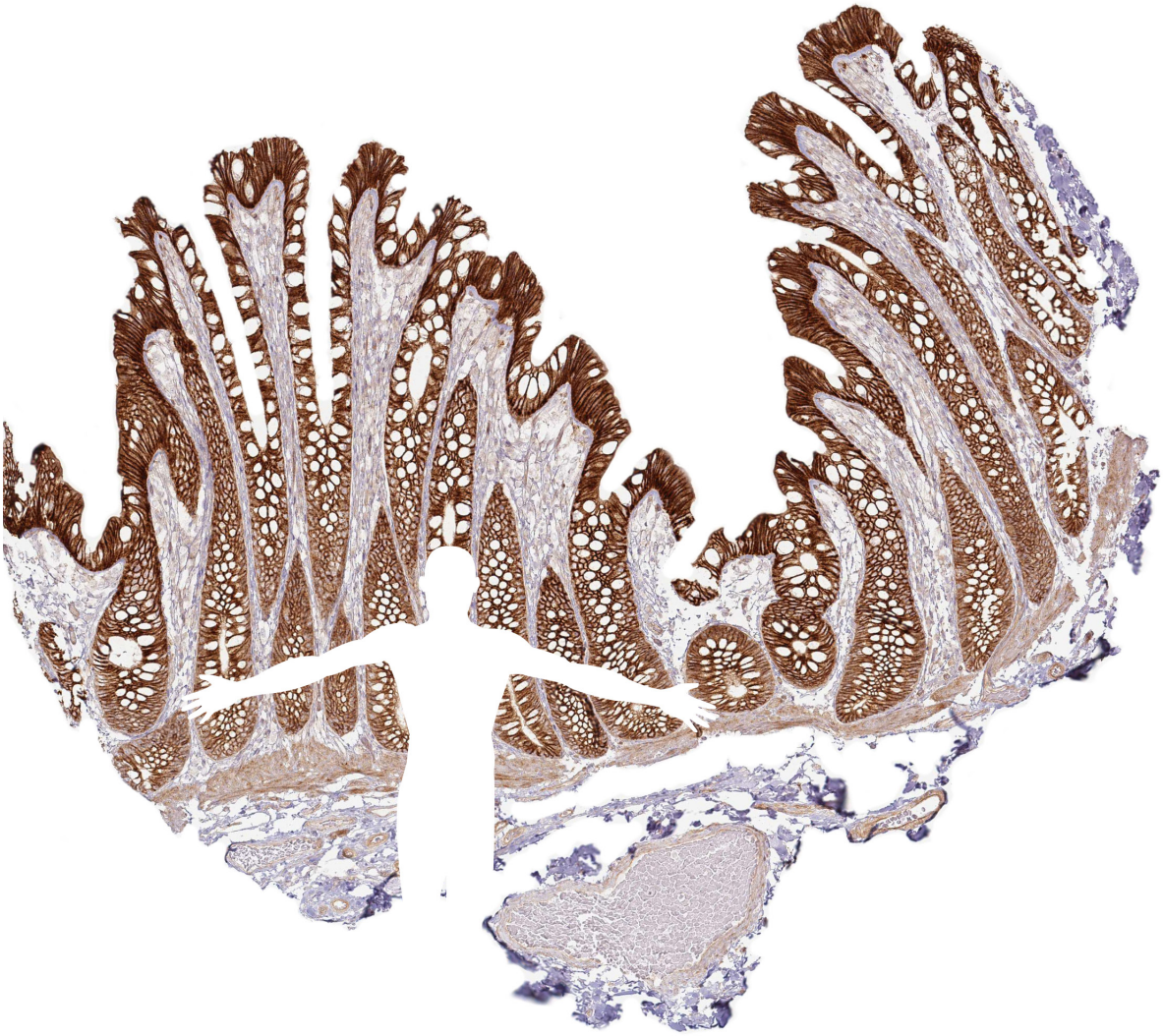
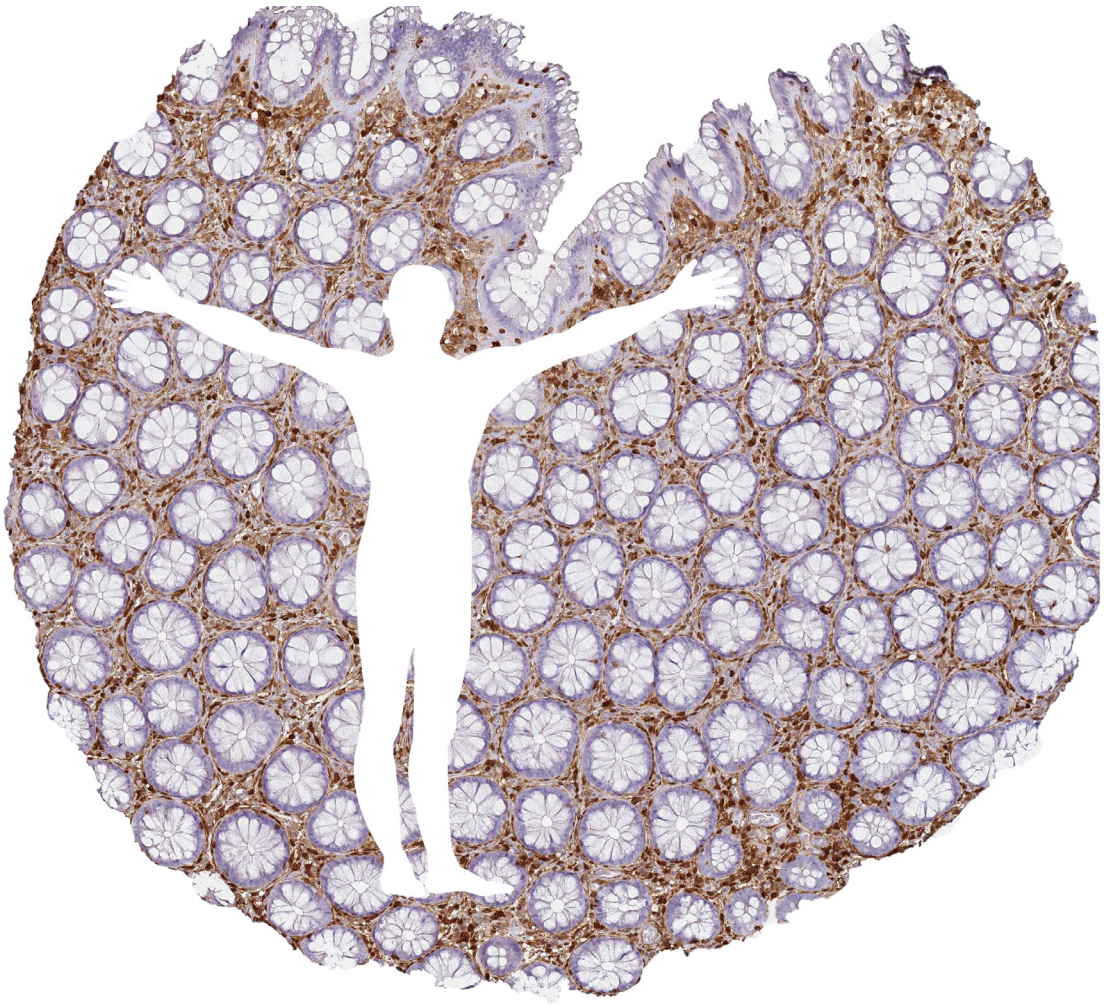


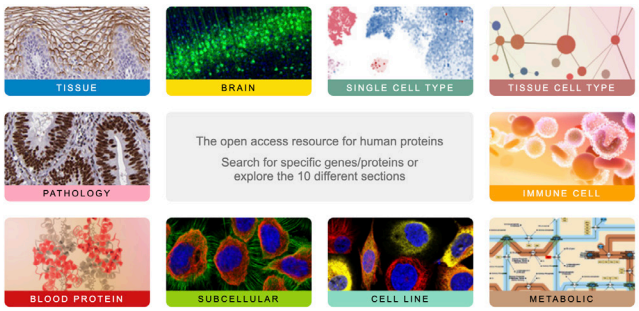
ATLAS ANTIBODIES IN COLORECTAL CANCER RESEARCH

ATLAS ANTIBODIES

TABLE OF CONTENTS



THE HUMAN PROTEIN ATLAS



The Human Protein Atlas: a map of the Human Proteome

The Human Protein Atlas (HPA) is a Swedish-based program initiated in 2003 with the aim to map all the human proteins in cells, tissues and organs using integration of various omics technologies, including antibody-based imaging, mass spectrometry-based proteomics, transcriptomics and systems biology.

All the data in the knowledge resource is open access to allow scientists both in academia and industry to freely access the data for exploration of the human proteome.

The HPA project aims to present an expression map of the complete human proteome. To accomplish this, highly specific Triple A polyclonal antibodies are developed against all protein-coding human genes and protein profiling is established in a multitude of tissues and cells using tissue arrays. The antibodies are tested in immunohistochemistry (IHC), Western blot (WB) analysis, protein array assay and immunofluorescent based confocal microscopy (ICC-IF).

The Human Protein Atlas program has already contributed to several thousands of publications in the field of human biology and disease and it is selected by the organization ELIXIR (www.elixir-europe.org) as a European core resource due to its fundamental importance for a wider life science community.

The HPA project employes tissue microarrays with samples from 44 different normal human tissues, 20 different cancer types and 44 different human cell lines. The 44 normal tissues are present in triplicate samples and represent 82 different cell types. All the IHC images for the normal tissue have undergone pathology-based annotation of expression levels.

The Human Protein Atlas consortium is mainly funded by the Knut and Alice Wallenberg Foundation.

Read more at
proteinatlas.org

The Human Protein Atlas consists of 10 separate parts, each focusing on a particular aspect of the genome-wide analysis of the human proteins:

1. TISSUE
The Tissue section shows the distribution of the proteins across all primary tissues and organs in the human body.

2. BRAIN
The Brain section explores the distribution of proteins in various mammalian brain regions.

3. SINGLE-CELL TYPE
The Single Cell Type section shows the expression of protein-coding genes in single human cell types based on scRNA-seq.

4. PATHOLOGY
The Pathology section shows the impact of protein levels on the survival of patients with cancer.

5. BLOOD PROTEIN
The Blood Protein section, describes the proteins detected in the blood and proteins secreted by human tissues.

6. TISSUE CELL TYPE
The Tissue Cell Type section shows the expression of protein-coding genes in human cell types based on bulk RNA-seq data.

7. IMMUNE CELL
The Immune Cell section shows the expression of protein-coding genes in immune cell types.

8. SUBCELLULAR
The Subcellular section shows the subcellular localization of proteins in single cells.

9. CELL LINE
The Cell Line section shows the expression of protein-coding genes in human cell lines.

10. METABOLIC
The Metabolic section explores the expression of protein-coding genes in the context of the human metabolic network.

Triple A Polyclonals™

Triple A Polyclonals - the Building Blocks of HPA

The uniqueness and specificity of Triple A Polyclonals are due to a thorough selection of antigen regions, affinity purification on the recombinant antigen, validation using several methods and a stringent approval process.

Development

The Triple A Polyclonals are developed against recombinant human Protein Epitope Signature Tags (PrESTs) of approximately 50 to 150 amino acids. These protein fragments are designed, using a proprietary software, to contain unique epitopes present in the native protein suitable for triggering the generation of antibodies of high specificity. This is achieved by a complete human genome scanning to ensure that PrESTs with the lowest homology to other human proteins are used as antigens.

Approval

The approval of the Triple A Polyclonals relies on a combined validation of the experimental results using IHC, WB or ICC-IF, from RNA sequencing and from information obtained via bioinformatics prediction methods and literature.

Since the literature is often inconclusive, an important objective of the HPA project has been to generate paired antibodies with non-overlapping epitopes towards the same protein target, allowing the results and validation of one antibody to be used to validate the other one.

Triple A Polyclonal catalog

Today, there are more than 21,000 Triple A Polyclonals.

The antibodies developed and characterized within the Human Protein Atlas project are made available to the scientific community by Atlas Antibodies under the brand name Triple A Polyclonals. The antibodies are available in 25 and 100 µL size. The product numbers of Triple A Polyclonals start with "HPA".

PrecisA Monoclonals™

PrecisA Monoclonals™ are mouse monoclonal primary antibodies developed for a number of carefully selected targets. Atlas Antibodies selects the relevant antibodies for each target and takes special care in offering clones recognizing unique non-overlapping epitopes and/or isotypes.
Thanks to a stringent production process and characterization procedure, PrecisA Monoclonals provide outstanding performance in approved applications, defined specificity, secured continuity, and stable supply.

Antigen Selection

The Protein Epitope Signature Tag (PrEST) concept gives the antibody performance built-in from the start. Using proprietary bioinformatics software, 50-150 amino acid regions (with the lowest possible sequence identity to other human proteins) are selected, cloned, and recombinantly produced in a tightly controlled set-up.

Epitope Mapping

Clones are epitope-mapped using synthetic overlapping peptides in a bead-based array format to select clones with non-overlapping epitopes only.

Hybridoma Cell Cultivation

Atlas Antibodies uses in-vitro methods in the production scale-up phase, thus replacing mice for ascites fluid production.

Isotyping

PrecisA Monoclonals are isotyped to allow for multiplexing using isotype-specific secondary antibodies.

Antibody Characterization

The characterization of PrecisA Monoclonals starts with an extensive literature search to select the most relevant and clinically significant tissues to use for immunohistochemistry (IHC) characterization. As a result, you will often find more than one tissue type displayed in the IHC application data in our product catalog. In addition to the positive stained tissue, we also show the staining in a negative control tissue and, if relevant, staining in cancerous tissue.

The characterization for Western Blot (WB) data follows that same working procedure. It starts with a profound literature search to find the best matching lysate, which can be endogenous human cells, tissue protein lysates, or optionally recombinant full-length human protein lysates.

Each PrecisA Monclonal is thus supplied with the most appropriate characterization data for its specific target.

PrecisA Monoclonals are developed by Atlas Antibodies, based on the knowledge from the Human Protein Atlas with careful antigen design and extended validation of antibody performance. With precise epitope information following all monoclonals, these precise, accurate and targeted antibodies are denoted PrecisA Monoclonals. The antibodies are available in 25 and 100 µL size. The product numbers of PrecisA Monclonals start with "AMAb".

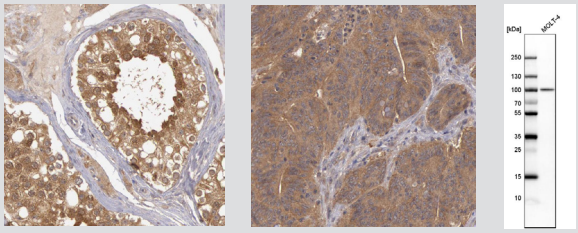
Antibodies Used in Colorectal Cancer Research

In this section, antibodies are selected either on a reference/article-basis or on colon cancer relevance for the corresponding target protein.

