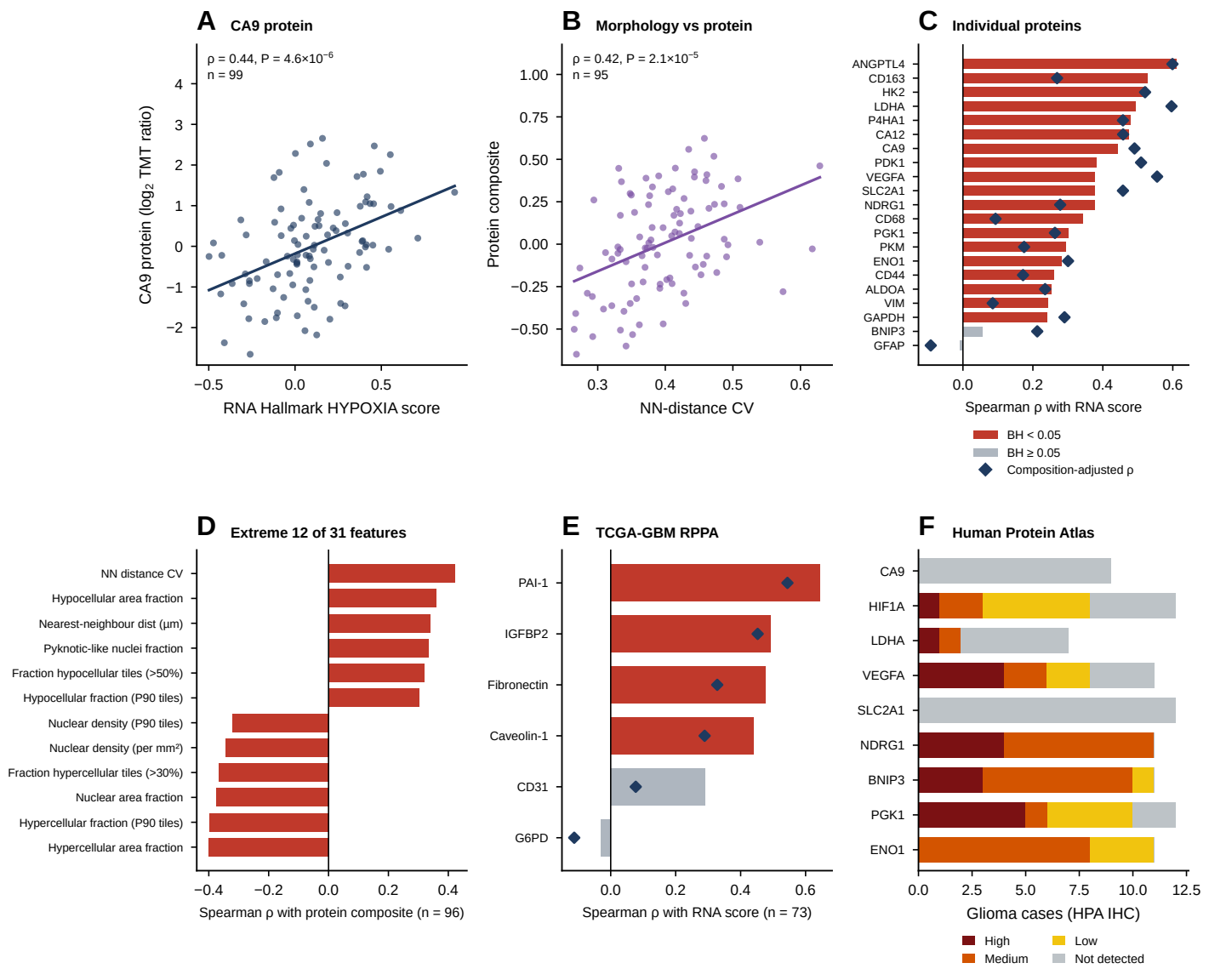

A
CA9 protein
ρ = 0.44, P = 4.6×10−6
n = 99
CA9 protein (log2 TMT ratio)
RNA Hallmark HYPOXIA score
B
Morphology vs protein
ρ = 0.42, P = 2.1×10−5
n = 95
Protein composite
NN-distance CV
C
Individual proteins
ANGPTL4
CD163
HK2
LDHA
P4HA1
CA12
CA9
PDK1
VEGFA
SLC2A1
NDRG1
CD68
PGK1
PKM
ENO1
CD44
ALDOA
VIM
GAPDH
BNIP3
GFAP
Spearman ρ with RNA score
BH < 0.05
BH ≥ 0.05
Composition-adjusted ρ
D
Extreme 12 of 31 features
NN distance CV
Hypocellular area fraction
Nearest-neighbour dist (µm)
Pyknotic-like nuclei fraction
Fraction hypocellular tiles (>50%)
Hypocellular fraction (P90 tiles)
Nuclear density (P90 tiles)
Nuclear density (per mm²)
Fraction hypercellular tiles (>30%)
Nuclear area fraction
Hypercellular fraction (P90 tiles)
Hypercellular area fraction
Spearman ρ with protein composite (n = 96)
E
TCGA-GBM RPPA
PAI-1
IGFBP2
Fibronectin
Caveolin-1
CD31
G6PD
Spearman ρ with RNA score (n = 73)
F
Human Protein Atlas
CA9
HIF1A
LDHA
VEGFA
SLC2A1
NDRG1
BNIP3
PGK1
ENO1
Glioma cases (HPA IHC)
High
Medium
Low
Not detected