

**Supplementary Table S2:** Individual clinical and tumor characteristics of patients in "VHL-like", "Multiple VHL tumors" and "Single VHL tumor" cohorts. M: male, F: female, RCC: renal carcinoma, PET: pancreatic endocrine tumor, CNS hemangioblastoma: central nervous system hemangioblastoma, HN: head and neck PPGL, TAP: thoracic, abdominal or pelvic PPGL, PCC: pheochromocytoma, NA: not available.

Number	Age at diagnostic	Sex	Family history of VHL tumors	Localization (1)	Localization (2)	Localization (3)	Localization (4)
Multiple VHL tumors1	69	NA	No	PCC	RCC		
Multiple VHL tumors2	53	F	No	PCC	PET		
Multiple VHL tumors3	66	F	No	PCC	PET		
Multiple VHL tumors4	44	M	No	RCC	PET		
Multiple VHL tumors5	26	M	No	Multiple RCC			
Multiple VHL tumors6	47	M	No	PCC	RCC		
Multiple VHL tumors7	23	M	No	PCC	RCC		
Multiple VHL tumors8	26	M	No	Multiple RCC			
Multiple VHL tumors9	31	F	No	PCC	RCC		
Multiple VHL tumors10	48	M	No	RCC	Epididymal cystadenoma		
Multiple VHL tumors11	49	NA	No	Multiple RCC			
Multiple VHL tumors12	49	NA	No	Multiple RCC			
Multiple VHL tumors13	48	NA	No	Multiple RCC			
Multiple VHL tumors14	81	NA	No	Multiple RCC	Renal cyst		
Multiple VHL tumors15	53	NA	No	Multiple RCC			
Multiple VHL tumors16	57	NA	No	Multiple RCC			
Multiple VHL tumors17	47	NA	No	Multiple RCC			
Multiple VHL tumors18	44	NA	No	Multiple RCC			
Multiple VHL tumors19	29	NA	No	RCC	Multiple renal cysts	Multiple pancreatic cysts	
Multiple VHL tumors20	63	NA	No	Multiple RCC	Pancreatic cyst		
Multiple VHL tumors21	61	NA	No	PET	Multiple RCC		
Multiple VHL tumors22	NA	F	No	RCC	Multiple pancreatic cysts		
Multiple VHL tumors23	NA	M	No	RCC	Polycythemia		
Multiple VHL tumors24	NA	NA	No	RCC	Polycythemia		
Multiple VHL tumors25	81	M	No	RCC			
Multiple VHL tumors26	65	M	No	PGL TAP	Multiple renal cysts		
Multiple VHL tumors27	39	F	No	PCC	Pancreatic cyst		
Multiple VHL tumors28	47	M	No	PGL TAP	PET		
Multiple VHL tumors29	41	M	No	PCC	RCC		
Multiple VHL tumors30	55	M	No	PCC	Multiple renal cysts		
Multiple VHL tumors31	47	F	No	PCC	PET		
Multiple VHL tumors32	78	F	No	PCC	Multiple renal cysts	PET	Pancreatic cyst
Multiple VHL tumors33	57	F	No	PCC	RCC	PET	
Multiple VHL tumors34	NA	M	No	PCC	PET		
Multiple VHL tumors35	63	M	No	PCC	RCC		
Multiple VHL tumors36	58	M	No	PCC	RCC		
Multiple VHL tumors37	61	F	No	PCC	Pancreatic cyst		
Multiple VHL tumors38	51	M	No	PCC	RCC		
Multiple VHL tumors39	63	M	No	Multiple RCC	PET		
Multiple VHL tumors40	69	M	No	RCC	PET		
Multiple VHL tumors41	43	F	No	Multiple pancreatic cysts			
Multiple VHL tumors42	NA	M	No	Multiple RCC	PET		
Multiple VHL tumors43	NA	F	No	RCC	PET		
Multiple VHL tumors44	58	F	No	Multiple PET			
Multiple VHL tumors45	60	F	No	Multiple PET			
Multiple VHL tumors46	NA	M	No	Multiple renal cysts	PET		
Multiple VHL tumors47	56	M	No	Multiple renal cysts	Multiple PET		
Multiple VHL tumors48	NA	F	No	Multiple pancreatic cysts			
