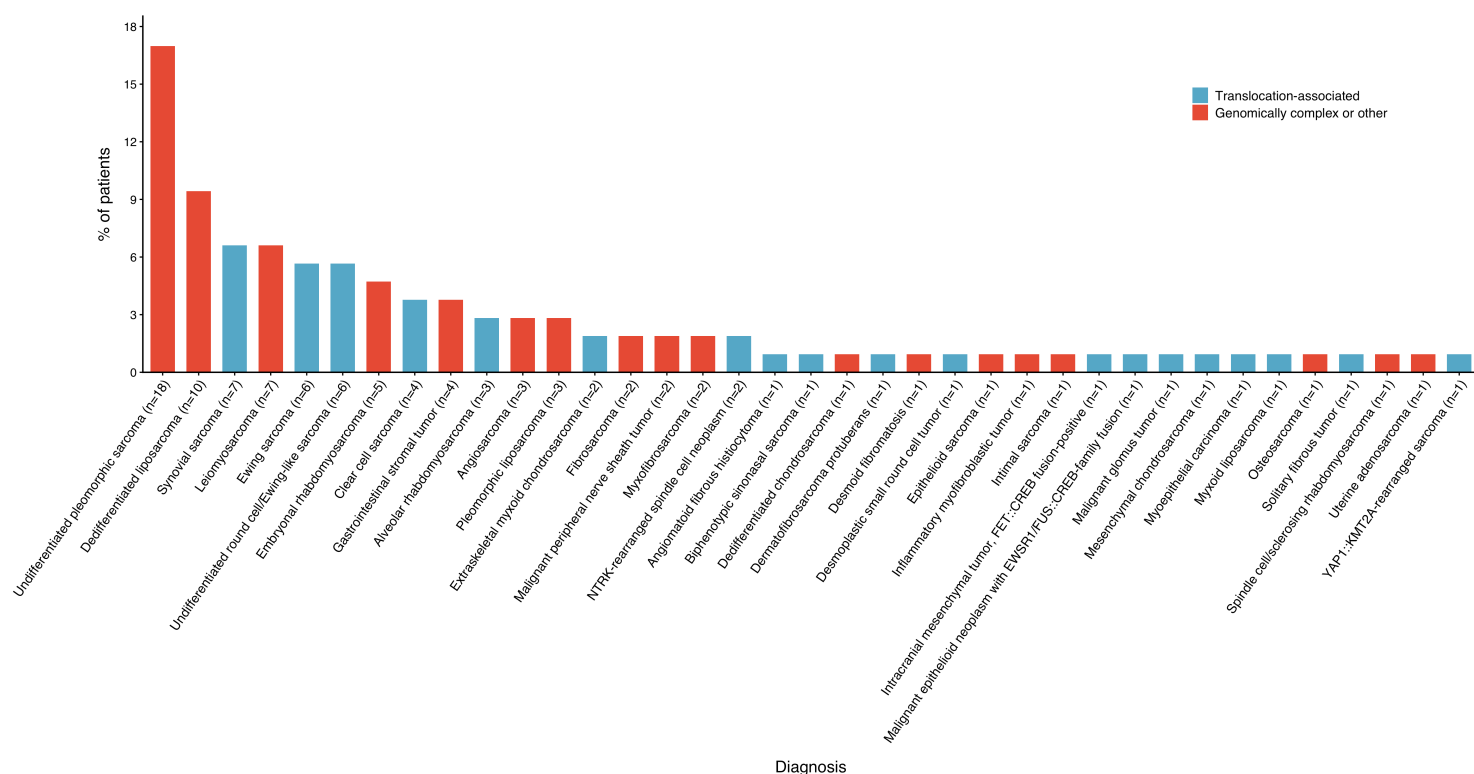
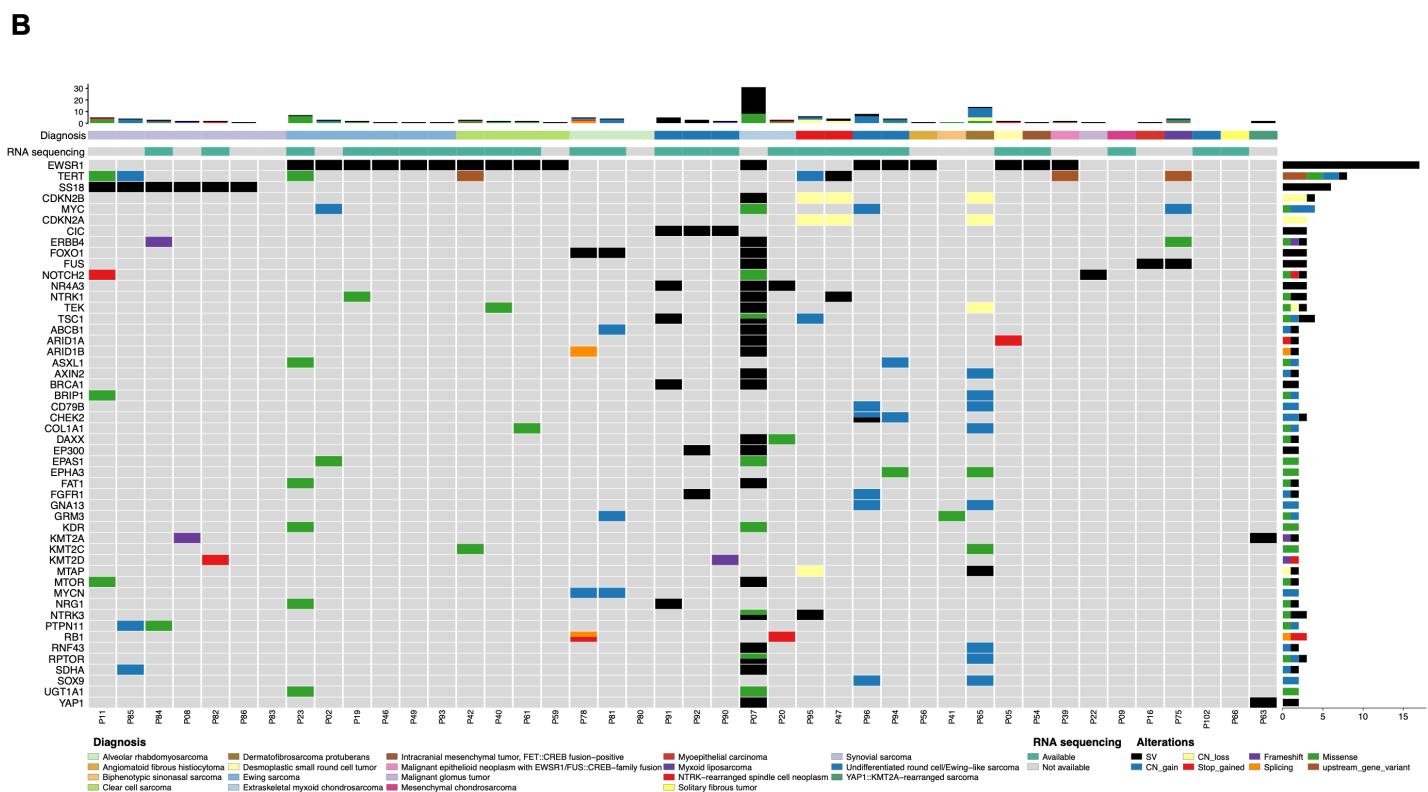
