

SUPPLEMENT 1

Kim Y.S., Kaidina A.M., Chiang J.H., Yarygin K.N., Lupatov A.Yu., Molecular markers of cancer stem cells verified *in vivo*, Biomeditsinskaya khimiya, 2016, vol: 62(3), 228-238. DOI: 10.18097/PBMC20166203228

Table. CSCs molecular markers verified *in vivo*.

In this table is presented the phenotype of tumor cells, displaying the highest tumorigenicity in immunodeficient mice. Table encompasses 97 publications, respecting to approximately 30 different oncological nosological entities.

Tumor type	Phenotype of the most tumorigenic populations	Phenotype of the least tumorigenic or non-tumorigenic populations	Phenotype of populations with similar tumorigenicity	Strain of mice	Reference
SOLID TUMORS					
Breast					
Breast cancer	CD44 ⁺ CD24 ⁻	He-CD44 ⁺ CD24 ⁻	-	NOD/SCID	138
Breast cancer	CD44 ⁺ CD24 ⁻	CD44 ⁺ CD24 ⁺	-	NOD/SCID	139
		CD44 ⁻ CD24 ⁺			
		CD44 ⁻ CD24 ⁻			
Breast cancer	ALDH1 ⁺	ALDH1 ⁻	-	NOD/SCID	140
Breast cancer	ALDH+GD2+	ALDH+ ALDH- ALDH-GD2-	-	NOD/SCID	141
Breast carcinosarcoma	CD49d ⁺ /high	CD49d ⁻ /low	-	NOD/SCID	142
Breast cancer	Lin ⁻ CD44 ⁺ CD24 ^{-/low}	Lin ⁻ He-CD44 ⁺ CD24 ^{-/low}	-	NOD/SCID	143
Breast cancer	CD44 ⁺ CD24 ⁻	He-CD44 ⁺ CD24 ⁻	-	SCID	144
Breast cancer	CD44 ⁺ CD24 ⁻	He-CD44 ⁺ CD24 ⁻	-	NOD/SCID	145

Breast cancer	Lin ⁻ CD44 ⁺	Lin ⁻ CD44 ⁻	-	NOD/SCID	146
	Lin ⁻ B38.1 ⁺	Lin ⁻ B38.1 ⁻			
	Lin ⁻ CD24 ⁻	Lin ⁻ CD24 ⁺			
	Lin ⁻ CD44 ⁺ CD24 ^{-/low}	Lin ⁻ CD44 ⁺ CD24 ⁺			
	Lin ⁻ CD44 ⁺ CD24 ^{-/low} EpCAM ⁺	Lin ⁻ CD44 ⁺ CD24 ^{-/low} EpCAM ⁻			
Endometrium					
Endometrial carcinoma	-	-	CD133 ⁺	NOD/SCID	173
			CD133 ⁻		
Gallbladder					
Gallbladder carcinoma	CD133 ⁺	CD133 ⁻	-	Nude (BALB/c)	123
Gaster					
Gastric cancer	EpCAM ⁺ CD44 ^{v8-10} ⁺	EpCAM ⁺ CD44 ^{v8-10} ⁻	-	NOD/SCID/IL2 γ ⁻ (NSG)	120
Gastric cancer	EpCAM ⁺ CD44 ⁺	EpCAM ⁻ CD44 ⁻	-	Nude	121
		EpCAM ⁻ CD44 ⁺			
		EpCAM ⁺ CD44 ⁻			
Gastric adenocarcinoma	CD44 ⁺ CD54 ⁺	CD44 ⁻ CD54 ⁺	-	SCID, nude	122
		CD44 ⁺ CD54 ⁻			
		CD44 ⁻ CD54 ⁻			
Head and neck					
Head and neck squamous cell carcinoma	Lin ⁻ CD44 ⁺	Lin ⁻ CD44 ⁻	-	NOD/SCID, Rag2 γ DKO	160