Target Protein	Product Name	Product Number	Validated Applications
ABCB1/CD243	Anti-ABCB1	HPA002199[1-2]	IHC*,ICC-IF
ALCAM/CD166 antigen	Anti-ALCAM	HPA010926[3-5]	IHC*
AOC3/HPAO	ANTI-AOC3	HPA000980[6-8]	IHC*,WB*
APC	Anti-APC	HPA013349	IHC
AXL	Anti-AXL	HPA037422[9-10]	IHC,WB*
B-Raf	Anti-BRAF	HPA001328[11-13]	IHC,WB
B-Raf	Anti-BRAF	HPA071048	ICC-IF,WB
B-Raf	Anti-BRAF	AMAb91257	IHC,WB
B-Raf	Anti-BRAF	AMAb91258	IHC,WB
BCL9	Anti-BCL9	HPA020274	IHC*,ICC-IF
Bloom syndrome prot	Anti-BLM	HPA005689[14-15]	IHC,ICC-IF
Cadherin-17	Anti-CDH17	HPA023616[16]	IHC*,WB*
Cadherin-17	Anti-CDH17	HPA026556	IHC*,WB*
Caldesmon	Anti-CALD1	HPA008066[17-20]	IHC*,WB*,ICC-IF
Caspase-3	Anti-CASP3	HPA002643[21-22]	IHC*,WB,ICC-IF
Catenin beta-1	Anti-CTNNB1	HPA029159	IHC*,WB,ICC-IF
Catenin beta-1	Anti-CTNNB1	HPA029160	IHC*,ICC-IF
Catenin beta-1	Anti-CTNNB1	AMAb91209	IHC,WB, ICC-IF
Catenin beta-1	Anti-CTNNB1	AMAb91210	IHC,WB, ICC-IF
CDX-2	Anti-CDX2	HPA045669	ICC-IF
CDX-2	Anti-CDX2	HPA049580	ICC-IF
CEACAM1/3/5/6	Anti-CEACAM1	HPA011041	IHC
Chromogranin-A	Anti-CHGA	HPA017369[23-25]	IHC*,WB*,ICC-IF
Cytokeratin 18	Anti-KRT18	HPA001605	IHC,WB*,ICC-IF

* Products with enhanced validation for indicated application

Anti-BRAF (HPA001328)



The Anti-BRAF antibody (HPA001328) shows cytoplasmic positivity in cells in seminiferous ducts in normal human testis as well as in tumor cells in colorectal cancer using immunohistochemistry. The HPA001328 antibody detects BRAF in human cell line MOLT-4 lysate using Western Blot analysis.

1. Trumpi K *et al*. ABC-Transporter Expression Does Not Correlate with Response to Irinotecan in Patients with Metastatic Colorectal Cancer. *J Cancer* 2015; 6(11):1079-1086.

2.Bernstein HG *et al.* Vascular and extravascular distribution of the ATP-binding cassette transporters ABCB1 and ABCC1 in aged human brain and pituitary. *Mech Ageing Dev*.

3. Hansen AG *et al.* Elevated ALCAM shedding in colorectal cancer correlates with poor patient outcome. *Cancer Res* 2013 May 15; 73(10):2955-2964.

4. Ishiguro F *et al.* Membranous expression of activated leukocyte cell adhesion molecule contributes to poor prognosis and malignant phenotypes of non-small-cell lung cancer. *J Surg Res* 2013 Jan; 179(1):24-32.

5.Kahlert C *et al.* Increased expression of ALCAM/CD166 in pancreatic cancer is an independent prognostic marker for poor survival and early tumour relapse. *Br J Cancer* 2009 Aug 4; 101(3):457-64.

6. Ward ST *et al.* Evaluation of serum and tissue levels of VAP-1 in colorectal cancer. *BMC Cancer* 2016 Feb 24; 16:154.

7. Weston CJ *et al.* Vascular adhesion protein-1 promotes liver inflammation and drives hepatic fibrosis. *J Clin Invest* 2015 Feb; 125(2):501-520.

8. Ek S *et al.* From gene expression analysis to tissue microarrays: a rational approach to identify therapeutic and diagnostic targets in lymphoid malignancies. *Mol Cell Proteomics* 2006 Jun; 5(6):1072-81.

9. Ong CW *et al.* The prognostic value of the stem-like group in colorectal cancer using a panel of immunohistochemistry markers. *Oncotarget* 2015 May 20; 6(14):12763-12773.

10. Pinato DJ *et al.* The expression of Axl receptor tyrosine kinase influences the tumour phenotype and clinical outcome of patients with malignant pleural mesothelioma. *Br J Cancer* 2013 Feb 19; 108(3):621-628.

11. Cao L *et al.* Clinical characteristics and molecular pathology of skull ectopic thyroid cancer. *Ann Transl Med* 2016 Dec 19; 4(23):462.

12. Kiel C *et al.* The yin–yang of kinase activation and unfolding explains the peculiarity of Val600 in the activation segment of BRAF. *eLife* 2016 Jan 8; 5:e12814. Epub 2016 Jan 8.

13. Beltran-Sastre V *et al.* Tuneable endogenous mammalian target complementation via multiplexed plasmid-based recombineering. *Sci Rep* 2015 Nov 27; 5:17432.

14. Meena JK *et al.* Telomerase abrogates aneuploidy-induced telomere replication stress, senescence and cell depletion. *EMBO J* 2015 May 12; 34(10):1371-1384.

15. Lao VV *et al.* Altered RECQ Helicase Expression in Sporadic Primary Colorectal Cancers. *Transl Oncol* 2013 Aug; 6(4):458-469.

16.Magnusson K *et al.* SATB2 in combination with cytokeratin 20 identifies over 95% of all colorectal carcinomas. *Am J Surg Pathol* 2011 Jul; 35(7):937-48.

17. Alexandre Calon *et al.* Stromal gene expression defines poor-prognosis subtypes in colorectal cancer. *Nature Genetics* February 23, 2015.

18. Stadler C *et al.* Systematic validation of antibody binding and protein subcellular localization using siRNA and confocal microscopy. *J Proteomics* 2012 Apr 3; 75(7):2236-51.

19. Fagerberg L *et al.* Mapping the subcellular protein distribution in three human cell lines. *J Proteome Res* 2011 Aug 5; 10(8):3766-77.

20. Köhler CN. Histochemical Localization of Caldesmon in the CNS and Ganglia of the Mouse. J Histochem Cytochem 2011 May; 59(5):504-517.

21. Flanagan L *et al.* Low levels of Caspase-3 predict favourable response to 5FU-based chemotherapy in advanced colorectal cancer: Caspase-3 inhibition as a therapeutic approach. *Cell Death Dis* 2016 Feb 4; 7(2):e2087-.

22. Contín MA *et al.* Photoreceptor damage induced by low-intensity light: model of retinal degeneration in mammals. *Mol Vis* 2013; 19:1614-1625.

23. Chen JH *et al.* A recellularized human colon model identifies cancer driver genes. *Nature Biotechnology* July 11, 2016.

24. Marbiah MM *et al.* Identification of a gene regulatory network associated with prion replication. *EMBO J* 2014 Jul 17; 33(14):1527-1547.

25.Kiflemariam S *et al.* Scalable in situ hybridization on tissue arrays for validation of novel cancer and tissue-specific biomarkers. *PLoS One* 2012; 7(3):e32927.

Target Protein	Product Name	Product Number	Validated Applications
Cytokeratin 19	Anti-KRT19	HPA002465	IHC*,ICC-IF
Cytokeratin 20	Anti-KRT20	HPA024309	IHC*,WB
Cytokeratin 20	Anti-KRT20	HPA024684	IHC*,WB
Cytokeratin 20	Anti-KRT20	HPA027236	IHC*,WB*
Cytokeratin 8	Anti-KRT8	HPA049866	IHC,WB*,ICC-IF
DACH1	Anti-DACH1	HPA012672[26-28]	IHC,ICC-IF
DCC	Anti-DCC	HPA055376	ICC-IF
DCC	Anti-DCC	HPA069552	IHC
DTL	Anti-DTL	HPA028016[29]	IHC,WB
EGFR	Anti-EGFR	HPA001200[30]	IHC*
EGFR	Anti-EGFR	HPA018530[31-32]	IHC*,WB,ICC-IF
EGFR	Anti-EGFR	AMAb90816	IHC,WB
FCGRT	Anti-FCGRT	HPA012122[33-35]	IHC,WB*
Fibronectin	Anti-FN1	HPA027066[36]	IHC*,WB
FOXRED1	Anti-FOXRED1	HPA046192[37]	IHC,WB
GDF15	Anti-GDF15	HPA011191[38-42]	IHC*,WB*,ICC-IF
GPA33	Anti-GPA33	HPA018858[43-44]	IHC*,WB
GRHL2	Anti-GRHL2	HPA004820[45-49]	IHC

* Products with enhanced validation for indicated application

26. TZhou J *et al.* DACH1, a Zona Glomerulosa Selective Gene in the Human Adrenal, Activates Transforming Growth Factor-β Signaling and Suppresses Aldosterone Secretion. *Hypertension* 2015 May; 65(5):1103-1110.

27. Powe DG *et al.* DACH1: Its Role as a Classifier of Long Term Good Prognosis in Luminal Breast Cancer. *PLoS One* 2014; 9(1):e84428.

28. Vonlanthen J *et al.* A comprehensive look at transcription factor gene expression changes in colorectal adenomas. *BMC Cancer* 2014 Jan 29; 14:46.

29. Karaayvaz M *et al.* Prognostic significance of miR-215 in colon cancer. *Clin Colorectal Cancer* 2011 Dec; 10(4):340-7.

30. Hudson EP *et al.* Multiplex epitope mapping using bacterial surface display reveals both linear and conformational epitopes. *Sci Rep* 2012; 2:706.

31. Luke GP *et al.* Sentinel lymph node biopsy revisited: ultrasound-guided photoacoustic detection of micrometastases using molecularly targeted plasmonic nanosensors. *Cancer Res* 2014 Oct 1; 74(19):5397-5408.

32. Arabi A et al. Proteomic screen reveals Fbw7 as a modulator of the NF-κB pathway. Nat Commun 2012; 3:976.

33. Ko SY *et al.* Enhanced neonatal Fc receptor function improves protection against primate SHIV infection. *Nature* 2014 Oct 30; 514(7524):642-645.

34. Baker K *et al.* Neonatal Fc Receptor Expression in Dendritic Cells Mediates Protective Immunity Against Colorectal Cancer. *Immunity* 2013 Dec 12; 39(6):1095-1107.
35. Seijsing J *et la.* Robust expression of the human neonatal Fc receptor in a truncated soluble form and as a full-length membrane-bound protein in fusion with eGFP. *PLoS One* 2013; 8(11):e81350. Epub 2013 Nov 18.

36. Kwon CH *et al.* Snail and serpinA1 promote tumor progression and predict prognosis in colorectal cancer. *Oncotarget* 2015 Aug 21; 6(24):20312-20326.

37. Fei W *et al.* High FOXRED1 expression predicted good prognosis of colorectal cancer. *Am J Cancer Res* 2016 Nov 1; 6(11):2722-2728.

38. Lee J *et al.* Reconstitution of TGFBR2-Mediated Signaling Causes Upregulation of GDF-15 in HCT116 Colorectal Cancer Cells. *PLoS One* 2015; 10(6):e0131506.

39. Wallin U *et al.* Growth differentiation factor 15: a prognostic marker for recurrence in colorectal cancer. *Br J Cancer* 2011 May 10; 104(10):1619-1627.

40. Ishige T *et al.* Combined Secretomics and Transcriptomics Revealed Cancer-Derived GDF15 is Involved in Diffuse-Type Gastric Cancer Progression and Fibroblast Activation. *Sci Rep* 2016 Feb 19; 6:21681.

41. Uchiyama T *et al.* The role of growth differentiation factor 15 in the pathogenesis of primary myelofibrosis. *Cancer Med* 2015 Oct; 4(10):1558-1572.

42. Urakawa N *et al.* GDF15 derived from both tumor-associated macrophages and esophageal squamous cell carcinomas contributes to tumor progression via Akt and Erk pathways. *Laboratory Investigation* March 02, 2015.

43. Chen JH *et al.* A recellularized human colon model identifies cancer driver genes. *Nature Biotechnology* July 11, 2016.

44. Wu CC *et al.* Candidate Serological Biomarkers for Cancer Identified from the Secretomes of 23 Cancer Cell Lines and the Human Protein Atlas. *Mol Cell Proteomics* 2010 Jun; 9(6):1100-1117.

45. Quan Y *et al.* Grainyhead-like 2 Promotes Tumor Growth and is Associated with Poor Prognosis in Colorectal Cancer. *J Cancer* 2015; 6(4):342-350.

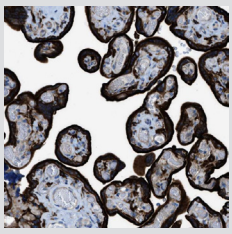
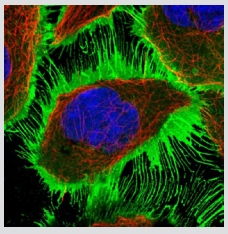
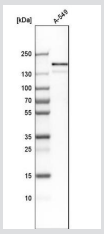
46. Quan Y *et al.* Downregulation of GRHL2 inhibits the proliferation of colorectal cancer cells by targeting ZEB1. *Cancer Biol Ther* 2014 Jul; 15(7):878-887.

47. Gao X *et al.* Evidence for multiple roles for grainyhead-like 2 in the establishment and maintenance of human mucociliary airway epithelium. *Proc Natl Acad Sci U S A* 2013 Jun 4; 110(23):9356-9361.

48. Chung VY *et al.* GRHL2-miR-200-ZEB1 maintains the epithelial status of ovarian cancer through transcriptional regulation and histone modification. *Sci Rep* 2016 Feb 18; 6:19943.

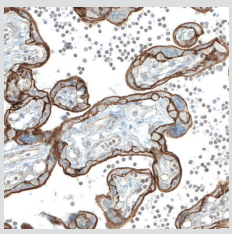
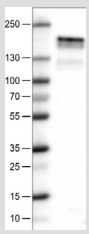
49. Cieply B *et al.* Epithelial-mesenchymal transition and tumor suppression are controlled by a reciprocal feedback loop between ZEB1 and Grainyhead-like-2. *Cancer Res* 2013 Oct 15; 73(20):6299-6309.