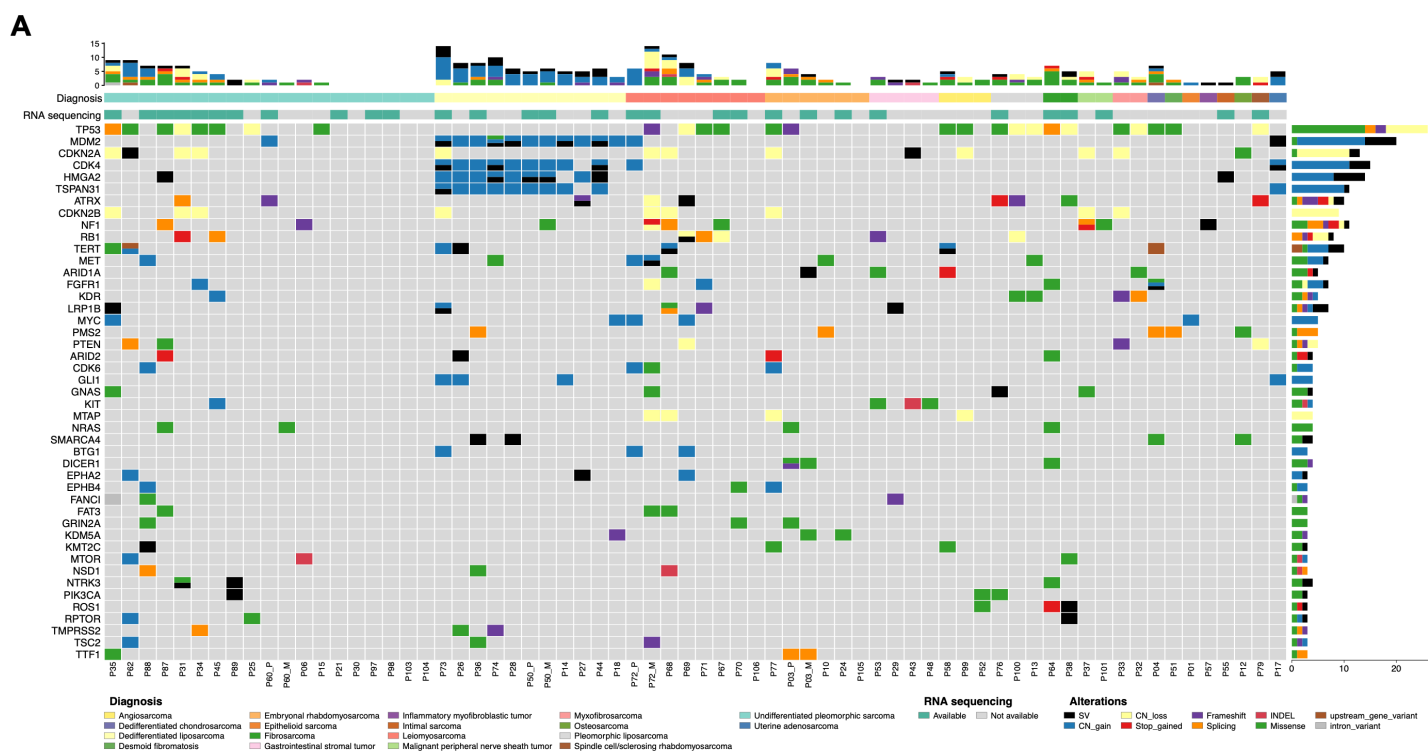


