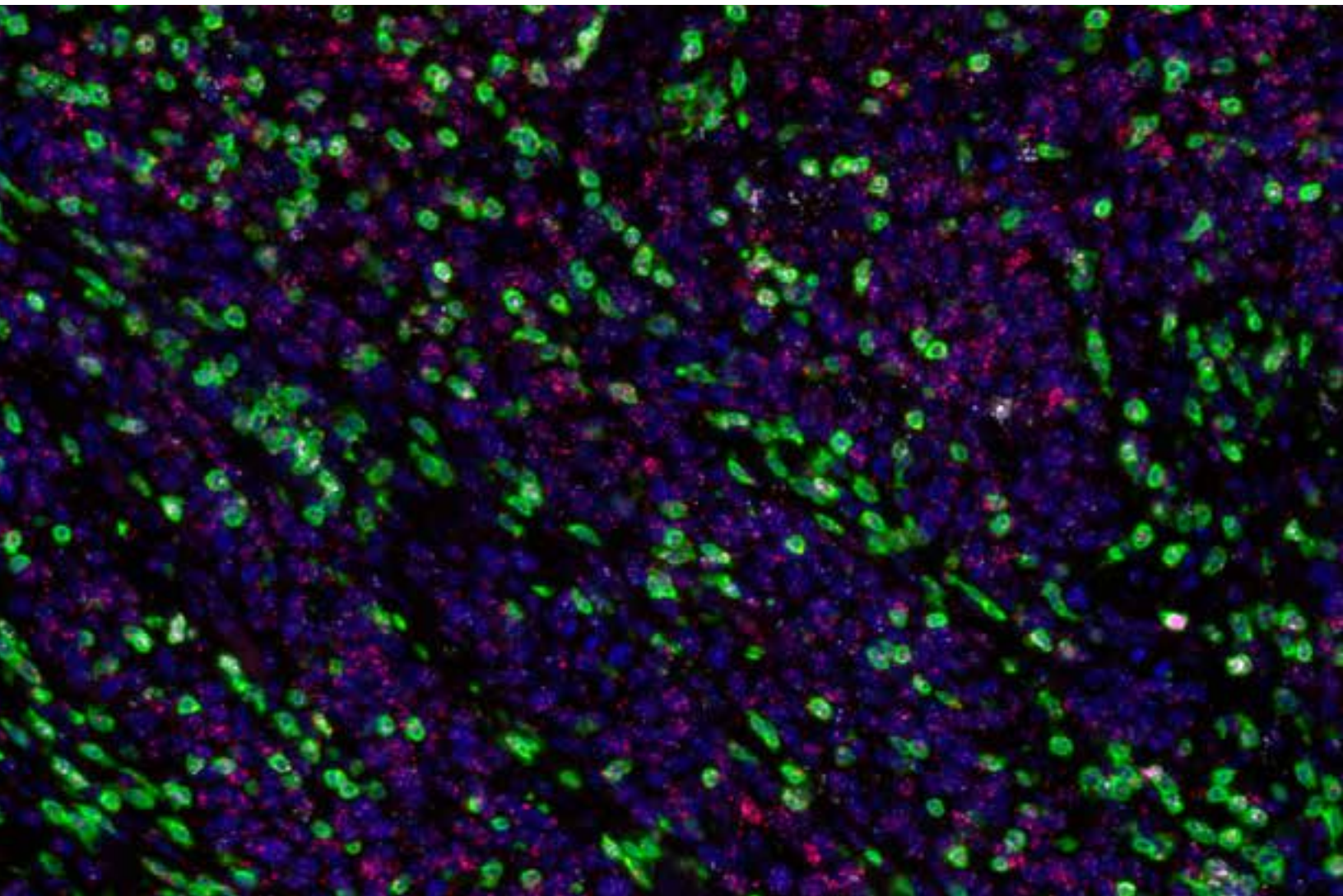


# Learn about the Antibodies Researchers are Using with the RNAscope™ Technology

Publications utilizing the RNAscope *in situ*  
hybridization technology in combination with  
immunohistochemistry or immunofluorescence





# Antigens

Introduction.....	4	Chromogranin A.....	25	GFP.....	35	Peripherin.....	47
Miscellaneous.....	5	Collagen IV.....	26	Glucagon.....	38	PKC.....	47
Virus-Related Antibodies.....	15	CTB.....	26	Glut1.....	38	Porcupine.....	47
Beta amyloid.....	15	Cytokeratins.....	26	HNK1.....	38	PUM.....	48
BrdU.....	16	DCLK1.....	28	IB4.....	38	RFP.....	48
Cadherins.....	17	DCP1A.....	28	Iba1.....	39	S100B.....	49
Calbindin.....	18	DCX.....	29	Ig Molecules.....	41	SCGB1A1.....	49
CD3.....	18	DDX4.....	29	Insulin.....	41	Smooth Muscle Alpha Actin.....	49
CD4.....	19	Desmin.....	29	Ki67.....	41	SST/Somatostatin.....	51
CD8.....	20	dsRed.....	30	Lysozyme.....	42	Sox2.....	51
CD11.....	20	EGFP.....	30	LYVE-1.....	42	Synaptophysin.....	52
CD20.....	20	eIF.....	31	MBP.....	43	tdTomato.....	52
CD31/PECAM.....	21	ELAV.....	31	MCH.....	43	TH.....	52
CD34.....	21	Endomucin.....	31	Myosin.....	44	TIA-1.....	53
CD45.....	22	EPCAM.....	31	NeuN.....	44	TRK5.....	3
CD68.....	22	ERG.....	32	Neurofilament H.....	45	Tubulin.....	54
CD163.....	24	eYFP.....	32	Olig1/2.....	46	Tubulin, Acetylated.....	54
Other CD Markers.....	24	F4/80.....	32	PAX.....	46	Vimentin.....	55
CGRP.....	25	FOXP3.....	33	PD-1.....	46	YM1.....	55
		GFAP.....	33	PDGFR.....	47		

# Introduction

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Spatially resolved gene expression has emerged as a crucial technique to understand complex multicellular interactions within the tissue. Traditional methods such as RNA *in situ* hybridization (ISH) and immunohistochemistry (IHC) or immunofluorescence (IF) allow gene expression analysis with spatial resolution at the RNA and protein level, respectively. Traditional RNA ISH has been challenging due to low sensitivity and specificity, as well as time-consuming and cumbersome to perform. The highly sensitive and specific RNAscope™ technology has been developed to overcome the limitations of a traditional RNA ISH method while also providing robust single molecule RNA detection at single cell resolution.

Simultaneous detection of RNA and proteins can reveal cellular sources of secreted proteins, identify specific cell types, and visualize the spatial organization of cells within the tissue. Given the similarities in workflow, the RNAscope ISH assay can be combined with IHC/IF to achieve simultaneous visualization of RNA and protein on the same sample. Referred to as “dual ISH-IHC/IF”, this methodology has been used extensively in neurobiology, immunology, developmental biology, cell and gene therapy, and inflammation, among other research areas.

In this reference guide are the nearly 300 publications that have used the dual RNAscope ISH-IHC/IF method to simultaneously detect RNA and protein in the same section, categorized by the antigen targeted by IHC/IF in that publication. For more information and recommendations for performing dual ISH-IHC/IF (including technical notes), please visit: [www.acdbio.com/dual-ish-and-ihc](http://www.acdbio.com/dual-ish-and-ihc).

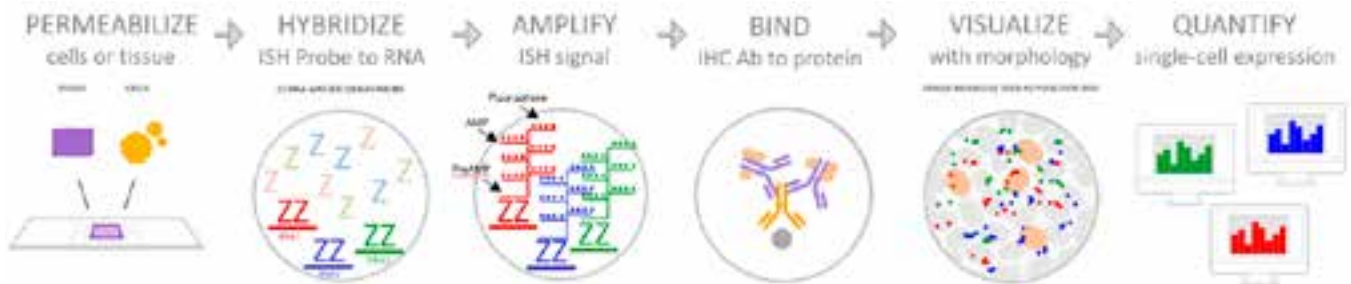


FIGURE 1. General workflow for combining the RNAscope assay with IHC or IF.

## Miscellaneous

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- 8OHdG **Oligodendroglia are particularly vulnerable to oxidative damage after neurotrauma *in vivo***  
Giacci MK, *et al.* (2018). *J Neurosci*. DOI: 10.1523/JNEUROSCI.1898-17.2018
- AADC (DDC) **Gene therapy for Parkinson's disease: preclinical evaluation of optimally configured TH:CH1 fusion for maximal dopamine synthesis**  
Badin RA, *et al.* (2019). *Mol Ther Methods Clin Dev*. DOI: 10.1016/j.omtm.2019.07.002
- Annexin 1 **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, *et al.* (2017). *Elife*. DOI: 10.7554/eLife.28415
- AQP1 **WNT5A is transported via lipoprotein particles in the cerebrospinal fluid to regulate hindbrain morphogenesis**  
Kaiser K, *et al.* (2019). *Nat Commun*. DOI: 10.1038/s41467-019-09298-4
- ARC **A novel environment-evoked transcriptional signature predicts reactivity in single dentate granule neurons**  
Jaeger BN, *et al.* (2018). *Nat Commun*. DOI: 10.1038/s41467-018-05418-8
- ATPase **Transcellular stomach absorption of a derivatized glucagon-like peptide-1 receptor agonist**  
Buckley ST, *et al.* (2018). *Sci Transl Med*. DOI: 10.1126/scitranslmed.aar7047
- BAMBI **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, *et al.* (2017). *Elife*. DOI: 10.7554/eLife.28415
- BDNF **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, *et al.* (2017). *Elife*. DOI: 10.7554/eLife.28415
- Bestrophin-4 **Colonic epithelial cell diversity in health and inflammatory bowel disease**  
Parikh K, *et al.* (2019). *Nature*. DOI: 10.1038/s41586-019-0992-y
- $\beta$ -gal **Loss of Shh signaling in the neocortex reveals heterogeneous cell recovery responses from distinct oligodendrocyte populations**  
Winkler CC, *et al.* (2019). *Dev Biol*. DOI: 10.1016/j.ydbio.2019.04.016
- Brn1/2 **A translational repression complex in developing mammalian neural stem cells that regulates neuronal specification**  
Zahr SK, *et al.* (2018). *Neuron*. DOI: 10.1016/j.neuron.2017.12.045

## Miscellaneous (*continued*)

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- CA9      **Acidification of tumor at stromal boundaries drives transcriptome alterations associated with aggressive phenotypes**  
Rohani N, *et al.* (2019). *Cancer Res.* DOI: 10.1158/0008-5472.Can-18-1604
- Calretinin      **Neuronal heterogeneity and stereotyped connectivity in the auditory afferent system**  
Petitpré C, *et al.* (2018). *Nat Commun.* DOI: 10.1038/s41467-018-06033-3
- Car2      **A Family of non-GPCR chemosensors defines an alternative logic for mammalian olfaction**  
Greer PL, *et al.* (2016). *Cell.* DOI: 10.1016/j.cell.2016.05.001
- Cav3.2      **Detection of single mRNAs in individual cells of the auditory system**  
Salehi P, *et al.* (2018). *Hear Res.* DOI: 10.1016/j.heares.2018.07.008
- CC1 (APC)      **Oligodendroglia are particularly vulnerable to oxidative damage after neurotrauma *in vivo***  
Giacci MK, *et al.* (2018). *J Neurosci.* DOI: 10.1523/JNEUROSCI.1898-17.2018
- CCK      **Diversity of interneurons in the dorsal striatum revealed by single-cell RNA sequencing and PatchSeq**  
Muñoz-Manchado AB, *et al.* (2018). *Cell Rep.* DOI: 10.1016/j.celrep.2018.07.053
- CEL      **The mucinous domain of pancreatic carboxyl-ester lipase (CEL) contains core 1/core 2 O-glycans that can be modified by ABO blood group determinants**  
El Jellas K, *et al.* (2018). *J Biol. Chem.* DOI: 10.1074/jbc.RA118.001934
- CNP      **Altered human oligodendrocyte heterogeneity in multiple sclerosis**  
Jäkel S, *et al.* (2019). *Nature.* DOI: 10.1038/s41586-019-0903-2
- COUPTFII      **Immature excitatory neurons develop during adolescence in the human amygdala**  
Sorrells SF, *et al.* (2019). *Nat Commun.* DOI: 10.1038/s41467-019-10765-1
- CRYAB      **Multimodal single-cell analysis reveals physiological maturation in the developing human neocortex**  
Mayer S, *et al.* (2019). *Neuron.* DOI: 10.1016/j.neuron.2019.01.027
- CTLA4      **CTLA-4\*PD-1<sup>hi</sup> memory CD4<sup>+</sup> T cells critically contribute to viral persistence in antiretroviral therapy-suppressed, SIV-infected rhesus macaques**  
McGary CS, *et al.* (2017). *Immunity.* DOI: 10.1016/j.immuni.2017.09.018
- Cyp11a1      **Zika virus infects human testicular tissue and germ cells**  
Matusali G, *et al.* (2018). *J Clin Invest.* DOI: 10.1172/jci121735
- DAZL      **RNA immunoprecipitation identifies novel targets of DAZL in human foetal ovary**  
Rosario R, *et al.* (2017). *Mol Hum Reprod.* DOI: 10.1093/molehr/gax004

## Miscellaneous (*continued*)

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DEFA5	<b>Interleukin-2 induces the in vitro maturation of human pluripotent stem cell-derived intestinal organoids</b> Jung KB, <i>et al.</i> (2018). <i>Nat Commun.</i> DOI: 10.1038/s41467-018-05450-8
Desmoplakin	<b>Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions</b> Morrison JA, <i>et al.</i> (2017). <i>Elife.</i> DOI: 10.7554/eLife.28415
ER $\alpha$ (ESR1)	<b>Merkel cells activate sensory neural pathways through adrenergic synapses</b> Hoffman BU, <i>et al.</i> (2018). <i>Neuron.</i> DOI: 10.1016/j.neuron.2018.10.034
Fascin (p55)	<b>Lymphatic dissemination of simian immunodeficiency virus after penile inoculation</b> Ma ZM, <i>et al.</i> (2016). <i>J Virol.</i> DOI: 10.1128/jvi.02947-15
FVIII	<b>STAT-3 RNAscope determination in human diffuse large B-cell lymphoma</b> Tamma R, <i>et al.</i> (2019). <i>Transl Oncol.</i> DOI: 10.1016/j.tranon.2018.12.008
G3BP1	<b>Microtubule-driven stress granule dynamics regulate inhibitory immune checkpoint expression in T cells</b> Franchini DM, <i>et al.</i> (2019). <i>Cell Rep.</i> DOI: 10.1016/j.celrep.2018.12.014
G8	<b>Rhabdomyosarcoma and Wilms tumors contain a subpopulation of noggin producing, myogenic cells immunoreactive for lens beaded filament proteins</b> Gerhart J, <i>et al.</i> (2019). <i>PLoS One.</i> DOI: 10.1371/journal.pone.0214758
Gad67	<b>Migrating interneurons secrete fractalkine to promote oligodendrocyte formation in the developing mammalian brain</b> Voronova A, <i>et al.</i> (2017). <i>Neuron.</i> DOI: 10.1016/j.neuron.2017.04.018
GFR $\alpha$ 1	<b>SHISA6 confers resistance to differentiation-promoting Wnt/<math>\beta</math>-Catenin signaling in mouse spermatogenic stem cells</b> Tokue M, <i>et al.</i> (2017). <i>Stem Cell Reports.</i> DOI: 10.1016/j.stemcr.2017.01.006
Glutamine synthetase (Glul)	<b>Inflammasome activation induces pyroptosis in the retina exposed to ocular hypertension injury</b> Pronin A, <i>et al.</i> (2019). <i>Front Mol Neurosci.</i> DOI: 10.3389/fnmol.2019.00036
Glypican 3 (GPC3)	<b>Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions</b> Morrison JA, <i>et al.</i> (2017). <i>Elife.</i> DOI: 10.7554/eLife.28415
gp130	<b>Dedifferentiated schwann cell precursors secreting paracrine factors are required for regeneration of the mammalian digit tip</b> Johnston AP, <i>et al.</i> (2016). <i>Cell Stem Cell.</i> DOI: 10.1016/j.stem.2016.06.002

