

RNAscope® Probes for Stem Cell RNA Biomarkers

Get quantitative molecular detection with morphological context in a single assay.

Above: Human gut intestine: *OLFM4* crypt base columnar (CBCs) stem cells

Featured Publications using RNAscope® Technology

Clinical application of circulating tumor cells in breast cancer. Broersen LH, Van Pelt GW, Tollenaar RA, Mesker WE. (2014). *Cellular Onc.*, 1–7. doi: 10.1371/journal.pone.0054543. PMID: 24249155

Distribution of *LGR5+* Cells and Associated Implications during the Early Stage of Gastric Tumorigenesis. Jang BG, Lee BL, Kim WH. (2013). *PLoS One*, 8(12):e82390. doi: 10.1371/journal.pone.0082390. PMID: 24340024

Interfollicular Epidermal Stem Cells Self-Renew via Autocrine *Wnt* Signaling. Lim X, Tan SH, Koh WL, Chau RM, Yan KS, Kuo CJ, van Amerongen R, Klein AM, Nusse R (2013). *Science*, 342(6163), 1226–1230. doi: 10.1126/science.1239730. PMID: 24311688

In situ validation of an intestinal stem cell signature in colorectal cancer. Ziskin JL, Dunlap D, Yaylaoglu M, Fodor IK, Forrest WF, Patel R, Ge N, Hutchins GG, Pine JK, Quirke P, Koeppen H, Jubb AM (2013). *Gut*, 62(7), 1012–1023. doi: 10.1136/gutjnl-2011-301195. PMID: 22637696

MD+MC

Molecular Detection visualizes what genes are expressed.

Morphological Context localizes where those genes are expressed.

Stem Cell RNA Biomarkers

Recent stem cell research produced a wealth of discoveries on the identities of stem cells, how they self-renew and differentiate into specialized cells and how they can be reprogrammed *in situ*. Researchers are further studying stem cells in complex tissue environments addressing the following topics:

Identification of stem cells and signaling molecules: Where are the stem cells located and where do their differentiation signals come from? Antibody-based approaches lack the sensitivity required to study secreted protein signals, often present at low concentrations. Although high in sensitivity, extraction-based techniques like PCR destroy the localization information.

Stem cell functions *in vivo*: Why do different lineages of stem cells exist and what are their functions in a tissue? What are the roles of these stem cells in processes like wound regeneration?

Balancing of stem cell signaling: What controls proliferation over differentiation? How are these different cell fates balanced in the tissue?

Clinical relevance—connecting stem cells with diseases: Which stem cell lineages are associated with a certain disease? One area of intense investigation is cancer stem cells.

Multiplexing of several targets in a single assay enables detection of both stem cell markers and signals that they produce. Additionally, RNAscope's single-molecule sensitivity and intact morphological context have proven to be a key tool in these applications.

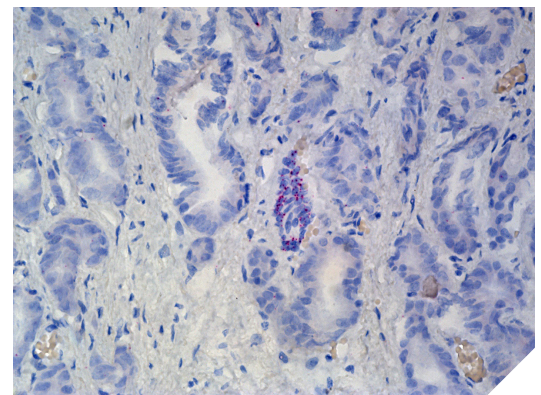


Figure 1. Human prostate: Detection of *TP63* mRNA expression in FFPE tissue with RNAscope® 2.0 HD Red Detection Kit

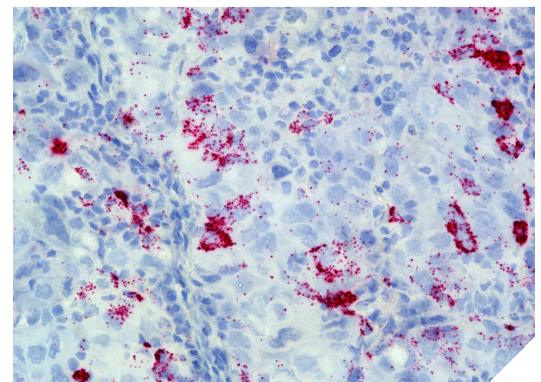


Figure 2. Human lung: Detection of *MMP9* mRNA expression in FFPE tissue with RNAscope® 2.0 HD Red Detection Kit