Figure S1



Supplementary Figure S1. Distribution of diagnoses by genomic class. Bars show the percentage of patients with each diagnosis in the 106-patient cohort. Colors denote translocation-associated sarcomas and genomically complex or other tumors. For visualization, CIC-rearranged sarcoma, sarcoma with BCOR genetic alterations, and round cell sarcoma with EWSR1–non-ETS fusions were grouped as “Undifferentiated round cell/Ewing-like sarcoma.”

Figure S2



Supplementary Figure S2. Genomic alteration landscapes by genomic class. Oncoplots of (A) genomically complex or other tumors and (B) translocation-associated sarcomas. Columns represent sequencing assays, rows represent genes, and colors indicate alteration types. Gray squares indicate no detected alteration. Genes were selected independently within each class: panel A includes genes altered in at least three assays, and panel B includes genes altered in at least two assays. The upper and right bar plots summarize alterations by assay and gene, respectively. Samples were arranged by standardized histologic diagnosis, with RNA-sequencing availability shown in the upper annotation. CNA, copy-number alteration; NGS, next-generation sequencing; RNA, ribonucleic acid; SV, structural variant.

Supplementary Table S1. Diagnostic impact of genomic findings. P indicates the presence of the listed molecular event; A indicates the absence of an expected molecular event when reliably assessed.

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Clear cell sarcoma	Undifferentiated pleomorphic sarcoma	Diagnostic reclassification	EWSR1::ATF1/EWSR1::CREM fusion (A)	1
Epithelioid fibrosarcoma	Solitary fibrous tumor	Diagnostic reclassification	NAB2::STAT6 fusion (P)	1
Epithelioid sarcoma	Undifferentiated pleomorphic sarcoma	Diagnostic reclassification	SMARCB1/INI1 loss or inactivation (A)	1
Epithelioid sarcoma	YAP1::KMT2A-rearranged sarcoma	Diagnostic reclassification	YAP1::KMT2A fusion (P)	1
Ewing sarcoma	Alveolar rhabdomyosarcoma	Diagnostic reclassification	PAX3::FOXO1 fusion (P)	1
Ewing sarcoma	Round cell sarcoma with EWSR1-non-ETS fusion	Diagnostic reclassification	EWSR1::NFATC2 rearrangement (P)	1
Ewing sarcoma	Synovial sarcoma	Diagnostic reclassification	SS18::SSX1 fusion (P)	1
Extraskeletal osteosarcoma	Dedifferentiated liposarcoma	Diagnostic reclassification	CDK4 amplification (P); HMGA2 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1
Fibrosarcoma	Gastrointestinal stromal tumor	Diagnostic reclassification	KIT mutation c.1676T>G(p.V559G) (P)	1