Anti-EGFR (HPA018530)

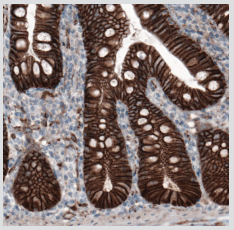
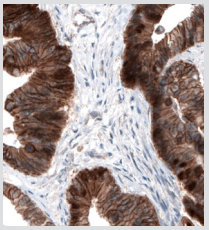
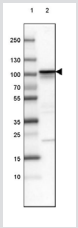
The Anti-EGFR antibody (HPA018530) shows strong cytoplasmic positivity in trophoblastic cells in human placenta tissue using IHC. By ICC-IF, the antibody shows strong positivity in plasma membrane in human cell line A-431 and in Western blot analysis, EGFR is detected in human cell line A-549 lysate.

Anti-EGFR (AMAb90816)

The Anti-EGFR (AMAb90816) shows strong membranous positivity in trophoblasts in human placenta tissue using IHC and by Western Blot analysis, EGFR is detected in human A-431 cell line lysate.

Anti-CTNNB1 (AMAb91210)

IHC staining using the Anti-CTNNB1 (AMAb91210) antibody shows strong membranous immunoreactivity in epithelial cells in normal small intestine and in tumor cells in colorectal cancer tissues. By WB analysis, Catenin beta-1 is detected in human cell line A-431.

Target Protein	Product Name	Product Number	Validated Applications
Guanylin	Anti-GUCA2A	HPA018215[50-52]	IHC*,WB*
HMGCR	Anti-HMGCR	HPA008338[53-55]	IHC
HTRB	Anti-HTRB	HPA012867[57-59]	IHC*,ICC-IF
IDH1	Anti-IDH1	HPA035248[60]	IHC*,WB*
IGFBP7/IBP-7	Anti-IGFBP7	HPA002196[61-63]	IHC
Integrin alpha-6	Anti-ITGA6	HPA012696[64-65]	IHC*,WB*
IRF2BP1	Anti-IRF2BP1	HPA042164[66]	IHC,WB
KIT	Anti-KIT	AMAb90901	IHC,WB
KIT	Anti-KIT	AMAb90904	IHC,WB
KIT	Anti-KIT	HPA004471	IHC*
KIT	Anti-KIT	HPA073252	ICC-IF

* Products with enhanced validation for indicated application

50. Brenna Ø *et al.* Cellular localization of guanylin and uroguanylin mRNAs in human and rat duodenal and colonic mucosa. *Cell Tissue Res* 2016 Apr 5; 365:331-341.

51. Brenna Ø *et al.* The guanylate cyclase-C signaling pathway is down-regulated in inflammatory bowel disease. *Scand J Gastroenterol* 2015; 50(10):1241-1252.

52. Wilson C *et al.* The paracrine hormone for the GUCY2C tumor suppressor, guanylin, is universally lost in colorectal cancer. *Cancer Epidemiol Biomarkers Prev* 2014 Nov; 23(11):2328-2337.

53. Gustbée E *et al.* Tumor-specific expression of HMG-CoA reductase in a population-based cohort of breast cancer patients. *BMC Clin Pathol* 2015; 15:8.

54. Bengtsson E *et al.* HMG-CoA reductase expression in primary colorectal cancer correlates with favourable clinicopathological characteristics and an improved clinical outcome. *Diagn Pathol* 2014 Apr 7; 9:78.

55. Bjarnadottir O *et al.* Targeting HMG-CoA reductase with statins in a window-of-opportunity breast cancer trial. *Breast Cancer Res Treat* 2013 Apr; 138(2):499-508.

56. Tanaka T *et al.* Cimetidine and Clobenpropit Attenuate Inflammation-Associated Colorectal Carcinogenesis in Male ICR Mice. *Cancers (Basel)* 2016 Feb 20; 8(2):25.

57. Vellinga TT *et al.* Collagen-rich stroma in aggressive colon tumors induces mesenchymal gene expression and tumor cell invasion. *Oncogene* March 21, 2016.

58. Haley SA *et al.* Human Polyomavirus Receptor Distribution in Brain Parenchyma Contrasts with Receptor Distribution in Kidney and Choroid Plexus. *Am J Pathol* 2015 Jun 6; 185(8):2246-2258.

59. De Sousa E Melo F *et al.* Poor-prognosis colon cancer is defined by a molecularly distinct subtype and develops from serrated precursor lesions. *Nat Med* 2013 May; 19(5):614-8.

60. O'Dwyer D *et al.* The Proteomics of Colorectal Cancer: Identification of a Protein Signature Associated with Prognosis. *PLoS One* 2011; 6(11):e27718.

61. Gambaro K *et al.* Low levels of IGFBP7 expression in high-grade serous ovarian carcinoma is associated with patient outcome. *BMC Cancer* 2015 Mar 17; 15:135.

62. Calon A *et al.* Stromal gene expression defines poor-prognosis subtypes in colorectal cancer. *Nature Genetics* February 23, 2015.

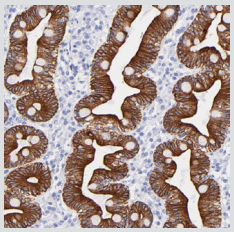
63. Chugh S *et al.* Pilot study identifying myosin heavy chain 7, desmin, insulin-like growth factor 7, and annexin A2 as circulating biomarkers of human heart failure. *Proteomics* 2013 Aug; 13(15):2324-2334.

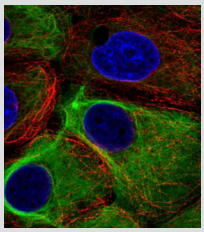
64. Sukhdeo K *et al.* Multiplex Flow Cytometry Barcoding and Antibody Arrays Identify Surface Antigen Profiles of Primary and Metastatic Colon Cancer Cell Lines. *PLoS One* 2013; 8(1):e53015. Epub 2013 Jan 7.

65. Kielosto M *et al.* Identification of integrins alpha6 and beta7 as c-Jun- and transformation-relevant genes in highly invasive fibrosarcoma cells. *Int J Cancer* 2009 Sep 1; 125(5):1065-73.

66. Croner RS *et al.* Quantitative proteome profiling of lymph node positive vs. negative colorectal carcinomas pinpoints MX1 as a marker for lymph node metastasis. *Int J Cancer* 2014 Dec 15; 135(12):2878-2886.

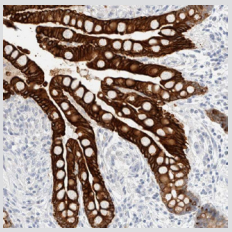
Anti-KRT19 (HPA002465)

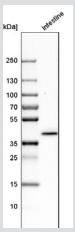




The Anti-KRT19 antibody (HPA002465) shows strong cytoplasmic and membranous positivity in glandular cells in human duodenum tissue using IHC (left). ICC-IF staining of human cell line MCF7 shows localization to intermediate filaments (right).

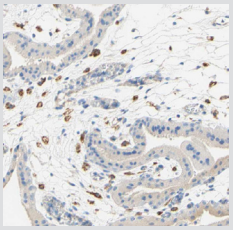
Anti-KRT20 (HPA024309)

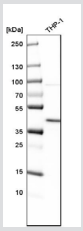




The Anti-KRT20 antibody (HPA024309) shows strong cytoplasmic and membranous positivity in glandular cells in colon tissue using IHC. Cytokeratin 20 ist detected using Western blot analysis in small intestine tissue lysate.

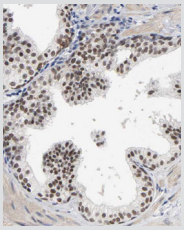
Anti-FCGRT (HPA012122)

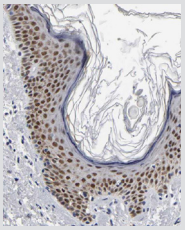




By IHC, the Anti-FCGRT antibody (HPA012122) shows cytoplasmic positivity in Hofbauer cells in human placenta tissue. In Western blot analysis, FCGRT is detected in human cell line THP1 lysate.

Anti-GRHL2 (HPA004820)



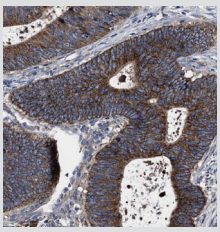
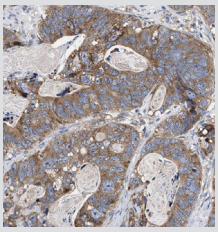


The Anti-GRHL2 antibody (HPA004820) shows strong nuclear positivity in glandular cells in human prostate tissue (left) as well as in squamous epithelial cells in human skin tissue (right) using IHC.

Target Protein	Product Name	Product Number	Validated Applications
KRAS/HRAS/NRAS	Anti-KRAS	HPA049830	IHC
LAMB2/S-LAM beta	Anti-LAMB2	HPA001895[67]	IHC,WB
LCN2/NGAL/p25	Anti-LCN2	HPA002695[68-70]	IHC*,WB*
LGR5	Anti-LGR5	HPA012530[71-74]	IHC
LMAN1/ERGIC-53	Anti-LMAN1	HPA002320[75]	IHC,WB
LPAR2	Anti-LPAR2	HPA019616[76-78]	IHC
LPAR3	Anti-LPAR3	HPA013421[79]	ICC-IF
MACC1	Anti-MACC1	HPA020103[80-81]	IHC
MAP1B	Anti-MAP1B	HPA022275[82-83]	IHC*,WB*,ICC-IF
MCAM/MUC18	Anti-MCAM	HPA008848[84]	IHC*, WB*
MGAT5/GNT-V	Anti-MGAT5	HPA010919	IHC
MLH1/COCA2	Anti-MLH1	HPA052707	IHC,ICC-IF
MLH1/COCA2	Anti-MLH1	HPA060714	ICC-IF
MSH6/GTBP	Anti-MSH6	HPA028376	IHC*,WB,ICC-IF
MSH6/GTBP	Anti-MSH6	HPA028446	IHC*
MUC3/MUC3A	Anti-MUC3A	HPA010871	IHC
Mucin-1	Anti-MUC1	HPA004179	IHC*
Mucin-1	Anti-MUC1	HPA007235	IHC
Mucin-1	Anti-MUC1	HPA008855[85]	IHC*
NDRG1	Anti-NDRG1	HPA006881[86-89]	IHC*,WB*,ICC-IF

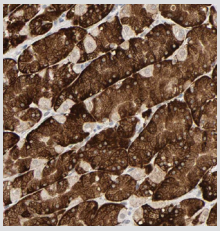
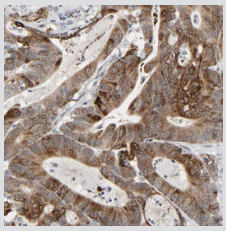
* Products with enhanced validation for indicated application

Anti-MACC1 (HPA020103)

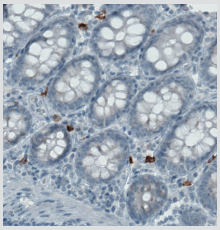
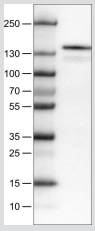
The Anti-MACC1 antibody (HPA020103) shows cytoplasmic positivity in tumor cells in colorectal and stomach cancer using IHC.

Anti-MUC1 (HPA004179)

The Anti-MUC1 antibody (HPA004179) shows cytoplasmic and membranous positivity in glandular cells in normal stomach (left) and in tumor cells in colorectal cancer (right).

Anti-KIT (AMAb90901)

The Anti-KIT antibody (AMAb90901) shows strong immunoreactivity in a subset of lymphoid cells (macrophages) in colon tissue. In Western blot analysis , KIT is detected in human cell line RT-4 lysate.

67. Chen JH *et al.* A recellularized human colon model identifies cancer driver genes. *Nature Biotechnology* July 11, 2016.

68. Candido S *et al.* Roles of neutrophil gelatinase-associated lipocalin (NGAL) in human cancer. *Oncotarget* 2014 Mar 30; 5(6):1576-1594.

69. McLean MH *et al.* Expression of neutrophil gelatinase-associated lipocalin in colorectal neoplastic progression: a marker of malignant potential?. *Br J Cancer* 2013 Jun 25; 108(12):2537-2541.

70. Rathore KI *et al.* Lipocalin 2 plays an immunomodulatory role and has detrimental effects after spinal cord injury. *J Neurosci* 2011 Sep 21; 31(38):13412-9.

71. Ayadi M *et al.* Chronic chemotherapeutic stress promotes evolution of stemness and WNT/beta-catenin signaling in colorectal cancer cells: implications for clinical use of WNT-signaling inhibitors. *Oncotarget* 2015 Jul 30; 6(21):18518-18533.

72. Qu B *et al.* Testing Stem Cell Therapy in a Rat Model of Inflammatory Bowel Disease: Role of Bone Marrow Stem Cells and Stem Cell Factor in Mucosal Regeneration. *PLoS One* 2014; 9(10):e107891.

73. Oeztuerk-Winder F *et al.* Regulation of human lung alveolar multipotent cells by a novel p38α MAPK/miR-17-92 axis. *EMBO J* 2012 Aug 15; 31(16):3506.

74. Walker F *et al.* LGR5 Is a Negative Regulator of Tumourigenicity, Antagonizes Wnt Signalling and Regulates Cell Adhesion in Colorectal Cancer Cell Lines. *PLoS One* 2011; 6(7):e22733.

75. Roeckel N *et al.* High frequency of LMAN1 abnormalities in colorectal tumors with microsatellite instability. *Cancer Res* 2009 Jan 1; 69(1):292-9.

76. Hashimoto S *et al.* Lysophosphatidic acid activates Arf6 to promote the mesenchymal malignancy of renal cancer. *Nat Commun* 2016 Feb 8; 7:10656.

77. Leve F *et al.* LPA Induces Colon Cancer Cell Proliferation through a Cooperation between the ROCK and STAT-3 Pathways. *PLoS One* 2015; 10(9):e0139094.

78. Kuriyama S *et al.* In vivo collective cell migration requires an LPAR2-dependent increase in tissue fluidity. *J Cell Biol* 2014 Jul 7; 206(1):113-127.

79. Leve F *et al.* LPA Induces Colon Cancer Cell Proliferation through a Cooperation between the ROCK and STAT-3 Pathways. *PLoS One* 2015; 10(9):e0139094.

80. Koelzer VH *et al.* Heterogeneity analysis of Metastasis Associated in Colon Cancer 1 (MACC1) for survival prognosis of colorectal cancer patients: a retrospective cohort study. *BMC Cancer* 2015 Mar 21; 15:160.

81. Ge Y *et al.* Positive MACC1 expression correlates with invasive behaviors and postoperative liver metastasis in colon cancer. *Int J Clin Exp Med* 2015; 8(1):1094-1100.

