

CHOL - Cholangiocarcinoma

Subtype	Biology & Expression	Genomic/Pathway Alterations	Clinical Features
Mesenchymal & Immunosuppressive (C1)	<ul style="list-style-type: none"> • Strong EMT and Wnt/β-catenin activation (tSNAI1, IL1B) • High infiltration of M2-like TAMs and Tregs; upregulation of immune-checkpoint genes (e.g. CTLA-4, PD-L1) 	<ul style="list-style-type: none"> • Enrichment of immune-evasion programs; overexpression of checkpoint ligands and co-inhibitors 	<ul style="list-style-type: none"> • Poorer prognosis (median OS ~376 days) • High T-cell exclusion score • Candidate for checkpoint blockade
Metabolic & Proliferative (C2)	<ul style="list-style-type: none"> • Upregulated fatty-acid, bile-acid and xenobiotic metabolism (peroxisome genes, ADH1A, CYP3A4) • Elevated MYC/E2F targets and G2M checkpoint activity; ferroptosis-resistant profile 	<ul style="list-style-type: none"> • Activation of PI3K-AKT-mTOR and mTORC1 pathways; high proliferation signature 	<ul style="list-style-type: none"> • Better prognosis (median OS ~565 days) • Higher CD8⁺ T-cell abundance • May benefit from chemo-/radiotherapy