## Miscellaneous (*continued*)

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gp38 (Podoplanin)	<b>Colonic CD90+ crypt fibroblasts secrete semaphorins to support epithelial growth</b> Karpus ON, et al. (2019). <i>Cell Rep</i> . DOI: 10.1016/j.celrep.2019.02.101
Gpr37	<b>GPR37 regulates macrophage phagocytosis and resolution of inflammatory pain</b> Bang S, et al. (2018). <i>J Clin Invest</i> . DOI: 10.1172/jci99888
GS Lectin AlexaFluor 488	<b>Simultaneous visualization and cell-specific confirmation of RNA and protein in the mouse retina</b> Stempel AJ, et al. (2014). <i>Mol Vis</i> . PMID: 25352743
GZMB	<b>A case report of clonal EBV-like memory CD4+ T cell activation in fatal checkpoint inhibitor-induced encephalitis</b> Johnson DB, et al. (2019). <i>Nat Med</i> . DOI: 10.1038/s41591-019-0523-2
HCRT	<b>Involvement of PLAGL1/ZAC1 in hypocretin/orexin transcription</b> Tanaka S, et al. (2019). <i>Int J Mol Med</i> . DOI: 10.3892/ijmm.2019.4143
HERV (Syncytin, ERVW1)	<b>Dengue virus immunity increases Zika virus-induced damage during pregnancy</b> Brown JA, et al. (2019). <i>Immunity</i> . DOI: 10.1016/j.immuni.2019.01.005
HLA-DR	<b>Tumor-specific MHC-II expression drives a unique pattern of resistance to immunotherapy via LAG-3/FCRL6 engagement</b> Johnson DB, et al. (2018). <i>JCI Insight</i> . DOI: 10.1172/jci.insight.120360
HNF4a	<b>H19 is expressed in hybrid hepatocyte nuclear factor 4<math>\alpha</math>+ periportal hepatocytes but not cytokeratin 19+ cholangiocytes in cholestatic livers</b> Jiang Y, et al. (2018). <i>Hepatology Commun</i> . DOI: 10.1002/hep4.1252
HOPX	<b>Multimodal single-cell analysis reveals physiological maturation in the developing human neocortex</b> Mayer S, et al. (2019). <i>Neuron</i> . DOI: 10.1016/j.neuron.2019.01.027
HSD2	<b>Aldosterone-sensitive HSD2 neurons in mice</b> Gasparini S, et al. (2019). <i>Brain Struct Funct</i> . DOI: 10.1007/s00429-018-1778-y
HTII-280	<b>MicroRNA-29c prevents pulmonary fibrosis by regulating epithelial cell renewal and apoptosis</b> Xie T, et al. (2017). <i>Am J Respir Cell Mol Biol</i> . DOI: 10.1165/rcmb.2017-01330C
Int	<b>Oxytocin/vasopressin-like peptide inotocin regulates cuticular hydrocarbon synthesis and water balancing in ants</b> Koto A, et al. (2019). <i>Proc Natl Acad Sci U S A</i> . DOI: 10.1073/pnas.1817788116
IRF8	<b>GPR34 in spinal microglia exacerbates neuropathic pain in mice</b> Sayo A, et al. (2019). <i>J Neuroinflammation</i> . DOI: 10.1186/s12974-019-1458-8



## Miscellaneous (*continued*)

- Isl1/2      **Motor neurons control blood vessel patterning in the developing spinal cord**  
Himmels P, et al. (2017). *Nat Commun*. DOI: 10.1038/ncomms14583
- KAZALD1      **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, et al. (2017). *Elife*. DOI: 10.7554/eLife.28415
- Laminin      **Netrin-1 confines rhombic lip-derived neurons to the CNS**  
Yung AR, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.01.068
- Langerin      **Identification of HIV transmitting CD11c<sup>+</sup> human epidermal dendritic cells**  
Bertram KM, et al. (2019). *Nat Commun*. DOI: 10.1038/s41467-019-10697-w
- LAMP1      **Senolytic therapy alleviates A $\beta$ -associated oligodendrocyte progenitor cell senescence and cognitive deficits in an Alzheimer's disease model**  
Zhang P, et al. (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0372-9
- LOR      **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**  
Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010
- MAC-2 (LGALS3)      **Dengue virus immunity increases Zika virus-induced damage during pregnancy**  
Brown JA, et al. (2019). *Immunity*. DOI: 10.1016/j.immuni.2019.01.005

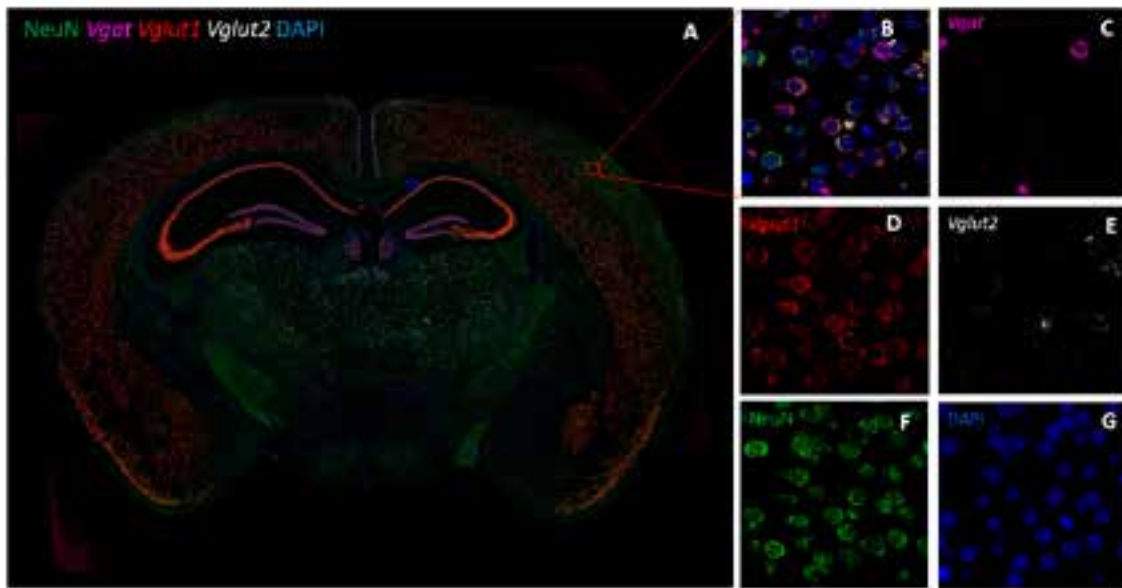


FIGURE 2. Spatial mapping of glutamatergic and GABAergic neurons in the mouse brain. The RNAscope Multiplex Fluorescent V2 Assay for *Vgat*, *Vglut1*, and *Vglut2* was combined with IF for NeuN.

## Miscellaneous (*continued*)

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- MAP2 **ALS along the axons – expression of coding and noncoding RNA differs in axons of ALS models**  
Rotem N, *et al.* (2017). *Sci Rep*. DOI: 10.1038/srep44500
- MCT **Possible involvement of human mast cells in the establishment of pregnancy via killer cell Ig-like receptor 2DL4**  
Ueshima C, *et al.* (2018). *Am J Pathol*. DOI: 10.1016/j.ajpath.2018.02.012
- MEF2C **Dusp6 attenuates Ras/MAPK signaling to limit zebrafish heart regeneration**  
Missinato MA, *et al.* (2018). *Development*. DOI: 10.1242/dev.157206
- MERTK **Apoptotic tumor cell-derived microRNA-375 uses CD36 to alter the tumor-associated macrophage phenotype**  
Frank AC, *et al.* (2019). *Nat Commun*. DOI: 10.1038/s41467-019-08989-2
- MPO **Single-cell transcriptomics of human and mouse lung cancers reveals conserved myeloid populations across individuals and species**  
Zilionis R, *et al.* (2019). *Immunity*. DOI: 10.1016/j.immuni.2019.03.009
- MYRF **Altered human oligodendrocyte heterogeneity in multiple sclerosis**  
Jäkel S, *et al.* (2019). *Nature*. DOI: 10.1038/s41586-019-0903-2
- Na,K-ATPase (ATA1A3) **Detection of single mRNAs in individual cells of the auditory system**  
Salehi P, *et al.* (2018) *Hear Res*. DOI: 10.1016/j.heares.2018.07.008
- Nephrin **Dysregulated expression but redundant function of the long non-coding RNA HOTAIR in diabetic kidney disease**  
Majumder S, *et al.* (2019). *Diabetologia*. DOI: 10.1007/s00125-019-4967-1
- Nexilin **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, *et al.* (2017). *Elife*. DOI: 10.7554/eLife.28415
- Nidogen-2 **Spatially and functionally distinct subclasses of breast cancer-associated fibroblasts revealed by single cell RNA sequencing**  
Bartoschek M, *et al.* (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07582-3
- Nkx2.2 **Glial- and neuronal-specific expression of CCL5 mRNA in the rat brain**  
Lanfranco MF, *et al.* (2018). *Front Neuroanat*. DOI: 10.3389/fnana.2017.00137
- Notch1 **A method for manual and automated multiplex RNAscope *in situ* hybridization and immunocytochemistry on cytospin samples**  
Chan S, *et al.* (2018). *PLoS One*. DOI: 10.1371/journal.pone.0207619

## Miscellaneous (*continued*)

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- OLFM4 **Interleukin-2 induces the in vitro maturation of human pluripotent stem cell-derived intestinal organoids**  
Jung KB, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-05450-8
- OXTR **Peri-infarct upregulation of the oxytocin receptor in vascular dementia**  
McKay EC, et al. (2019). *J Neuropathol Exp Neurol*. DOI: 10.1093/jnen/nlz023
- p24 **Elucidating the burden of HIV in tissues using multiplexed immunofluorescence and *in situ* hybridization: methods for the single-cell phenotypic characterization of cells harboring HIV *in situ***  
Vasquez JJ, et al. (2018). *J Histochem Cytochem*. DOI: 10.1369/0022155418756848
- P2Y12 (P2RY12, Purinergic Receptor) **Sexual dimorphism in the inflammatory response to traumatic brain injury**  
Villapol S, et al. (2017). *Glia*. DOI: 10.1002/glia.23171
- P75ntr (NGFR) **Morphological characteristics of p75 neurotrophin receptor-positive cells define a new type of glial cell in the rat dorsal root ganglia**  
Koike T, et al. (2019). *J Comp Neurol*. DOI: 10.1002/cne.24667
- Parvalbumin **Sensory neuron diversity in the inner ear is shaped by activity**  
Shrestha BR, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.07.007
- PDF **Transcriptional regulation of lipophorin receptors supports neuronal adaptation to chronic elevations of activity**  
Yin J, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.10.016
- pERK **Central relaxin-3 receptor (RXFP3) activation impairs social recognition and modulates ERK-phosphorylation in specific GABAergic amygdala neurons**  
Albert-Gasco H, et al. (2019). *Brain Struct Funct*. DOI: 10.1007/s00429-018-1763-5
- PgR (Progesterone Receptor) **Oestrogen receptor  $\alpha$  AF-1 and AF-2 domains have cell population-specific functions in the mammary epithelium**  
Cagnet S, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07175-0
- PKP2 **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**  
Morrison JA, et al. (2017). *Elife*. DOI: 10.7554/eLife.28415
- PLAGL1 **Involvement of PLAGL1/ZAC1 in hypocretin/orexin transcription**  
Tanaka S, et al. (2019). *Int J Mol Med*. DOI: 10.3892/ijmm.2019.4143
- PLEKHA7 **Cadherin complexes recruit mRNAs and RISC to regulate epithelial cell signaling**  
Kourtidis A, et al. (2017). *J Cell Biol*. DOI: 10.1083/jcb.201612125

## Miscellaneous (*continued*)

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Plin2	<b>Obesity-induced cellular senescence drives anxiety and impairs neurogenesis</b> Ogrodnik M, et al. (2019). <i>Cell Metab</i> . DOI: 10.1016/j.cmet.2018.12.008
PPP1R17	<b>Multimodal single-cell analysis reveals physiological maturation in the developing human neocortex</b> Mayer S, et al. (2019). <i>Neuron</i> . DOI: 10.1016/j.neuron.2019.01.027
Ppy	<b>Use of the Fluidigm C1 platform for RNA sequencing of single mouse pancreatic islet cells</b> Xin Y, et al. (2016). <i>Proc Natl Acad Sci U S A</i> . DOI: 10.1073/pnas.1602306113
pro-MBP1 (PRG2)	<b>Basophil recruitment into tumor-draining lymph nodes correlates with Th2 inflammation and reduced survival in pancreatic cancer patients</b> De Monte L, et al. (2016). <i>Cancer Res</i> . DOI: 10.1158/0008-5472.can-15-1801-t
Prospc (Pro-surfactant Protein C)	<b>The strength of mechanical forces determines the differentiation of alveolar epithelial cells</b> Li J, et al. (2018). <i>Dev Cell</i> . DOI: 10.1016/j.devcel.2018.01.008
PrRP (PRLH)	<b>GLP-1 neurons form a local synaptic circuit within the rodent nucleus of the solitary tract</b> Card JP, et al. (2018). <i>J Comp Neurol</i> . DOI: 10.1002/cne.24482
pSHP-1	<b>PD-L1 inhibits acute and chronic pain by suppressing nociceptive neuron activity via PD-1</b> Chen G, et al. (2017). <i>Nat Neurosci</i> . DOI 10.1038/nn.4571
pSTAT3	<b>Brs3 neurons in the mouse dorsomedial hypothalamus regulate body temperature, energy expenditure, and heart rate, but not food intake</b> Piñol RA, et al. (2018). <i>Nat Neurosci</i> . DOI: 10.1038/s41593-018-0249-3
PTBP3	<b>LncRNA Meg3 protects endothelial function by regulating the DNA damage response</b> Shihabudeen Haider Ali MS, et al. (2019). <i>Nucleic Acids Res</i> . DOI: 10.1093/nar/gky1190
PTEN	<b>Cabozantinib eradicates advanced murine prostate cancer by activating antitumor innate immunity</b> Patnaik A, et al. (2017). <i>Cancer Discov</i> . DOI: 10.1158/2159-8290.cd-16-0778
RBPMS	<b>Inflammasome activation induces pyroptosis in the retina exposed to ocular hypertension injury</b> Pronin A, et al. (2019). <i>Front Mol Neurosci</i> . DOI: 10.3389/fnmol.2019.00036
Renin	<b>Angiotensin II short-loop feedback: Is there a role of Ang II for the regulation of the renin system <i>in vivo</i>?</b> Neubauer B, et al. (2018). <i>Hypertension</i> . DOI: 10.1161/hypertensionaha.117.10357

