PAAD - Pancreatic adenocarcinoma

Subtype	Biology & Expression	Genomic Alterations	Clinical Features
Squamous	• Enriched TP63ΔN, MYC, inflammation, and EMT pathways • Low expression of endoderm and pancreatic lineage markers	• TP53 mutations common • High chromosomal instability • Loss of GATA6 expression	• Worst prognosis • Often poorly differentiated • Associated with resistance to chemotherapy
Pancreatic Progenitor	• High expression of transcription factors regulating pancreatic development (PDX1, HNF1A, HNF4A)	• KRAS mutations (~90%) • Frequent CDKN2A and SMAD4 alterations	• Better differentiation • Moderate prognosis
Immunogenic	• Similar to progenitor subtype but with enriched immune-related pathways (e.g., CTLA4, PD1 signaling)	• Similar to progenitor subtype • Some with high neoantigen load	• Variable prognosis • Potential responsiveness to immunotherapy
ADEX (Aberrantly Differentiated Endocrine-Exocrine)	• Upregulation of genes involved in exocrine (NR5A2) and endocrine (INS, NEUROD1) differentiation pathways	• Common KRAS mutations • Enriched for MAPK signaling and MYC targets	• Generally more differentiated tumors • Prognostic significance unclear; overlaps with progenitor subtype