

Supplementary Table 1. PD-1 Treatment Characteristics in the Combination Group (n = 26)

Variable	Value
Initiation mode, n (%)	
Concurrent with chemotherapy	21 (80.8%)
Sequential after chemotherapy	5 (19.2%)
Time from surgery to PD-1 initiation, days	52.5 (IQR: 36–72)
Patients with delayed initiation >8 weeks, n (%)	11 (42.3%)
Total PD-1 cycles, median (range)	4 (1–21)
Patients completing ≥4 cycles, n (%)	15 (57.7%)
Treatment discontinuation due to toxicity, n (%)	2 (7.7%)
Type of PD-1 agent used, n (%)	
Tislelizumab	15 (57.7%)
Camrelizumab	11 (42.3%)

PD-1 initiation was defined as concurrent if administered within 7 days of chemotherapy start; otherwise, it was categorized as sequential. Delayed initiation was defined as PD-1 therapy starting later than 56 days post-surgery. All patients received PD-1 therapy at a fixed dose of 200 mg IV every 3 weeks.

Supplementary Table 2. Molecular characteristics of patients in the two treatment groups

Variable	Chemo+PD-1 (n=26)	Chemo (n=31)	P value
MSI status			
MSI-H	0	0	
MSS	10/10 (100%)	18/18 (100%)	
KRAS mutation subtype			
G12C	0/7 (0.0%)	2/13 (15.4%)	0.350
G12D	4/7 (57.1%)	6/13 (46.1%)	
G12V	2/7 (28.6%)	5/13 (38.5%)	
Wild-type	1/7 (14.3%)	0/13 (0.0%)	
TP53 mutant			
	6/7 (85.7%)	9/13 (69.2%)	0.613
SMAD4 mutant			
	1/7 (14.3%)	5/13 (38.5%)	0.354
CDKN2A mutant			
	3/7 (42.9%)	2/13 (15.4%)	0.290
ARID1A mutant			
	1/7 (14.3%)	2/13 (15.4%)	1.000
Tumor mutational burden (TMB), median (IQR)			
	3.20 (2.11-3.20)	2.05 (1.10-3.95)	0.229

Abbreviations: MSI-H, microsatellite instability-high; MSS, microsatellite stable; TMB, tumor mutational burden; IQR, interquartile range.

Mutation data presented as n/N (%), where N is the number of patients with successful sequencing for that gene.

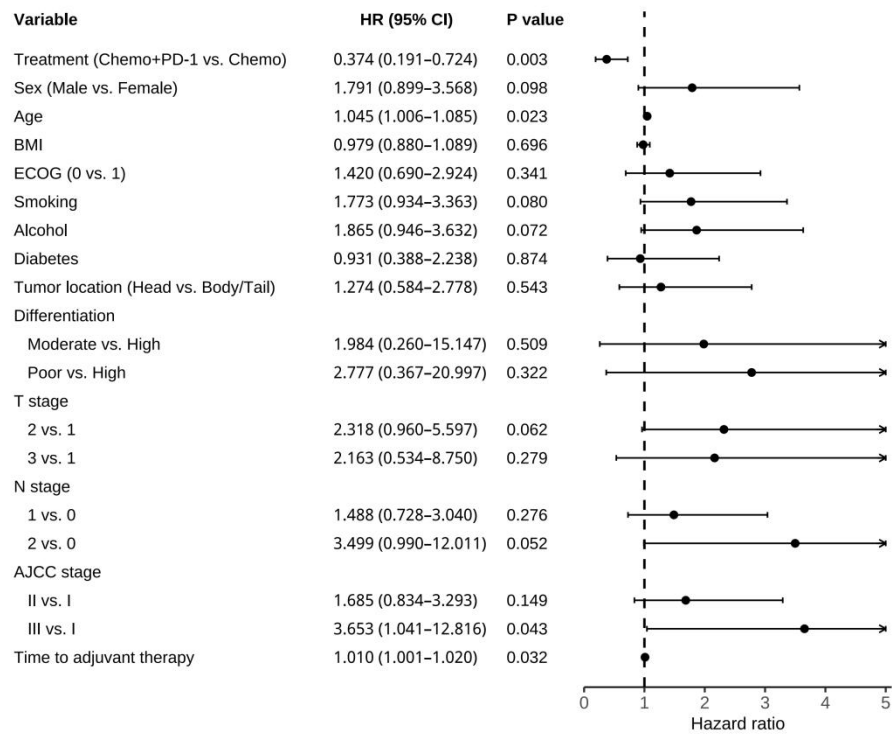
Supplementary Table 3. Baseline laboratory parameters in the two treatment groups