## Miscellaneous (*continued*)

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Rh6	<b>The HisCl1 histamine receptor acts in photoreceptors to synchronize <i>Drosophila</i> behavioral rhythms with light-dark cycles</b> <i>Alejevski F, et al. (2019). Nat Commun. DOI: 10.1038/s41467-018-08116-7</i>
SAHH	<b>Combined single-cell profiling of lncRNAs and functional screening reveals that H19 is pivotal for embryonic hematopoietic stem cell development</b> <i>Zhou J, et al. (2019). Cell Stem Cell. DOI: 10.1016/j.stem.2018.11.023</i>
SFTPC	<b>Expansion of hedgehog disrupts mesenchymal identity and induces emphysema phenotype</b> <i>Wang C, et al. (2018). J Clin Invest. DOI: 10.1172/jci99435</i>
SM22alpha (Tagln)	<b>Feasibility evaluation of myocardial cannabinoid type 1 receptor imaging in obesity: a translational approach</b> <i>Valenta I, et al. (2018). JACC Cardiovasc Imaging. DOI: 10.1016/j.jcmg.2017.11.019</i>
Smaug2 (SAMD4B)	<b>A Smaug2-based translational repression complex determines the balance between precursor maintenance versus differentiation during mammalian neurogenesis</b> <i>Amadei G, et al. (2015). J Neurosci. DOI: 10.1523/jneurosci.2172-15.2015</i>
SSEA-1 (CD15, FUT4)	<b>Does human endometrial LGR5 gene expression suggest the existence of another hormonally regulated epithelial stem cell niche?</b> <i>Tempest N, et al. (2018). Hum Reprod. DOI: 10.1093/humrep/dey083</i>
STAR	<b>Zika virus infects human testicular tissue and germ cells</b> <i>Matusali G, et al. (2018). J Clin Invest. DOI: 10.1172/jci121735</i>
Synaptotagmin	<b>The local expression and trafficking of tyrosine hydroxylase mRNA in the axons of sympathetic neurons</b> <i>Gervasi NM, et al. (2016). RNA. DOI: 10.1261/rna.053272.115</i>
Tescalcin	<b>Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions</b> <i>Morrison JA, et al. (2017). Elife. DOI: 10.7554/eLife.28415</i>
TFPI2	<b>Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions</b> <i>Morrison JA, et al. (2017). Elife. DOI: 10.7554/eLife.28415</i>
TGFβ	<b>Inhibition of Nox4-dependent ROS signaling attenuates prostate fibroblast activation and abrogates stromal-mediated protumorigenic interactions</b> <i>Sampson N, et al. (2018). Int J Cancer. DOI: 10.1002/ijc.31316</i>

## Miscellaneous (*continued*)

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TOMM20	<b>CLUH regulates mitochondrial metabolism by controlling translation and decay of target mRNAs</b> Schatton D, et al. (2017). <i>J Cell Biol.</i> DOI: 10.1083/jcb.201607019
TRAcP (ACP5)	<b>Coupling of bone resorption and formation in real time: new knowledge gained from human haversian BMUs</b> Lassen NE, et al. (2017). <i>J Bone Miner Res.</i> DOI: 10.1002/jbmr.3091
Tropomyosin	<b>Myocardial polyploidization creates a barrier to heart regeneration in zebrafish</b> González-Rosa JM, et al. (2018). <i>Dev Cell.</i> DOI: 10.1016/j.devcel.2018.01.021
Troponin I1	<b>Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions</b> Morrison JA, et al. (2017). <i>Elife.</i> DOI: 10.7554/eLife.28415
TSLP	<b>A single-cell survey of the small intestinal epithelium</b> Haber AL, et al. (2017). <i>Nature.</i> DOI: 10.1038/nature24489
Ubiquitin	<b>High-dimensional cell-level analysis of tissues with Ce3D multiplex volume imaging</b> Li W, et al. (2019). <i>Nat Protoc.</i> DOI: 10.1038/s41596-019-0156-4
VCAM1	<b>Developmental emergence of adult neural stem cells as revealed by single-cell transcriptional profiling</b> Yuzwa SA, et al. (2017). <i>Cell Rep.</i> DOI: 10.1016/j.celrep.2017.12.017
VDR	<b>Vitamin D differentially regulates colon stem cells in patient-derived normal and tumor organoids</b> Fernández-Barral A, et al. (2019). <i>FEBS J.</i> DOI: 10.1111/febs.14998
VEGFR3	<b>Transcriptional landscape of pulmonary lymphatic endothelial cells during fetal gestation</b> Norman TA Jr, et al. (2019). <i>PLoS One.</i> DOI: 10.1371/journal.pone.0216795
YBX1	<b>Satellite RNAs promote pancreatic oncogenic processes via the dysfunction of YBX1</b> Kishikawa T, et al. (2016). <i>Nat Commun.</i> DOI: 10.1038/ncomms13006
YTHDF2	<b>Suppression of m<sup>6</sup>A reader Ythdf2 promotes hematopoietic stem cell expansion</b> Li Z, et al. (2018). <i>Cell Res.</i> DOI: 10.1038/s41422-018-0072-0

## Virus-Related Antibodies

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- Anti-ZIKV NS3      **Zika virus production is resistant to RNase L antiviral activity**  
Whelan JN, *et al.* (2019). *J Virol*. DOI: 10.1128/jvi.00313-19
- dsRNA      **A novel sheet-like virus particle array is a hallmark of Zika virus infection**  
Liu J, *et al.* (2018). *Emerg Microbes Infect*. DOI: 10.1038/s41426-018-0071-8
- Flavivirus      **A novel sheet-like virus particle array is a hallmark of Zika virus infection**  
Liu J, *et al.* (2018). *Emerg Microbes Infect*. DOI: 10.1038/s41426-018-0071-8
- gD (LP14)      **Multiple posttranscriptional strategies to regulate the herpes simplex virus 1 vhs endoribonuclease**  
Elliott G, *et al.* (2018). *J Virol*. DOI: 10.1128/jvi.00818-18
- HIV p24/GAG      **Visualization of HIV-1 RNA transcription from integrated HIV-1 DNA in reactivated latently infected cells**  
Ukah OB, *et al.* (2018). *Viruses*. DOI: 10.3390/v10100534
- HIV-1 p24      **Inhibition of heat shock protein 90 prevents HIV rebound**  
Joshi P, *et al.* (2016). *J Biol Chem*. DOI: 10.1074/jbc.M116.717538
- HIVp24      **Cellular HIV reservoirs and viral rebound from the lymphoid compartments of 4'-ethynyl-2-fluoro-2'-deoxyadenosine (EFdA)-suppressed humanized mice**  
Maidji E, *et al.* (2019). *Viruses*. DOI: 10.3390/v11030256
- LCMV      **Neurons under T cell attack coordinate phagocyte-mediated synaptic stripping**  
Di Liberto G, *et al.* (2018). *Cell*. DOI: 10.1016/j.cell.2018.07.049
- PyMT      **Loss of amphiregulin reduces myoepithelial cell coverage of mammary ducts and alters breast tumor growth**  
Mao SPH, *et al.* (2018). *Breast Cancer Res*. DOI: 10.1186/s13058-018-1057-0
- V5-vhs      **Multiple posttranscriptional strategies to regulate the herpes simplex virus 1 vhs endoribonuclease**  
Elliott G, *et al.* (2018). *J Virol*. DOI: 10.1128/jvi.00818-18

## Beta amyloid

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**Senolytic therapy alleviates A $\beta$ -associated oligodendrocyte progenitor cell senescence and cognitive deficits in an Alzheimer's disease model**

Zhang P, *et al.* (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0372-9

**Senolytic therapy alleviates A $\beta$ -associated oligodendrocyte progenitor cell senescence and cognitive deficits in an Alzheimer's disease model**

Zhang P, *et al.* (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0372-9

## Beta-amyloid (*continued*)

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### Human Alzheimer's disease gene expression signatures and immune profile in APP mouse models: a discrete transcriptomic view of A $\beta$ plaque pathology

Rothman SM, et al. (2018). *J Neuroinflammation*. DOI: 10.1186/s12974-018-1265-7

### The major risk factors for Alzheimer's disease: Age, sex, and genes modulate the microglia response to A $\beta$ plaques

Sala Frigerio C, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.03.099

## BrdU

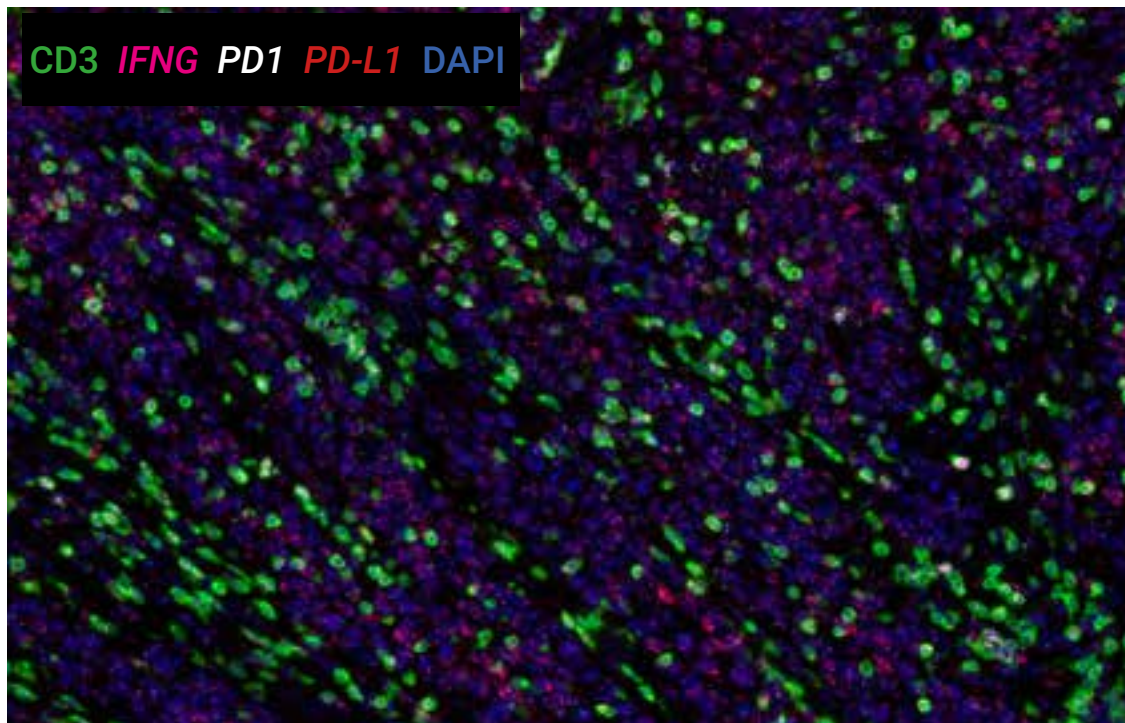
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### PHD2 inactivation in Type I cells drives HIF-2 $\alpha$ -dependent multilineage hyperplasia and the formation of paraganglioma-like carotid bodies

Fielding JW, et al. (2018). *J Physiol*. DOI: 10.1113/jp275996

### Colonic CD90+ crypt fibroblasts secrete semaphorins to support epithelial growth

Karpus ON, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.02.101



**FIGURE 3. Immune cell characterization in the tumor microenvironment.** The RNAscope Multiplex Fluorescent V2 Assay for *IFNG*, *PD1*, and *PD-L1* was combined with IF for CD3.



## **Reference component analysis of single-cell transcriptomes elucidates cellular heterogeneity in human colorectal tumors**

Li H, et al. (2017). *Nat Genet*. DOI: 10.1038/ng.3818

## **Cadherin complexes recruit mRNAs and RISC to regulate epithelial cell signaling**

Kourtidis A, et al. (2017). *J Cell Biol*. DOI: 10.1083/jcb.201612125

## **CD8<sup>+</sup> T cells modulate autosomal dominant polycystic kidney disease progression**

Kleczo EK, et al. (2018). *Kidney Int*. DOI: 10.1016/j.kint.2018.06.025

## **T helper cell cytokines modulate intestinal stem cell renewal and differentiation**

Biton M, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.10.008

## **ROBO2 is a stroma suppressor gene in the pancreas and acts via TGF- $\beta$ signalling**

Pinho AV, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07497-z

## **Colonic CD90<sup>+</sup> crypt fibroblasts secrete semaphorins to support epithelial growth**

Karpus ON, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.02.101

## **Single-cell transcriptomes of the regenerating intestine reveal a revival stem cell**

Ayyaz A, et al. (2019). *Nature*. DOI: 10.1038/s41586-019-1154-y

## **The previously uncharacterized lncRNA APP promotes prostate cancer progression by acting as a competing endogenous RNA**

Shi X, et al. (2019). *Int J Cancer*. DOI: 10.1002/ijc.32422

## **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**

Morrison JA, et al. (2017). *Elife*. DOI: 10.7554/eLife.28415

## **Self-maintaining gut macrophages are essential for intestinal homeostasis**

De Schepper S, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.07.048

## **Tumour-vasculature development via endothelial-to-mesenchymal transition after radiotherapy controls CD44v6<sup>+</sup> cancer cell and macrophage polarization**

Choi SH, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07470-w

## Calbindin

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### **CSF-1 controls cerebellar microglia and is required for motor function and social interaction**

Kana V, et al. (2019). *J Exp Med*. DOI: 10.1084/jem.20182037

### **Mechanically activated Piezo channels mediate touch and suppress acute mechanical pain response in mice**

Zhang M, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.01.056

## CD3

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### **Lymphatic dissemination of simian immunodeficiency virus after penile inoculation**

Ma ZM, et al. (2016). *J Virol*. DOI: 10.1128/jvi.02947-15

### **Replication of CMV in the gut of HIV-infected individuals and epithelial barrier dysfunction**

Maidji E, et al. (2017). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1006202

### **Benzimidazoles promote anti-TNF mediated induction of regulatory macrophages and enhance therapeutic efficacy in a murine model**

Wildenberg ME, et al. (2017). *J Crohns Colitis*. DOI: 10.1093/ecco-jcc/jjx104

### **Liver macrophage-associated inflammation correlates with SIV burden and is substantially reduced following cART**

Fisher BS, et al. (2018). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1006871

### **Elucidating the burden of HIV in tissues using multiplexed immunofluorescence and *in situ* hybridization: Methods for the single-cell phenotypic characterization of cells harboring HIV *in situ***

Vasquez JJ, et al. (2018). *J Histochem Cytochem*. DOI: 10.1369/0022155418756848

### **Accumulation of follicular CD8+ T cells in pathogenic SIV infection**

Ferrando-Martinez S, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci96207

### **Cytokines produced by dendritic cells administered intratumorally correlate with clinical outcome in patients with diverse cancers**

Subbiah V, et al. (2018). *Clin Cancer Res*. DOI 10.1158/1078-0432.Ccr-17-2707

### **Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

### **Cellular HIV reservoirs and viral rebound from the lymphoid compartments of 4'-ethynyl-2-fluoro-2'-deoxyadenosine (EFdA)-suppressed humanized mice**

Maidji E, et al. (2019). *Viruses*. DOI: 10.3390/v11030256

## CD3 (continued)

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### **CD32-RNA Co-localizes with HIV-RNA in CD3+ Cells Found within Gut Tissues from Viremic and ART-Suppressed Individuals**

Vásquez JJ, et al. (2019). *Pathog Immun*. DOI: 10.20411/pai.v4i1.271

### **CD8<sup>+</sup> T cells modulate autosomal dominant polycystic kidney disease progression**

Kleczo EK, et al. (2018). *Kidney Int*. DOI: 10.1016/j.kint.2018.06.025

## CD4

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### **The presence of interleukin-13 at pancreatic ADM/PanIN lesions alters macrophage populations and mediates pancreatic tumorigenesis**

Liou GY, et al. (2017). *Cell Rep*. DOI: 10.1016/j.celrep.2017.04.052

### **Accumulation of follicular CD8<sup>+</sup> T cells in pathogenic SIV infection**

Ferrando-Martinez S, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci96207

### **Simian immunodeficiency virus persistence in cellular and anatomic reservoirs in antiretroviral therapy-suppressed infant rhesus macaques**

Mavigner M, et al. (2018). *J Virol*. DOI: 10.1128/jvi.00562-18

### **Brain is a potential sanctuary for subtype C HIV-1 irrespective of ART treatment outcome**

Tso FY, et al. (2018). *PLoS One*. DOI: 10.1371/journal.pone.0201325

### **Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

### **T helper cell cytokines modulate intestinal stem cell renewal and differentiation**

Biton M, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.10.008

### **Pomalidomide alters pancreatic macrophage populations to generate an immune-responsive environment at precancerous and cancerous lesions**