82. Isella C *et al.* Stromal contribution to the colorectal cancer transcriptome. *Nature Genetics* February 23, 2015.

83. Danielsson F *et al.* RNA deep sequencing as a tool for selection of cell lines for systematic subcellular localization of all human proteins. *J Proteome Res* 2013 Jan 4; 12(1):299-307.

84. Ferguson HJ *et al.* Glutamate dependent NMDA receptor 2D is a novel angiogenic tumour endothelial marker in colorectal cancer. *Oncotarget* 2016 Mar 1; 7(15):20440-20454.

85. Lawson DA *et al*. Single-cell analysis reveals a stem-cell program in human metastatic breast cancer cells. *Nature* 2015 Oct 1; 526(7571):131-135.

86. Lane DJ *et al.* N-myc Downstream Regulated 1 (NDRG1) Is Regulated by Eukaryotic Initiation Factor 3a (eIF3a) during Cellular Stress Caused by Iron Depletion. *PLoS One* 2013; 8(2):e57273.

87. Mao Z *et al.* The Metastasis Suppressor, N-myc Downregulated Gene 1 (NDRG1), Is a Prognostic Biomarker for Human Colorectal Cancer. *PLoS One* 2013; 8(7):e68206.

88. Drögemüller C *et al.* A Deletion in the N-Myc Downstream Regulated Gene 1 (NDRG1) Gene in Greyhounds with Polyneuropathy. *PLoS One* 2010 Jun 22; 5(6):e11258.

89. Schilling SH *et al.* NDRG4 Is Required for Cell Cycle Progression and Survival in Glioblastoma Cells. *J Biol Chem* 2009 Sep 11; 284(37):25160-25169.

Target Protein	Product Name	Product Number	Validated Applications
Nucleophosmin	Anti-NPM1	HPA011384[90-91]	IHC,WB,ICC-IF
P53	Anti-P53 Antibody	AMAb90956[92]	IHC*,WB*,ICC-IF
PARP6	Anti-PARP6	HPA026991[93-94]	IHC,ICC-IF
Periostin	Anti-POSTN	HPA012306[95-96]	IHC*,WB
Plexin-B1	Anti-PLXNB1	HPA040586[100]	IHC*, WB
PMS2/PMSL2	Anti-PMS2	HPA070310	ICC-IF
PMS2/PMSL2	Anti-PMS2	HPA066490	ICC-IF
Podocalyxin	Anti-PODXL	HPA002110[101-105]	IHC*,WB,ICC-IF
PTP4A1/2/3	Anti-PTP4A1	HPA003281	IHC
RBM3	Anti-RBM3	AMAb90655[106-110]	IHC*,WB*,ICC-IF
RBM3	Anti-RBM3	HPA003624[111-113]	IHC,WB*,ICC-IF
RECQL5	Anti-RECQL5	HPA029971[114-116]	IHC,WB*,ICC-IF
RET	Anti-RET	HPA008356[117-118]	IHC,ICC-IF
RIBC2	Anti-RIBC2	HPA003210[119]	IHC
ROBO2	Anti-ROBO2	HPA013371[120]	IHC,WB,ICC-IF

* Products with enhanced validation for indicated application

90. Röwer C *et al.* Toponostics of invasive ductal breast carcinoma: combination of spatial protein expression imaging and quantitative proteome signature analysis. *Int J Clin Exp Pathol* 2011 Mar 31; 4(5):454-467.

91. O'Dwyer D *et al.* The Proteomics of Colorectal Cancer: Identification of a Protein Signature Associated with Prognosis. *PLoS One* 2011; 6(11):e27718.

92. Hedström E *et al.* Downregulation of the cancer susceptibility protein WRAP53β in epithelial ovarian cancer leads to defective DNA repair and poor clinical outcome. *Cell Death Dis* 2015 Oct 1; 6(10):e1892.

93. Qi G *et al.* PARP6 acts as a tumor suppressor via downregulating Survivin expression in colorectal cancer. *Oncotarget* 2016 Feb 25; 7(14):18812-18824.

94. Huang JY *et al.* PARP6 is a Regulator of Hippocampal Dendritic Morphogenesis. *Sci Rep* 2016 Jan 4; 6:18512.

95. Calon A *et al.* Stromal gene expression defines poor-prognosis subtypes in colorectal cancer. *Nature Genetics* February 23, 2015.

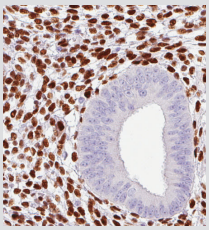
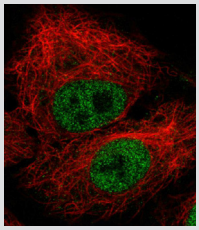
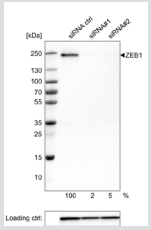
96. Edlund K *et al.* CD99 is a novel prognostic stromal marker in non-small cell lung cancer. *Int J Cancer* 2012 Nov 15; 131(10):2264-73.

97. Ibarrola-Villava M *et al.* Deregulation of ARID1A, CDH1, cMET and PIK3CA and target-related microRNA expression in gastric cancer. *Oncotarget* 2015 Sep 29; 6(29):26935-26945.

98. Won HS *et al.* Difference in expression of EGFR, pAkt, and PTEN between oropharyngeal and oral cavity squamous cell carcinoma. *Oral Oncol* 2012 Oct; 48(10):985-90.

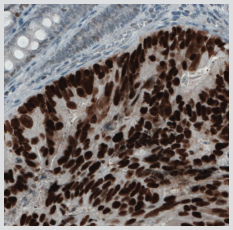
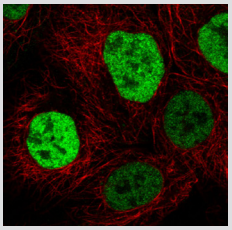
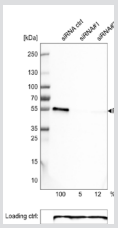
99. McCaughan F *et al.* Progressive 3q Amplification Consistently Targets SOX2 in Preinvasive Squamous Lung Cancer. *Am J Respir Crit Care Med* 2010 Jul 1; 182(1):83-91.

Anti-ZEB1 (AMAb90510)

The Anti-ZEB1 antibody (AMAb90510) shows strong nuclear positivity in the stromal, but not glandular cells in endometrium tissue using IHC. ICC-IF shows nuclear staining in the human A-549 cell line. The antibody signal is downregulated using ZEB1-specific siRNA probes in extracts from RH-30 cells, shown by WB analysis.

ANTI-P53 (AMAb90956)

The Anti-P53 antibody shows strong nuclear immunoreactivity in tumor cells in human colorectal cancer using IHC. ICC-IF staining in A431 cell line shows cell cycle dependent nuclear (without nucleoli) staining. The antibody signal is downregulated using p53-specific siRNA probes in extracts from U-251 cells, shown by WB analysis.

100. Ikeya T *et al.* The combined expression of Semaphorin4D and PlexinB1 predicts disease recurrence in colorectal cancer. *BMC Cancer* 2016 Jul 25; 16:525.

101. Larsson A *et al.* Overexpression of podocalyxin-like protein is an independent factor of poor prognosis in colorectal cancer. *Br J Cancer* 2011 Aug 23; 105(5):666-72.

102. Borg D *et al.* Expression of podocalyxin-like protein is an independent prognostic biomarker in resected esophageal and gastric adenocarcinoma. *BMC Clin Pathol* 2016 Jul 29; 16:13.

103. Heby M *et al.* Prognostic and predictive significance of podocalyxin-like protein expression in pancreatic and periampullary adenocarcinoma. *BMC Clin Pathol* 2015; 15:10.

104. Saukkonen K *et al.* Podocalyxin Is a Marker of Poor Prognosis in Pancreatic Ductal Adenocarcinoma. *PLoS One* 2015; 10(6):e0129012.

105. Boman K *et al.* Membranous expression of podocalyxin-like protein is an independent factor of poor prognosis in urothelial bladder cancer. *Br J Cancer* 2013 Jun 11; 108(11):2321-2328.

106. Hjelm B *et al.* High nuclear RBM3 expression is associated with an improved prognosis in colorectal cancer. *Proteomics Clin Appl* 2011 Dec; 5(11-12):624-35.

107. Florianova L *et al.* Evaluation of RNA-binding motif protein 3 expression in urothelial carcinoma of the bladder: an immunohistochemical study. *World J Surg Oncol* 2015 Nov 14; 13(None):317.

108. Olofsson SE *et al.* Low RBM3 Protein Expression Correlates with Clinical Stage, Prognostic Classification and Increased Risk of Treatment Failure in Testicular Non-Seminomatous Germ Cell Cancer. *PLoS One* 2015; 10(3):e0121300.

109. Boman K *et al.* Decreased expression of RNA-binding motif protein 3 correlates with tumour progression and poor prognosis in urothelial bladder cancer. *BMC Urol* 2013 Apr 8; 13(None):17.

110. Nodin B *et al.* High MCM3 expression is an independent biomarker of poor prognosis and correlates with reduced RBM3 expression in a prospective cohort of malignant melanoma. *Diagn Pathol* 2012 Jul 17; 7:82.

111. Hjelm B *et al.* High nuclear RBM3 expression is associated with an improved prognosis in colorectal cancer. *Proteomics Clin Appl* 2011 Dec; 5(11-12):624-35.

112. Hjelm B *et al.* Generation of monospecific antibodies based on affinity capture of polyclonal antibodies. *Protein Sci* 2011 Nov; 20(11):1824-35.

113. Jögi A *et al.* Nuclear expression of the RNA-binding protein RBM3 is associated with an improved clinical outcome in breast cancer. *Mod Pathol* 2009 Dec; 22(12):1564-74.

114. Arora A *et al.* Clinicopathological and prognostic significance of RECQL5 helicase expression in breast cancers. *Carcinogenesis* 2015 Nov 19; 37(1):63-71.

115. Lao VV *et el.* Altered RECQ Helicase Expression in Sporadic Primary Colorectal Cancers. *Transl Oncol* 2013 Aug; 6(4):458-469. Epub 2013 Aug 1.

116. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

117. Qundos U *et al.* Profiling post-centrifugation delay of serum and plasma with antibody bead arrays. *J Proteomics* 2013 Dec 16; 95:46-54.

118. Luo Y *et al.* RET is a potential tumor suppressor gene in colorectal cancer. *Oncogene* 2013 Apr 18; 32(16):2037-2047.

119. Tsofack SP *et al.* NONO and RALY proteins are required for YB-1 oxaliplatin induced resistance in colon adenocarcinoma cell lines. *Mol Cancer* 2011 Nov 25; 10:145.

120. Sanz-Pamplona R *et al.* Aberrant gene expression in mucosa adjacent to tumor reveals a molecular crosstalk in colon cancer. *Mol Cancer* 2014 Mar 5; 13:46.

Target Protein	Product Name	Product Number	Validated Applications
SATB2	Anti-SATB2	HPA029543[121]	IHC*,WB,ICC-IF
SATB2	Anti-SATB2	AMAb90679	IHC,WB,ICC-IF
Semaphorin-4D	Anti-SEMA4D	HPA015662	IHC,WB*
Serpin A1	Anti-SERPINA1	HPA000927	IHC*,WB*,ICC-IF
SIX1	Anti-SIX1	HPA001893	IHC*,WB*,ICC-IF
SORD	Anti-SORD	HPA040260	IHC*,WB*,ICC-IF
SOX9	Anti-SOX9	HPA001758	IHC*,WB*,ICC-IF
SOX21	Anti-SOX21	AMAb91309	IHC,WB
SOX21	Anti-SOX21	AMAb91311	IHC,WB,ICC-IF
SRC	Anti-SRC	HPA030875	IHC,WB*,ICC-IF
SRSF5	Anti-SRSF5	HPA043484[122]	IHC,WB,ICC-IF
SRSF6	Anti-SRSF6	HPA029005[123]	IHC,WB
SRSF7	Anti-SRSF7	HPA043850[124]	IHC*,ICC-IF
STK4/MST-1	Anti-STK4	HPA015270[125]	IHC,WB*,ICC-IF
SUSD2	Anti-SUSD2	HPA004117[126-127]	IHC*
TAK1/TR4/NR2C2	Anti-NR2C2	HPA006313	IHC,WB,ICC-IF
TET1	Anti-TET1	HPA019032[128-129]	IHC,ICC-IF
TFAP4	Anti-TFAP4	HPA001912[130]	IHC,WB*,ICC-IF
TGFB1	Anti-TGFB1	HPA008612[131-133]	IHC*
TIMP1/EPA	Anti-TIMP1	HPA053417	IHC
TJP1	Anti-TJP1	HPA001636[134-135]	IHC*,WB,ICC-IF
TNIK	Anti-TNIK	HPA012128[136-137]	IHC,ICC-IF
TRAF6	Anti-TRAF6	HPA019805	IHC,WB,ICC-IF
TRAF6	Anti-TRAF6	HPA020599	IHC,WB
Transgelin	Anti-TAGLN	HPA019467[138]	IHC*,WB,ICC-IF
YWHAB/KCIP-1	Anti-YWHAB	HPA011212[140]	IHC*,WB,ICC-IF
ZEB1/TCF-8	Anti-ZEB1	HPA027524[141-145]	IHC*,ICC-IF
ZEB1/TCF-8	Anti-ZEB1	AMAb90510	IHC,WB*,ICC-IF
Zyxin	Anti-ZYX	HPA004835[146]	IHC,ICC-IF

* Products with enhanced validation for indicated application

121. Nodin B *et al.* Molecular correlates and prognostic significance of SATB1 expression in colorectal cancer. *Diagn Pathol* 2012 Aug 30; 7:115.

122. Park WC *et al.* Comparative expression patterns and diagnostic efficacies of SR splicing factors and HNRNPA1 in gastric and colorectal cancer. *BMC Cancer* 2016 Jun 10; 16:358.

123. Park WC *et al.* Comparative expression patterns and diagnostic efficacies of SR splicing factors and HNRNPA1 in gastric and colorectal cancer. *BMC Cancer* 2016 Jun 10; 16:358.

124. Park WC *et al.* Comparative expression patterns and diagnostic efficacies of SR splicing factors and HNRNPA1 in gastric and colorectal cancer. *BMC Cancer* 2016 Jun 10; 16:358.

125. Babel I *et al.* Identification of MST1/STK4 and SULF1 proteins as autoantibody targets for the diagnosis of colorectal cancer by using phage microarrays. *Mol Cell Proteomics* 2011 Mar; 10(3):M110.001784.

126. Pan W *et al.* CSBF/C10orf99, a novel potential cytokine, inhibits colon cancer cell growth through inducing G1 arrest. *Sci Rep* 2014 Oct 29; 4:6812.

