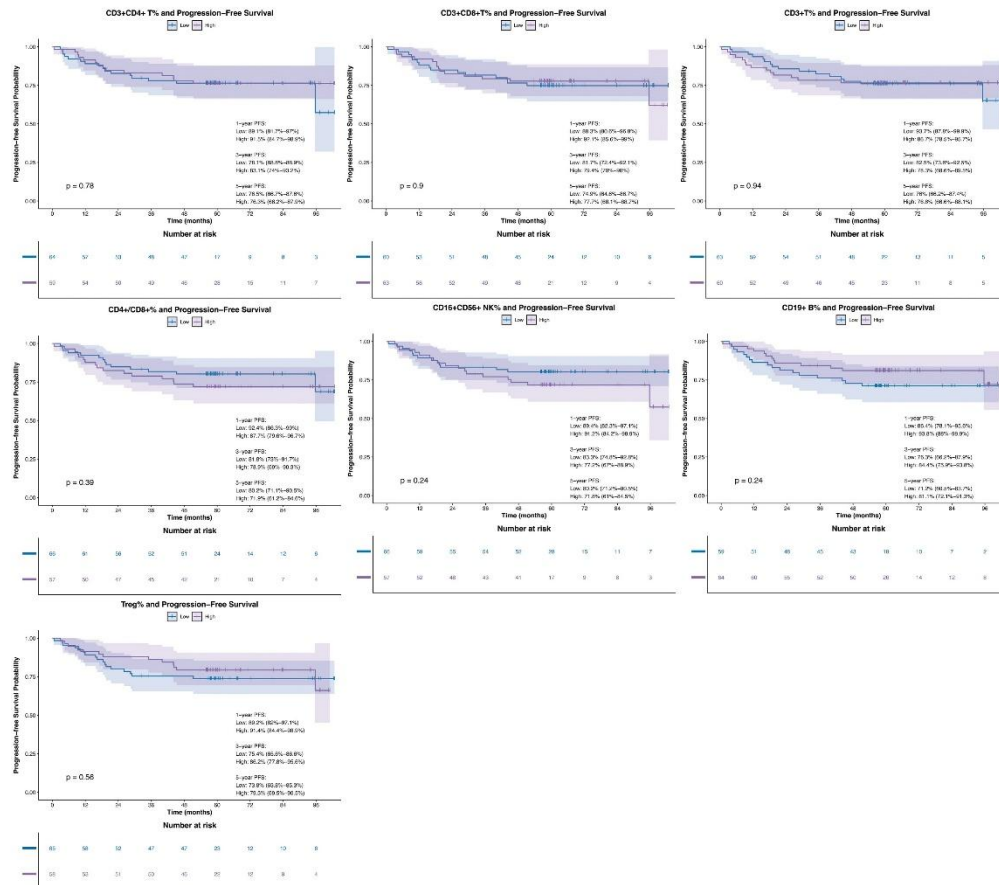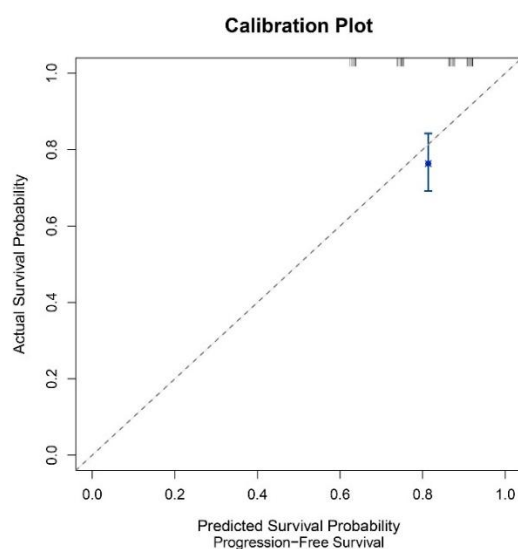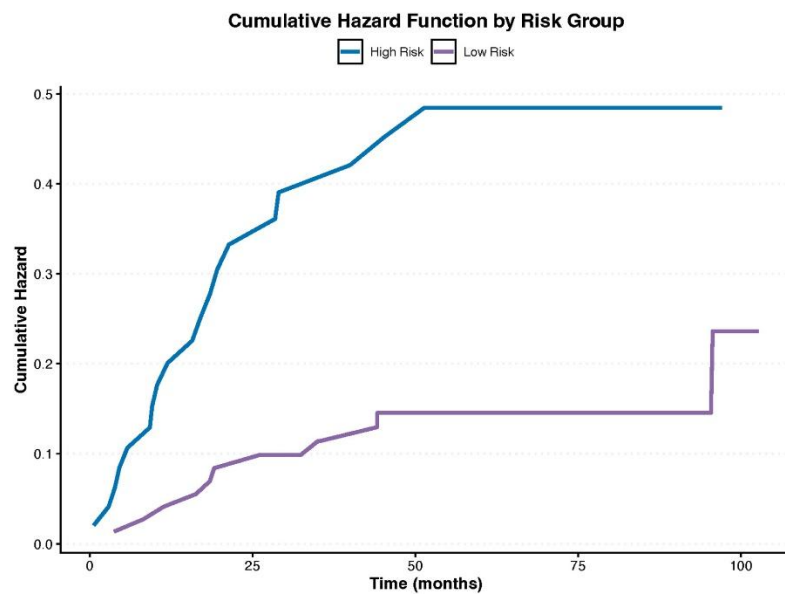**Supplementary Figure 1 Kaplan-Meier estimates of progression-free survival at A: 1 year; B: 3 years; C: 5 years, according to risk group.** PFS: Progression-free survival.
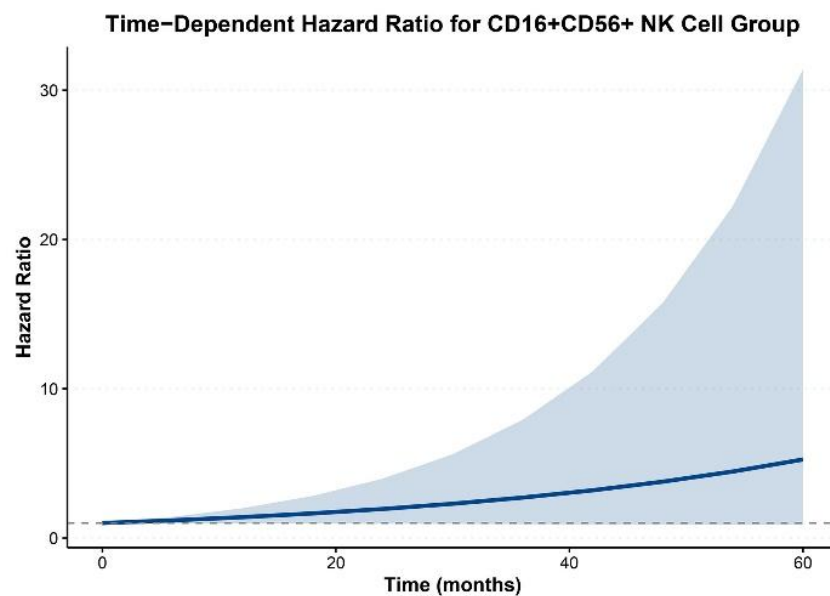
Supplementary Figure 2 Kaplan-Meier estimates of progression-free survival according to immune cell subgroups. PFS: Progression-free survival; CD: Cluster of differentiation; NK: Natural killer.