Bastea LI, et al. (2019). *Cancer Res*. DOI: 10.1158/0008-5472.Can-18-1153

### **A case report of clonal EBV-like memory CD4<sup>+</sup> T cell activation in fatal checkpoint inhibitor-induced encephalitis**

Johnson DB, et al. (2019). *Nat Med*. DOI: 10.1038/s41591-019-0523-2

### **Intra- and inter-cellular rewiring of the human colon during ulcerative colitis**

Smillie CS, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.06.029

## CD8

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### **Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

### **High-dimensional cell-level analysis of tissues with Ce3D multiplex volume imaging**

Li W, et al. (2019). *Nat Protoc*. DOI: 10.1038/s41596-019-0156-4

### **A case report of clonal EBV-like memory CD4+ T cell activation in fatal checkpoint inhibitor-induced encephalitis**

Johnson DB, et al. (2019). *Nat Med*. DOI: 10.1038/s41591-019-0523-2

### **Intra- and inter-cellular rewiring of the human colon during ulcerative colitis**

Smillie CS, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.06.029

## CD11

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### **Epigenetic promoter DNA methylation of miR-124 promotes HIV-1 Tat-mediated microglial activation via MECP2-STAT3 axis**

Periyasamy P, et al. (2018). *J Neurosci*. DOI: 10.1523/jneurosci.3474-17.2018

### **Intra- and inter-cellular rewiring of the human colon during ulcerative colitis**

Smillie CS, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.06.029

### **Identification of HIV transmitting CD11c<sup>+</sup> human epidermal dendritic cells**

Bertram KM, et al. (2019). *Nat Commun*. DOI: 10.1038/s41467-019-10697-w

## CD20

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### **The human IL-15 superagonist ALT-803 directs SIV-specific CD8<sup>+</sup> T cells into B-cell follicles**

Webb GM, et al. (2018). *Blood Adv*. DOI: 10.1182/bloodadvances.2017012971

### **Accumulation of follicular CD8<sup>+</sup> T cells in pathogenic SIV infection**

Ferrando-Martinez S, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci96207

**Accumulation of worn-out GBM material substantially contributes to mesangial matrix expansion in diabetic nephropathy**

Kriz W, et al. (2017). *Am J Physiol Renal Physiol*. DOI: 10.1152/ajprenal.00020.2017

**Interleukin-33 overexpression reflects less aggressive tumour features in large-duct type cholangiocarcinomas**

Sawada R, et al. (2018). *Histopathology*. DOI: 10.1111/his.13633

**LRG1 promotes diabetic kidney disease progression by enhancing TGF- $\beta$ -induced angiogenesis**

Hong Q, et al. (2019). *J Am Soc Nephrol*. DOI: 10.1681/asn.2018060599

**Myocardial-specific R-spondin3 drives proliferation of the coronary stems primarily through the Leucine Rich Repeat G Protein coupled receptor LGR4**

Da Silva F, et al. (2018). *Dev Biol*. DOI: 10.1016/j.ydbio.2018.05.024

**Gpr116 receptor regulates distinctive functions in pneumocytes and vascular endothelium**

Niaudet C et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0137949

**The proton-activated receptor GPR4 modulates intestinal inflammation**

Wang Y, et al. (2018). *J Crohns Colitis*. DOI: 10.1093/ecco-jcc/jjx147

**Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell syst*. DOI: 10.1016/j.cels.2016.08.010

**Integrated Human Evaluation of the Lysophosphatidic Acid Pathway as a Novel Therapeutic Target in Atherosclerosis**

Aldi S, et al. (2018). *Mol Ther Methods Clin Dev*. DOI: 10.1016/j.omtm.2018.05.003

**VEGF receptor-2/neuropilin 1 trans-complex formation between endothelial and tumor cells is an independent predictor of pancreatic cancer survival**

Morin E, et al. (2018). *J Pathol*. DOI: 10.1002/path.5141

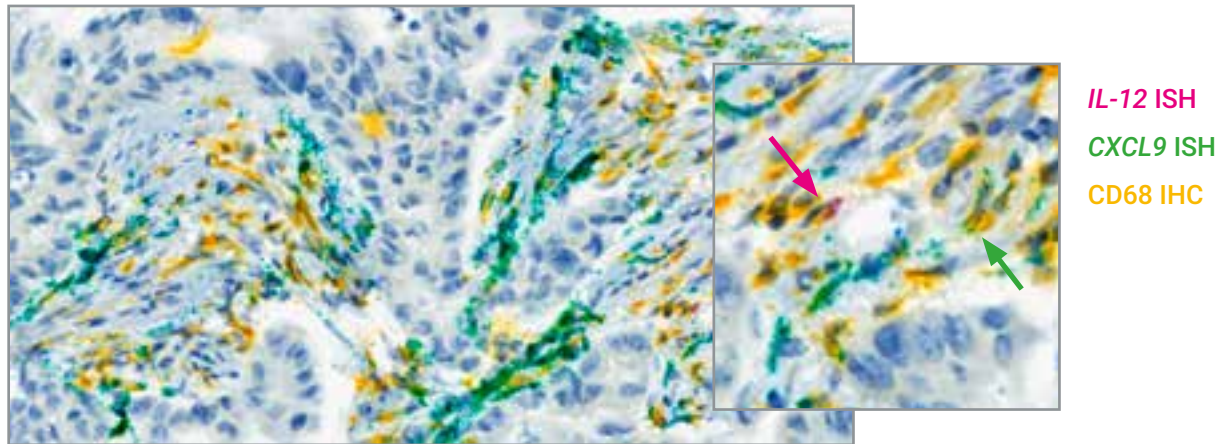


FIGURE 4. Detection of activated macrophages in the TME of human lung cancer. The RNAscope VS Duplex Assay for *IL-12* and *CXCL9* was combined with IHC for CD68.

## CD45

### Phosphatidylinositol 3-kinase delta pathway: a novel therapeutic target for Sjögren's syndrome

Nayar S, et al. (2019). *Ann Rheum Dis*. DOI: 10.1136/annrheumdis-2017-212619

### Recurrent PDGFRB mutations in unicentric Castleman disease

Li Z, et al. (2019). *Leukemia*. DOI: 10.1038/s41375-018-0323-6

### High-dimensional cell-level analysis of tissues with Ce3D multiplex volume imaging

Li W, et al. (2019). *Nat Protoc*. DOI: 10.1038/s41596-019-0156-4

### Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

### A case report of clonal EBV-like memory CD4+ T cell activation in fatal checkpoint inhibitor-induced encephalitis

Johnson DB, et al. (2019). *Nat Med*. DOI: 10.1038/s41591-019-0523-2

## CD68

### Lymphatic dissemination of simian immunodeficiency virus after penile inoculation

Ma ZM, et al. (2016). *J Virol*. DOI: 10.1128/jvi.02947-15

### Reactivation of simian immunodeficiency virus reservoirs in the brain of virally suppressed macaques

Gama L, et al. (2017). *AIDS*. DOI: 10.1097/qad.0000000000001267

**Replication of CMV in the gut of HIV-infected individuals and epithelial barrier dysfunction**

Maidji E, et al. (2017). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1006202

**The meningeal lymphatic system: a route for HIV brain migration?**

Lamers SL, et al. (2016). *J Neurovirol*. DOI: 10.1007/s13365-015-0399-y

**Liver macrophage-associated inflammation correlates with SIV burden and is substantially reduced following cART**

Fisher BS, et al. (2018). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1006871

**Elucidating the burden of HIV in tissues using multiplexed immunofluorescence and *in situ* hybridization: methods for the single-cell phenotypic characterization of cells harboring HIV *in situ***

Vasquez JJ, et al. (2018). *J Histochem Cytochem*. DOI: 10.1369/0022155418756848

**Live imaging of HIV-1 transfer across T cell virological synapse to epithelial cells that promotes stromal macrophage infection**

Real F, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.04.028

**Simian immunodeficiency virus persistence in cellular and anatomic reservoirs in antiretroviral therapy-suppressed infant rhesus macaques**

Mavigner M, et al. (2018). *J Virol*. DOI: 10.1128/jvi.00562-18

**Brain is a potential sanctuary for subtype C HIV-1 irrespective of ART treatment outcome**

Tso FY, et al. (2018). *PLoS One*. DOI: 10.1371/journal.pone.0201325

**Zika virus infects human testicular tissue and germ cells**

Matusali G, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci121735

**Macrophages but not astrocytes harbor HIV DNA in the brains of HIV-1-infected aviremic individuals on suppressive antiretroviral therapy**

Ko A, et al. (2019). *J Neuroimmune Pharmacol*. DOI: 10.1007/s11481-018-9809-2

**CD32-RNA Co-localizes with HIV-RNA in CD3+ Cells Found within Gut Tissues from Viremic and ART-Suppressed Individuals**

Vásquez JJ, et al. (2019). *Pathog Immun*. DOI: 10.20411/pai.v4i1.271

**Replication of CMV in the gut of HIV-infected individuals and epithelial barrier dysfunction**

Maidji E, et al. (2017). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1006202

**The meningeal lymphatic system: a route for HIV brain migration?**

Lamers SL, et al. (2016). *J Neurovirol*. DOI: 10.1007/s13365-015-0399-y

**Elucidating the burden of HIV in tissues using multiplexed immunofluorescence and *in situ* hybridization: methods for the single-cell phenotypic characterization of cells harboring HIV *in situ***

Vasquez JJ, et al. (2018). *J Histochem Cytochem*. DOI: 10.1369/0022155418756848

**Simian immunodeficiency virus persistence in cellular and anatomic reservoirs in antiretroviral therapy-suppressed infant rhesus macaques**

Mavigner M, et al. (2018). *J Virol*. DOI: 10.1128/jvi.00562-18

**Zika virus infects human testicular tissue and germ cells**

Matusali G, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci121735

**Cellular HIV reservoirs and viral rebound from the lymphoid compartments of 4'-ethynyl-2-fluoro-2'-deoxyadenosine (EFdA)-suppressed humanized mice**

Maidji E, et al. (2019). *Viruses*. DOI: 10.3390/v11030256

**Human tumor-associated macrophage and monocyte transcriptional landscapes reveal cancer-specific reprogramming, biomarkers, and therapeutic targets**

Cassetta L, et al. (2019). *Cancer Cell*. DOI: 10.1016/j.ccell.2019.02.009

**CD32-RNA Co-localizes with HIV-RNA in CD3+ Cells Found within Gut Tissues from Viremic and ART-Suppressed Individuals**

Vásquez JJ, et al. (2019). *Pathog Immun*. DOI: 10.20411/pai.v4i1.271

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Other CD Markers

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**Pericyte loss leads to circulatory failure and pleiotrophin depletion causing neuron loss**

Nikolakopoulou AM, et al. (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0434-z

**Elucidating the burden of HIV in tissues using multiplexed immunofluorescence and *in situ* hybridization: methods for the single-cell phenotypic characterization of cells harboring HIV *in situ***

Vasquez JJ, et al. (2018). *J Histochem Cytochem*. DOI: 10.1369/0022155418756848

**A method for manual and automated multiplex RNAscope *in situ* hybridization and immunocytochemistry on cytospin samples**

Chan S, et al. (2018). *PLoS One*. DOI: 10.1371/journal.pone.0207619



## Other CD Markers (*continued*)

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### **Reduced lymphotoxin-beta production by tumour cells is associated with loss of follicular dendritic cell phenotype and diffuse growth in follicular lymphoma**

Pepe G, et al. (2018). *J Pathol Clin Res*. DOI: 10.1002/cjp2.97

### **Human tumor-associated macrophage and monocyte transcriptional landscapes reveal cancer-specific reprogramming, biomarkers, and therapeutic targets**

Cassetta L, et al. (2019). *Cancer Cell*. DOI: 10.1016/j.ccell.2019.02.009

### **Macrophages but not astrocytes harbor HIV DNA in the brains of HIV-1-infected aviremic individuals on suppressive antiretroviral therapy**

Ko A, et al. (2019). *J Neuroimmune Pharmacol*. DOI: 10.1007/s11481-018-9809-2

### **A method for manual and automated multiplex RNAscope *in situ* hybridization and immunocytochemistry on cytospin samples**

Chan S, et al. (2018). *PLoS One*. DOI: 10.1371/journal.pone.0207619

## CGRP

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### **Immune or genetic-mediated disruption of CASPR2 causes pain hypersensitivity due to enhanced primary afferent excitability**

Dawes JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.01.033

### **Comprehensive analysis of long noncoding RNA expression in dorsal root ganglion reveals cell-type specificity and dysregulation after nerve injury**

Baskozos G, et al. (2019). *Pain*. DOI: 10.1097/j.pain.0000000000001416

### **Mechanically activated Piezo channels mediate touch and suppress acute mechanical pain response in mice**

Zhang M, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.01.056

## Chromogranin A

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### **Lineage dynamics of murine pancreatic development at single-cell resolution**

Byrnes LE, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06176-3

### **A single-cell survey of the small intestinal epithelium**

Haber AL, et al. (2017). *Nature*. DOI: 10.1038/nature24489

## Collagen IV

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### **Sustained inflammation after pericyte depletion induces irreversible blood-retina barrier breakdown**

Ogura S, et al. (2017). *JCI Insight*. DOI: 10.1172/jci.insight.90905

### **Semaphorin-3C signals through Neuropilin-1 and PlexinD1 receptors to inhibit pathological angiogenesis**

Yang WJ, et al. (2015). *EMBO Mol Med*. DOI: 10.15252/emmm.201404922

### **Endothelial cell clonal expansion in the development of cerebral cavernous malformations**

Malinverno M, et al. (2019). *Nat Commun*. DOI: 10.1038/s41467-019-10707-x

## CTB

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### **Control of feeding behavior by cerebral ventricular volume transmission of melanin-concentrating hormone**

Noble EE, et al. (2018). *Cell Metab*. DOI: 10.1016/j.cmet.2018.05.001

### **Single-cell transcriptomic analysis of the lateral hypothalamic area reveals molecularly distinct populations of inhibitory and excitatory neurons**

Mickelsen LE, et al. (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0349-8

## Cytokeratins

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### **Co-detection of miR-21 and TNF- $\alpha$ mRNA in budding cancer cells in colorectal cancer**

Møller T, et al. (2019). *Int J Mol Sci*. DOI 10.3390/ijms20081907

### **Establishment of EBV latency in nasopharyngeal tumor epithelial cells by in vivo cell-mediated transfer infection**

Yu F, et al. (20C. *Otorhinolaryngology-Head and Neck Surgery*. DOI: 10.15761/OHNS.1000174

### **H19 Is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ <sup>+</sup> periportal hepatocytes but not cytokeratin 19<sup>+</sup> cholangiocytes in cholestatic livers**

Jiang Y, et al. (2018). *Hepatol Commun*. DOI: 10.1002/hep4.1252

### **Changes in serum interleukin-8 (IL-8) levels reflect and predict response to anti-PD-1 treatment in melanoma and non-small-cell lung cancer patients**

Sanmamed MF, et al. (2017). *Ann Oncol*. DOI: 10.1093/annonc/mdx190

### **ErbB activation signatures as potential biomarkers for anti-ErbB3 treatment in HNSCC**

Alvarado D, et al. (2017). *PLoS One*. DOI: 10.1371/journal.pone.0181356

### **Siglec-15 as an immune suppressor and potential target for normalization cancer immunotherapy**

Wang J, et al. (2019). *Nat Med*. DOI: 10.1038/s41591-019-0374-x

### **Interleukin-6 blockade attenuates lung cancer tissue construction integrated by cancer stem cells**

Ogawa H, et al. (2017). *Sci Rep*. DOI: 10.1038/s41598-017-12017-y

### **Dengue virus immunity increases Zika virus-induced damage during pregnancy**

Brown JA, et al. (2019). *Immunity*. DOI: 10.1016/j.immuni.2019.01.005

### **Accumulation of Progerin affects the symmetry of cell division and is associated with impaired Wnt signaling and the mislocalization of nuclear envelope proteins**