Visualize your stem cell RNA today acdbio.com/stemcells

RNAscope® Human Stem Cell RNA Probe List

STEM CELL RELATED GENES								CANCER STEM CELL MARKERS	
CAT #	Gene	CAT #	Gene	CAT #	Gene	CAT #	Gene	CAT #	Gene
401191	ABCB1	400771	H19	310221	KRT19	404231	SMAD2	310151	ALDH1A1
311011	ASCL2	400771-C3	H19	588991	LIN28A	404251	SMAD4	310151-C3	ALDH1A1
591721	BCL2	607081	HAS2	315401	LINC-ROR	405831	SMO	591931	BMI1
591721-C3	BCL2	524821	HBEGF	408991	MAPT	560421	SNAI1	313021	CD24
408271-C4	BCL2L1	524821-C2	HBEGF	601731	MCAM	554581	SNAI2	539251-C2	CD34
409041	BDNF	311191	HES1	311781	MDM2	311301	SOX11	560821-C2	CD34
485471	BRCA1	310761	HGF	310051-C2	MET	404221	SOX9	311271	CD44
485471-C2	BRCA1	314331	HIF1A	588941	MGMT	605511	TERT	310511	CXCR4
401371	BRCA2	594851	HMGB2	408011	MMP14	313131	TGFA	310281	EPCAM
549171	CCL5	594851-C3	HMGB2	311331	MMP9	400881	TGFB1	312671	ERBB2
591821	CCND1	402951	ICAM1	311331-C2	MMP9	407121	TGFB1	310081	ERBB2
313021-C3	CD24	537491	IDH1	432361	MSI2	404581	TGFB2	310081-C2	ERBB2
407201	CDH3	537791	IDH2	310391	MUC1	310421	TNF	310081-C3	ERBB2
311401	CDKN1A	559781	IFNG	310391-C2	MUC1	310421-C2	TNF	310991	GLI1
607061	CDKN1B	310501-C2	IFNG	310391-C3	MUC1	400611	TNFRSF1A	310991-C2	GLI1
310181	CDKN2A	314641	IGF1	312891	MUC5AC	310831	TNFRSF8	557201	IL6R
406261	CDX2	313031	IGF1	604491	NANOG	605201	TP53	559021	ITGA6
310111	CSF1R	602051	IL10	604491-C2	NANOG	601891	TP63	559021-C3	ITGA6
310811	CSF1R	310931	IL17A	549451	NGF	312731	TSC2	311021	LGR5
311731	CTNNB1	400301	IL18	311861	NOTCH1	310431	TWIST1	311021-C2	LGR5
403051	DICER1	310361	IL1B	558991	NOTCH3	311351	VEGFA	311021-C3	LGR5
319461	EGFR	402041	IL2	558991-C2	NOTCH3	604921	WNT5A	310051	MET
310281-C5	EPCAM	542211	IL3	531491	PAF1	408231	WNT7A	311761	MYC
604021	ERG	315191	IL4	588881-C2	PAX6	315581	IFNG	311761-C2	MYC
528941	EZH1	319391-C2	IL5	402431-C3	PODXL	406601	IL17A	406331	NGFR
405491	EZH2	310371	IL6	592861	POU5F1	316151	TNF	311041	HS-OLFM4
319861	F2RL1	310371-C2	IL6	592861-C2	POU5F1	414751	IL1B	311831	Mm-OLFM4
405801	FBXW7	310381	IL8	592861-C3	POU5F1	414791	IL6	539751	PDPN
312111	FGF2	546181	JAG1	311261	PROM1	414741	IL8	310121	PTEN
310071	FGFR1	403791	JAK2	311261-C2	PROM1	414761	TNF	408511	PTEN
311171	FGFR2	312121	KDR	460751	PRR16	404101	CTNNB1	400871	SOX2
310791	FGFR3	591611	KDR	406801	PTGS2	318611	FGFR2	412581	DPP4
311221	FLI1	606401	KIT	601991	PTPRC	318731	BDNF		
310311	FN1	606401-C2	KIT	400251	RNF43	315151	CYP26A1		
310311-C2	FN1	407671	KITLG	600951	SHH	315121	FGF10		
600301	GDF15	595101	KRAS	600951-C2	SHH	402871	PTGS2		

ACD offers an ever-growing selection of RNA biomarker probes for virtually ANY gene from ANY species in ANY tissue. Don't see your gene of interest? We can design your custom probes within 2 weeks.

Visualize your stem cell RNA today acdbio.com/stemcells



This document is provided for informational use only.

For Molecular Biology Applications (MBA), not intended for diagnosis. Refer to appropriate regulations. RNAscope® is a registered trademark of Advanced Cell Diagnostics, Inc. in the United States or other countries. All rights reserved. ©2014 Advanced Cell Diagnostics, Inc. Doc#: 321098/041814/revA

3960 Point Eden Way,
Hayward, CA 94545, USA
1-510-576-8800 (Main)
1-877-576-3636 (Toll Free)