127. Lindgren D *et al.* Isolation and characterization of progenitor-like cells from human renal proximal tubules. *Am J Pathol* 2011 Feb; 178(2):828-37.

128. ZHAO XQ *et al.* Promoter demethylation of nuclear factor-erythroid 2-related factor 2 gene in drug-resistant colon cancer cells. *Oncol Lett* 2015 Sep; 10(3):1287-1292.

129. Barazeghi E *et al.* 5-Hydroxymethylcytosine discriminates between parathyroid adenoma and carcinoma. *Clin Epigenetics* 1/01/01; 8:31.

130. Jackstadt R *et al.* AP4 is a mediator of epithelial–mesenchymal transition and metastasis in colorectal cancer. *J Exp Med* 2013 Jul 1; 210(7):1331-1350.

131. Zhu J *et al.* TGFBI protein high expression predicts poor prognosis in colorectal cancer patients. *Int J Clin Exp Pathol* 2015; 8(1):702-710.

132. Kuot A *et al.* Association of TCF4 and CLU polymorphisms with Fuchs' endothelial dystrophy and implication of CLU and TGFBI proteins in the disease process. *Eur J Hum Genet* 2012 Jun; 20(6):632-638.

133. Kashyap MK *et al.* SILAC-based quantitative proteomic approach to identify potential biomarkers from the esophageal squamous cell carcinoma secretome. *Cancer Biol Ther* 2010 Oct 15; 10(8):796-810. Epub 2010 Oct 7.

134. Chen JH *et al.* A recellularized human colon model identifies cancer driver genes. *Nature Biotechnology* July 11, 2016.

135. McIntyre BA *et al.* Expansive Generation of Functional Airway Epithelium From Human Embryonic Stem Cells. *Stem Cells Transl Med* 2014 Jan; 3(1):7-17. Epub 2013 Dec 3.

136. Takahashi H *et al.* Prognostic significance of Traf2- and Nck- interacting kinase (TNIK) in colorectal cancer. *BMC Cancer* 2015 Oct 24; 15:794. Epub 2015 Oct 24.

137. Yu DH *et al.* The essential role of TNIK gene amplification in gastric cancer growth. *Oncogenesis* 2014 Feb 24; 2:e89. Epub 2014 Feb 24.

138. Isella C *et al.* Stromal contribution to the colorectal cancer transcriptome. *Nature Genetics* February 23, 2015.

139. De Sousa E Melo F *et al.* Poor-prognosis colon cancer is defined by a molecularly distinct subtype and develops from serrated precursor lesions. *Nat Med* 2013 May; 19(5):614-8. Epub 2013 Apr 14.

140. O'Dwyer D *et al.* The Proteomics of Colorectal Cancer: Identification of a Protein Signature Associated with Prognosis. *PLoS One* 2011; 6(11):e27718. Epub 2011 Nov 18.

141. Isella C *et al.* Stromal contribution to the colorectal cancer transcriptome. *Nature Genetics* February 23, 2015.

142. Flanagan L *et al.* Low levels of Caspase-3 predict favourable response to 5FU-based chemotherapy in advanced colorectal cancer: Caspase-3 inhibition as a therapeutic approach. *Cell Death Dis* 2016 Feb 4; 7(2):e2087-. Epub 2016 Feb 4.

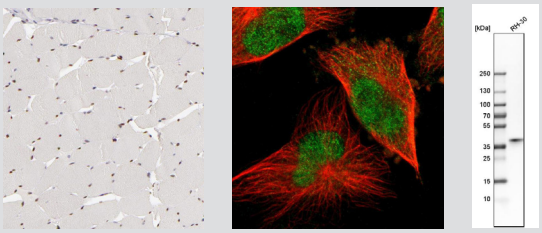
143. Lehmann W *et al.* ZEB1 turns into a transcriptional activator by interacting with YAP1 in aggressive cancer types. *Nat Commun* 2016 Feb; 7:10498. Epub 2016 Feb 15.

144. Barbáchano A *et al.* SPROUTY-2 represses the epithelial phenotype of colon carcinoma cells via upregulation of ZEB1 mediated by ETS1 and miR-200/miR-150. *Oncogene* October 12, 2015.

145. Fessler E *et al.* TGFβ signaling directs serrated adenomas to the mesenchymal colorectal cancer subtype. *EMBO Mol Med* 2016 May 24; 8(7):745-760. Epub 2016 May 24.

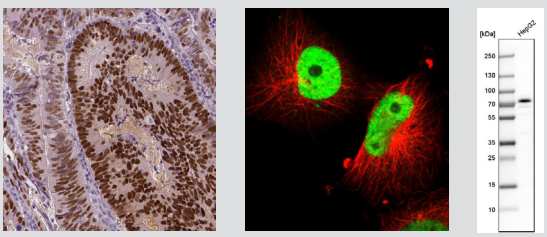
146. Fukumoto M *et al.* α-Actinin-4 Enhances Colorectal Cancer Cell Invasion by Suppressing Focal Adhesion Maturation. *PLoS One* 2015; 10(4):e0120616. Epub 2015 Apr 10.

ANTI-SIX1 (HPA001893)



The Anti-SIX1 antibody (HPA001893) shows strong nuclear positivity in striated muscle fibers in human skeletal muscle using IHC. ICC-IF staining of human cell line U-251 MG shows positivity in nucleus but excluded from the nucleoli. Western blot analysis detects SIX1 in human cell line RH-30.

ANTI-SOX9 (HPA001758)



Anti-SOX9 (HPA001758) shows moderate to strong nuclear positivity in tumor cells in human colorectal cancer using IHC. ICC-IF staining of human cell line U-251 MG shows positivity in nucleus but excluded from the nucleoli. Western blot analysis detects SOX9 in human cell line HepG2.

Antibodies against gene products in Oncotype and Coloprint tests

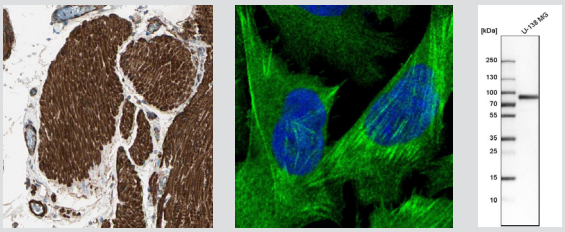
This section presents antibodies in Atlas Antibodies' product catalog against gene products included in the diagnostic Oncotype and Coloprint tests.

Oncotype DX (developed by Genomic Health) is the most frequently used gene expression profile in clinical practice in the United States analyzing a panel of 21 genes within a tumor to determine a Recurrence Score.

Target Protein	Product Name	Product Number	Validated Applications
AKAP12	Anti-AKAP12	HPA006344[1]	IHC*,WB*,ICC-IF
AKAP12	Anti-AKAP12	HPA056230	IHC*,ICC-IF
AKT3	Anti-AKT3	HPA026441[2-4]	IHC,WB
Caldesmon	Anti-CALD1	HPA008066[5-8]	IHC*,WB*,ICC-IF
Caldesmon	Anti-CALD1	HPA017330[9-11]	IHC*,WB*,ICC-IF
Biglycan	Anti-BGN	HPA003157[12-13]	IHC*,WB,ICC-IF
Collagen alpha-1	Anti-COL1A1	HPA008405	IHC
Collagen alpha-1	Anti-COL1A1	HPA011795	IHC,ICC-IF
SPARC	Anti-SPARC	HPA002989[14]	IHC,WB*
SPARC	Anti-SPARC	HPA003020[15]	IHC,WB*
CTHRC1/NMTC1	Anti-CTHRC1	HPA059806	IHC,WB
LOXL2	Anti-LOXL2	HPA036257	ICC-IF
LOXL2	Anti-LOXL2	HPA056542	ICC-IF
TGFB3	Anti-TGFB3	HPA063582	ICC-IF
PDGFC	Anti-PDGFC	HPA009134	IHC,ICC-IF
IGFBP7	Anti-IGFBP7	HPA002196[19-21]	IHC
SFRP4	Anti-SFRP4	HPA009712	IHC*,WB*
SFRP4	Anti-SFRP4	HPA050585	IHC*,WB
DLC1	Anti-DLC1	HPA017753[22]	IHC,WB,ICC-IF
EGR1	Anti-EGR1	HPA029938	ICC-IF
EGR1	Anti-EGR1	HPA029937	ICC-IF
GADD45B	Anti-GADD45B	HPA029816[23]	IHC,ICC-IF
SERPINE1/PAI1	Anti-SERPINE1	HPA050039[24]	IHC,ICC-IF
SPP1/OPN	Anti-SPP1	HPA027541[25]	IHC*,WB, ICC-IF
S100A4	Anti-S100A4	HPA007973[26-27]	IHC*,WB*

* Products with enhanced validation for indicated application

Anti-CALD1 (HPA008066)



IHC staining of human smooth muscle tissue using the Anti-CALD1 antibody (HPA008066) shows cytoplasmic positivity in smooth muscle cells. Using ICC-IF in U2-OS cells, the antibody stains actin filament and plasma membrane. CALD1 is detected in cell line U-138 MG cell line.

1. Bateman NW *et al.* Elevated AKAP12 in Paclitaxel-Resistant Serous Ovarian Cancer Cells is Prognostic and Predictive of Poor Survival in Patients. *J Proteome Res* 2015 Apr 3; 14(4):1900-1910.

2. O'Hurley G *et al.* Investigation of molecular alterations of AKT-3 in triple-negative breast cancer. *Histopathology* 2014 Apr; 64(5):660-70.

3. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

4, Vredeveld LC *et al.* Abrogation of BRAFV600E-induced senescence by PI3K pathway activation contributes to melanomagenesis. *Genes Dev* 2012 May 15; 26(10):1055-1069.

5. Alexandre Calon a *et al.* Stromal gene expression defines poor-prognosis subtypes in colorectal cancer. *Nature Genetics* February 23, 2015.

6. Stadler C *et al.* Systematic validation of antibody binding and protein subcellular localization using siRNA and confocal microscopy. *J Proteomics* 2012 Apr 3; 75(7):2236-51.

7. Fagerberg L *et al.* Mapping the subcellular protein distribution in three human cell lines. *J Proteome Res* 2011 Aug 5; 10(8):3766-77.

8. Köhler CN. Histochemical Localization of Caldesmon in the CNS and Ganglia of the Mouse. *J Histochem Cytochem* 2011 May; 59(5):504-517.

9. Qundos U *et al.* Profiling post-centrifugation delay of serum and plasma with antibody bead arrays. *J Proteomics* 2013 Dec 16; 95:46-54.

10. Andersson S *et al.* Antibodies Biotinylated Using a Synthetic Z-domain from Protein A Provide Stringent In Situ Protein Detection. *J Histochem Cytochem* 2013 Nov; 61(11):773-784.

11. Köhler CN. Histochemical Localization of Caldesmon in the CNS and Ganglia of the Mouse. *J Histochem Cytochem* 2011 May; 59(5):504-517.

12. Van Bockstal M *et al.* Differential regulation of extracellular matrix protein expression in carcinoma-associated fibroblasts by TGF-β1 regulates cancer cell spreading but not adhesion. *Oncoscience* 2014; 1(10):634-648.

13. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

14. Kato BS *et al.* Variance decomposition of protein profiles from antibody arrays using a longitudinal twin model. *Proteome Sci* 2011 Nov 17; 9:73.

15. Kato BS *et al.* Variance decomposition of protein profiles from antibody arrays using a longitudinal twin model. *Proteome Sci* 2011 Nov 17; 9:73.

16. Michela Locci *et al.* Activin A programs the differentiation of human TFH cells. *Nature Immunology* July 04, 2016.

17. Howley BV *et al.* Translational regulation of Inhibin βA by TGFβ via the RNA-binding protein hnRNP E1 enhances the invasiveness of epithelial-to-mesenchymal transitioned cells. *Oncogene* 2016/03/31; 35(13):1725-1735.

18. Wamsley JJ *et al.* Activin Upregulation by NF-κB is Required to Maintain Mesenchymal Features of Cancer Stem-like Cells in Non-Small Cell Lung Cancer. *Cancer Res* 2015/01/15; 75(2):426-435.

19. Gambaro K *et al.* Low levels of IGFBP7 expression in high-grade serous ovarian carcinoma is associated with patient outcome. *BMC Cancer* 2015 Mar 17; 15:135.

20. Calon A *et al.* Stromal gene expression defines poor-prognosis subtypes in colorectal cancer. *Nature Genetics* February 23, 2015.

21. Chugh S *et al.* Pilot study identifying myosin heavy chain 7, desmin, insulin-like growth factor 7, and annexin A2 as circulating biomarkers of human heart failure. *Proteomics* 2013 Aug; 13(15):2324-2334.

22. Muehlich S *et al.* The transcriptional coactivators megakaryoblastic leukemia 1/2 mediate the effects of loss of the tumor suppressor deleted in liver cancer 1. *Oncogene* 2012 Aug 30; 31(35):3913-23.

23. Rizzardi AE *et al.* Evaluation of protein biomarkers of prostate cancer aggressiveness. *BMC Cancer* 2014 Apr 5; 14:244.

24. Zhang G *et al.*Validation and clinicopathologic associations of a urine-based bladder cancer biomarker signature. *Diagn Pathol* 2014 Nov 12; 9:200.

25. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells.. *Nat Methods* 2013 Apr;10(4):315-23.

26. den Boon JA *et al.* Molecular transitions from papillomavirus infection to cervical precancer and cancer: Role of stromal estrogen receptor signaling. *Proc Natl Acad Sci U S A* 2015 Jun 23; 112(25):E3255-E3264.

27. Laguë MN *et al.* Decidual PTEN expression is required for trophoblast invasion in the mouse. *Am J Physiol Endocrinol Metab* 2010 Dec; 299(6):E936-E946.

