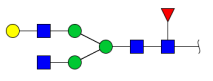
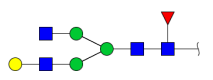
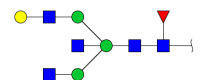
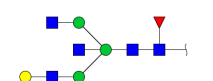
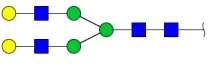
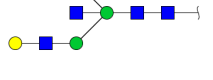
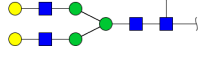
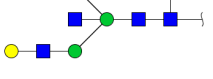


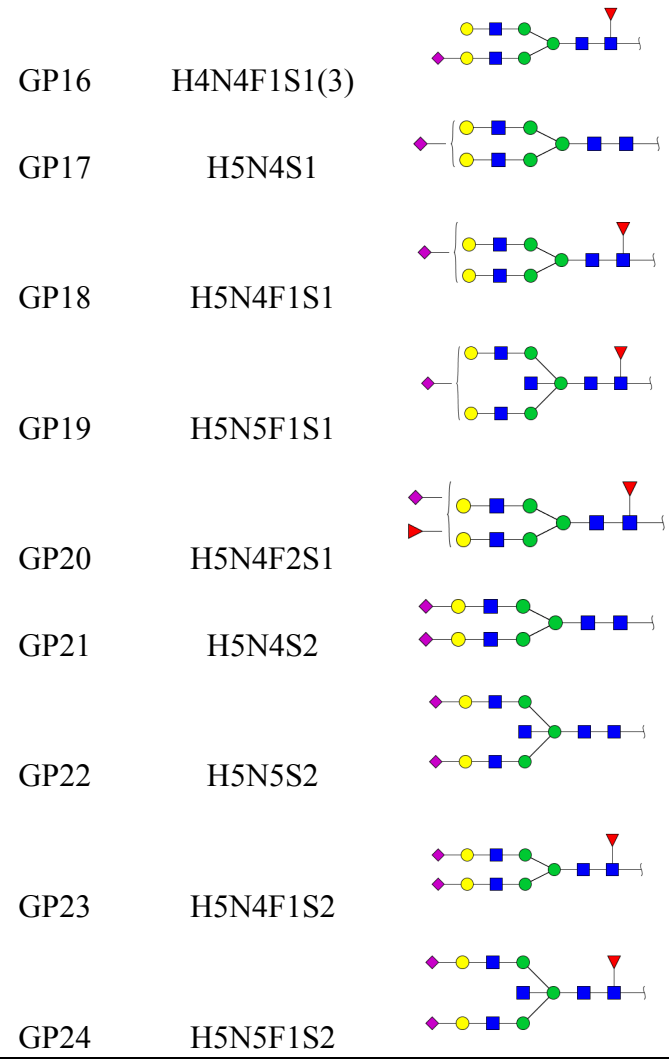
**Supplementary Table**

**Supplementary Table 1**

**Compositions of 24 directly measured glycan peaks by UPLC**

Glycan peak	Composition	Proposed Structure
GP1	H3N3F1	
GP2	H3N4	
GP3	H3N5	
GP4	H3N4F1	
GP5	H5N2	
GP6	H3N5F1	
GP7	H4N4	

GP8	H4N4F1(6)	
GP9	H4N4F1(3)	
GP10	H4N5F1(6)	
GP11	H4N5F1(3)	
GP12	H5N4	
GP13	H5N5	
GP14	H5N4F1	
GP15	H5N5F1	



Note: H: hexose, N: N-acetylhexosamine; F: fucose, S: sialic acid.

## Supplementary Table 2

Derived glycan traits based on the glycan structure

<b>Derived traits</b>	<b>Description</b>	<b>Formula</b>
GPN	Proportion of neutral glycans in total IgG glycans	GP1+GP2+GP3+GP4+GP5+GP6+GP7+GP8+GP9+GP10+GP11+GP12+GP13+GP14+GP15
S1	Proportion of monosialylated glycans in total IgG glycans	GP16+GP17+GP18+GP19
S2	Proportion of disialylated glycans in total IgG glycans	GP21+GP22+GP23+GP24
GPS	Proportion of sialylated glycans in total IgG glycans	GPS1+GPS2
G0	Proportion of agalactosylated glycans in total IgG glycans	GP1+ GP2+ GP3+ GP4+ GP6

G1	Proportion of monogalactosylated glycans in total IgG glycans	GP7+ GP8+ GP9+ GP10+ GP11
G2	Proportion of diagalactosylated glycans in total IgG glycans	GP12+ GP13+ GP14+ GP15
F	Proportion of fucosylated glycans in total IgG glycans	GP1+ GP4+ GP6+ GP8+ GP9+ GP10+ GP11+ GP14+ GP15+ GP16+ GP18+ GP19+ GP23+ GP24
FN	Proportion of fucosylated glycans in total neutral IgG glycans	$(GP1+ GP4+ GP6+ GP8+ GP9+ GP10+ GP11+ GP14+ GP15)/GPN*100$
FS	Proportion of fucosylated glycans in total sialylated IgG glycans	$(GP16+ GP18+ GP19+ GP23+ GP24)/GPS*100$
B	Proportion of bisecting glycans in total IgG glycans	GP3+ GP6+ GP10+ GP11+ GP13+ GP15+ GP19+ GP22+ GP24