Head and neck squamous cell carcinoma	ALDH ^{high}	ALDH ^{low}	-	NOD/SCID	161
Head and neck cancer	CD133 ⁺	CD133 ⁻	-	Nude (BALB/c)	162
Head and neck squamous cell carcinoma	-	-	CD44 ⁺	Nude (BALB/c)	163
			CD44 ⁻		
Hypopharynx					
Hypopharyngeal cancer	EpCAM ⁺ CD271 ⁺	EpCAM ⁺ CD271 ⁻	-	NOD/SCID/IL-2R γ C ^{null} (NOG)	119
Intestine					
Colorectal cancer	CD133 ⁺ CD44 ⁺	CD133 ⁻ CD44 ⁻	-	NOD/SCID	124
		CD133 ⁺ CD44 ⁻			
		CD133 ⁻ CD44 ⁺			
Colorectal cancer	EpCAM ^{high} CD44 ⁺	EpCAM ^{low} CD44 ⁻	-	NOD/SCID	125
		EpCAM ^{high} CD166 ⁺			
		CD44 ⁺ CD166 ⁺			
		CD44 ⁺ CD166 ⁻			
		CD44 ⁻ CD166 ⁻			
Colorectal cancer	EphB2 ^{high} EpCAM ⁺	EphB2 ^{med} EpCAM ⁺	-	NOD/SCID	126
		EphB2 ^{low} EpCAM ⁺			
Colorectal cancer	CD133 ⁺	CD133 ⁻	-	NOD/SCID	23
Colorectal cancer	CD133 ⁺	CD133 ⁻	-	SCID	127

Colorectal cancer (pleural effusion)	EpCAM+	CD45+ EpCAM-CD45-	-	NOD/SCID/IL2 γ R-/-	128
	EpCAM+CD24(high)	EpCAM+CD24(low)	-		
	EpCAM+CEA(high)	EpCAM+CEA(low)	-		
	EpCAM+CD44v7(low)	EpCAM+CD44v7(high)	-		
	EpCAM+Cadherin-11(low)	EpCAM+Canherin-11(high)	-		
Colon cancer	ALDH1 ⁺	ALDH1 ⁻	-	NOD/SCID	129
	CD44 ⁺	CD44 ⁻	-		
	CD133 ⁺	CD133 ⁻	-		
	ALDH1 ⁺ CD133 ⁺	ALDH1 ⁺ CD133 ⁻ , ALDH1 ⁺	-		
	-	-	ALDH1 ⁺ CD44 ⁺ ALDH1 ⁺ CD44 ⁻		
Colon adenocarcinoma	CD133 ⁺	CD133 ⁻	-	nude	130
Rectal adenocarcinoma	CD44 ⁺ CD54 ⁺	CD44 ⁺ CD54 ⁻	-	Nude (BALB/c)	131
		CD44 ⁻ CD54 ⁺			
		CD44 ⁻ CD54 ⁻			
Kidney					
Renal cell cancer	CD105 ⁺	CD105 ⁻	-	SCID	170
Wilms tumor	NCAM ⁺	NCAM ⁻	-	NOD/SCID, NOG	171
	NCAM ⁺ ALDH1 ⁺	NCAM ⁺ ALDH1 ⁻			
Liver					
Hepatocellular carcinoma	CD45 ⁻ CD90 ⁺	CD45 ⁻ CD90 ⁻	-	SCID/Beige	164

Hepatocellular carcinoma (subtype EpCAM+AFP+)	EpCAM ⁺	EpCAM ⁻	-	NOD/SCID	165
Hepatocellular carcinoma	EpCAM ⁺	EpCAM ⁻	-	NOD/SCID (NOD/NCrCrl-Prkdc ^{scid})	166
Lung					
Lung cancer	CD133 ⁺	CD133 ⁻	-	SCID	22
Lung cancer	CD133 ⁺	CD133 ⁻	-	SCID	136
Non-small cell lung cancer	CD133 ⁺	CD133 ⁻	-	Nude (BALB/c)	137
Musculo-skeletal system					
Ewing sarcoma	CD133 ⁺	CD133 ⁻	-	NOD/SCID	158
Synovial sarcoma	SP	Non-SP	-	NOD/SCID	159
Osteosarcoma	SP	Non-SP	-	NOD/SCID	
Malignant fibrohistiocyoma	SP	Non-SP	-	NOD/SCID	
Nervous system					
Medulloblastoma	CD133 ⁺	CD133 ⁻	-	NOD/SCID	147
Glioblastoma multiforme	CD133 ⁺	CD133 ⁻	-	NOD/SCID	148
Glioblastoma	CD133 ⁺	CD133 ⁻	-	NOD/SCID	147
Glioblastoma	CD133 ⁺	CD133 ⁻	-	BalbC athymic nude	149
Glioblastoma	CD133 ⁺	CD133 ⁻	-	Athymic BALB/c nu/nu	150

