The Future of Tumor Markers: Advancing Early Malignancy Detection through Omics Technologies, Continuous Monitoring, and Personalized Reference Intervals

SUPPLEMENTARY MATERIAL

Novel tumor markers

Table S1. Genetic Alterations

Tumor Marker		Associated Cancer	Ref.
BARD1	BRCA1-associated ring domain	Breast Cancer	[1,2]
CDK12	Cyclin-dependent kinase 12	Breast Cancer	[3]
CDKN2A	Cyclin-dependent kinase inhibitor 2A	Melanoma	[4,5]
CHEK2	Checkpoint kinase 2	Breast Cancer	[6]
CTNNB1	Catenin Beta-1	Hepatocellular Carcinoma	[7,8]
HOXB	Homeobox B genes	Prostate Cancer	[9]
LIN28B	Lin-28 homolog B	Neuroblastoma	[10]
NRAS	Neuroblastoma Rat Sarcoma Viral Oncogene Homolog	Multiple Myeloma	[11]
PALB2	Partner and localizer of BRCA2	Breast Cancer	[12]
PTPN11	Protein tyrosine phosphatase nonreceptor type 11	Neuroblastoma	[13,14]
RAD51	RAD51 recombinase	Breast Cancer	[15]
SEPT9	Septin 9	Colorectal Cancer	[16]
SMAD4	SMAD family member 4	Pancreatic Cancer	[17]
SPI1	SPI-1 proto-oncogene	Neuroblastoma	[18]
TERT	Telomerase Reverse Transcriptase	Hepatocellular Carcinoma	[7]
TWIST1	Twist family transcription factor 1	Bladder Cancer	[19]
WASCH5	WASH complex subunit 5	Gastric Cancer	[20]

Table S2. Tissue Markers

Tumor Marker		Associated Cancer	Ref.
ACTBL2	Actin beta-like 2	Colorectal cancer	[21]
ADGRG1	Adhesion G protein-coupled receptor G1	Ovarian cancer	[22]

AMIGO2	Adhesion Molecule with Ig Like Domain family 2	Prostate cancer	[23]
C1QB	Complement C1q B-Chain	Gastric cancer	[24]
CDH3	Cadherin 3	Thyroid Cancer	[25]
CDK 3/5/8	Cyclin-dependent kinase 3/5/7	Colorectal cancer	[26]
CSPG4	Chondroitin sulfate proteoglycan 4	Melanoma	[27]
DHFR	Dihydrofolate Reductase	Neuroblastoma	[28]
E2F3	E2F Transcription Factor 3	Neuroblastoma	[28]
EPCAM	Epithelial cell adhesion molecule	Ovarian cancer	[22]
ESRP1	Epithelial splicing regulatory protein 1	Ovarian cancer	[22]
GARS1	Glycyl-tRNA synthetase	Bladder cancer	[29]
INSM-1	Insulinoma-associated protein 1	Thyroid Cancer	[30,31]
IQGAP1	GTPase Activating Protein-1	Gastric cancer	[32]
MCM	Minichromosome Maintenance Proteins	Bladder cancer	[33]
PRC1	Protein regulator of cytokinesis-1	Hepatocellular carcinoma	[34]
SATB2	Special AT-Rich Sequence-Binding Protein 2 ,	Colorectal cancer	[35]
TYROBP	TYRO protein tyrosine kinase binding protein,	Gastric cancer	[24]

Table S3. Serum Markers

Tumor Marker		Associated Cancer	Ref.
1-MA	1-Methyladenosine	Prostate cancer	[36]
Acetylcarnitine		Hepatocellular Carcinoma	[37]
AGO2	Argonaute-2	Multiple myeloma	[38]
AGT	Angiotensinogen	Gastric cancer	[39]
Anxa2	Annexin A2	Ovarian cancer Hepatocellular carcinoma	[40,41]
APO-A2	Apolipoprotein A2	Breast Cancer, Hepatocellular Carcinoma	[42,43]
Apo-AIV	Apolipoprotein A-4	Prostate Cancer	[36]
Benzoic acid		Colorectal cancer	[44]
C163A		Lung cancer	[45]
C3fc	C3f complement	Colorectal cancer	[46]

C4BPA	C4b-binding protein α-chain	Pancreatic cancer	[47]
Dermcidin		Melanoma	[48]
DKK1	Dickkopf-1	Hepatocellular carcinoma	[49]
Dysbindin		Pancreatic cancer	[50]
FBLN1	Fibulin-1	Colorectal cancer	[51]
FJX1	Four-jointed box kinase-1	Colorectal cancer	[52]
FOLR1	Folate-receptor-1	Ovarian cancer	[53]
H19	Long non-coding RNA-H19	Gastric cancer	[54]
Hsp90α	Heatshock protein 90α	Hepatocellular Carcinoma	[55,56]
ISG15	Ubiquitin-like protein ISG15	Thyroid Cancer	[57]
LG3BP	Galectin-3 recombinant protein	Lung Cancer	[45]
MIC-1	Macrophage inhibitory cytokine-1	Pancreatic Cancer	[58]
MDKN	Midkine	Neuroblastoma, Hepatocellular Carcinoma	[59,60]
miR-200	miRNA-200	Ovarian cancer	[61]
miR-200b	miRNA-200b	Hepatocellular Carcinoma	[43]
miR-21	miRNA-21	Breast Cancer	[62]
miR-421	miRNA-421,	Gastric cancer	[63]
MMP-7	Matrix metalloproteinase-7	Gastric cancer	[39]
MMP-9	Matrix metalloproteinase-9	Ovarian caner	[64]
MTA2	Metastasis-associated protein-2	Multiple myeloma	[38]
MUC5AC	Mucin 5AC	Pancreatic cancer	[65]
NY-ESO-1	New York esophageal squamous cell carcinoma,	Lung cancer	[66]
Osteopontin		Hepatocellular carcinoma	[67,68]
PA	Phosphatidic acid	Prostate cancer	[36]
Plexin-B2		Thyroid Cancer	[57]
sBCMA	Soluble B cell maturation antigen	Multiple myeloma	[69]
SOX2	SRY-Box Transcription Factor 2	Lung cancer	[66]
STK31	Serine threonine kinase-31	Colorectalcancer	[51]
TIMP-1	Tissue inhibitor metalloproteinase 1	Pancreatic cancer	[70]
TIMP4	Tissue inhibitor metalloproteinase 4	Gastric cancer	[20]
TNC	Tenascin C	Prostate Cancer	[36]
TTR	Transthyretin	Melanoma	[71]

Vitronectin	Melanoma	[48]

Table S4. Urinary Markers

Tumor Marker		Associated Cancer	Ref.
3-MTS	3-Methoxytyramine sulphate	Neuroblastoma	[72]
5-hydroxymethylcytosine		Multiple myeloma	[73]
A1-antitrypsin		Bladder cancer	[74]
APOA1	Apolipoprotein A-I	Bladder cancer	[74]
CR	Creatine riboside	Lung cancer	[75,76]
FGβ	Fibrinogen Beta Chain	Bladder cancer	[74]
NAM	nicotinic acid mononucleotide,	Thyroid Cancer	[77]
NANA	*N*-acetylneuraminic acid	Lung cancer	[75,76]
Sarcosine		Prostate cancer	[78,79]
ZA2G	Zinc-alpha-2 glycoprotein, 1	Breast Cancer	[80]

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