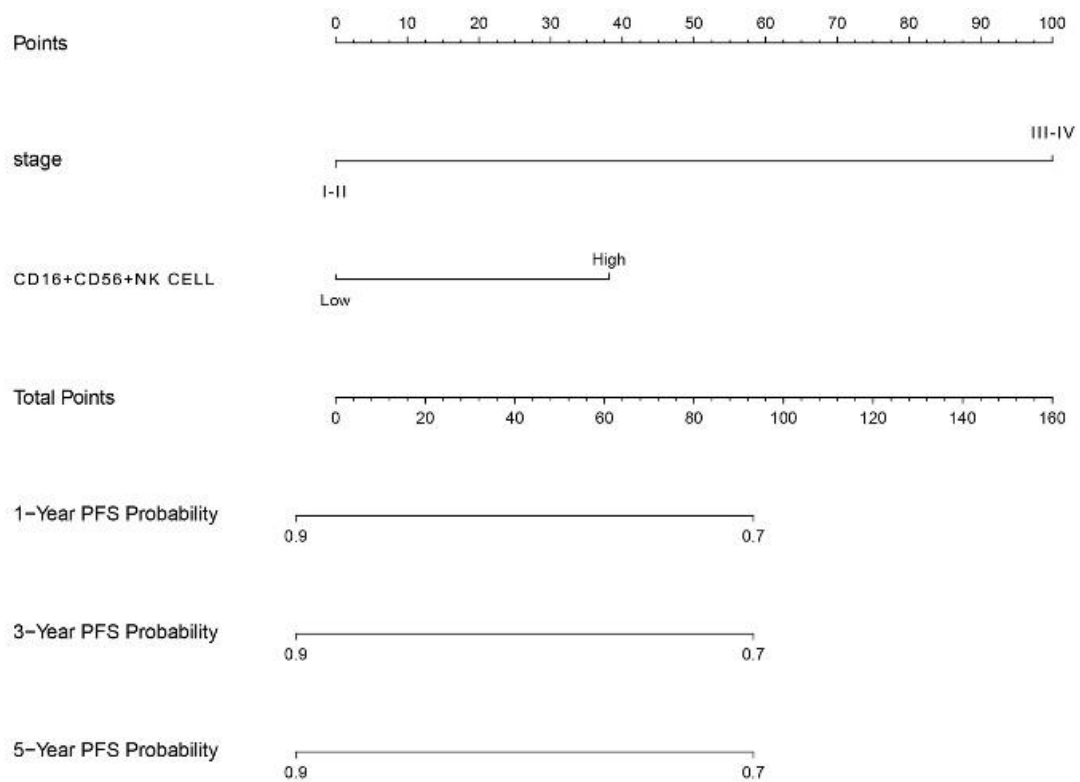**Supplementary Figure 3 Calibration plot for predicted *vs* actual progression-free survival probabilities.**