Variable	Chemo+PD-1 (n=26)	Chemo (n=31)	P value
WBC (10 ³ /μL)	5.41 (4.04-8.09)	5.28 (3.84-6.84)	0.486
Hemoglobin (g/L)	118.0 (101.8-128.0)	108.0 (102.0-121.0)	0.191
Platelet (10 ³ /μL)	221.4 ± 73.2	199.2 ± 53.5	0.192
Neutrophil (10 ³ /μL)	0.19 (0.78-0.33)	0.16 (0.10-0.24)	0.671
Lymphocyte (10 ³ /μL)	1.56 (1.17-2.03)	1.50 (0.89-1.84)	0.287
Monocyte (10 ³ /μL)	0.49 (0.34-0.67)	0.48 (0.32-0.62)	0.324
Neutrophil-to-lymphocyte ratio (NLR)	2.05 (1.65-3.10)	2.13 (1.52-3.41)	0.949
Albumin (g/L)	37.7 ± 4.9	37.6 ± 5.6	0.926
LDH (U/L)	169.0 (140.0-198.5)	156.0 (130.0-211.5)	0.515
Creatinine (μmol/L)	53.0 (43.0-62.0)	60.0 (48.5-68.0)	0.245
Glucose (mmol/L)	6.20 (5.48-6.88)	6.40 (5.30-8.30)	0.835
HbA1c (%)	5.70 (5.60-6.05)	6.30 (5.70-7.53)	0.134
Triglyceride (mmol/L)	2.07 (1.13-2.7)4	1.32 (0.92-2.22)	0.168
LDL-C (mmol/L)	2.82 (1.69-3.02)	2.34 (1.80-2.96)	0.601
CD4 ⁺ T cells (cells/μL)	604.5 ± 154.9	480.8 ± 276.5	0.327
CD8 ⁺ T cells (cells/μL)	314.6 ± 165.8	291.0 ± 150.3	0.765
CD4/CD8 ratio	2.17 (1.50-3.49)	1.73 (1.44-2.43)	0.349
NKT cells (cells/μL)	24.0 (20.3-41.3)	24.5 (16.5-54.3)	1.000
IL-6 (pg/ml)	4.78 (2.69-9.76)	3.16 (1.98-6.05)	0.149
TNF-α (pg/ml)	2.71 (1.77-4.26)	1.71 (0.54-2.20)	0.049
CA19-9 (U/ml)	12.7 (6.3-30.9)	21.3 (9.7-70.8)	0.135
CEA (ng/ml)	2.65 (1.65-4.98)	2.00 (1.20-3.20)	0.120
Total bilirubin (umol/L)	10.20 (8.30-12.35)	12.30 (8.70-16.55)	0.175
Cholesterol (mmol/L)	4.77 (4.38-5.05)	4.27 (3.08-5.06)	0.033

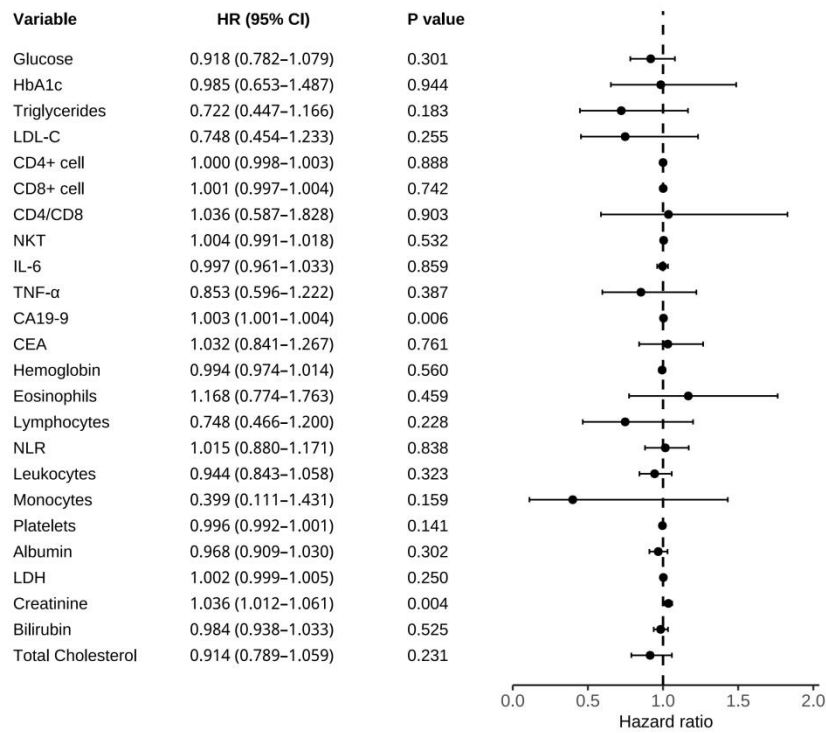
Abbreviations: WBC, white blood cell count; LDH, lactate dehydrogenase; HbA1c, glycated hemoglobin; LDL-C, low-density lipoprotein cholesterol; NKT, natural killer T cells; IL-6, interleukin-6; TNF-α, tumor necrosis factor-α; CA19-9, carbohydrate antigen 19-9; CEA, carcinoembryonic antigen; NLR, neutrophil-to-lymphocyte ratio.

Data are presented as mean ± standard deviation (SD) for normally distributed variables and median (interquartile range [IQR]) for non-normally distributed variables.

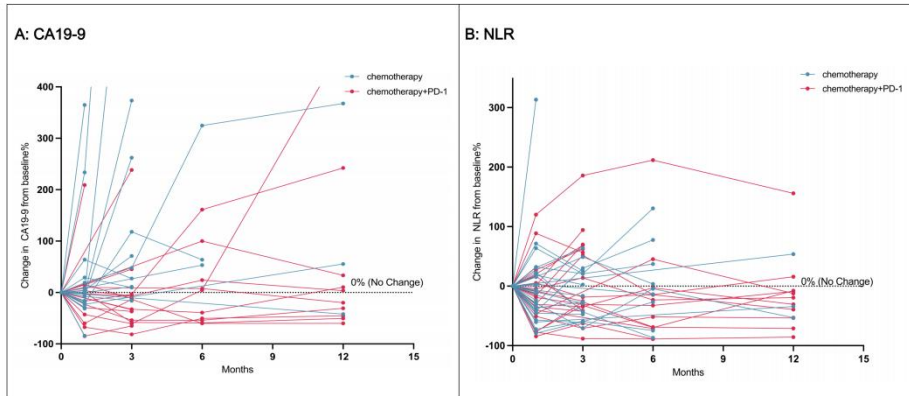
Supplementary Figure 1



Supplementary Figure 2



Supplementary Figure 3



Supplementary Figure 4

