

Supplementary Table 1 Abbreviations

Abbreviation	Full term	Definition
AI	Artificial intelligence	Computer systems performing tasks requiring human-like intelligence (<i>e.g.</i> , medical image analysis)
CCIM	Colorectal cancer immune module	Transcriptomic signature predicting immune activity and prognosis in colorectal cancer
CEUS	Contrast-enhanced ultrasound	Ultrasound technique using microbubble contrast agents to visualize tissue perfusion dynamics
CNN	Convolutional neural network	Deep learning architecture specialized in image recognition and feature extraction
CT	Computed tomography	Cross-sectional X-ray imaging for structural assessment of abdominal organs
ctDNA	Circulating tumor DNA	Tumor-derived cell-free DNA in blood; biomarker for early cancer detection and monitoring
DFS	Disease-free survival	Duration after treatment without clinical or radiological evidence of disease recurrence
DLRN	Learning-based radiomics nomogram	Prognostic model integrating deep learning radiomic features with clinical variables
DSA	Donor-specific antibodies	Antibodies targeting donor HLA antigens; biomarker for transplant rejection risk
EGC	Early gastric cancer	Gastric carcinoma limited to mucosa/submucosa without lymph node involvement
FL	Federated learning	Privacy-preserving ML framework training

			models across decentralized data sources
GAN	Generative networks	adversarial	AI system generating synthetic data <i>via</i> adversarial training of generator/discriminator networks.
HLA	Human antigen	leukocyte	Major histocompatibility complex (MHC) proteins governing immune recognition
LAGC	Locally advanced gastric cancer		Gastric tumors invading beyond submucosa (T2-T4) or with regional lymph node metastasis
LNM	Lymph node metastasis		Metastatic dissemination of cancer cells to regional lymph nodes
EGC	Early gastric cancer		Gastric carcinoma limited to mucosa/submucosa without lymph node involvement
FL	Federated learning		Privacy-preserving ML framework training models across decentralized data sources
GAN	Generative networks	adversarial	AI system generating synthetic data <i>via</i> adversarial training of generator/discriminator networks
HLA	Human antigen	leukocyte	Major histocompatibility complex (MHC) proteins governing immune recognition
LAGC	Locally advanced gastric cancer		Gastric tumors invading beyond submucosa (T2-T4) or with regional lymph node metastasis
LNM	Lymph node metastasis		Metastatic dissemination of cancer cells to regional lymph nodes
MAF	Mutation frequency	allele	Proportion of DNA fragments harboring a somatic mutation in liquid biopsies

MRI	Magnetic resonance imaging	Non-ionizing imaging using magnetic fields for high-resolution soft-tissue characterization (<i>e.g.</i> , liver fibrosis)
MSI	Microsatellite instability	Hypermutation phenotype from defective DNA mismatch repair; predictor of immunotherapy response.
NACT	Neoadjuvant chemotherapy	Cytotoxic therapy administered before curative-intent surgery
NER	Neutrophil-to-eosinophil ratio	Hematologic ratio reflecting inflammatory status in gastrointestinal disorders
NLP	Natural language processing	Computational analysis of unstructured clinical text (<i>e.g.</i> , pathology reports)
NPV	Negative predictive value	Probability that a negative diagnostic test result indicates true absence of disease
LAGC	Locally advanced gastric cancer	Gastric tumors invading beyond submucosa (T2-T4) or with regional lymph node metastasis
LMN	Lymph node metastasis	Metastatic dissemination of cancer cells to regional lymph nodes
MAF	Mutation allele frequency	Proportion of DNA fragments harboring a somatic mutation in liquid biopsies
MRI	Magnetic resonance imaging	Non-ionizing imaging using magnetic fields for high-resolution soft-tissue characterization (<i>e.g.</i> , liver fibrosis)
MSI	Microsatellite instability	Hypermutation phenotype from defective DNA mismatch repair; predictor of immunotherapy response
NACT	Neoadjuvant	Cytotoxic therapy administered before

	chemotherapy	curative-intent surgery
NER	Neutrophil-to-eosinophil ratio	Hematologic ratio reflecting inflammatory status in gastrointestinal disorders
NLP	Natural language processing	Computational analysis of unstructured clinical text (<i>e.g.</i> , pathology reports)
NPV	Negative predictive value	Probability that a negative diagnostic test result indicates true absence of disease
NRG	Non-apoptosis regulated cell death	Alternative cell death pathways (<i>e.g.</i> , necroptosis) implicated in therapy resistance
SWE	Shear wave elastography	Quantitative ultrasound technique measuring tissue stiffness <i>via</i> shear wave propagation
LNМ	Lymph node metastasis	Metastatic dissemination of cancer cells to regional lymph nodes
MAF	Mutation allele frequency	Proportion of DNA fragments harboring a somatic mutation in liquid biopsies
MRI	Magnetic resonance imaging	Non-ionizing imaging using magnetic fields for high-resolution soft-tissue characterization (<i>e.g.</i> , liver fibrosis)
MSI	Microsatellite instability	Hypermutation phenotype from defective DNA mismatch repair; predictor of immunotherapy response
NACT	Neoadjuvant chemotherapy	Cytotoxic therapy administered before curative-intent surgery
NER	Neutrophil-to-eosinophil ratio	Hematologic ratio reflecting inflammatory status in gastrointestinal disorders
NLP	Natural language	Computational analysis of unstructured

	processing	clinical text (<i>e.g.</i> , pathology reports)
NPV	Negative predictive value	Probability that a negative diagnostic test result indicates true absence of disease
NRG	Non-apoptosis regulated cell death	Alternative cell death pathways (<i>e.g.</i> , necroptosis) implicated in therapy resistance
SWE	Shear wave elastography	Quantitative ultrasound technique measuring tissue stiffness <i>via</i> shear wave propagation
TACS	Tumor-associated collagen signatures	Peritumoral collagen alignment patterns correlating with invasive potential
TLS	Tertiary lymphoid structures	Ectopic lymph node-like structures in tumors; surrogate for active anti-tumor immunity
TTB	Total tumor burden	Volumetric summation of all tumor lesions in serial imaging assessments
WSI	Whole-section images	Digitized high-resolution scans of complete histopathological tissue sections
