Disease-specific search strings

Searches combined each disease entity with terms reflecting the manuscript's conceptual axes: precision oncology, molecular stratification, biomarkers, heterogeneity, minimal residual disease/ctDNA, targeted therapy, immunotherapy, resistance, clinical trials, treatment sequencing, and unmet clinical needs. Equivalent spelling variants and closely related terms were used where appropriate. To ensure a structured and transparent screening process, two Authors were assigned to each disease-specific literature search: colorectal cancer (AO and ACC), gastric cancer (FP and GN), esophageal adenocarcinoma (FS and MC), pancreatic ductal adenocarcinoma (SZ and MCa), biliary tract cancers (MB and AO), and hepatocellular carcinoma (OG and GN). Within each disease area, the assigned Authors independently screened the titles and abstracts retrieved through the searches for relevance to the predefined conceptual scope of the Review. The resulting pools of potentially relevant records were subsequently discussed collectively by all Authors, who reached consensus on the articles to be retrieved and assessed in full text.

Disease	**Representative Boolean search string**
Colorectal cancer	("colorectal cancer" OR "colon cancer") AND ("precision oncology" OR "precision medicine" OR "molecular stratification" OR biomarker* OR "molecular subtype*" OR MSI OR "microsatellite instability" OR ctDNA OR "circulating tumor DNA" OR "minimal residual disease" OR MRD OR "targeted therapy" OR BRAF OR HER2 OR RAS OR resistance OR "treatment sequencing" OR "clinical trial*" OR "unmet need*")
Gastric cancer	("gastric cancer" OR "gastric adenocarcinoma" OR "gastroesophageal junction cancer") AND ("precision oncology" OR "precision medicine" OR "molecular classification" OR TCGA OR ACRG OR biomarker* OR HER2 OR MSI OR EBV OR PD-L1 OR immunotherapy OR "intratumoral heterogeneity" OR "spatial heterogeneity" OR "temporal heterogeneity" OR ctDNA OR MRD OR "perioperative therapy" OR resistance OR "clinical trial*" OR "unmet need*")
Esophageal cancer	("esophageal adenocarcinoma" OR "oesophageal adenocarcinoma" OR "gastroesophageal junction adenocarcinoma" OR "esophageal squamous cell carcinoma" OR "oesophageal squamous cell carcinoma") AND ("precision oncology" OR "precision medicine" OR "molecular profiling" OR biomarker* OR "pathological complete response" OR pCR OR "residual disease" OR ctDNA OR MRD OR immunotherapy OR PD-L1 OR "neoadjuvant therapy" OR "adjuvant therapy" OR "treatment response" OR "clinical trial*" OR "unmet need*")
Pancreatic ductal adenocarcinoma	("pancreatic ductal adenocarcinoma" OR PDAC OR "pancreatic cancer") AND ("precision oncology" OR "precision medicine" OR "molecular subtype*" OR "classical subtype" OR "basal-like" OR biomarker* OR "tumor microenvironment" OR stroma OR metabolism OR resistance OR FOLFIRINOX

	OR gemcitabine OR "targeted therapy" OR "treatment intensification" OR "adaptive trial*" OR "biomarker-enriched trial*" OR "unmet need*")
Biliary tract cancers	("biliary tract cancer" OR cholangiocarcinoma OR "gallbladder cancer") AND ("precision oncology" OR "precision medicine" OR "molecular profiling" OR biomarker* OR FGFR2 OR IDH1 OR BRAF OR HER2 OR NTRK OR "targeted therapy" OR immunotherapy OR ctDNA OR MRD OR heterogeneity OR "anatomical subtype*" OR "adjuvant therapy" OR "clinical trial*" OR "treatment sequencing" OR "unmet need*")
Hepatocellular carcinoma	("hepatocellular carcinoma" OR HCC) AND ("precision oncology" OR "precision medicine" OR "molecular profiling" OR biomarker* OR "WNT/beta-catenin" OR immunotherapy OR "immune exclusion" OR etiology OR cirrhosis OR "liver function" OR "host factor*" OR ctDNA OR "liquid biopsy" OR MRD OR "anti-angiogenic therapy" OR "clinical trial*" OR "treatment response" OR "unmet need*")