Target Protein	Product Name	Product Number	Validated Applications
S100A4	Anti-S100A4	AMAb90596	IHC*,WB,ICC-IF
S100A4	Anti-S100A4	AMAb90598	IHC,WB*,ICC-IF
S100A4	Anti-S100A4	AMAb90599	IHC*,WB,ICC-IF
HSPA1A	Anti-HSPA1A	HPA052504	IHC,WB,ICC-IF
TGFBI	Anti-TGFBI	HPA008612[28-30]	IHC*
TGFBI	Anti-TGFBI	HPA017019	IHC*,WB
GRB10	Anti-GRB10	HPA027502	IHC
LAMC2	Anti-LAMC2	AMAb91098	IHC*,WB*,ICC-IF
CDKN2A/P14ARF	Anti-CDKN2A	HPA047838	ICC-IF
CDC20	Anti-CDC20	HPA055288	IHC*,WB
CDC20	Anti-CDC20	HPA045842	ICC-IF
Ki-67/MKI67	Anti-MKI67	AMAb90870	IHC,ICC-IF
Ki-67/MKI67	Anti-MKI67	HPA000451[31-32]	IHC*,ICC-IF
Ki-67/MKI67	Anti-MKI67	HPA001164[33]	IHC*,ICC-IF
MCM2	Anti-MCM2	HPA031495	IHC*,WB*,ICC-IF
MCM2	Anti-MCM2	HPA031496	IHC*,WB,ICC-IF
RRM1	Anti-RRM1	HPA057265	IHC,ICC-IF
RRM1	Anti-RRM1	HPA064297	IHC
RRM2	Anti-RRM2	HPA056994	IHC*,WB*,ICC-IF
SKP2	Anti-SKP2	HPA051196	WB*,ICC-IF
SKP2	Anti-SKP2	HPA054633	IHC,WB*
MYC/CMYC	Anti-MYC	HPA055893	IHC,ICC-IF
MYC/CMYC	Anti-MYC	HPA066556	ICC-IF
CSEL1/CSE1L	Anti-CSE1L	HPA038059	IHC*,WB,ICC-IF
CSEL1/CSE1L	Anti-CSE1L	HPA038060	IHC*,ICC-IF
MYBL2	Anti-MYBL2	HPA030530	IHC
MYBL2	Anti-MYBL2	HPA055416	ICC-IF
NME1/GAAD	Anti-NME1	HPA008467[34]	IHC,WB,ICC-IF
NME1/GAAD	Anti-NME1	HPA041113	IHC,WB
UMPS/OPRT	Anti-UMPS	HPA036178	IHC,WB*,ICC-IF
UMPS/OPRT	Anti-UMPS	HPA036179	IHC,WB
HNRPD	Anti-HNRNPD	HPA004911	IHC,WB,ICC-IF
MCTP1	Anti-MCTP1	HPA019018	IHC,ICC-IF
LAMA3	Anti-LAMA3	HPA009309	IHC,ICC-IF
LAMA3	Anti-LAMA3	AMAb91123	IHC,WB
CTSC/Cathepsin C	Anti-CTSC	HPA066610	WB,ICC-IF
PYROXD1	Anti-PYROXD1	HPA038320	IHC,WB*,ICC-IF
EDEM1	Anti-EDEM1	HPA029565	IHC,ICC-IF
IL2RB/CD122	Anti-IL2RB	HPA062657	IHC*
ZNF697	Anti-ZNF697	HPA049933	IHC,ICC-IF
SLC6A11/GAT-3	Anti-SLC6A11	HPA037981	IHC,WB
IL2RA/CD25	Anti-IL2RA	HPA054622	IHC*
CYFIP2	Anti-CYFIP1	HPA068106	IHC
PIM3	Anti-PIM3	HPA068758	ICC-IF
LIF	Anti-LIF	HPA018844	IHC,ICC-IF
Perilipin-3/PLIN3	Anti-PLIN3	HPA006427[35]	IHC,WB*,ICC-IF
Perilipin-3/PLIN3	Anti-PLIN3	HPA066538	IHC,WB*,ICC-IF
HSD3B1	Anti-HSD3B1	HPA043261	IHC
HSD3B1	Anti-HSD3B1	HPA043264	IHC
HSD3B1	Anti-HSD3B1	HPA044028	IHC
ZBED4	Anti-ZBED4	HPA045341	IHC,WB,ICC-IF
PPARA	Anti-PPARA	HPA067049	WB,ICC-IF
THNSL2	Anti-THNSL2	HPA035395	IHC
ZG16	Anti-ZG16	HPA052512	IHC*,WB*

* Products with enhanced validation for indicated application

28. Zhu J *et al.* TGFBI protein high expression predicts poor prognosis in colorectal cancer patients. *Int J Clin Exp Pathol* 2015; 8(1):702-710.

29. Kuot A *et al.* Association of TCF4 and CLU polymorphisms with Fuchs' endothelial dystrophy and implication of CLU and TGFBI proteins in the disease process. *Eur J Hum Genet* 2012 Jun; 20(6):632-638.

30. Kashyap MK *et al.* SILAC-based quantitative proteomic approach to identify potential biomarkers from the esophageal squamous cell carcinoma secretome. *Cancer Biol Ther* 2010 Oct 15; 10(8):796-810.

31. Li S *et al.* Endothelial VEGF Sculpts Cortical Cytoarchitecture. *J Neurosci* 2013 Sep 11; 33(37):14809-14815.

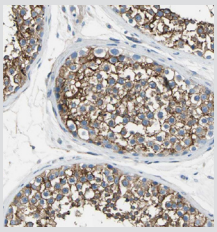
32. Pohler E *et al.* Haploinsufficiency for AAGAB causes clinically heterogeneous forms of punctate palmoplantar keratoderma. *Nat Genet* 2012 Nov; 44(11):10.1038/ng.2444.

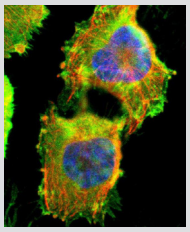
33. Roca H *et al.* IL-4 induces proliferation in prostate cancer PC3 cells under nutrient-depletion stress through the activation of the JNK-pathway and survivin upregulation
J Cell Biochem 2012 May; 113(5):1569-1580.

34. Röwer C *et al.* Toponostics of invasive ductal breast carcinoma: combination of spatial protein expression imaging and quantitative proteome signature analysis. *Int J Clin Exp Pathol* 2011 Mar 31; 4(5):454-467.

35. Akil A *et al.* Septin 9 induces lipid droplets growth by a phosphatidylinositol-5-phosphate and microtubule-dependent mechanism hijacked by HCV. *Nat Commun* 2016 Jul 15; 7:12203.

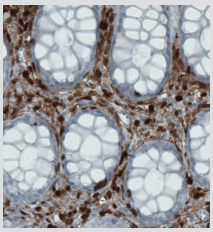
Anti-AKAP12 (HPA006344)

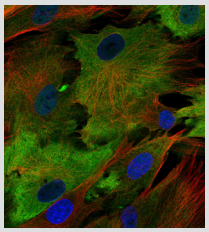




IHC staining of human testis tissue using the Anti-AKAP12 antibody (HPA006344) shows cytoplasmic and membranous positivity in seminiferous ducts. ICC-IF staining of human cell line U-251 MG shows localization to plasma membrane and cytosol.

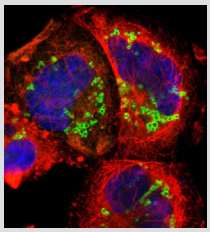
Anti-S100A4 (AMAb90598)

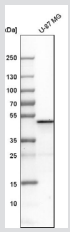




IHC staining of human rectum tissue using the Anti-S100A4 antibody (AMAb90598) shows strong immunoreactivity in a subset of lymphoid cells. In ICC-IF, in BJ cells, plasma membrane is stained.

Anti-PLIN3 (HPA006427)





IHC staining of human small intestine tissue using the Anti-PLIN3 antibody (HPA006427) shows positivity in glandular cells. ICC-IF in A-431 cell line shows positivity in lipid droplets. PLIN3 is detedted in cell line U-87 MG lysate using WB analysis.

Antibodies against gene products elevated in colon identified in the Human Protein Atlas

The genes included in this section show at least 5-fold higher mRNA levels in colon tissue compared to all other human tissues. The table lists the antibodies available for targeting these gene products.

Target Protein	Product Name	Product Number	Validated Applications
B3GNT6	Anti-B3GNT6	HPA039805	IHC*
C10orf99	Anti-C10orf99	HPA050920	IHC*
CA1	Anti-CA1	HPA006558	IHC*,WB
CA2	Anti-CA2	HPA001550[1]	IHC,WB*
CD177	Anti-CD177	HPA041820	IHC*
CD177	Anti-CD177	HPA046601	IHC*
CDH17	Anti-CDH17	HPA023614	IHC*,WB
CDH17	Anti-CDH17	HPA023616[2]	IHC*,WB*
CDH17	Anti-CDH17	HPA026556	IHC*,WB*
CDHR5	Anti-CDHR5	HPA009081	IHC*
CDHR5	Anti-CDHR5	HPA009173	IHC*,WB
CDX1	Anti-CDX1	HPA055196	IHC*
CDX2	Anti-CDX2	HPA045669	ICC-IF
CDX2	Anti-CDX2	HPA049580	ICC-IF
CEACAM1/3/5/6	Anti-CEACAM1	HPA011041	IHC
CEACAM5	Anti-CEACAM5	HPA019758	IHC*,WB,ICC-IF
CEACAM7	Anti-CEACAM7	HPA069621	IHC
Claudin-3	Anti-CLDN3	HPA014361	IHC,ICC-IF
CLCA1	Anti-CLCA1	HPA052787	IHC*
CLCA1	Anti-CLCA1	HPA059301	IHC*
DHRS11	Anti-DHRS11	HPA041226	IHC*,ICC-IF
DHRS11	Anti-DHRS11	HPA048236	IHC*
DHRS11	Anti-DHRS11	HPA053623	IHC*
ENTPD8	Anti-ENTPD8	HPA021509	IHC*,ICC-IF
FABP1	Anti-FABP1	HPA028275	IHC*,WB,ICC-IF
FCGBP	Anti-FCGBP	HPA003517[3]	IHC*
FCGBP	Anti-FCGBP	HPA003564	IHC*
FUT3/5/6	Anti-FUT3	HPA046966	IHC
FXYD3	Anti-FXYD3	HPA010856[4]	IHC*
GAL3ST2	Anti-GAL3ST2	HPA071809	IHC*
Galectin-4	Anti-LGALS4	HPA031184	IHC*
Galectin-4	Anti-LGALS4	HPA031185	IHC*
Galectin-4	Anti-LGALS4	HPA031186	IHC*
GPA33	Anti-GPA33	HPA018858	IHC*,WB
GUCA2A	Anti-GUCA2A	HPA018215[5-7]	IHC*,WB*
HNF4A	Anti-HNF4A	HPA004712[8-9]	IHC*,WB*,ICC-IF
HSD11B2	Anti-HSD11B2	HPA042186	IHC*,WB
HSD11B2	Anti-HSD11B2	HPA056385	IHC*,ICC-IF
INSL5	Anti-INSL5	HPA030100	IHC*,WB*
Keratin 20	Anti-KRT20	HPA024309	IHC*,WB
Keratin 20	Anti-KRT20	HPA024684	IHC*,WB
Keratin 20	Anti-KRT20	HPA027236	IHC*,WB*
MEP1A	Anti-MEP1A	HPA029416	IHC*
MISP	Anti-MISP	HPA049511	IHC*,WB*,ICC-IF
MISP	Anti-MISP	HPA062232	IHC*,WB*,ICC-IF
MS4A12	Anti-MS4A12	HPA057657	IHC*
MUC13	Anti-MUC13	HPA045163	IHC*,WB
NOXO1	Anti-NOXO1	HPA071540	IHC
NXPE1	Anti-NXPE1	HPA049133	IHC*,WB*
NXPE2	Anti-NXPE2	HPA039744	IHC*

* Products with enhanced validation for indicated application

1. Hu X *et al.* Low CA II expression is associated with tumor aggressiveness and poor prognosis in gastric cancer patients *Int J Clin Exp Pathol* 2014; 7(10):6716-6724.

2. Magnusson K *et al.* SATB2 in combination with cytokeratin 20 identifies over 95% of all colorectal carcinomas. *Am J Surg Pathol* 2011 Jul; 35(7):937-48.

3. Erickson NA *et al.* The Goblet Cell Protein Clca1 (Alias mClca3 or Gob-5) Is Not Required for Intestinal Mucus Synthesis, Structure and Barrier Function in Naive or DSS-Challenged Mice. *PLoS One* 2015; 10(7):e0131991.

4. Okudela K *et al.* Down-regulation of FXYD3 expression in human lung cancers: its mechanism and potential role in carcinogenesis. *Am J Pathol* 2009 Dec; 175(6):2646-56.

5. Brenna Ø *et al.* Cellular localization of guanylin and uroguanylin mRNAs in human and rat duodenal and colonic mucosa. *Cell Tissue Res* 2016 Apr 5; 365:331-341.

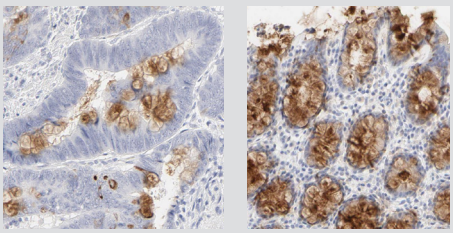
6. Brenna Ø *et al.* The guanylate cyclase-C signaling pathway is down-regulated in inflammatory bowel disease. *Scand J Gastroenterol* 2015; 50(10):1241-1252.

7. Wilson C *et al.* The paracrine hormone for the GUCY2C tumor suppressor, guanylin, is universally lost in colorectal cancer. *Cancer Epidemiol Biomarkers Prev* 2014 Nov; 23(11):2328-2337.

8. Bonner C *et al.* Inhibition of the glucose transporter SGLT2 with dapagliflozin in pancreatic alpha cells triggers glucagon secretion. *Nature Medicine April* 20, 2015.

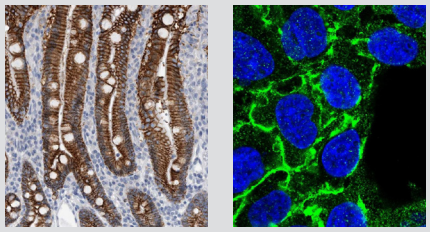
9. Mezentsev A *et al.* Global Gene Expression Responses to Low- or High-Dose Radiation in a Human Three-Dimensional Tissue Model. *Radiat Res* 2011 Jun; 175(6):677-688.

Anti-FCGBP (HPA003564)



The Anti-FCGBP antibody (HPA003564) shows strong cytoplasmic positivity in glandular cells in human colorectal cancer and normal rectum tissue using IHC.

Anti-CDH17 (HPA023614)



The Anti-CDH17 antibody (HPA023614) shows membranous positivity in glandular cells in human duodenum tissue using IHC. In ICC-IF, CDH17 is localized to cell junctions in human cell line CACO-2.

