Supplementary Table 1: Key Gene Mutations Associated with Skin and Uveal Melanomas and Their Representation in Melan-a and B16F10 Cells

Gene	Mutation in human	Pathway/Role	Frequency (%)	Cancer Type	Ocular melanocyte	Melan-a cells	B16F10 Cells
BRAF	V600E	MAPK/ERK pathway	~50% (CM)	CM	Non-mutation	Non-mutation	nonsynonymous SNV
NRAS	Q61R, Q61K, G12D	MAPK/ERK, PI3K/AKT pathways	~20% (CM)	CM	Non-mutation	Non-mutation	Non-mutation
TP53	Various loss-of-function	Tumor suppressor	~19% (CM)	CM	Non-mutation	Non-mutation	Non-mutation
CDKN2A	Deletions, point mutations	Tumor suppressor (cell cycle regulation)	10-40% (CM)	CM	Non-mutation	Non-mutation	Non-mutation
PTEN	Loss of heterozygosity (LOH)	PI3K/AKT pathway	~5-10% (skin melanoma)	CM	Non-mutation	Non-mutation	nonsynonymous SNV
KIT	L576P, K642E	Receptor tyrosine kinase	2-8% (acral/mucosal types)	CM	Non-mutation	Non-mutation	Non-mutation
TERT	C228T, C250T (promoter)	Telomere maintenance	~70-80% (CM)	CM	Non-mutation	Non-mutation	Non-mutation
MAP2K1	K57N, P124L	MAPK/ERK pathway	Rare (~1-2%)	CM	Non-mutation	Non-mutation	Non-mutation
CTNNB1	S45F, D32H	Wnt signaling	Rare	CM	Non-mutation	Non-mutation	Non-mutation
RB1	LOH, point mutations	Cell cycle regulation	Rare	CM	Non-mutation	Non-mutation	Non-mutation
GNAQ	Q209L, Q209P	G-protein signaling, MAPK pathway	~50% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
GNA11	Q209L, Q209P	G-protein signaling, MAPK pathway	~30% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
BAP1	Loss-of-function, deletions	Chromatin remodeling, tumor suppression	~40-50% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
SF3B1	R625H, R625C	Spliceosome machinery	~20% (UM)	UM	Non-mutation	nonsynonymous	Non-mutation
EIF1AX	P2S, A113V	Translation initiation	~10-15% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
CYSLTR2	L129Q	GPCR signaling	~5-10% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
PLCB4	D630Y	G-protein signaling	~5% (UM)	UM	Non-mutation	Non-mutation	Non-mutation
TERT	C228T, C250T (promoter)	Telomere maintenance	Rare (~5%)	UM	Non-mutation	Non-mutation	Non-mutation
RB1	LOH, point mutations	Cell cycle regulation	Rare	UM	Non-mutation	Non-mutation	Non-mutation
PTEN	Loss, rarely mutated	PI3K/AKT pathway	Rare (metastatic cases)	UM	Non-mutation	Non-mutation	nonsynonymous SNV