Sola-Carvajal A, et al. (2019). *J Invest Dermatol*. DOI: 10.1016/j.jid.2019.05.005

### **IL-38 ameliorates skin inflammation and limits IL-17 production from $\gamma\delta$ T cells**

Han Y, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.03.082

### **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010

### **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010:

### **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010

### **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010

### **Targeting LIF-mediated paracrine interaction for pancreatic cancer therapy and monitoring**

Shi Y, et al. (2019). *Nature*. DOI: 10.1038/s41586-019-1130-6

### **Single-cell analysis of the liver epithelium reveals dynamic heterogeneity and an essential role for YAP in homeostasis and regeneration**

Pepe-Mooney BJ, et al. (2019). *Cell Stem Cell*. DOI: 10.1016/j.stem.2019.04.004

### **Characterization of a BAC transgenic mouse expressing *Krt19*-driven iCre recombinase in its digestive organs**

Kanayama T, et al. (2019). *PLoS One*. DOI: 10.1371/journal.pone.0220818

## Cytokeratins (*continued*)

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### **Visualization and targeting of LGR5+ human colon cancer stem cells**

Shimokawa M, *et al.* (2017). *Nature*. DOI: 10.1038/nature22081

### **Single-cell analysis identifies LY6D as a marker linking castration-resistant prostate luminal cells to prostate progenitors and cancer**

Barros-Silva JD, *et al.* (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.11.069

### **Increased lactate secretion by cancer cells sustains non-cell-autonomous adaptive resistance to MET and EGFR targeted therapies**

Apicella M, *et al.* (2018). *Cell Metabol*. DOI: 10.1016/j.cmet.2018.08.006

### **Single-cell analysis of the liver epithelium reveals dynamic heterogeneity and an essential role for YAP in homeostasis and regeneration**

Pepe-Mooney BJ, *et al.* (2019). *Cell Stem Cell*. DOI: 10.1016/j.stem.2019.04.004

## DCLK1

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### **The presence of interleukin-13 at pancreatic ADM/PanIN lesions alters macrophage populations and mediates pancreatic tumorigenesis**

Liou GY, *et al.* (2017). *Cell Rep*. DOI: 10.1016/j.celrep.2017.04.052

### **A single-cell survey of the small intestinal epithelium**

Haber AL, *et al.* (2017). *Nature*. DOI: 10.1038/nature24489

### **T helper cell cytokines modulate intestinal stem cell renewal and differentiation**

Biton M, *et al.* (2018). *Cell*. DOI: 10.1016/j.cell.2018.10.008

## DCP1A

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### **Suppression of m<sup>6</sup>A reader Ythdf2 promotes hematopoietic stem cell expansion**

Li Z, *et al.* (2018). *Cell Res*. DOI: 10.1038/s41422-018-0072-0

### **Microtubule-driven stress granule dynamics regulate inhibitory immune checkpoint expression in T cells**

Franchini DM, *et al.* (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2018.12.014

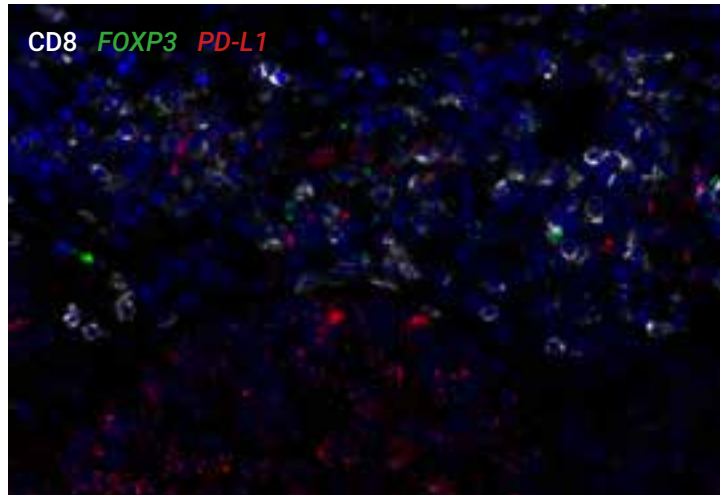


FIGURE 5. **Characterization of immune cell infiltration into the TME in human lung cancer.** The RNAscope Multiplex Fluorescent V2 Assay for *FOXP3* and *PD-L1* was combined with IF for CD3.

## DCX

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### **Onset of differentiation is post-transcriptionally controlled in adult neural stem cells**

Baser A, *et al.* (2019). *Nature*. DOI: 10.1038/s41586-019-0888-x

### **Immature excitatory neurons develop during adolescence in the human amygdala**

Sorrells SF, *et al.* (2019). *Nat Commun*. DOI: 10.1038/s41467-019-10765-1:

## DDX4

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### **Zika virus infects human testicular tissue and germ cells**

Matusali G, *et al.* (2018). *J Clin Invest*. DOI: 10.1172/jci121735

### **Single-cell RNA sequencing analysis reveals sequential cell fate transition during human spermatogenesis**

Wang M, *et al.* (2018). *Cell Stem Cell*. DOI: 10.1016/j.stem.2018.08.007

## Desmin

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### **The presence of interleukin-13 at pancreatic ADM/PanIN lesions alters macrophage populations and mediates pancreatic tumorigenesis**

Liou GY, *et al.* (2017). *Cell Rep*. DOI: 10.1016/j.celrep.2017.04.05

### **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**

Morrison JA, *et al.* (2017). *Elife*. DOI: 10.7554/eLife.28415

## Desmin (*continued*)

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### **Single-cell RNA sequencing of lymph node stromal cells reveals niche-associated heterogeneity**

Rodda LB, et al. (2018). *Immunity*. DOI: 10.1016/j.immuni.2018.04.006

### **H19 is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ <sup>+</sup> periportal hepatocytes but not cytokeratin 19<sup>+</sup> cholangiocytes in cholestatic livers**

Jiang Y, et al. (2018). *Hepatol Commun*. DOI: 10.1002/hep4.1252

## dsRed

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### **Melanin-concentrating hormone neurons promote rapid eye movement sleep independent of glutamate release**

Naganuma F, et al. (2019). *Brain Struct Funct*. DOI: 10.1007/s00429-018-1766-2

### **Merkel cells activate sensory neural pathways through adrenergic synapses**

Hoffman BU, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.10.034

### **Galanin neurons in the ventrolateral preoptic area promote sleep and heat loss in mice**

Kroeger D, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06590-7

### **Brs3 neurons in the mouse dorsomedial hypothalamus regulate body temperature, energy expenditure, and heart rate, but not food intake**

Piñol RA, et al. (2018). *Nat Neurosci*. DOI: 10.1038/s41593-018-0249-3

## EGFP

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### **Single-cell transcriptomics reveals that differentiation and spatial signatures shape epidermal and hair follicle heterogeneity**

Joost S, et al. (2016). *Cell Syst*. DOI: 10.1016/j.cels.2016.08.010

### **Diversity of interneurons in the dorsal striatum revealed by single-cell RNA sequencing and PatchSeq**

Muñoz-Manchado AB, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.07.053

### **Genetic identification of a population of noradrenergic neurons implicated in attenuation of stress-related responses**

Chen YW, et al. (2019). *Mol Psychiatry*. DOI: 10.1038/s41380-018-0245-8

### **Single-cell transcriptomes of the regenerating intestine reveal a revival stem cell**

Ayyaz A, et al. (2019). *Nature*. DOI: 10.1038/s41586-019-1154-y

## eIF

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### **Circ-ZNF609 regulates G1-S progression in rhabdomyosarcoma**

Rossi F, *et al.* (2019). *Oncogene*. DOI: 10.1038/s41388-019-0699-4

### **A translational repression complex in developing mammalian neural stem cells that regulates neuronal specification**

Zahr SK, *et al.* (2018). *Neuron*. DOI: 10.1016/j.neuron.2017.12.045

## ELAV

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### **Temporal and spatial post-transcriptional regulation of zebrafish *tie1* mRNA by long noncoding RNA during brain vascular assembly**

Chowdhury TA, *et al.* (2018). *Arterioscler Thromb Vasc Biol*. DOI: 10.1161/atvbaha.118.310848

### **Interleukin-1 $\beta$ induced stress granules sequester COX-2 mRNA and regulates its stability and translation in human OA chondrocytes**

Ansari MY, *et al.* (2016). *Sci Rep*. DOI: 10.1038/srep27611

## Endomucin

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### **Notch signaling regulates Hey2 expression in a spatiotemporal dependent manner during cardiac morphogenesis and trabecular specification**

Miao L, *et al.* (2018). *Sci Rep*. DOI: 10.1038/s41598-018-20917-w

### **Tie2 regulates endocardial sprouting and myocardial trabeculation**

Qu X, *et al.* (2019). *JCI Insight*. DOI: 10.1172/jci.insight.96002

## EPCAM

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### **H19 is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ <sup>+</sup> periportal hepatocytes but not cytokeratin 19<sup>+</sup> cholangiocytes in cholestatic livers**

Jiang Y, *et al.* (2018). *Hepatal Commun*. DOI: 10.1002/hep4.1252

### **Lineage dynamics of murine pancreatic development at single-cell resolution**

Byrnes LE, *et al.* (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06176-3

### **High-dimensional cell-level analysis of tissues with Ce3D multiplex volume imaging**

Li W, *et al.* (2019). *Nat Protoc*. DOI: 10.1038/s41596-019-0156-4

### **Intra- and inter-cellular rewiring of the human colon during ulcerative colitis**

Smillie CS, *et al.* (2019). *Cell*. DOI: 10.1016/j.cell.2019.06.029

## ERG

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### **Wnt receptor Frizzled 8 is a target of ERG in prostate cancer**

Chakravarthi BVSK, *et al.* (2018). *Prostate*. DOI: 10.1002/pros.23704

### **Endothelial cell clonal expansion in the development of cerebral cavernous malformations**

Malinverno M, *et al.* (2019). *Nat Commun*. DOI: 10.1038/s41467-019-10707-x

## eYFP

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### **Oxytocin receptors are expressed by glutamatergic prefrontal cortical neurons that selectively modulate social recognition**

Tan Y, *et al.* (2019). *J Neurosci*. DOI: 10.1523/jneurosci.2944-18.2019

### **Chemosensory modulation of neural circuits for sodium appetite**

Lee S, *et al.* (2019). *Nature*. DOI: 10.1038/s41586-019-1053-2

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### **Sexual dimorphism in the inflammatory response to traumatic brain injury**

Villapol S, *et al.* (2017). *Glia*. DOI: 10.1002/glia.23171

### **The proton-activated receptor GPR4 modulates intestinal inflammation**

Wang Y, *et al.* (2018). *J Crohns Colitis*. DOI: 10.1093/ecco-jcc/jjx147

### **Zika virus infects human testicular tissue and germ cells**

Matusali G, *et al.* (2018). *J Clin Invest*. DOI: 10.1172/jci121735

### **TGF $\beta$ inhibition restores a regenerative response in acute liver injury by suppressing paracrine senescence**

Bird TG, *et al.* (2018). *Sci Transl Med*. DOI: 10.1126/scitranslmed.aan1230

### **Hepatic leptin receptor expression can partially compensate for IL-6Ra deficiency in DEN-induced hepatocellular carcinoma**

Mittenbühler MJ, *et al.* (2018). *Mol Metab*. DOI: 10.1016/j.molmet.2018.08.010

### **Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, *et al.* (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

### **H19 Is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ <sup>+</sup> periportal hepatocytes but not cytokeratin 19<sup>+</sup> cholangiocytes in cholestatic livers**

Jiang Y, *et al.* (2018). *Hepatol Commun*. DOI: 10.1002/hep4.1252



## F4/80 (continued)

### The stimulation of macrophages with TLR ligands supports increased IL-19 expression in inflammatory bowel disease patients and in colitis models

Steinert A, et al. (2017). *J Immunol*. DOI 10.4049/jimmunol.1700350

### Liver macrophages regulate systemic metabolism through non-inflammatory factors

Morgantini C, et al. (2019). *Nature Metab*. DOI: 10.1038/s42255-019-0044-9

## FOXP3

### Intra- and inter-cellular rewiring of the human colon during ulcerative colitis

Smillie CS, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.06.029

### Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

## GFAP

### Simultaneous visualization and cell-specific confirmation of RNA and protein in the mouse retina

Stempel AJ, et al. (2014). *Mol Vis*. PMID: 25352743

### Translation in astrocyte distal processes sets molecular heterogeneity at the gliovascular interface

Boulay AC, et al. (2017). *Cell Discov*. DOI: 10.1038/celldisc.2017.5

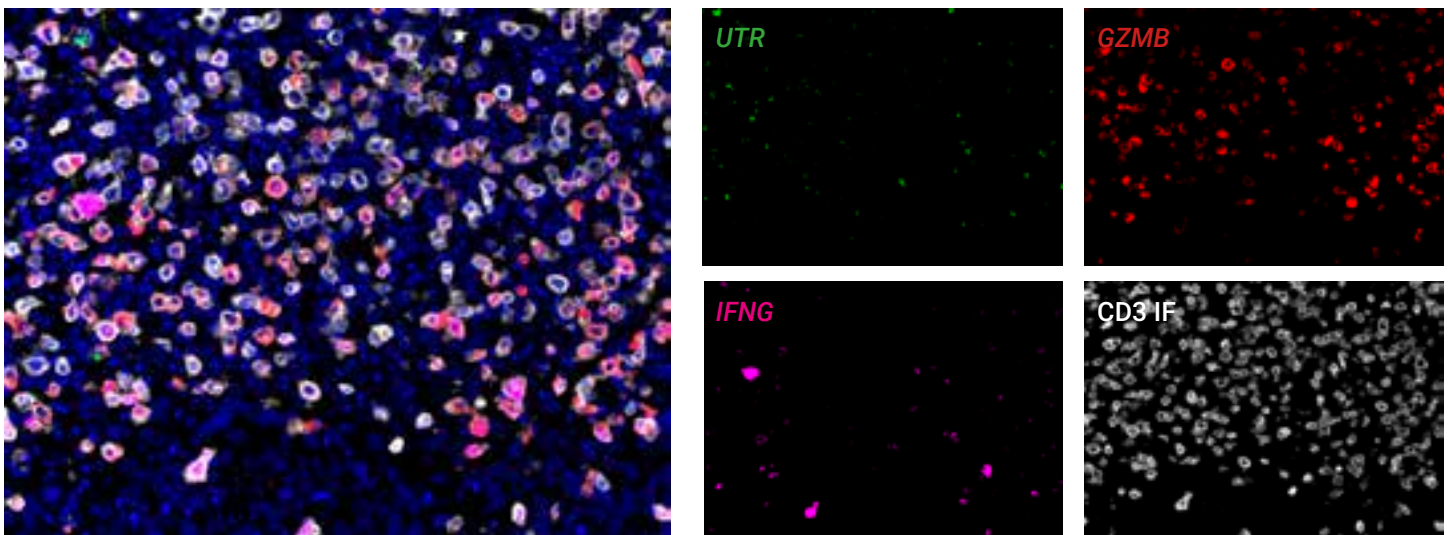


FIGURE 6. Visualization of activated CAR-T cells in human xenograft tumor. The RNAscope Multiplex Fluorescent V2 Assay for *IFNG*, *GZMB*, and the 3' *UTR* of a CAR vector was combined with IF for *CD3*.