Target Protein	Product Name	Product Number	Validated Applications
NXPE2	Anti-NXPE2	HPA039876	IHC*
PADI2	Anti-PADI2	HPA047735	IHC*
PHGR1	Anti-PHGR1	HPA068787	IHC*,ICC-IF
PIGR	Anti-PIGR	HPA006154	IHC*
PIGR	Anti-PIGR	HPA012012[10-13]	IHC*,WB
PYY	Anti-PYY	HPA010973	IHC*
REG4	Anti-REG4	HPA046555	IHC*
SATB2	Anti-SATB2	HPA001042[14-17]	IHC*,WB
SATB2	Anti-SATB2	HPA029543[18]	IHC*,WB,ICC-IF
SATB2	Anti-SATB2	AMAb90679	IHC, WB,ICC-IF
SLC22A18AS	Anti-SLC22A18AS	HPA068288	IHC*,WB,ICC-IF
SLC26A2	Anti-SLC26A2	HPA058090	IHC*,WB*
SLC9A3	Anti-SLC9A3	HPA036493	IHC*,ICC-IF
SLC9A3	Anti-SLC9A3	HPA036669	IHC*
SPINK4	Anti-SPINK4	HPA007286	IHC*,ICC-IF
SULT1B1	Anti-SULT1B1	HPA002107	IHC*
Tetraspanin 8	Anti-TSPAN8	HPA044337	IHC*,ICC-IF
TFF3	Anti-TFF3	HPA035464	IHC*,ICC-IF
TPH1	Anti-TPH1	HPA022483	IHC*
UGT2B17	Anti-UGT2B4	HPA045108	IHC
VIL1	Anti-VIL1	HPA006884[19]	IHC*,WB*,ICC-IF
VIL1	Anti-VIL1	HPA006885[20]	IHC*,WB*,ICC-IF
VIP	Anti-VIP	HPA017324[21]	IHC
ZG16	Anti-ZG16	HPA052066	IHC*,WB*
ZG16	Anti-ZG16	HPA052512	IHC*,WB*

* Products with enhanced validation for indicated application

10. Fristedt R *et al.* Expression and prognostic significance of the polymeric immunoglobulin receptor in esophageal and gastric adenocarcinoma. *J Transl Med* 2014 Apr 2; 12:83.

11. Fristedt R *et al.* Reduced Expression of the Polymeric Immunoglobulin Receptor in Pancreatic and Periampullary Adenocarcinoma Signifies Tumour Progression and Poor Prognosis. *PLoS One* 2014; 9(11):e112728.

12. Berntsson J *et al.* Expression and prognostic significance of the polymeric immunoglobulin receptor in epithelial ovarian cancer. *J Ovarian Res* 2014 Feb 26; 7:26.

13. Trevisi P *et al.* Age-Related Expression of the Polymeric Immunoglobulin Receptor (pIgR) in the Gastric Mucosa of Young Pigs. *PLoS One* 2013; 8(11):e81473.

14. Hjelm B *et al.* Generation of monospecific antibodies based on affinity capture of polyclonal antibodies. *Protein Sci* 2011 Nov; 20(11):1824-35.

15. Magnusson K *et al.* SATB2 in combination with cytokeratin 20 identifies over 95% of all colorectal carcinomas. *Am J Surg Pathol* 2011 Jul; 35(7):937-48.

16. Wensman H *et al.* Extensive expression of craniofacial related homeobox genes in canine mammary sarcomas. *Breast Cancer Res Treat* 2009 Nov; 118(2):333-43.

17. Ek S *et al.* From gene expression analysis to tissue microarrays: a rational approach to identify therapeutic and diagnostic targets in lymphoid malignancies. *Mol Cell Proteomics* 2006 Jun; 5(6):1072-81.

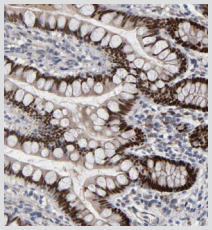
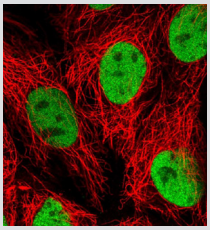
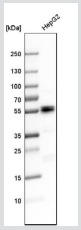
18. Nodin B *et al.* Molecular correlates and prognostic significance of SATB1 expression in colorectal cancer. *Diagn Pathol* 2012 Aug 30; 7:115.

19. Andersson S *et al.* Antibodies Biotinylated Using a Synthetic Z-domain from Protein A Provide Stringent In Situ Protein Detection. *J Histochem Cytochem* 2013 Nov; 61(11):773-784.

20. Kiflemariam S *et al.* Scalable in situ hybridization on tissue arrays for validation of novel cancer and tissue-specific biomarkers. *PLoS One* 2012; 7(3):e32927.

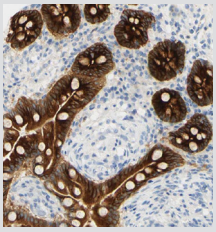
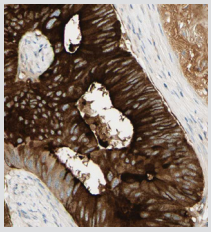
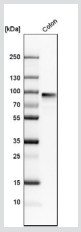
21. Dedeene L *et al.* Circadian sleep/wake-associated cells show dipeptide repeat protein aggregates in C9orf72-related ALS and FTLD cases. *Acta Neuropathol Commun*, 2019 Dec 2; 7:189.

Anti-HNF4A (HPA004712)

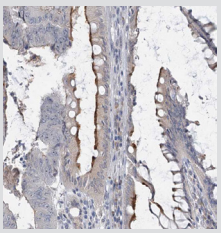
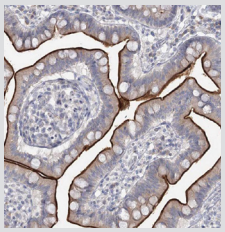
The Anti-HNF4A antibody (HPA004712) shows strong nuclear positivity in glandular cells in human small intestine using IHC. Using ICC-IF, HNF4A was localized to nucleoplasm in cell line CACO-2. HNF4A was detected in human cell line HepG2 using WB analysis.

Anti-PIGR (HPA012012)

The Anti-PIGR antibody (HPA012012) shows strong cytoplasmic and membranous positivity in glandular cells in human colon and in tumor cells in colorectal cancer tissue using IHC. PIGR is detected in colon tissue lysate using Western blot analysis.

Anti-SLC9A3 (HPA036669)

The Anti-SLC9A3 antibody (HPA036669) shows strong apical membrane positivity in glandular cells in human small intestine and in colorectal cancer tissues using immunohistochemistry.

Antibodies identified in the Human Protein Atlas

In this section, antibodies are selected based on identified differential IHC staining patterns in colon and colorectal cancer samples.

Product Name	Product Number	Validated Applications
Anti-ACADSB	HPA041458	IHC*,WB*,ICC-IF
Anti-ACBD7	HPA043326	ICC-IF
Anti-ACSL5	HPA007162	IHC*,WB,ICC-IF
Anti-ADIRF	HPA026810	IHC,ICC-IF
Anti-AGR3	HPA053942	IHC*,ICC-IF
Anti-AJUBA	HPA006171[1]	IHC,WB,ICC-IF
Anti-ALG14	HPA031829	IHC,ICC-IF
Anti-ANKRD34C	HPA045329	IHC,ICC-IF
Anti-AOAH	HPA021666	IHC,WB
Anti-AQP3	HPA014924	IHC*,ICC-IF
Anti-ATF6	HPA005935	IHC
Anti-ATP6V1B2	HPA008147	IHC*,WB*,ICC-IF
Anti-B3GNT8	HPA043669	IHC*
Anti-BCL9	HPA020274	IHC*,ICC-IF
Anti-CAND2	HPA005777	IHC,ICC-IF
Anti-CCDC144NL	HPA023457	IHC,WB*,ICC-IF
Anti-CDK6	HPA002637	IHC*,WB*,ICC-IF
Anti-CLDN18	HPA018446	IHC*
Anti-COG7	HPA040758	IHC,WB*,ICC-IF
Anti-CPE	HPA003545	IHC*
Anti-CPE	HPA003819	IHC
Anti-CXorf67	HPA006128	IHC*,WB*,ICC-IF
Anti-DACH1	HPA012672[2-4]	IHC,ICC-IF
Anti-DEFB115	HPA053160	IHC
Anti-FAM3D	HPA013844	IHC
Anti-FBXW12	HPA037491	IHC
Anti-FKBP7	HPA008707[5]	IHC,WB*,ICC-IF
Anti-GAA	HPA026970	IHC,WB*
Anti-GAK	HPA027463	IHC,ICC-IF
Anti-GALNT6	HPA011762	IHC*,WB*
Anti-GLB1L3	HPA039916	IHC
Anti-GLDC	HPA002318[6]	IHC*,WB*
Anti-GLUL	HPA007316[7-8]	IHC,WB*
Anti-HEPH	HPA005824	IHC
Anti-HLA-E	HPA031454	IHC*,ICC-IF
Anti-HMGCS2	HPA027423	IHC*,WB*
Anti-HMGCS2	HPA027442	IHC*,WB*,ICC-IF
Anti-HNF4G	HPA005438	IHC*
Anti-HPS6	HPA040687	IHC,WB
Anti-IFITM3	HPA004337[9]	IHC,WB*
Anti-ITGBL1	HPA005676	IHC
Anti-KLHL8	HPA017762	IHC,ICC-IF
Anti-MAGEB1	HPA002820	IHC*
Anti-ME2	HPA008247	IHC*,WB*,ICC-IF
Anti-ME2	HPA008880[10-14]	IHC*,WB*

* Products with enhanced validation for indicated application

1. Tsuneki M *et al.* A Hydrogel-Endothelial Cell implant Mimics Infantile Hemangioma: Modulation by Survivin and the Hippo pathway*. *Lab Invest* 2015 May 11; 95(7):765-780.

2. Zhou J *et al.* DACH1, a Zona Glomerulosa Selective Gene in the Human Adrenal, Activates Transforming Growth Factor-β Signaling and Suppresses Aldosterone Secretion. *Hypertension* 2015 May; 65(5):1103-1110.

3. Powe DG *et al.* DACH1: Its Role as a Classifier of Long Term Good Prognosis in Luminal Breast Cancer. *PLoS One* 2014; 9(1):e84428.

4. Vonlanthen J *et al.* A comprehensive look at transcription factor gene expression changes in colorectal adenomas. *BMC Cancer* 2014 Jan 29; 14:46.

5. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

6. Kim D *et al.* SHMT2 drives glioma cell survival in ischaemia but imposes a dependence on glycine clearance. *Nature* April 08, 2015.

7. Perisic L *et al.* Profiling of atherosclerotic lesions by gene and tissue microarrays reveals PCSK6 as a novel protease in unstable carotid atherosclerosis. *Arterioscler Thromb Vasc Biol* 2013 Oct; 33(10):2432-43.

8. Ko YH *et al.* Glutamine fuels a vicious cycle of autophagy in the tumor stroma and oxidative mitochondrial metabolism in epithelial cancer cells: Implications for preventing chemotherapy resistance. *Cancer Biol Ther* 2011 Dec 15; 12(12):1085-1097.

9. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

10. Brown LJ *et al.* Chronic Reduction of the Cytosolic or Mitochondrial NAD(P)-malic Enzyme Does Not Affect Insulin Secretion in a Rat Insulinoma Cell Line. *J Biol Chem* 2009 Dec 18; 284(51):35359-35367.

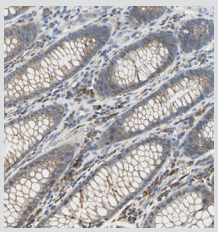
11. Zoccarato F *et al.* Succinate is the controller of O2-/H2O2 release at mitochondrial complex I : negative modulation by malate, positive by cyanide. *J Bioenerg Biomembr* 2009 Aug; 41(4):387-93.

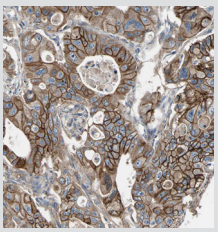
12. MacDonald MJ *et al.* Mitochondrial malic enzyme (ME2) in pancreatic islets of the human, rat and mouse and clonal insulinoma cells. *Arch Biochem Biophys* 2009 Aug 15; 488(2):100-4.

13. MacDonald MJ *et al.* Mitochondrial malic enzyme (ME2) in pancreatic islets of the human, rat and mouse and clonal insulinoma cells. *Arch Biochem Biophys* 2009 Aug 15; 488(2):100-4.

14. MacDonald MJ *et al.* Mitochondrial Malic Enzyme (ME2) In Pancreatic Islets of the Human, Rat and Mouse and Clonal Insulinoma Cells: Simple Enzyme Assay For Mitochondrial Malic Enzyme 2. *Arch Biochem Biophys* 2009 Aug 15; 488(2):100-104.

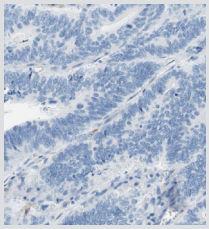
Anti-HEPH (HPA005824)

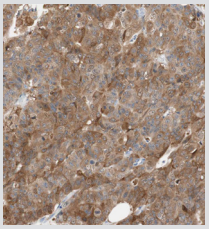




Using IHC, the Anti-HEPH antibody (HPA005824) shows cytoplasmic and membranous positivity in glandular cells in normal human colon tissue. In some colorectal cancer samples, prominent membranous positivity could be seen.

Anti-GLUL (HPA007316)



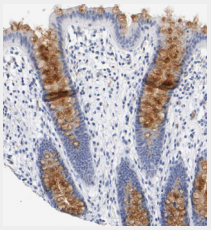


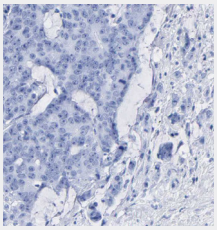
Using IHC, the Anti-GLUL antibody (HPA007316) shows either positive, or negative staining in different colorectal cancer samples.

