THCA - Thyroid carcinoma

Subtype	Biology & Expression	Genomic Alterations	Clinical Features
BRAF-like	• High MAPK pathway output; low thyroid differentiation score • Enrichment of proliferation and EMT signatures	• **BRAF^V600E^** mutations (≈60 %) • TERT promoter mutations (in a subset) • Few fusion events	• Classical and tall-cell PTC histology • More frequent lymph node metastases • Higher recurrence risk
RAS-like	• High thyroid differentiation score; retention of follicular gene programs • Lower MAPK output, more PI3K/AKT signaling	• **NRAS/HRAS/KRAS** mutations (≈13 %) • PAX8-PPARG and other rare fusions • Rare TERT mutations	• Follicular variant PTC and follicular carcinoma • Vascular invasion more common than nodal spread • Generally favorable prognosis
Kinase-fusion	• Intermediate differentiation score; MAPK activation via receptor tyrosine kinases • Distinct fusion-driven expression	• RET/PTC1, RET/PTC3, NTRK1/3, ALK and other RTK fusions (≈5–10 %)	• Often in younger or radiation-exposed patients • Variable nodal spread • Targetable by specific kinase inhibitors