**Rationally engineered AAV capsids improve transduction and volumetric spread in the CNS**

Kanaan NM, et al. (2017). *Mol Ther Nucleic Acids*. DOI: 10.1016/j.omtn.2017.06.011

**Co-activation of metabotropic glutamate receptor 3 and beta-adrenergic receptors modulates cyclic-AMP and long-term potentiation, and disrupts memory reconsolidation**

Walker AG, et al. (2017). *Neuropsychopharmacology* DOI: 10.1038/npp.2017.136

**Liver macrophages regulate systemic metabolism through non-inflammatory factors**

Lanfranco MF, et al. (2018). *Front Neuroanat*. DOI: 10.3389/fnana.2017.00137

**Translation in astrocyte distal processes sets molecular heterogeneity at the gliovascular interface**

Boulay AC, et al. (2017). *Cell Discov*. DOI: 10.1038/celldisc.2017.5

**Apolipoprotein E4 impairs spontaneous blood brain barrier repair following traumatic brain injury**

Main BS, et al. (2018). *Mol Neurodegener*. DOI: 10.1186/s13024-018-0249-5

**Deletion of specific sphingolipids in distinct neurons improves spatial memory in a mouse model of Alzheimer's disease**

Herzer S, et al. (2018). *Front Mol Neurosci*. DOI: 10.3389/fnmol.2018.00206

**New role of P2X7 receptor in an Alzheimer's disease mouse model**

Martin E, et al. (2019). *Mol Psychiatry*. DOI: 10.1038/s41380-018-0108-3

**Biallelic mutations in MYORG cause autosomal recessive primary familial brain calcification**

Yao XP, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.05.037

**Nuclear localization of *Huntingtin* mRNA is specific to cells of neuronal origin**

Didiot MC, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.07.106

**Macrophages but not astrocytes harbor HIV DNA in the brains of HIV-1-infected aviremic individuals on suppressive antiretroviral therapy**

Ko A, et al. (2019). *J Neuroimmune Pharmacol*. DOI: 10.1007/s11481-018-9809-2

**PDGFR $\beta$  cells rapidly relay inflammatory signal from the circulatory system to neurons via chemokine CCL2**

Duan L, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.08.030

**Inflammasome activation induces pyroptosis in the retina exposed to ocular hypertension injury**

Pronin A, et al. (2019). *Front Mol Neurosci*. DOI: 10.3389/fnmol.2019.00036

**Defining the role of NG2-expressing cells in experimental models of multiple sclerosis. A biofunctional analysis of the neurovascular unit in wild type and NG2 null mice**

Girolamo F, et al. (2019). *PLoS One*. DOI: 10.1371/journal.pone.0213508

## GFAP (continued)

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### **Unique RNA signature of different lesion types in the brain white matter in progressive multiple sclerosis**

Elkjaer ML, et al. (2019). *Acta Neuropathol Commun*. DOI: 10.1186/s40478-019-0709-3

### **The central fibroblast growth factor receptor/beta klotho system: Comprehensive mapping in *Mus musculus* and comparisons to nonhuman primate and human samples using an automated *in situ* hybridization platform**

Hultman K, et al. (2019). *J Comp Neurol*. DOI: 10.1002/cne.24668

### **Spinal IL-33/ST2 signaling mediates chronic itch in mice through the astrocytic JAK2-STAT3 cascade**

Du L, et al. (2019). *Glia*. DOI: 10.1002/glia.23639

### **Elevated levels of Secreted-Frizzled-Related-Protein 1 contribute to Alzheimer's disease pathogenesis**

Esteve P, et al. (2019). *Nat Neurosci*. DOI: 10.1038/s41593-019-0432-1

### **A method for combining RNAscope *in situ* hybridization with immunohistochemistry in thick free-floating brain sections and primary neuronal cultures**

Grabinski TM, et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0120120

### **Neuropeptide S promotes wakefulness through the inhibition of sleep-promoting VLPO neurons**

Chauveau F, et al. (2019). *Sleep*. DOI: 10.1093/sleep/zsz189

## GFP

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### **The peptidergic control circuit for sighing**

Li P, et al. (2016). *Nature*. DOI: 10.1038/nature16964

### **Inflammatory triggers associated with exacerbations of COPD orchestrate plasticity of group 2 innate lymphoid cells in the lungs**

Silver JS, et al. (2016). *Nat Immunol*. DOI: 10.1038/ni.3443

### **Dedifferentiated schwann cell precursors secreting paracrine factors are required for regeneration of the mammalian digit tip**

Johnston AP, et al. (2016). *Cell Stem Cell*. DOI: 10.1016/j.stem.2016.06.002

### **Blood pressure regulation by the rostral ventrolateral medulla in conscious rats: effects of hypoxia, hypercapnia, baroreceptor denervation, and anesthesia**

Wenker IC, et al. (2017). *J Neurosci*. DOI: 10.1523/jneurosci.3922-16.2017

### **Tbx5a lineage tracing shows cardiomyocyte plasticity during zebrafish heart regeneration**

Sánchez-Iranzo H, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-017-02650-6

**Dusp6 attenuates Ras/MAPK signaling to limit zebrafish heart regeneration**

Missinato MA, et al. (2018). *Development*. DOI: 10.1242/dev.157206

**Transcriptional profiling of somatostatin interneurons in the spinal dorsal horn**

Chamessian A, et al. (2018). *Sci Rep*. DOI: 10.1038/s41598-018-25110-7

**The epigenetic state of PRDM16-regulated enhancers in radial glia controls cortical neuron position**

Baizabal JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.04.033

**Sensory afferents use different coding strategies for heat and cold**

Wang F, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.04.065

**Clonal analysis of Notch1-expressing cells reveals the existence of unipotent stem cells that retain long-term plasticity in the embryonic mammary gland**

Lilja AM, et al. (2018). *Nat Cell Biol*. DOI: 10.1038/s41556-018-0108-1

**Epigenetic regulation of brain region-specific microglia clearance activity**

Ayata P, et al. (2018). *Nat Neurosci*. DOI: 10.1038/s41593-018-0192-3

**Galanin neurons in the ventrolateral preoptic area promote sleep and heat loss in mice**

Kroeger D, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06590-7

**Endodermal pouch-expressed *dmrt2b* is important for pharyngeal cartilage formation**

Li L, et al. (2018). *Biol Open*. DOI: 10.1242/bio.035444

**T helper cell cytokines modulate intestinal stem cell renewal and differentiation**

Biton M, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.10.008

**Food perception primes hepatic ER homeostasis via melanocortin-dependent control of mTOR activation**

Brandt C, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.10.015

**NUAK2 is a critical YAP target in liver cancer**

Yuan WC, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07394-5

**Axon-seq decodes the motor axon transcriptome and its modulation in response to ALS**

Nijssen J, et al. (2018). *Stem Cell Reports*. DOI: 10.1016/j.stemcr.2018.11.005

**Single-cell analysis reveals a hair follicle dermal niche molecular differentiation trajectory that begins prior to morphogenesis**

Gupta K, et al. (2019). *Dev Cell*. DOI: 10.1016/j.devcel.2018.11.032

**Dermal condensate niche fate specification occurs prior to formation and is placode progenitor dependent**

Mok KW, et al. (2019). *Dev Cell*. DOI: 10.1016/j.devcel.2018.11.034

**Subcellular transcriptomes and proteomes of developing axon projections in the cerebral cortex**

Poulopoulos A, et al. (2019). *Nature*. DOI: 10.1038/s41586-018-0847-y

**Combined social and spatial coding in a descending projection from the prefrontal cortex**

Murugan M, et al. (2017). *Cell*. DOI: 10.1016/j.cell.2017.11.002

**Lineage tracing of Notch1-expressing cells in intestinal tumours reveals a distinct population of cancer stem cells**

Mourao L, et al. (2019). *Sci Rep*. DOI: 10.1038/s41598-018-37301-3

**Distinct modes of presynaptic inhibition of cutaneous afferents and their functions in behavior**

Zimmerman AL, et al. (2019). *Neuron*. DOI: 10.1016/j.neuron.2019.02.002

**Colonic CD90+ crypt fibroblasts secrete semaphorins to support epithelial growth**

Karpus ON, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.02.101

**Single cell RNA sequencing identifies TGF $\beta$  as a key regenerative cue following LPS-induced lung injury**

Riemyndy KA, et al. (2019). *JCI Insight*. DOI: 10.1172/jci.insight.123637

**Lineage tracing reveals a subset of reserve muscle stem cells capable of clonal expansion under stress**

Scaramozza A, et al. (2019). *Cell Stem Cell*. DOI: 10.1016/j.stem.2019.03.020

**Hyperactivity with disrupted attention by activation of an astrocyte synaptogenic cue**

Nagai J, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.03.019

**Profiling of G protein-coupled receptors in vagal afferents reveals novel gut-to-brain sensing mechanisms**

Egerod KL, et al. (2018). *Mol Metab*. DOI: 10.1016/j.molmet.2018.03.016

**SHISA6 confers resistance to differentiation-promoting Wnt/ $\beta$ -Catenin signaling in mouse spermatogenic stem cells**

Tokue M, et al. (2017). *Stem Cell Reports*. DOI: 10.1016/j.stemcr.2017.01.006

**Wilms tumor 1b expression defines a pro-regenerative macrophage subtype and is required for organ regeneration in the zebrafish**

Sanz-Morejón A, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.06.091

## Glucagon

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### **GPR142 prompts glucagon-like Peptide-1 release from islets to improve $\beta$ cell function**

Lin HV, et al. (2018). *Mol Metab*. DOI: 10.1016/j.molmet.2018.02.008

### **GPR119 agonism increases glucagon secretion during insulin-induced hypoglycemia**

Li NX, et al. (2018). *Diabetes*. DOI: 10.2337/db18-0031

## Glut1

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### **FZD<sub>10</sub>-G $\alpha$ <sub>13</sub> signalling axis points to a role of FZD<sub>10</sub> in CNS angiogenesis**

Hot B, et al. (2017). *Cell Signal*. DOI: 10.1016/j.cellsig.2017.01.023

### **Fibronectin produced by cerebral endothelial and vascular smooth muscle cells contributes to perivascular extracellular matrix in late-delayed radiation-induced brain injury**

Andrews RN, et al. (2018). *Radiat Res*. DOI: 10.1667/rr14961.1

## HNK1

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### **Resolving *in vivo* gene expression during collective cell migration using an integrated RNAscope, immunohistochemistry and tissue clearing method**

Morrison JA, et al. (2017). *Mech Dev*. DOI: 10.1016/j.mod.2017.06.004

### **Single-cell transcriptome analysis of avian neural crest migration reveals signatures of invasion and molecular transitions**

Morrison JA, et al. (2017). *Elife*. DOI: 10.7554/eLife.28415

## IB4

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### **Motor neurons control blood vessel patterning in the developing spinal cord**

Himmels P, et al. (2017). *Nat Commun*. DOI: 10.1038/ncomms14583

### **Immune or genetic-mediated disruption of CASPR2 causes pain hypersensitivity due to enhanced primary afferent excitability**

Dawes JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.01.033

### **Translation in astrocyte distal processes sets molecular heterogeneity at the gliovascular interface**

Boulay AC, et al. (2017). *Cell Discov*. DOI: 10.1038/celldisc.2017.5

### **A critical role for dopamine D5 receptors in pain chronicity in male mice**

Megat S, et al. (2018). *J Neurosci*. DOI: 10.1523/jneurosci.2110-17.2017

**Sustained inflammation after pericyte depletion induces irreversible blood-retina barrier breakdown**

Ogura S, et al. (2017). *JCI Insight*. DOI: 10.1172/jci.insight.90905

**NOX2 deficiency alters macrophage phenotype through an IL-10/STAT3 dependent mechanism: implications for traumatic brain injury**

Barrett JP, et al. (2017). *J Neuroinflammation*. DOI: 10.1186/s12974-017-0843-4

**Migrating interneurons secrete fractalkine to promote oligodendrocyte formation in the developing mammalian brain**

Voronova A, et al. (2017). *Neuron*. DOI: 10.1016/j.neuron.2017.04.018

**Sexual dimorphism in the inflammatory response to traumatic brain injury**

Villapol S, et al. (2017). *Glia*. DOI: 10.1002/glia.23171

**Rationally engineered AAV capsids improve transduction and volumetric spread in the CNS**

Kanaan NM, et al. (2017). *Mol Ther Nucleic Acids*. DOI: 10.1016/j.omtn.2017.06.011

**HIV-infected macrophages and microglia that survive acute infection become viral reservoirs by a mechanism involving Bim**

Castellano P, et al. (2017). *Sci Rep*. DOI: 10.1038/s41598-017-12758-w

**Increased microglial CSF1R expression in the SIV/Macaque model of HIV CNS disease**

Knight AC, et al. (2018). *J Neuropathol Exp Neurol*. DOI: 10.1093/jnen/nlx115

**Glial- and neuronal-specific expression of CCL5 mRNA in the rat brain**

Lanfranco MF, et al. (2018). *Front Neuroanat*. DOI: 10.3389/fnana.2017.00137

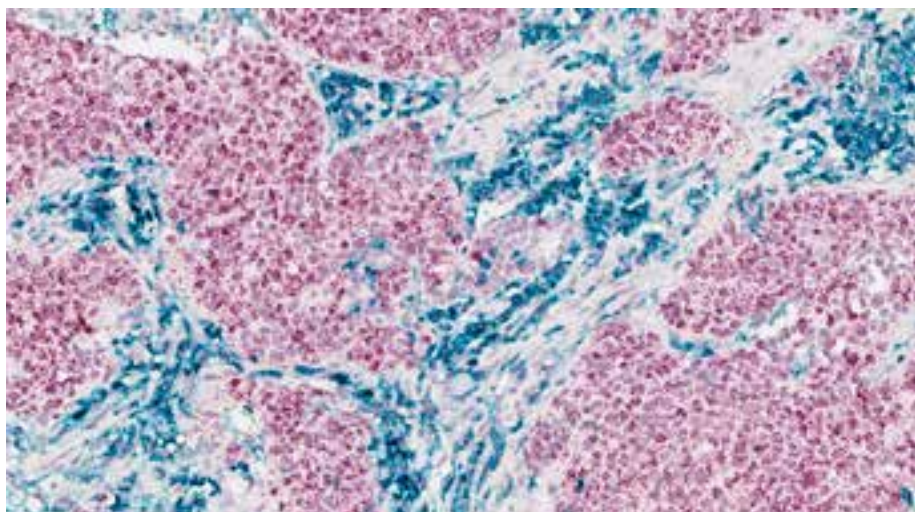


FIGURE 7. Discerning tumor and stromal gene expression. The RNAscope 2.5 HD Assay-Red for *PD-L1* was combined with IHC for CD45.