Glioblastoma	CD133+	CD133-	-	SCID	151
Glioblastoma	CD133+	CD133-	-	SCID	152
Glioblastoma	CFSE(high)	CFSE(low)	-	NOD/SCID	153
Neuroblastoma	CD24+CD34+	CD24-CD34- CD24+CD34- CD24-CD34+	-	SCID/Beige	154
Atypical teratoid/rhabdoid tumor	CD133+	CD133-	-	SCID (BALB/c)	155
Atypical teratoid/rhabdoid tumor	CD133+	CD133-	-	BALB/c nude	156
Supratentorial primitive neuroectodermal tumor	CD133+CD15+ CD133+CD15-	CD133-CD15+ CD133-CD15-	-	Rag2/SCID	157
Ovary					
Ovarian cancer	CD133 ⁺	CD133 ⁻	-	NOD/SCID	174
Ovarian cancer	CD44 ⁺ CD117 ⁺	CD44 ⁻ CD117 ⁻	-	BALB/c-nu/nu	175
Ovarian cancer	CD117 ⁺ Lin ⁻	CD117 ⁻ Lin ⁻	-	Nude (BALB/c)	176
Pancreas					
Pancreatic adenocarcinoma	c-Met ^{high}	c-Met ⁻	-	NOD/SCID	167
	c-Met ^{high} CD44 ⁺	c-Met ⁻ CD44 ⁻			
	c-Met ^{high} CD133 ⁺	c-Met ⁻ CD133 ⁻			
	CD44 ⁺ CD24 ⁺ EpCAM ⁺	CD44 ⁻ CD24 ⁻ EpCAM ⁻			
Pancreatic cancer	CD133 ⁺ CD44 ⁺ CD24 ⁺ EpCAM ⁺	CD133 ⁻ CD44 ⁻ CD24 ⁻ EpCAM ⁻	-	NOD/SCID	168
Pancreatic cancer	CD133 ⁺	CD133 ⁻	-	NMRI nu/nu	24

Pancreatic adenocarcinoma	CD44 ⁺	CD44 ⁻	-	NOD/SCID	169
	CD24 ⁺	CD24 ⁻			
	EpCAM ⁺	EpCAM ⁻			
	CD44 ⁺ EpCAM ⁺	CD44 ⁻ EpCAM ⁻			
	CD24 ⁺ EpCAM ⁺	CD24 ⁻ EpCAM ⁻			
	CD44 ⁺ CD24 ⁺	CD44 ⁻ CD24 ⁻			
	CD44 ⁺ CD24 ⁺ EpCAM ⁺	CD44 ⁻ CD24 ⁻ EpCAM ⁻			
Skin					
Melanoma	ABCB5 ⁺	ABCB5 ⁻	-	NOD/SCID	132
Melanoma	ALDH ⁺	ALDH ⁻	-	NOD/SCID (NCI), NSG	133
Melanoma	CD271 ⁺	CD271 ⁻	-	BALB/c-Swiss nude (CAnN.Cg- Foxn1nu/Crl, Nude) NSG (NOD.Cg-Prkdcscid Il2rgtm1Wjl/S, NSG) NOD/SCID (NOD.CB17/JHlHsd- Prkdcscid, N/S)	134
Melanoma	ALDH(high)SSC(low)	ALDH ⁻	-	NOD/SCID, NSG (Cg-Prkdc ^{scid} Il2rg ^{tm1Wjl/SzJ})	135
Thyroid gland					
Thyroid cancer	ALDH ^{high}	ALDH ^{low}	-	NOD/SCID	172