BN	Proportion of bisecting glycans in neutral IgG glycans	$(GP3+ GP6+ GP10+ GP11+ GP13)/GPN*100$
BS	Proportion of bisecting glycans in sialylated IgG glycans	$(GP19+ GP22+ GP24)/GPS*100$
FG0	Proportion of fucosylated agalactosylated glycans in total IgG glycans (glycan peak 4)	GP4
FG1	Proportion of fucosylated monogalactosylated glycans in total IgG glycans	GP8+GP9
FG2	Proportion of fucosylated diagalactosylated glycans in total IgG glycans (glycan peak 14)	GP14

Gal-ratio The relative intensity of  $FG0/(FG1+FG2*2)$   
IgG fucosylated  
galactosylation

---

**Supplementary Table 3**

The sensitivity and specificity of potential glyco-biomarkers in training cohort, validation cohort and combined cohort

Training cohort				
	AUC	95% CI	Sensitivity	Specificity
GPN	0.72	0.65 to 0.78	86.36%	50.93%
GPS	0.71	0.65 to 0.78	86.36%	50.93%
S2	0.76	0.69 to 0.82	72.73%	70.81%
Glyco-model	0.80	0.74 to 0.86	75.00%	73.29%

Validation cohort				
	AUC	95% CI	Sensitivity	Specificity
GPN	0.69	0.59 to 0.79	61.54%	68.24%
GPS	0.69	0.59 to 0.79	48.72%	81.18%
S2	0.72	0.62 to 0.82	51.28%	89.41%



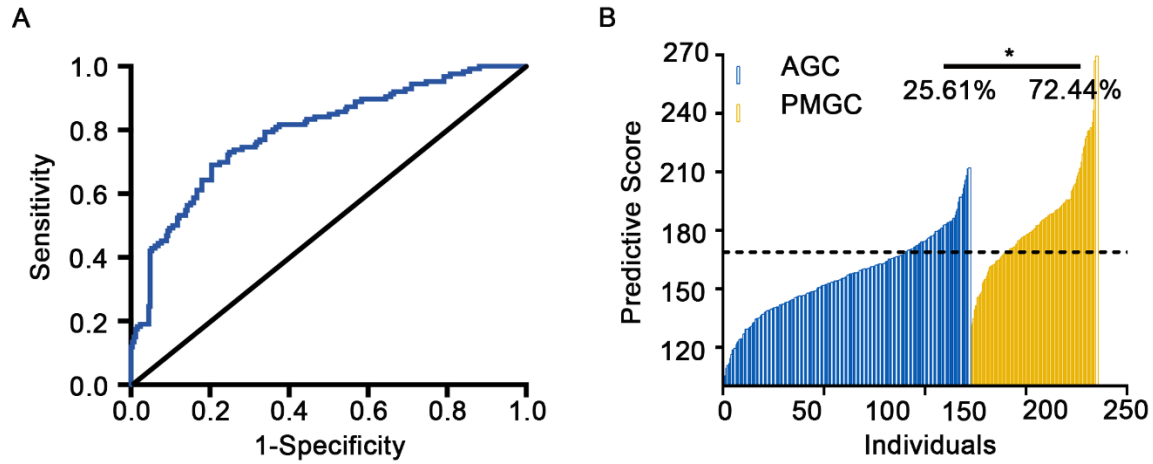
Glyco-model	0.77	0.68 to 0.86	66.67%	76.47%
Combined cohort				
	AUC	95% CI	Sensitivity	Specificity
GPN	0.71	0.65 to 0.76	66.93%	66.26%
GPS	0.71	0.65 to 0.76	67.72%	66.26%
S2	0.74	0.69 to 0.80	68.50%	69.92%
Glyco-model	0.79	0.74 to 0.84	72.44%	74.39%

**Supplementary Table 4**

The sensitivity and specificity of serum tumor biomarkers in combined cohort

	Combine cohort			
	AUC	95% CI	Sensitivity	Specificity
CEA	0.54	0.47 to 0.61	34.78%	73.33%
CA19-9	0.63	0.56 to 0.70	45.05%	80.79%
CA125	0.63	0.55 to 0.71	38.46%	86.84%
CA72-4	0.62	0.54 to 0.70	47.22%	76.22%

Supplementary Figure



**Figure S1: Efficacy prediction of discriminate glyco-model of combined cohort.** Plots of ROC result (AUC= 0.79, 95%CI: 0.74 to 0.84) (A). The logistic regression predictive score for each patient of the combined cohort (B).