**New role of P2X7 receptor in an Alzheimer's disease mouse model**

Martin E, et al. (2019). *Mol Psychiatry*. DOI: 10.1038/s41380-018-0108-3

**Simian immunodeficiency virus persistence in cellular and anatomic reservoirs in antiretroviral therapy-suppressed infant rhesus macaques**

Mavigner M, et al. (2018). *J Virol*. DOI: 10.1128/jvi.00562-18

**Macrophages regulate schwann cell maturation after nerve injury**

Stratton JA, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.08.004

**PDGFR $\beta$  cells rapidly relay inflammatory signal from the circulatory system to neurons via chemokine CCL2**

Duan L, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.08.030

**Alzheimer's disease phospholipase C-gamma-2 (PLCG2) protective variant is a functional hypermorph**

Magno L, et al. (2019). *Alzheimers Res Ther*. DOI: 10.1186/s13195-019-0469-0

**Inflammasome activation induces pyroptosis in the retina exposed to ocular hypertension injury**

Pronin A, et al. (2019). *Front Mol Neurosci*. DOI: 10.3389/fnmol.2019.00036

**C3- and CR3-dependent microglial clearance protects photoreceptors in retinitis pigmentosa**

Silverman SM, et al. (2019). *J Exp Med*. DOI: 10.1084/jem.20190009

**Silencing alpha synuclein in mature nigral neurons results in rapid neuroinflammation and subsequent toxicity**

Benskey MJ, et al. (2018). *Front Mol Neurosci*. DOI: 10.3389/fnmol.2018.00036

**A combination of ontogeny and CNS environment establishes microglial identity**

Bennett FC, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.05.014

**Combination of fluorescent *in situ* hybridization (FISH) and immunofluorescence imaging for detection of cytokine expression in microglia/macrophage Cells**

Fe Lanfranco M, et al. (2017). *Bio Protoc*. DOI: 10.21769/BioProtoc.2608

**Neutrophil and macrophage influx into the central nervous system are inflammatory components of lethal Rift Valley fever encephalitis in rats**

Albe JR, et al. (2019). *PLoS Pathog*. DOI: 10.1371/journal.ppat.1007833



## Ig Molecules

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### **Single-cell RNA sequencing of lymph node stromal cells reveals niche-associated heterogeneity**

Rodda LB, *et al.* (2018). *Immunity*. DOI: 10.1016/j.immuni.2018.04.006

### **S-Geranylgeranyl-L-glutathione is a ligand for human B cell-confinement receptor P2RY8**

Lu E, *et al.* (2019). *Nature*. DOI: 10.1038/s41586-019-1003-z

### **A method for manual and automated multiplex RNAscope *in situ* hybridization and immunocytochemistry on cytospin samples**

Chan S, *et al.* (2018). *PLoS One*. DOI: 10.1371/journal.pone.0207619

## Insulin

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### **Suppression of insulin production and secretion by a decretin hormone**

Alfa RW, *et al.* (2015). *Cell Metab*. DOI: 10.1016/j.cmet.2015.01.006

### **GPR142 prompts glucagon-like Peptide-1 release from islets to improve $\beta$ cell function**

Lin HV, *et al.* (2018). *Mol Metab*. DOI: 10.1016/j.molmet.2018.02.008

### **GPR119 agonism increases glucagon secretion during insulin-induced hypoglycemia**

Li NX, *et al.* (2018). *Diabetes*. DOI: 10.2337/db18-0031

### **Use of the Fluidigm C1 platform for RNA sequencing of single mouse pancreatic islet cells**

Xin Y, *et al.* (2016). *Proc Natl Acad Sci U S A*. DOI: 10.1073/pnas.1602306113

## Ki67

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### **Distribution of Lgr5-positive cancer cells in intramucosal gastric signet-ring cell carcinoma**

Pathol Int, *et al.* (2016). *Pathol Int*. DOI: 10.1111/pin.12451

### **Multimodal single-cell analysis reveals physiological maturation in the developing human neocortex**

Mayer S, *et al.* (2019). *Neuron*. DOI: 10.1016/j.neuron.2019.01.027

### **A case report of clonal EBV-like memory CD4+ T cell activation in fatal checkpoint inhibitor-induced encephalitis**

Johnson DB, *et al.* (2019). *Nat Med*. DOI: 10.1038/s41591-019-0523-2

**Automated double *in situ* detection of mouse Lgr5 mRNA and lysozyme protein in examining the neighboring cell types of the mouse intestinal crypt**

Turkekul M, et al. (2017). *Methods Mol Biol*. DOI: 10.1007/978-1-4939-6759-9\_19

**A single-cell survey of the small intestinal epithelium**

Haber AL, et al. (2017). *Nature*. DOI: 10.1038/nature24489

**Radical and lunatic fringes modulate notch ligands to support mammalian intestinal homeostasis**

Murthy P, et al. (2018). *Elife*. DOI: 10.7554/eLife.35710

**Mouse fetal intestinal organoids: new model to study epithelial maturation from suckling to weaning**

Navis M, et al. (2019). *EMBO Rep*. DOI: 10.15252/embr.201846221

**The atypical chemokine receptor 2 limits renal inflammation and fibrosis in murine progressive immune complex glomerulonephritis**

Bideak A, et al. (2018). *Kidney Int*. DOI: 10.1016/j.kint.2017.11.013

**High-dimensional cell-level analysis of tissues with Ce3D multiplex volume imaging**

Li W, et al. (2019). *Nat Protoc*. DOI: 10.1038/s41596-019-0156-4

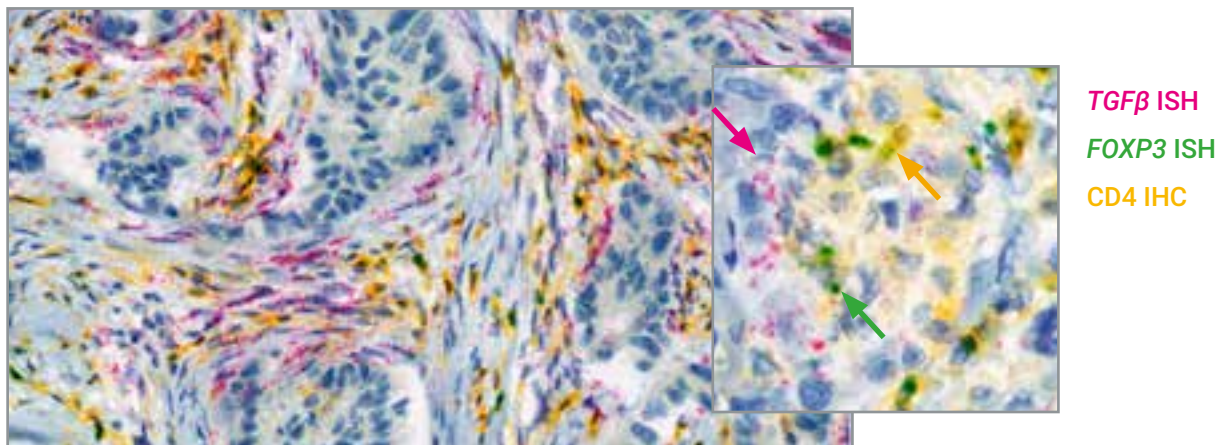
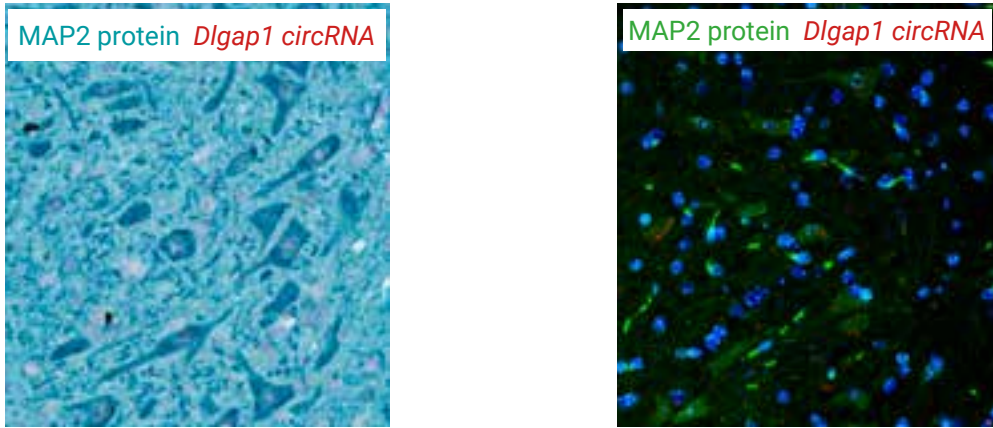


FIGURE 8. Detection of regulatory T cells in the TME of human lung cancer. The RNAscope VS Duplex Assay for *TGFβ* and *FOXP3* was combined with IHC for CD4.



**FIGURE 9. Cell type-specific expression of circRNAs in the tissue.** The BaseScope™ assay for the circRNA *Dlgap1* was combined with IHC for Map2. Due to the fluorescent nature of the Fast Red chromogen, the image was visualized under brightfield (left) and fluorescent (right) microscopy.

## MBP

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### **Oligodendroglia are particularly vulnerable to oxidative damage after neurotrauma *in vivo***

Giacci MK, *et al.* (2018). *J Neurosci*. DOI: 10.1523/JNEUROSCI.1898-17.2018

### **NRG1 type I dependent autocrine stimulation of Schwann cells in onion bulbs of peripheral neuropathies**

Fledrich R, *et al.* (2019). *Nat Commun*. DOI: 10.1038/s41467-019-09385-6

## MCH

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### **Control of feeding behavior by cerebral ventricular volume transmission of melanin-concentrating hormone**

Noble EE, *et al.* (2018). *Cell Metab*. DOI: 10.1016/j.cmet.2018.05.001

### **Melanin-concentrating hormone neurons promote rapid eye movement sleep independent of glutamate release**

Naganuma F, *et al.* (2019). *Brain Struct Funct*. DOI: 10.1007/s00429-018-1766-2

### **Functional analysis reveals differential effects of glutamate and MCH neuropeptide in MCH neurons**

Schneeberger M, *et al.* (2018). *Mol Metab*. DOI: 10.1016/j.molmet.2018.05.001

## **Chromatin-remodelling factor Brg1 regulates myocardial proliferation and regeneration in zebrafish**

Xiao C, et al. (2016). *Nat Commun*. DOI: 10.1038/ncomms13787

## **Notch signaling regulates Hey2 expression in a spatiotemporal dependent manner during cardiac morphogenesis and trabecular specification**

Miao L, et al. (2018). *Sci Rep*. DOI: 10.1038/s41598-018-20917-w

## **Heart regeneration in the mexican cavefish**

Stockdale WT, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.10.072

## **Disruption of embryonic ROCK signaling reproduces the sarcomeric phenotype of hypertrophic cardiomyopathy**

Bailey KE, et al. (2019). *JCI Insight*. DOI: 10.1172/jci.insight.125172

## **Tbx5a lineage tracing shows cardiomyocyte plasticity during zebrafish heart regeneration**

Sánchez-Iranzo H, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-017-02650-6

## **Lewy body-like alpha-synuclein inclusions trigger reactive microgliosis prior to nigral degeneration**

Duffy MF, et al. (2018). *J Neuroinflammation*. DOI: 10.1186/s12974-018-1171-z

## **Unique RNA signature of different lesion types in the brain white matter in progressive multiple sclerosis**

Elkjaer ML, et al. (2019). *Acta Neuropathol Commun*. DOI: 10.1186/s40478-019-0709-3

## **Detection of single mRNAs in individual cells of the auditory system**

Salehi P, et al. (2018). *Hear Res*. DOI: 10.1016/j.heares.2018.07.008

## **A RNAscope whole mount approach that can be combined with immunofluorescence to quantify differential distribution of mRNA**

Kersigo J, et al. (2018). *Cell Tissue Res*. DOI: 10.1007/s00441-018-2864-4

## **A method for combining RNAscope *in situ* hybridization with immunohistochemistry in thick free-floating brain sections and primary neuronal cultures**

Grabinski TM, et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0120120

## **Impact of age and vector construct on striatal and nigral transgene expression**

Polinski NK, et al. (2016). *Mol Ther Methods Clin Dev*. DOI: 10.1038/mtm.2016.82

## **A critical role for dopamine D5 receptors in pain chronicity in male mice**

Megat S, et al. (2018). *J Neurosci*. DOI: 10.1523/jneurosci.2110-17.2017

**Glial- and neuronal-specific expression of CCL5 mRNA in the rat brain**

Lanfranco MF, et al. (2018). *Front Neuroanat*. DOI: 10.3389/fnana.2017.00137

**Antisense oligonucleotides selectively suppress target RNA in nociceptive neurons of the pain system and can ameliorate mechanical pain**

Mohan A, et al. (2018). *Pain*. DOI: 10.1097/j.pain.0000000000001074

**Nuclear localization of *Huntingtin* mRNA is specific to cells of neuronal origin**

Didiot MC, et al. (2018). *Cell Rep*. DOI: 10.1016/j.celrep.2018.07.106

**Natural killer cells degenerate intact sensory afferents following nerve injury**

Davies AJ, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2018.12.022

**Alzheimer's disease phospholipase C-gamma-2 (PLCG2) protective variant is a functional hypermorph**

Magno L, et al. (2019). *Alzheimers Res Ther*. DOI: 10.1186/s13195-019-0469-0

**Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

**Immune or genetic-mediated disruption of CASPR2 causes pain hypersensitivity due to enhanced primary afferent excitability**

Dawes JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.01.033

**Comprehensive analysis of long noncoding RNA expression in dorsal root ganglion reveals cell-type specificity and dysregulation after nerve injury**

Baskozos G, et al. (2019). *Pain*. DOI: 10.1097/j.pain.0000000000001416

**Merkel cells activate sensory neural pathways through adrenergic synapses**

Hoffman BU, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.10.034

**Mechanically activated Piezo channels mediate touch and suppress acute mechanical pain response in mice**

Zhang M, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.01.056

**The human motor neuron axonal transcriptome is enriched for transcripts related to mitochondrial function and microtubule-based axonal transport**

Maciel R, et al. (2018). *Exp Neurol*. DOI: 10.1016/j.expneurol.2018.06.008

## Olig1/2

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### **Altered human oligodendrocyte heterogeneity in multiple sclerosis**

Jäkel S, et al. (2019). *Nature*. DOI: 10.1038/s41586-019-0903-2

### **Loss of Shh signaling in the neocortex reveals heterogeneous cell recovery responses from distinct oligodendrocyte populations**

Winkler CC, et al. (2019). *Dev Biol*. DOI: 10.1016/j.ydbio.2019.04.016

### **Rationally engineered AAV capsids improve transduction and volumetric spread in the CNS**

Kanaan NM, et al. (2017). *Mol Ther Nucleic Acids*. DOI: 10.1016/j.omtn.2017.06.011

### **Role of dopamine D2 receptor in stress-induced myelin loss**

Choi MH, et al. (2017). *Sci Rep*. DOI: 10.1038/s41598-017-10173-9

## PAX

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### **Immune or genetic-mediated disruption of CASPR2 causes pain hypersensitivity due to enhanced primary afferent excitability**

Dawes JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.01.033

### **A translational repression complex in developing mammalian neural stem cells that regulates neuronal specification**

Zahr SK, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2017.12.045

### **Lineage tracing reveals a subset of reserve muscle stem cells capable of clonal expansion under stress**

Scaramozza A, et al. (2019). *Cell Stem Cell*. DOI: 10.1016/j.stem.2019.03.020

## PD-1

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### **Microtubule-driven stress granule dynamics regulate inhibitory immune checkpoint expression in T Cells**

Franchini DM, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2018.12.014

### **CTLA-4<sup>+</sup>PD-1<sup>-</sup> memory CD4<sup>+</sup> T cells critically contribute to viral persistence in antiretroviral therapy-suppressed, SIV-infected rhesus macaques**

McGary CS, et al. (2017). *Immunity*. DOI: 10.1016/j.immuni.2017.09.018

## PDGFR

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### **Apolipoprotein E4 impairs spontaneous blood brain barrier repair following traumatic brain injury**

Main BS, *et al.* (2018). *Mol Neurodegener.* DOI: 10.1186/s13024-018-0249-5

### **PDGFR $\beta$ cells rapidly relay inflammatory signal from the circulatory system to neurons via chemokine CCL2**

Duan L, *et al.* (2018). *Neuron.* DOI: 10.1016/j.neuron.2018.08.030

### **Defining the role of NG2-expressing cells in experimental models of multiple sclerosis. A biofunctional analysis of the neurovascular unit in wild type and NG2 null mice**

Girolamo F, *et al.* (2019). *PLoS One.* DOI: 10.1371/journal.pone.0213508

## Peripherin

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### **Detection of single mRNAs in individual cells of the auditory system**

Salehi P, *et al.* (2018). *Hear Res.* DOI: 10.1016/j.heares.2018.07.008

### **Neuronal heterogeneity and stereotyped connectivity in the auditory afferent system**

Petitpré C, *et al.* (2018). *Nat Commun.* DOI: 10.1038/s41467-018-06033-3

## PKC

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### **Central amygdala prepronociceptin-expressing neurons mediate palatable food consumption and reward**

Hardaway JA, *et al.* (2019). *Neuron.* DOI: 10.1016/j.neuron.2019.03.037

### **Functional ectopic neuritogenesis by retinal rod bipolar cells is regulated by miR-125b-5p during retinal remodeling in RCS rats**

Fu Y, *et al.* (2017). *Sci Rep.* DOI: 10.1038/s41598-017-01261-x

## Porcupine

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### **Non-equivalence of Wnt and R-spondin ligands during Lgr5<sup>+</sup> intestinal stem-cell self-renewal**