Multiple VHL tumors49	70	F	No	Multiple pancreatic cysts			
Multiple VHL tumors50	64	F	No	Multiple pancreatic cysts			
Multiple VHL tumors51	NA	F	No	PET	Pancreatic cyst		
Multiple VHL tumors52	49	F	No	RCC	PET		
Multiple VHL tumors53	63	F	No	Multiple PET			
Multiple VHL tumors54	58	M	No	RCC	PET		
Multiple VHL tumors55	61	M	No	RCC	PET		
Multiple VHL tumors56	64	M	No	PET	Pancreatic cyst		
Multiple VHL tumors57	79	M	No	PCC	RCC		
Multiple VHL tumors58	NA	M	No	Multiple PET			
Multiple VHL tumors59	59	F	No	Multiple PET			
Multiple VHL tumors60	NA	M	No	Multiple PET			
Multiple VHL tumors61	NA	M	No	Multiple PET			
Multiple VHL tumors62	64	M	No	Multiple PET			
Multiple VHL tumors63	58	F	No	Multiple renal cysts	PET		
Multiple VHL tumors64	NA	F	No	Multiple renal cysts	PET		
Multiple VHL tumors65	61	F	No	Multiple PET			
Multiple VHL tumors66	76	F	No	RCC	Multiple PET		
Multiple VHL tumors67	52	F	No	RCC	PET		
Multiple VHL tumors68	11	F	No	PET	Pancreatic cyst		
Multiple VHL tumors69	69	NA	Yes (Pancreatic cyst)	PGL TAP	Polycythemia		
Multiple VHL tumors70	55	F	No	PGL TAP	Polycythemia		
Single VHL tumor1	51	F	No	CNS hemangioblastoma			
Single VHL tumor2	54	M	No	Multiple renal cysts			
Single VHL tumor3	12	F	No	RCC			
Single VHL tumor4	42	M	No	RCC			
Single VHL tumor5	25	NA	No	Retinal hemangioblastoma			
Single VHL tumor6	14	NA	No	Retinal hemangioblastoma			
Single VHL tumor7	50	NA	No	CNS hemangioblastoma			
Single VHL tumor8	35	NA	No	CNS hemangioblastoma			
Single VHL tumor9	32	NA	No	Medulla hemangioblastoma			
Single VHL tumor10	21	NA	No	CNS hemangioblastoma			
Single VHL tumor11	17	NA	No	CNS hemangioblastoma			
Single VHL tumor12	36	NA	No	CNS hemangioblastoma			
Single VHL tumor13	22	NA	No	CNS hemangioblastoma			
Single VHL tumor14	22	NA	No	CNS hemangioblastoma			
Single VHL tumor15	14	NA	No	CNS hemangioblastoma			
Single VHL tumor16	30	NA	No	CNS hemangioblastoma			
Single VHL tumor17	35	NA	No	CNS hemangioblastoma			
Single VHL tumor18	22	NA	No	Retinal hemangioblastoma			
Single VHL tumor19	33	NA	No	Retinal hemangioblastoma			
Single VHL tumor20	37	NA	No	CNS hemangioblastoma			
Single VHL tumor21	23	NA	No	CNS hemangioblastoma			
Single VHL tumor22	16	NA	No	CNS hemangioblastoma			
Single VHL tumor23	17	NA	No	Retinal hemangioblastoma			
Single VHL tumor24	19	NA	No	CNS hemangioblastoma			
Single VHL tumor25	NA	NA	No	CNS hemangioblastoma			
Single VHL tumor26	29	M	No	Retinal hemangioblastoma			
Single VHL tumor27	NA	F	No	Endolymphatic sac tumor			
Single VHL tumor28	39	M	No	RCC			
Single VHL tumor29	25	F	No	Endolymphatic sac tumor			
Single VHL tumor30	66	F	No	Multiple pancreatic cysts			
Single VHL tumor31	14	F	No	PET			
Single VHL tumor32	41	F	No	Multiple pancreatic cysts			
Single VHL tumor33	22	F	No	Endolymphatic sac tumor			
Single VHL tumor34	34	M	No	CNS hemangioblastoma			
Single VHL tumor35	18	M	No	Pancreatic cyst			
Single VHL tumor36	67	M	No	Multiple pancreatic cysts			