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Myxofibrosarcoma	Gastrointestinal stromal tumor	Diagnostic reclassification	MKRN1::BRAF fusion (P)	1
Rhabdomyosarcoma	Intracranial mesenchymal tumor, FET::CREB fusion-positive	Diagnostic reclassification	EWSR1::ATF1 fusion (P)	1
Soft tissue myoepithelioma/parachordoma	Extraskelatal myxoid chondrosarcoma	Diagnostic reclassification	EWSR1::NR4A3 fusion (P)	1
Spindle cell/sclerosing rhabdomyosarcoma	Dedifferentiated liposarcoma	Diagnostic reclassification	CDK4 amplification (P); HMGA2 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1
Well-differentiated liposarcoma	Dedifferentiated liposarcoma	Diagnostic reclassification	CDK4 amplification (P); HMGA2 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1
EWSR1-rearranged spindle cell tumor	Clear cell sarcoma	Diagnostic refinement	EWSR1::ATF1 fusion (P)	1
Liposarcoma	Myxoid liposarcoma	Diagnostic refinement	FUS::DDIT3 fusion (P)	1
Rhabdomyosarcoma	Embryonal rhabdomyosarcoma	Diagnostic refinement	DICER1 mutation c.5127T>A(p.D1709E) (P); DICER1 loss-of-function c.4732del(p.A1578Lfs*11) (P); FGFR4 mutation c.1605C>A(p.N535K) (P)	1
Undifferentiated round/small cell sarcoma	Ewing sarcoma	Diagnostic refinement	EWSR1::FLI1 fusion (P)	1

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Undifferentiated round/small cell sarcoma	Malignant epithelioid tumor with EWSR1/FUS-CREB family fusion	Diagnostic refinement	EWSR1::ATF1 fusion (P)	1
Undifferentiated round/small cell sarcoma	Round cell sarcoma with EWSR1-non-ETS fusion	Diagnostic refinement	EWSR1::NFATC2 rearrangement (P)	1
Undifferentiated round/small cell sarcoma	Synovial sarcoma	Diagnostic refinement	SS18::SSX2 fusion (P)	1
Undifferentiated round/small cell sarcoma	Sarcoma with BCOR genetic alterations	Diagnostic refinement	BCOR::CREBBP rearrangement (P)	1
Sarcoma, NOS	CIC-rearranged sarcoma	Diagnostic refinement	CIC::DUX4 fusion (P)	3
Sarcoma, NOS	Angiomatoid fibrous histiocytoma	Diagnostic refinement	EWSR1::CREM fusion (P)	1
Sarcoma, NOS	Biphenotypic sinonasal sarcoma	Diagnostic refinement	PAX3::WWTR1 rearrangement (P)	1
Sarcoma, NOS	Dedifferentiated liposarcoma	Diagnostic refinement	CDK4 amplification (P); HMGA2 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1
Sarcoma, NOS	Dedifferentiated liposarcoma	Diagnostic refinement	CDK4 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Sarcoma, NOS	Dedifferentiated liposarcoma	Diagnostic refinement	HMGA2 amplification (P); MDM2 amplification (P)	1
Sarcoma, NOS	Dedifferentiated liposarcoma	Diagnostic refinement	MDM2 amplification (P)	1
Sarcoma, NOS	Mesenchymal chondrosarcoma	Diagnostic refinement	HEY1::NCOA2 fusion (P)	1
Sarcoma, NOS	Myoepithelial carcinoma	Diagnostic refinement	FUS::KLF17 fusion (P)	1
Sarcoma, NOS	NTRK-rearranged spindle cell neoplasm	Diagnostic refinement	MYH9::NTRK3 fusion (P)	1
Sarcoma, NOS	NTRK-rearranged spindle cell neoplasm	Diagnostic refinement	TPM3::NTRK1 fusion (P); PRCC::NTRK1 fusion (P)	1
Sarcoma, NOS	Synovial sarcoma	Diagnostic refinement	SS18::SSX2 fusion (P)	1
Soft tissue myoepithelioma or extraskeletal myxoid chondrosarcoma	Extraskeletal myxoid chondrosarcoma	Diagnostic refinement	TFG::NR4A3 fusion (P)	1
Ewing sarcoma	Ewing sarcoma	Molecular confirmation	EWSR1::FLI1 fusion (P)	4
Clear cell sarcoma	Clear cell sarcoma	Molecular confirmation	EWSR1::ATF1 fusion (P)	2
Dedifferentiated liposarcoma	Dedifferentiated liposarcoma	Molecular confirmation	CDK4 amplification (P); MDM2 amplification (P); HMGA2 amplification (P); TSPAN31 amplification (P)	2
Synovial sarcoma	Synovial sarcoma	Molecular confirmation	SS18::SSX2 fusion (P)	2