Yan KS, *et al.* (2017). *Nature.* DOI: 10.1038/nature22313

### **A Wnt-producing niche drives proliferative potential and progression in lung adenocarcinoma**

Tammela T, *et al.* (2017). *Nature.* DOI: 10.1038/nature22334

**MECP2 is post-transcriptionally regulated during human neurodevelopment by combinatorial action of RNA-binding proteins and miRNAs**

Rodrigues DC, et al. (2016). *Cell Rep*. DOI: 10.1016/j.celrep.2016.09.049

**A translational repression complex in developing mammalian neural stem cells that regulates neuronal specification**

Zahr SK, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2017.12.045

**Medial amygdala *Kiss1* neurons mediate female pheromone stimulation of luteinizing hormone in male mice**

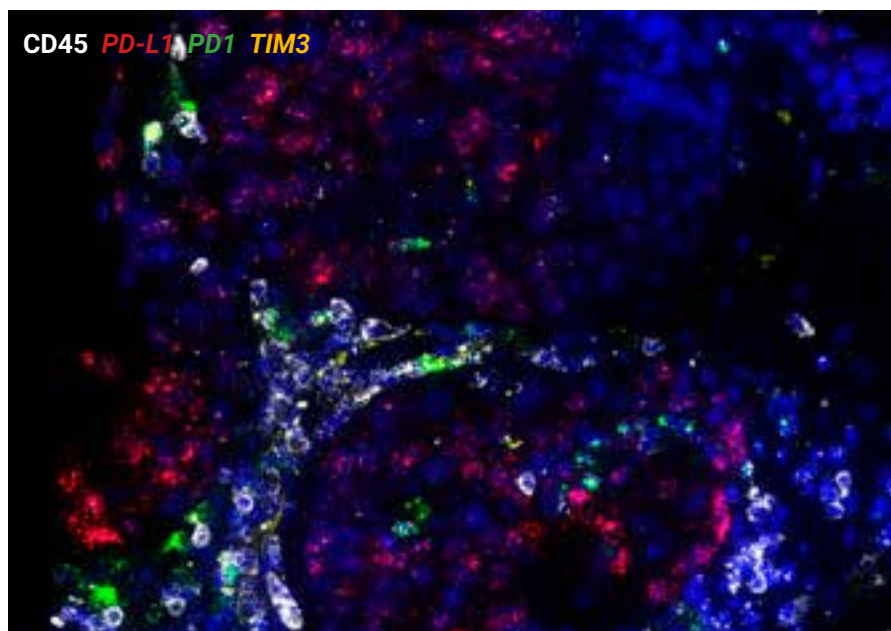
Aggarwal S, et al. (2019). *Neuroendocrinology*. DOI: 10.1159/000496106

**Hyperactivity with disrupted attention by activation of an astrocyte synaptogenic cue**

Nagai J, et al. (2019). *Cell*. DOI: 10.1016/j.cell.2019.03.019

**GLP-1-, but not GDF-15-, receptor activation increases the number of IL-6-expressing cells in the external lateral parabrachial nucleus**

Anesten F, et al. (2019). *Neuroendocrinology*. DOI: 10.1159/000499693



**FIGURE 10. Detection of multiple immune checkpoint markers in the TME of human lung cancer.** The RNAscope Multiplex Fluorescent V2 Assay for *PD-L1*, *PD1*, and *TIM3* was combined with IF for *CD45*.



**NRG1 type I dependent autocrine stimulation of Schwann cells in onion bulbs of peripheral neuropathies**

Fledrich R, et al. (2019). *Nat Commun*. DOI: 10.1038/s41467-019-09385-6

**Biallelic mutations in MYORG cause autosomal recessive primary familial brain calcification**

Yao XP, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.05.037

**Obesity-induced cellular senescence drives anxiety and impairs neurogenesis**

Ogrodnik M, et al. (2019). *Cell Metab*. DOI: 10.1016/j.cmet.2018.12.008

**Impact of age and vector construct on striatal and nigral transgene expression**

Polinski NK, et al. (2016). *Mol Ther Methods Clin Dev*. DOI: 10.1038/mtm.2016.82

**Dedifferentiated schwann cell precursors secreting paracrine factors are required for regeneration of the mammalian digit tip**

Johnston AP, et al. (2016). *Cell Stem Cell*. DOI: 10.1016/j.stem.2016.06.002

**Expansion of hedgehog disrupts mesenchymal identity and induces emphysema phenotype**

Wang C, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci99435

**The long noncoding RNA Falcor regulates Foxa2 expression to maintain lung epithelial homeostasis and promote regeneration**

Swarr DT, et al. (2019). *Genes Dev*. DOI: 10.1101/gad.320523.118

**Selective expression of TSPAN2 in vascular smooth muscle is independently regulated by TGF- $\beta$ 1/SMAD and myocardin/serum response factor**

Zhao J, et al. (2017). *FASEB J*. DOI: 10.1096/fj.201601021R

**Interleukin-33 overexpression reflects less aggressive tumour features in large-duct type cholangiocarcinomas**

Sawada R, et al. (2018). *Histopathology*. DOI: 10.1111/his.13633

**Endothelial and smooth muscle cell interaction via FoxM1 signaling mediates vascular remodeling and pulmonary hypertension**

Dai Z, et al. (2018). *Am J Respir Crit Care Med*. DOI: 10.1164/rccm.201709-18350C

### **Apparently normal kidney development in mice with conditional disruption of ANG II-AT1 receptor genes in FoxD1-positive stroma cell precursors**

Schrankl J, et al. (2019). *Am J Physiol Renal Physiol*. DOI: 10.1152/ajprenal.00305.2018

### **Visualization and targeting of LGR5+ human colon cancer stem cells**

Shimokawa M, et al. (2017). *Nature*. DOI: 10.1038/nature22081

### **MicroRNA-29c prevents pulmonary fibrosis by regulating epithelial cell renewal and apoptosis**

Xie T, et al. (2017). *Am J Respir Cell Mol Biol*. DOI: 10.1165/rcmb.2017-01330C

### **The proton-activated receptor GPR4 modulates intestinal inflammation**

Wang Y, et al. (2018). *J Crohns Colitis*. DOI: 10.1093/ecco-jcc/jjx147

### **H19 is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ + periportal hepatocytes but not cytokeratin 19+ cholangiocytes in cholestatic livers**

Jiang Y, et al. (2018). *HepatoL Commun*. DOI: 10.1002/hep4.1252

### **Cancer cell niche factors secreted from cancer-associated fibroblast by loss of H3K27me3**

Maeda M, et al. (2019). *Gut*. DOI: 10.1136/gutjnl-2018-317645

### **Zika virus infects human testicular tissue and germ cells**

Matusali G, et al. (2018). *J Clin Invest*. DOI: 10.1172/jci121735

### **Expression of olfactory signaling genes in the eye**

Pronin , et al. (2014). *PLoS One*. DOI: 10.1371/journal.pone.0096435

### **Integrated Human Evaluation of the Lysophosphatidic Acid Pathway as a Novel Therapeutic Target in Atherosclerosis**

Aldi S, et al. (2018). *Mol Ther Methods Clin Dev*. DOI: 10.1016/j.omtm.2018.05.003

### **GLI2 modulated by SUFU and SPOP induces intestinal stem cell niche signals in development and tumorigenesis**

Coquenlorge S, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.05.016

### **Distinct compartmentalization of the chemokines CXCL1 and CXCL2 and the atypical receptor ACKR1 determine discrete stages of neutrophil diapedesis**

Girbl T, et al. (2018). *Immunity*. DOI: 10.1016/j.immuni.2018.09.018

### **ROBO2 is a stroma suppressor gene in the pancreas and acts via TGF- $\beta$ signalling**

Pinho AV, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07497-z

### **Comprehensive alpha, beta and delta cell transcriptomes reveal that ghrelin selectively activates delta cells and promotes somatostatin release from pancreatic islets**

DiGruccio MR, et al. (2016). *Mol Metab*. DOI: 10.1016/j.molmet.2016.04.007

### **Suppression of insulin production and secretion by a decretin hormone**

Alfa RW, et al. (2015). *Cell Metab*. DOI: 10.1016/j.cmet.2015.01.006

### **GPR119 agonism increases glucagon secretion during insulin-induced hypoglycemia**

Li NX, et al. (2018). *Diabetes*. DOI: 10.2337/db18-0031

### **Use of the Fluidigm C1 platform for RNA sequencing of single mouse pancreatic islet cells**

Xin Y, et al. (2016). *Proc Natl Acad Sci U S A*. DOI: 10.1073/pnas.1602306113

### **Central amygdala prepronociceptin-expressing neurons mediate palatable food consumption and reward**

Hardaway JA, et al. (2019). *Neuron*. DOI: 10.1016/j.neuron.2019.03.037

### **Developmental emergence of adult neural stem cells as revealed by single-cell transcriptional profiling**

Yuzwa SA, et al. (2017). *Cell Rep*. DOI: 10.1016/j.celrep.2017.12.017

### **Interleukin-6 regulates adult neural stem cell numbers during normal and abnormal post-natal development**

Storer MA, et al. (2018). *Stem Cell Reports*. DOI: 10.1016/j.stemcr.2018.03.008

### **Onset of differentiation is post-transcriptionally controlled in adult neural stem cells**

Baser A, et al. (2019). *Nature*. DOI: 10.1038/s41586-019-0888-x

### **Cellular senescence in progenitor cells contributes to diminished remyelination potential in progressive multiple sclerosis**

Nicaise AM, et al. (2019). *Proc Natl Acad Sci U S A*. DOI: 10.1073/pnas.1818348116

### **H19 is expressed in hybrid hepatocyte nuclear factor 4 $\alpha$ <sup>+</sup> periportal hepatocytes but not cytokeratin 19<sup>+</sup> cholangiocytes in cholestatic livers**

Jiang Y, et al. (2018). *Hepatol Commun*. DOI: 10.1002/hep4.1252

## Synaptophysin

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### **Leucine-rich repeat-containing G-protein-coupled receptor 5 expression and clinicopathological features of colorectal neuroendocrine neoplasms**

Nakajima T, et al. (2018). *Pathol Int*. DOI: 10.1111/pin.12707

### **Cellular localization and regulation of receptors and enzymes of the endocannabinoid system in intestinal and systemic inflammation**

Grill M, et al. (2019). *Histochem Cell Biol*. DOI: 10.1007/s00418-018-1719-0

## tdTomato

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### **Genetic identification of a population of noradrenergic neurons implicated in attenuation of stress-related responses**

Chen YW, et al. (2019). *Mol Psychiatry*. DOI: 10.1038/s41380-018-0245-8

### **Hedgehog pathway drives fusion-negative rhabdomyosarcoma initiated from non-myogenic endothelial progenitors**

Drummond CJ, et al. (2018). *Cancer Cell*. DOI: 10.1016/j.ccell.2017.12.001

## TH

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### **The longitudinal transcriptomic response of the substantia nigra to intrastriatal 6-hydroxydopamine reveals significant upregulation of regeneration-associated genes**

Kanaan NM, et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0127768

### **AZI23'UTR is a new SLC6A3 downregulator associated with an epistatic protection against substance use disorders**

Liu K, et al. (2018). *Mol Neurobiol*. DOI: 10.1007/s12035-017-0781-2

### **Glial- and neuronal-specific expression of CCL5 mRNA in the rat brain**

Lanfranco MF, et al. (2018). *Front Neuroanat*. DOI: 10.3389/fnana.2017.00137

### **Immune or genetic-mediated disruption of CASPR2 causes pain hypersensitivity due to enhanced primary afferent excitability**

Dawes JM, et al. (2018). *Neuron*. DOI: 10.1016/j.neuron.2018.01.033

### **Neuronal activity regulates neurotransmitter switching in the adult brain following light-induced stress**

Meng D, et al. (2018). *Proc Natl Acad Sci U S A*. DOI: 10.1073/pnas.1801598115

## TH (continued)

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### **PHD2 inactivation in Type I cells drives HIF-2 $\alpha$ -dependent multilineage hyperplasia and the formation of paraganglioma-like carotid bodies**

Fielding JW, et al. (2018). *J Physiol*. DOI: 10.1113/jp275996

### **PACAP/PAC1 regulation of inflammation via catecholaminergic neurons in a model of multiple sclerosis**

Van C, et al. (2019). *J Mol Neurosci*. DOI: 10.1007/s12031-018-1137-8

### **CD24 expression does not affect dopamine neuronal survival in a mouse model of Parkinson's disease**

Stott SR, et al. (2017). *PLoS One*. DOI: 10.1371/journal.pone.0171748

### **A method for combining RNAscope *in situ* hybridization with immunohistochemistry in thick free-floating brain sections and primary neuronal cultures**

Grabinski TM, et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0120120

## TIA-1

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### **MECP2 is post-transcriptionally regulated during human neurodevelopment by combinatorial action of RNA-binding proteins and miRNAs**

Rodrigues DC, et al. (2016). *Cell Rep*. DOI: 10.1016/j.celrep.2016.09.049

### **Interleukin-1 $\beta$ induced stress granules sequester COX-2 mRNA and regulates its stability and translation in human OA chondrocytes**

Ansari MY, et al. (2016). *Sci Rep*. DOI: 10.1038/srep27611

## TRK

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### **Mechanically activated Piezo channels mediate touch and suppress acute mechanical pain response in mice**

Zhang M, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.01.056

### **PRDM12 is required for initiation of the nociceptive neuron lineage during neurogenesis**

Bartesaghi L, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2019.02.098

### **Detection of single mRNAs in individual cells of the auditory system**

Salehi P, et al. (2018). *Hear Res*. DOI: 10.1016/j.heares.2018.07.008

### **Self-maintaining gut macrophages are essential for intestinal homeostasis**

De Schepper S, et al. (2018). *Cell*. DOI: 10.1016/j.cell.2018.07.048

### **Neuronal heterogeneity and stereotyped connectivity in the auditory afferent system**

Petitpré C, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06033-3

### **A method for combining RNAscope *in situ* hybridization with immunohistochemistry in thick free-floating brain sections and primary neuronal cultures**

Grabinski TM, et al. (2015). *PLoS One*. DOI: 10.1371/journal.pone.0120120

### **The human motor neuron axonal transcriptome is enriched for transcripts related to mitochondrial function and microtubule-based axonal transport**

Maciel R, et al. (2018). *Exp Neurol*. DOI: 10.1016/j.expneurol.2018.06.008

### **Regulation of adult CNS axonal regeneration by the post-transcriptional regulator Cpeb**

Lou WP, et al. (2018). *Front Mol Neurosci*. DOI: 10.3389/fnmol.2017.00445

### **Sodium-activated potassium channels shape peripheral auditory function and activity of the primary auditory neurons in mice**

Reijntjes DOJ, et al. (2019). *Sci Rep*. DOI: 10.1038/s41598-019-39119-z

### **The long noncoding RNA Falcor regulates Foxa2 expression to maintain lung epithelial homeostasis and promote regeneration**

Swarr DT, et al. (2019). *Genes Dev*. DOI: 10.1101/gad.320523.118

### **Microtubule-driven stress granule dynamics regulate inhibitory immune checkpoint expression in T cells**

Franchini DM, et al. (2019). *Cell Rep*. DOI: 10.1016/j.celrep.2018.12.014

### **A RNAscope whole mount approach that can be combined with immunofluorescence to quantify differential distribution of mRNA**

Kersigo J, et al. (2018). *Cell Tissue Res*. DOI: 10.1007/s00441-018-2864-4

### **Single-cell lineage tracing reveals that oriented cell division contributes to trabecular morphogenesis and regional specification**

Li J, et al. (2016). *Cell Rep*. DOI: 10.1016/j.celrep.2016.03.012

## Vimentin

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### **Lineage dynamics of murine pancreatic development at single-cell resolution**

Byrnes LE, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-06176-3

### **ROBO2 is a stroma suppressor gene in the pancreas and acts via TGF- $\beta$ signalling**

Pinho AV, et al. (2018). *Nat Commun*. DOI: 10.1038/s41467-018-07497-z

### **Retinoblastoma protein represses E2F3 to maintain Sertoli cell quiescence in mouse testis**

Rotgers E, et al. (2019). *J Cell Sci*. DOI: 10.1242/jcs.229849

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