Single VHL tumor37	58	M	No	Multiple renal cysts			
Single VHL tumor38	38	F	No	Retinal hemangioblastoma			
Single VHL tumor39	60	F	No	CNS hemangioblastoma			
Single VHL tumor40	30	F	No	Pancreatic cyst			
Single VHL tumor41	59	M	No	PET			
Single VHL tumor42	40	F	No	Retinal hemangioblastoma			
Single VHL tumor43	27	F	No	Retinal hemangioblastoma			
Single VHL tumor44	71	F	No	Pancreatic cyst			
Single VHL tumor45	59	F	No	CNS hemangioblastoma			
Single VHL tumor46	11	F	No	Retinal hemangioblastoma			
Single VHL tumor47	43	F	No	PET			
Single VHL tumor48	34	F	No	PET			
Single VHL tumor49	23	F	No	CNS hemangioblastoma			
Single VHL tumor50	31	F	No	CNS hemangioblastoma			
Single VHL tumor51	NA	M	No	Medulla hemangioblastoma			

Single VHL tumor52	78	F	No	CNS hemangioblastoma				
Single VHL tumor53	NA	F	No	PET				
Single VHL tumor54	NA	M	No	PET				
Single VHL tumor55	NA	M	No	CNS hemangioblastoma				
Single VHL tumor56	NA	F	No	Multiple pancreatic cysts				
Single VHL tumor57	NA	F	No	Pancreatic cyst				
Single VHL tumor58	42	F	No	CNS hemangioblastoma				
Single VHL tumor59	NA	M	No	Endolymphatic sac tumor				
Single VHL tumor60	35	M	No	CNS hemangioblastoma				
Single VHL tumor61	25	F	No	Multiple pancreatic cysts				
Single VHL tumor62	NA	F	No	PET				
Single VHL tumor63	37	M	No	Endolymphatic sac tumor				
Single VHL tumor64	NA	M	No	Multiple pancreatic cysts				
Single VHL tumor65	45	F	No	PET				
Single VHL tumor66	40	M	No	Pancreatic cyst				
Single VHL tumor67	37	F	No	Multiple pancreatic cysts				
Single VHL tumor68	38	M	No	Multiple pancreatic cysts				
Single VHL tumor69	33	F	No	Pancreatic cyst				
Single VHL tumor70	37	M	No	Epididymal cystadenoma				
Single VHL tumor71	42	F	No	Polycythemia				
Single VHL tumor72	14	F	No	Polycythemia				
Single VHL tumor73	14	M	No	Polycythemia				
Single VHL tumor74	43	M	No	Polycythemia				
Single VHL tumor75	NA	M	No	Polycythemia				
VHL-like1	53	NA	Yes (RCC)	PCC				
VHL-like2	35	F	Yes (CNS hemangioblastoma)	RCC				
VHL-like3	73	F	Yes (RCC)	RCC				
VHL-like4	64	F	Yes (RCC)	RCC				
VHL-like5	34	F	Yes (RCC)	RCC				
VHL-like6	28	F	Yes (RCC)	RCC				
VHL-like7	42	M	Yes (RCC)	RCC				
VHL-like8	55	F	Yes	CNS hemangioblastoma				
VHL-like9	45	M	Yes (RCC)	PET				
VHL-like10	70	F	Yes (RCC)	PCC				
VHL-like11	NA	F	Yes (PET)	PGL HN				
VHL-like12	21	F	Yes (RCC)	Bilateral PCC				
VHL-like13	24	F	No	Retinal hemangioblastoma	RCC			PCC
VHL-like14	35	NA	No	CNS hemangioblastoma	RCC			
VHL-like15	54	NA	No	Medulla hemangioblastoma	Multiple RCC			PGL TAP
VHL-like16	34	NA	Yes (CNS hemangioblastoma)	CNS hemangioblastoma				
VHL-like17	42	NA	No	Multiple medulla hemangioblastomas				
VHL-like18	35	NA	Yes (RCC)	RCC				
VHL-like19	56	NA	Yes (RCC)	RCC				
VHL-like20	56	NA	No	Multiple CNS hemangioblastomas				
VHL-like21	38	NA	No	Multiple CNS hemangioblastomas	RCC			
VHL-like22	67	NA	No	Multiple CNS hemangioblastomas				