HEMATOLOGICAL MALIGNANCIES

Lymphoid tissue

Acute lymphoblastic leukemia	CD19 ⁺	CD19 ⁻	-	NOD.CB17-Prkdc ^{scid} /NcrCrl (NOD/SCID), NOD.Cg-Prkdc ^{scid} Il2rg ^{tm1Wjl} /SzJ (NSG)	177
Acute lymphoblastic leukemia	CD34 ⁺ CD7 ⁻	CD34 ⁺ CD7 ⁺	-	NSG, NOD/SCID	178
		CD34 ⁻			
	CD34 ⁺ CD19 ⁻	CD34 ⁺ CD19 ⁺			
Acute lymphoblastic leukemia	CD34 ⁺ CD10 ⁻	CD34 ⁺ CD10 ⁺	-	NOD/SCID	179
		CD34 ⁻ CD10 ⁺			
		CD34 ⁻ CD10 ⁻			
	CD34 ⁺ CD19 ⁻	CD34 ⁺ CD19 ⁺			
		CD34 ⁻ CD19 ⁻			
CD34 ⁻ CD19 ⁺					
B-precursor acute lymphoblastic leukemia	CD34 ⁺ CD38 ⁺ CD19 ⁺ , CD34 ⁺ CD38 ⁻ CD19 ⁺	CD34 ⁺ CD38 ⁻ CD10 ⁻ CD19 ⁻	-	NOD/SCID/IL2r γ ^{null}	180
B-cell acute lymphoblastic leukemia	CD34 ⁺ CD19 ⁻	CD34 ⁺ CD19 ⁺	-	NOD/LtSz-scid IL-2R γ^c -null (NSG)	181
T-cell acute lymphoblastic leukemia	CD34 ⁺ CD7 ⁻	CD34 ⁺ CD7 ⁺	-		

T-lymphoblastic leukemia	CD7 ⁺ CD1a ⁻	CD7 ⁻	CD34 ⁺	NS122	182
		CD7 ⁺ CD1a ⁺	CD34 ⁻		
T-cell acute lymphoblastic leukemia	CD34 ⁺ CD4 ⁻	CD34 ⁺ CD4 ⁺	-	NOD/SCID	183
		CD34 ⁻ CD4 ⁺			
		CD34 ⁻ CD4 ⁻			
	CD34 ⁺ CD7 ⁻	CD34 ⁺ CD7 ⁺			
		CD34 ⁻ CD7 ⁺			
		CD34 ⁻ CD7 ⁻			
Mantle cell lymphoma	CD133 ⁺ CD19 ⁻	CD133 ⁻ CD19 ⁺	-	NOD/SCID	184
Mantle cell lymphoma	CD45 ⁺ CD19 ⁻	CD45 ⁺ CD19 ⁺	-	NOD/SCID	185
Myeloid tissue					
Multiple myeloma	CD138 ⁻ CD34 ⁻	CD138 ⁺ CD34 ⁻	-	NOD/SCID	186
Acute myeloid leukemia	CD34 ⁺ Thy-1 ⁻	CD34 ⁻	-	NOD/SCID	187
		CD34 ⁺ Thy-1 ⁺			
Acute myeloid leukemia	CD34 ⁺	CD34 ⁻	-	NOD/SCID	5
	CD34 ⁺ CD38 ⁻	CD34 ⁺ CD38 ⁺			
Acute myeloid leukemia	CD34 ⁺ CD38 ⁻ CD123 ⁺ N-cadherin ⁺	CD34 ⁺ CD38 ⁻ CD123 ⁺ N-cadherin ⁻	-	NOD/SCID	188
	CD34 ⁺ CD38 ⁻ CD123 ⁺ Tie2 ⁺	CD34 ⁺ CD38 ⁻ CD123 ⁺ Tie2 ⁻			
Acute myeloid leukemia	TIM-3 ⁺	TIM-3 ⁻	-	NOD.Cg-Rag1 ^{tm1Mom} Il2rg ^{tm1Wjl/SzJ} (NRG)	189
Acute myeloid leukemia	CD34 ⁺ CD38 ⁺	CD34 ⁺ CD38 ⁻	-	NOD/SCID/IL2rγ ^{-/-} , NOD/SCID/β ₂ m ^{-/-}	190
Acute myeloid leukemia	CD34 ⁺ CD71 ⁻	CD34 ⁺ CD71 ⁺	CD34 ⁺	NOD/SCID	191
	CD34 ⁺ HLA-DR ⁻	HLA-DR ⁺	CD34 ⁻		