Supplementary Figure 4 Cumulative hazard functions according to risk group.

Supplementary Figure 5 Time-dependent hazard ratio for the cluster of differentiation 16+ cluster of differentiation 56+ natural killer cell group. CD: Cluster of differentiation; NK: Natural killer.

Supplementary Figure 6 Nomogram for predicting 1-year, 3-year, and 5-year progression-free survival based on tumor stage and cluster of differentiation 16+ cluster of differentiation 56+ natural killer cell percentage. PFS: Progression-free survival; CD: Cluster of differentiation; NK: Natural killer.

Supplementary Table 1 Comparison of parsimonious Cox model and random survival forest model for progression-free survival in colorectal cancer

Model	Variables	No. of variables	C_index	AIC
Parsimonious Cox model	Stage, CD16+CD56+NK(%)	2	0.310	261.5
Random survival forest model	CEA, M, N	3	0.256	240.3

Supplementary Table 2 Multivariable Cox regression analysis of progression-free survival

Variable	HR	CI lower	CI upper	*P* value
Stage				
I-II	Reference			
III-IV	2.98	1.36	6.51	0.012
CD16+CD56+NK (%)				
≤ 17.13	Reference			
> 17.13	1.74	0.67	4.55	0.281

Supplementary Table 3 Bootstrap validation results of the parsimonious Cox model and random survival forest model

Variable	Original HR (95%CI)	Bootstrap HR (95%CI)
Stage		
I-II	Reference	
III-IV	3.24 (4.82-1073.39)	3.61 (0.22-7.00)
CD16+CD56+NK (%)		
≤ 17.13	Reference	
> 17.13	1.56 (2.16-25.56)	1.72 (0.29-3.15)

Supplementary Table 4 Subgroup analysis of key predictors

Subgroup	N	Stage			CD16+CD56+NK (%)		
		HR	95% CI	*P* value	HR	95% CI	*P* value
Age: <45 years	60	3.18	2.92-12579.68	0.037	1.86	1.93-187.57	0.242
Age: ≥45 years	63	3.38	3.32-13646.40	0.021	1.3	1.60-36.68	0.609
Sex: Male	65	3.02	2.97-4356.90	0.034	1	1.43-16.23	0.997
Sex: Female	58	3.17	2.73-21709.47	0.049	2.41	2.27-1174.16	0.11
Chemoradiotherapy: No	38	2793007986	1.00-Inf	0.999	734747731.6	1.00-Inf	0.999
Chemoradiotherapy: Yes	85	2.01	2.50-81.79	0.082	1.42	1.95-20.17	0.364

Supplementary Table 5 Sensitivity analysis of parsimonious model

Scenario	N	Stage_HR	Stage_CI	NK_HR	NK_CI	C_index	AIC
Base Model	123	3.30	4.75-1080.82	1.58	2.15-25.71	0.663	269.1
Excluding M1	115	2.51	3.05-287.72	1.38	1.86-21.95	0.622	217.0
Including CEA	123	2.98	4.00-614.05	1.76	2.30-41.77	0.705	262.6