VHL-like23	20	NA	No	Multiple CNS hemangioblastomas	PET			
VHL-like24	NA	NA	No	Multiple retinal hemangioblastomas	RCC			Pancreatic cyst
VHL-like25	43	NA	Yes (CNS hemangioblastoma)	CNS hemangioblastoma				
VHL-like26	NA	F	No	CNS hemangioblastoma	Retinal hemangioblastoma			
VHL-like27	NA	F	No	Multiple retinal hemangioblastomas				
VHL-like28	NA	M	No	CNS hemangioblastoma	PCC			
VHL-like29	NA	NA	No	CNS hemangioblastoma	PCC			Renal cyst
VHL-like30	NA	NA	No	Multiple CNS hemangioblastomas				
VHL-like31	NA	NA	No	CNS hemangioblastoma	Retinal hemangioblastoma			Multiple pancreatic cysts
VHL-like32	NA	NA	Yes (RCC)	RCC				
VHL-like33	NA	M	Yes (RCC)	RCC				
VHL-like34	NA	F	Yes (RCC)	RCC				
VHL-like35	NA	NA	Yes	CNS hemangioblastoma				
VHL-like36	NA	F	Yes	CNS hemangioblastoma				
VHL-like37	NA	NA	No	CNS hemangioblastoma	RCC			
VHL-like38	36	F	No	Multiple retinal hemangioblastomas				
VHL-like39	NA	F	Yes	CNS hemangioblastoma	Multiple retinal hemangioblastomas			PCC
VHL-like40	NA	M	Yes	CNS hemangioblastoma	Multiple retinal hemangioblastomas			Multiple RCC
VHL-like41	NA	F	No	CNS hemangioblastoma	Multiple pancreatic cysts			
VHL-like42	NA	F	No	Multiple retinal hemangioblastomas				
VHL-like43	NA	NA	No	CNS hemangioblastoma	Retinal hemangioblastoma			
VHL-like44	NA	NA	No	CNS hemangioblastoma	Retinal hemangioblastoma			PCC
VHL-like45	NA	NA	No	Multiple CNS hemangioblastomas				
VHL-like46	NA	F	No	CNS hemangioblastoma	Multiple retinal hemangioblastomas			Multiple RCC
VHL-like47	37	F	Yes (RCC)	RCC				Multiple pancreatic cysts
VHL-like48	47	M	No	CNS hemangioblastoma	RCC			
VHL-like49	53	M	Yes (RCC)	RCC				
VHL-like50	42	F	No	Medulla hemangioblastoma	RCC			
VHL-like51	NA	F	No	Retinal hemangioblastoma	PCC			
VHL-like52	69	M	No	CNS hemangioblastoma	RCC			
VHL-like53	44	F	No	Retinal hemangioblastoma	Pancreatic cyst			
VHL-like54	78	M	No	CNS hemangioblastoma	PCC			
VHL-like55	55	F	No	CNS hemangioblastoma	RCC			
VHL-like56	50	F	No	CNS hemangioblastoma	PGL TAP			
VHL-like57	36	F	No	CNS hemangioblastoma	PGL TAP			PET
VHL-like58	56	M	No	CNS hemangioblastoma	PGL TAP			Pancreatic cyst
VHL-like59	49	F	No	Medulla hemangioblastoma	PCC			
VHL-like60	59	M	No	CNS hemangioblastoma	PCC			
VHL-like61	59	M	No	CNS hemangioblastoma	PCC			
VHL-like62	66	F	No	Medulla hemangioblastoma	PCC			
VHL-like63	67	F	No	CNS hemangioblastoma	PCC			
VHL-like64	33	M	Yes (RCC)	PCC				
VHL-like65	29	F	Yes (RCC)	PCC				
VHL-like66	15	F	No	CNS hemangioblastoma	RCC			
VHL-like67	NA	M	No	CNS hemangioblastoma	PET			
VHL-like68	NA	M	No	CNS hemangioblastoma	PCC			
VHL-like69	52	F	Yes (RCC)	PGL HN				
VHL-like70	50	M	Yes (RCC)	PCC				
VHL-like71	30	M	Yes (RCC)	PCC				
VHL-like72	48	M	Yes (RCC)	PCC				
VHL-like73	32	F	No	CNS hemangioblastoma	PGL HN			Renal cyst
VHL-like74	42	M	No	CNS hemangioblastoma	PCC			
VHL-like75	38	F	Yes (RCC)	PGL HN				
VHL-like76	20	F	No	CNS hemangioblastoma	PGL TAP			