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Alveolar rhabdomyosarcoma	Alveolar rhabdomyosarcoma	Molecular confirmation	PAX3::FOXO1 fusion (P)	1
Clear cell sarcoma	Clear cell sarcoma	Molecular confirmation	EWSR1::CREM fusion (P)	1
Dedifferentiated chondrosarcoma	Dedifferentiated chondrosarcoma	Molecular confirmation	IDH1 R132 mutation c.395G>A(p.R132H) (P); PDGFRA exon 18 mutation c.2524G>T(p.D842Y) (P)	1
Dedifferentiated liposarcoma	Dedifferentiated liposarcoma	Molecular confirmation	CDK4 amplification (P); MDM2 amplification (P); TSPAN31 amplification (P)	1
Dermatofibrosarcoma protuberans	Dermatofibrosarcoma protuberans	Molecular confirmation	COL1A1::PDGFB fusion (P)	1
Desmoid fibromatosis	Desmoid fibromatosis	Molecular confirmation	CTNNB1 mutation c.121A>G(p.T41A) (P)	1
Desmoplastic small round cell tumor	Desmoplastic small round cell tumor	Molecular confirmation	EWSR1::WT1 fusion (P)	1
Ewing sarcoma	Ewing sarcoma	Molecular confirmation	EWSR1::FEV fusion (P)	1
Gastrointestinal stromal tumor	Gastrointestinal stromal tumor	Molecular confirmation	KIT mutation c.1504_1509dup(p.A502_Y503dup) (P)	1
Gastrointestinal stromal tumor	Gastrointestinal stromal tumor	Molecular confirmation	KIT mutation c.1676T>A(p.V559D) (P)	1
Malignant glomus tumor	Malignant glomus tumor	Molecular confirmation	NOTCH2::CARMN/CARMN::NOTCH2 rearrangement (P)	1
Uterine adenosarcoma	Uterine adenosarcoma	Molecular confirmation	CDK4 amplification (P); MDM2 rearrangement (P)	1

Initial diagnosis	Final diagnosis	Diagnostic impact	Genomic basis	No. of patients
Epithelioid sarcoma	Epithelioid sarcoma	Molecular confirmation	SMARCB1 loss (P)	1
Synovial sarcoma	Synovial sarcoma	Molecular confirmation	SS18::SSX1 fusion (P)	1

Supplementary Table S2. Harmonized 79-gene common DNA set used for cross-platform alteration analysis.

ALK	CIC	EWSR1	FLT3	IDH1	MSH2	NRAS	PMS2	SDHD	TP53
APC	CTNNB1	FBXW7	FLT4	IDH2	MSH6	NTRK1	PRKAR1A	SMARCA4	TSC1
BCOR	DICER1	FGFR1	FOXO1	KDR	MTOR	NTRK2	PTEN	SMARCB1	TSC2
BRAF	EED	FGFR2	GLI1	KIT	MYC	NTRK3	RB1	STAT6	UGT1A1
CDK4	EGFR	FGFR3	GNAS	KRAS	MYOD1	NUTM1	ROS1	SUZ12	VEGFA
CDK6	ERG	FGFR4	H3F3A	MDM2	NF1	PDGFRA	SDHA	TFE3	WT1
CDKN2A	ETV1	FH	H3F3B	MED12	NF2	PDGFRB	SDHB	TOP1	YAP1
CDKN2B	ETV4	FLT1	HRAS	MLH1	NOTCH1	PIK3CA	SDHC	TOP2A	