | 6 | 6 | 6 | 5 | 5 | 3 |
| Low risk | 102 | 84 | 80 | 68 | 58 | 51 | 45 | 41 | 38 | 30 | 29 |

B TCGA-SKCM (*BRAF*-wild-type) n=222

n=128

n=94

p < 0.0001

| High risk | 94 | 76 | 49 | 34 | 25 | 19 | 13 | 9 | 7 | 7 | 4 |
| Low risk | 128 | 110 | 97 | 84 | 72 | 56 | 47 | 39 | 34 | 30 | 27 |

C TCGA-SKCM (*NRAS*-mutated) n=87

n=51

n=36

p < 0.0001

| High risk | 36 | 28 | 19 | 12 | 9 | 7 | 5 | 2 | 1 | 1 | 0 |
| Low risk | 51 | 46 | 43 | 37 | 32 | 24 | 19 | 14 | 14 | 14 | 14 |

D TCGA-SKCM (*NRAS*-wild-type) n=291

n=179

n=112

p < 0.0001

| High risk | 112 | 88 | 54 | 35 | 26 | 18 | 14 | 13 | 11 | 11 | 7 |
| Low risk | 179 | 148 | 134 | 115 | 98 | 83 | 73 | 66 | 58 | 46 | 42 |

High risk   Low risk

Fig 4

Fig 5

Enrichment KEGG Pathways

Fig 6

Fig 7

Fig S1