Acute myeloid leukemia	-	-	CD34+	SCID	192
			CD34-		
Acute myeloid leukemia	CD34 ⁺ CD38 ⁻	CD34 ⁺ CD38 ⁺	-	NOD/SCID-IL-2R γ ^{-/-}	193
		CD34 ⁻			
Acute myeloid leukemia	CD34 ⁺ MUC ^{high}	CD34 ⁺ MUC ^{low}	-	NOD/SCID/IL2R γ ^{null} (NSG)	194
Acute myeloid leukemia	Lin ⁻ CD34 ⁺ TIM3 ⁺	Lin ⁻ CD34 ⁺ TIM3 ⁻	-	NOD/SCID/IL2R γ ^{null} (NSG)	195
Acute myeloid leukemia	ALDH ^{br}	ALDH ^{dim}	-	NOD/SCID	196
Acute myeloid leukemia	ALDH ⁺	ALDH ⁻	-	NOD/SCID	197
Acute myeloid leukemia	CD33 ⁺	CD33 ⁻	-	NOD/SCID, NOD/SCID- β _{2m} ^{-/-}	198
	Lin ⁻ CD34 ⁺ CD38 ⁻ CD33 ⁺	Lin ⁻ CD34 ⁺ CD38 ⁻ CD33 ⁻			
Acute myeloid leukemia	Hoechst 33342 ⁻ PyroninY ⁻	Hoechst 33342 ⁻ PyroninY ⁺	-	NOD/SCID	199
		Hoechst 33342 ⁺ PyroninY ⁺			
Acute myeloid leukemia	CD34 ^{-/low} SP	CD34 ^{-/low} He-SP	-	NOD/SCID	200
Acute myeloid leukemia	Lin ⁻ CD34 ^{dim} CD38 ⁻	Lin ^{dim} CD34 ^{dim} CD38 ⁺	-	NOD/SCID/IL2R γ ^{c>null}	201
		Lin ^{dim} CD34 ^{dim} CD38 ⁻			
		Lin ⁻ CD34 ^{dim} CD38 ⁺			
Acute myeloid leukemia with mutated NPM1	CD34 ⁺	CD34 ⁻	-	NOD/SCID/IL2R γ ^{null} (NOG)	202
Acute myeloid leukemia with mutated NPM	-	-	CD34+	NOD/SCID/ β _{2m} ^{-/-} , NOD/SCID/IL2R γ ^{-/-}	203
			CD34-		

Chronic myeloid leukemia blast crisis; transformed Philadelphia chromosome-positive (Ph+)	CD34 ⁺ CD38 ⁻ CD19 ⁺	CD34 ⁻ CD38 ⁺ CD19 ⁺	-	NOD/SCID NOD/SCID/IL-2R γ ^{-/-} (NOG)	204
	CD34 ⁺ CD38 ⁺ CD19 ⁺		CD34 ⁺ CD38 ⁻ CD19 ⁺		
	-	-	CD34 ⁺ CD38 ⁺ CD19 ⁺		
	-	-	CD34 ⁻ CD38 ⁺ CD19 ⁺		
Chronic myeloid leukemia	CD34 ⁺	CD34 ⁻	-	NOD/SCID	205
Chronic myeloid leukemia	CD34 ⁺ CD38 ⁻ ALDH ^{high}	CD34 ⁺ CD38 ⁻ ALDH ^{low}	-	NOD/SCID-IL2R γ ^{null} (NOG)	206
Chronic myeloid leukemia	Lin ⁻ CD34 ⁺ CD38 ⁻	Lin ⁻ CD34 ⁺ CD38 ⁺	-	NOD/SCID- β ₂ m ^{-/-}	207
Chronic myeloid leukemia	-	-	CD34 ⁺ Hoechst33342 ^{low} PyroninY ^{low}	NOD/SCID- β ₂ m ^{-/-}	208
			CD34 ⁺ Hoechst33342 ^{dim/high} PyroninY ^{dim/high}		
Chronic myeloid leukemia	CD34 ⁺ CD38 ⁻ CD26 ⁺	CD34 ⁻	-	NOD/SCID/IL2r γ ^{-/-} (NSG)	209
Juvenile chronic myelogenous leukemia	CD34 ⁺ CD38 ⁻	CD34 ⁺ CD38 ⁺	-	SCID	210
		CD34 ⁻			

SP – side population; NS122 – NOD/SCID mice with anti-CD122 treatment.

Cells phenotype, mice strains and nosological entities are presented in the way they are designated in original publications.

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