Product Name	Product Number	Validated Applications
Anti-METTL7B	HPA038644	IHC*,WB*,ICC-IF
Anti-MRS2	HPA017642	IHC,WB
Anti-MYBBP1A	HPA005466	IHC*,WB,ICC-IF
Anti-NAALADL2	HPA012413	IHC,WB,ICC-IF
Anti-NCBP3	HPA008959[15]	IHC,ICC-IF
Anti-OR9K2	HPA015808	IHC
Anti-OSBPL3	HPA000691[16]	IHC*,WB*,ICC-IF
Anti-P2RX6	HPA028776	IHC,ICC-IF
Anti-PFKFB2	HPA049975	IHC,ICC-IF
Anti-PHTF2	HPA012312	IHC,ICC-IF
Anti-PITX1	HPA008743	IHC,ICC-IF
Anti-PKN3	HPA045390	IHC
Anti-POMK	HPA013321	IHC,WB*,ICC-IF
Anti-PPP1R35	HPA051607	IHC*
Anti-PYGB	HPA031067	IHC,WB,ICC-IF
Anti-RAD18	HPA008752	IHC,WB*,ICC-IF
Anti-REEP4	HPA042683	IHC,WB
Anti-REG1A	HPA045549	IHC,WB
Anti-RIPPLY2	HPA047454	IHC
Anti-RPS13	HPA005985	IHC,ICC-IF
Anti-S100A4	HPA007973[17-18]	IHC*,WB*
Anti-SATB2	HPA001042[19-22]	IHC*,WB
Anti-SOCS7	HPA004475[23]	IHC*,ICC-IF
Anti-SQLE	HPA018038[24]	IHC
Anti-STAG3	HPA049106	IHC*
Anti-SYNC	HPA028311	IHC,ICC-IF
Anti-TACC3	HPA005781[25]	IHC,WB*
Anti-TBXAS1	HPA031257	IHC*
Anti-TBXAS1	HPA031258	IHC*
Anti-TBXAS1	HPA031259	IHC*,WB
Anti-TGFBI	HPA017019	IHC*,WB
Anti-TMEM154	HPA019184	IHC
Anti-TMEM222	HPA016579	IHC
Anti-TPX2	HPA005487[26]	IHC*,WB,ICC-IF
Anti-TSPAN1	HPA011909	IHC*,WB,ICC-IF
Anti-WDR90	HPA049362	IHC
Anti-YBEY	HPA018162	IHC,WB
Anti-ZBTB7B	HPA006811	IHC*,ICC-IF
Anti-ZNF256	HPA055390	IHC,ICC-IF
Anti-ZNF524	HPA050981	IHC,WB*,ICC-IF
Anti-ZNF627	HPA049770	IHC,WB
Anti-ZG16	HPA052512	IHC*,WB*

* Products with enhanced validation for indicated application

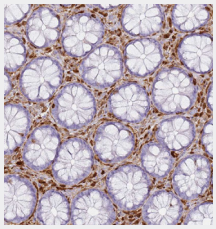
Anti-SOCS7 (HPA004475)

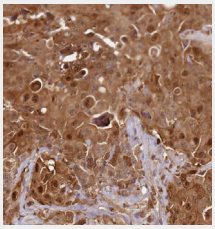




The Anti-SOCS7 antibody (HPA004475) shows positivity in glandular cells in normal human colon tissue, while colorectal cancer samples are negative.

Anti-S100A4 (HPA007973)





The Anti-S100A4 antibody (HPA007973) shows no positivity in glandular cells in normal human colon tissue (left image), while colorectal cancer samples are either positive (right image), or negative.

15. Gebhardt A *et al.* mRNA export through an additional cap-binding complex consisting of NCBP1 and NCBP3. *Nat Commun* 2015 Sep 18; 6:8192.

16. Ek S *et al*. From gene expression analysis to tissue microarrays: a rational approach to identify therapeutic and diagnostic targets in lymphoid malignancies. *Mol Cell Proteomics* 2006 Jun; 5(6):1072-81.

17. den Boon JA *et al.* Molecular transitions from papillomavirus infection to cervical precancer and cancer: Role of stromal estrogen receptor signaling. *Proc Natl Acad Sci U S A* 2015 Jun 23; 112(25):E3255-E3264.

18. Laguë MN *et al.* Decidual PTEN expression is required for trophoblast invasion in the mouse. *Am J Physiol Endocrinol Metab* 2010 Dec; 299(6):E936-E946.

19. Hjelm B *et al.* Generation of monospecific antibodies based on affinity capture of polyclonal antibodies. *Protein Sci* 2011 Nov; 20(11):1824-35.

20. Magnusson K *et al.* SATB2 in combination with cytokeratin 20 identifies over 95% of all colorectal carcinomas. *Am J Surg Pathol* 2011 Jul; 35(7):937-48.

21. Wensman H *et al.* Extensive expression of craniofacial related homeobox genes in canine mammary sarcomas. *Breast Cancer Res Treat* 2009 Nov; 118(2):333-43.

22. Ek S *et al.* From gene expression analysis to tissue microarrays: a rational approach to identify therapeutic and diagnostic targets in lymphoid malignancies. *Mol Cell Proteomics* 2006 Jun; 5(6):1072-81.

23. Fagerberg L *et al.* Analysis of the Human Tissue-specific Expression by Genome-wide Integration of Transcriptomics and Antibody-based Proteomics. *Mol Cell Proteomics* 2014 Feb; 13(2):397-406.

24. Nguyen VT *et al.* Differential epigenetic reprogramming in response to specific endocrine therapies promotes cholesterol biosynthesis and cellular invasion. *Nat Commun* 2015 Nov 27; 6:10044. Epub 2015 Nov 27.

25. Guo Y *et al.* Regulating the ARNT/TACC3 axis: Multiple approaches to manipulating protein/protein interactions with small molecules. *ACS Chem Biol* 2013 Mar 15; 8(3):626-635.

26. Stadler C *et al.* Immunofluorescence and fluorescent-protein tagging show high correlation for protein localization in mammalian cells. *Nat Methods* 2013 Apr; 10(4):315-23.

Epithelial to Mesenchymal Transition Marker Panel

The EMT Panel

Epithelial and mesenchymal cells are fundamentally different and represent the two main cell types in the body. Epithelial cells are polarised along the apical/basal axis and are tightly connected to each other as well as to the underlying basement membrane by several cell junction proteins. In contrast, mesenchymal cells are adhered to the extracellular matrix and have enhanced migratory capacities.

Epithelial cells can transition into mesenchymal cells – a process known as epithelial-mesenchymal transition (EMT), which leads to loss of epithelial barrier functions and changes in cell adhesion and motility[1]. Typically, EMT occurs during development (embryogenesis), but it is also present in wound healing and cancer progression of epithelial tumors. In metastasis, tumor cells dissociate from the epithelial layer, penetrate through the basement membrane into connective tissue, and enter the vascular system for further dissemination and subsequent growth of distant metastases[2].

Several factors drive and regulate the EMT process, including zinc finger proteins such as SNAI1, SNAI2, ZEB1, and ZNF703. These transcription factors down-regulate the expression of epithelial cell adhesion proteins such as E-cadherin, occludin, beta-catenin, and claudin. They up-regulate the expression of mesenchymal proteins, including N-cadherin, fibronectin, vimentin, S100A4, and others. Taken together, EMT leads to increase motility and invasiveness of cancer cells1.

At Atlas Antibodies, we have developed a panel of monoclonal antibodies against the key EMT markers for cell junctions, cytoskeletal changes, transcription regulation, and migration/motility. The antibodies targeting selected EMT marker proteins are:

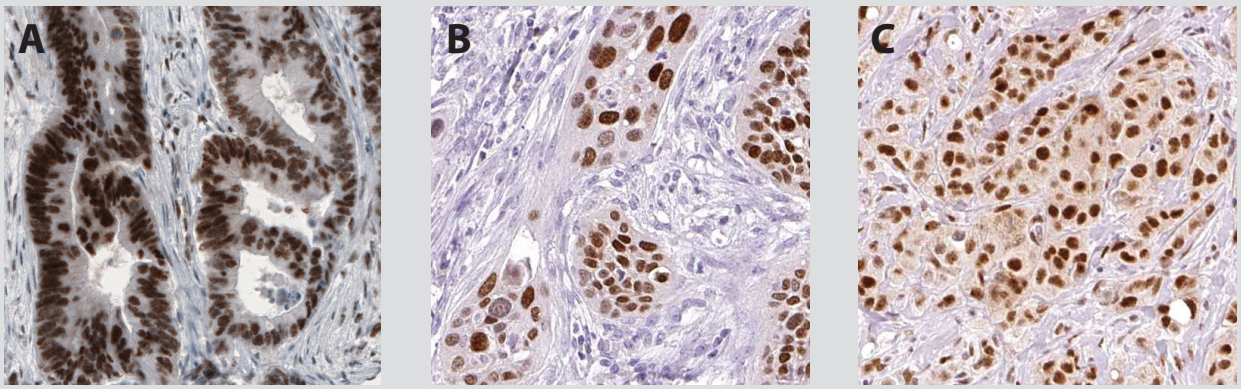
- IHC-validated in relevant healthy and human cancer tissues .
- WB-validated in positive and negative cell lines (when available)
- Available with different isotypes, allowing for multiplexing experiments
- Supplemented with information on antigens used for immunization and precise epitope sequence (when available)

The monoclonal antibodies within the panel have been developed using the same stringent conditions as for all PrecisA Monoclonals, ensuring a secured continuity and stable supply.

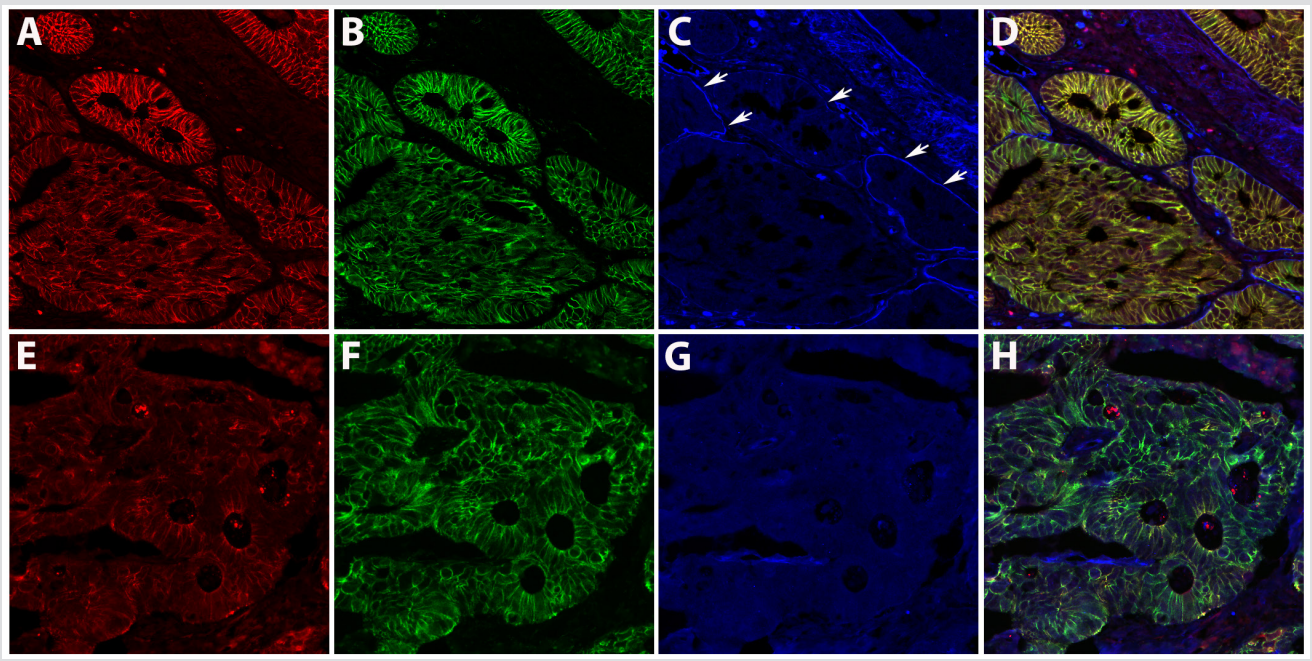
Using Monoclonals of Defined Isotypes for Multiplexed Immunofluorescence

The EMT panel includes monoclonal antibodies with different isotypes, which allows for co-localization studies using immunofluorescence with isotype-specific secondary antibodies.

The images on the right side show multiplexed staining of colorectal cancer tissue derived from two different patients using the Anti-CDH1 (**A,E**: AMAb90863, IgG1), Anti-CTNNB1 (**B,F**: AMAb91209, IgG2a) and LAMC1 (**C,G**: AMAb91138, IgG2b) monoclonal antibodies, respectively. The tumor with higher degree of differentiation (indicated by preserved basement membrane, **C**) shows higher expression of E-cadherin (**A**) as compared to the tumor with lower differentiation grade (**E**). Also note the absence of LAMC1 immunoreactivity in the second tumor (**G**). Beta-catenin (CTNNB1) expression is preserved in both tumors (**B,F**). Panels **D** and **H** show overlay images for the two tumors.



Transcription factors involved in regulation of EMT. IHC images show nuclear immunoreactivity in tumor cells in (A) colorectal cancer (Anti-SNAI1 antibody AMAb91215), (B) cervical cancer (Anti-SIX1 antibody AMAb90544) and (C) breast cancer (Anti-ZNF703 AMAb90789).



Multiplexed IHC-IF staining of two colorectal tumors (A-D and E-H) showing E-cadherin (A, E), beta-catenin (B, F) and laminin-gamma 1 (C, G) immunoreactivity using primary antibodies of different isotypes: Anti-CDH1 AMAb90863, IgG1 (red), Anti-CTNNB1 AMAb91209, IgG2a (green) and Anti-LAMC1 (AMAb91138), IgG2b (blue). Arrowheads in C indicate basement membrane. Alexa Fluor® 647-, 594- and 488-labelled isotype-specific secondary antibodies (Life Technologies) were used for visualisation.

Table 1.
Summary of the PrecisA Monoclonals EMT Markers.

Selected Markers	Product Name	Product Number	Validated Applications	Epitope	Isotype
Cell junctions	Anti-CDH1	AMAb90862	IHC*, WB, ICC-IF	NWTIQYNDPTQESII	IgG2b
Cell junctions	Anti-CDH1	AMAb90863	IHC*, WB*	APIPEPRTIF	IgG1
Cell junctions	Anti-CDH1	AMAb90865	IHC*, WB*,ICC-IF	LKPKMALEVG	IgG2a
Cell junctions	Anti-OCLN	AMAb90889	IHC, WB, ICC-IF	TSPVDDFRQPRYSSG	IgG2a
Cell junctions	Anti-OCLN	AMAb90890	IHC, WB, ICC-IF	NDKRFYPESSYKSTP	IgG2a
Cell junctions	Anti-OCLN	AMAb90893	IHC, WB, ICC-IF	RYSSGGNFETPSKRA	IgG1
Cell junctions	Anti-CTNNB1	AMAb91209	IHC, WB, ICC-IF	TSQVLYEWEQGFSQS	IgG2a
Cell junctions	Anti-CTNNB1	AMAb91210	IHC, WB, ICC-IF	TSQVLYEWEQGFSQS	IgG1
Cell junctions	Anti-CLDN1	AMAb91213	IHC, WB, ICC-IF	KTTSYPTPRPYPKPA	IgG1
Cytoskeletal changes	Anti-VIM	AMAb90516	IHC, WB*	N.D.	IgG1
Cytoskeletal changes	Anti-S100A4	AMAb90596	IHC*, WB, ICC-IF	KFKLNKSELKELLTR	IgG1
Cytoskeletal changes	Anti-S100A4	AMAb90598	IHC, WB*, ICC-IF	CNEFFEGFPDKQPRKK	IgG2b
Cytoskeletal changes	Anti-S100A4	AMAb90599	IHC*, WB, ICC-IF	CNEFFEGFPD	IgG1
Transcription regulation	Anti-SNAI1	AMAb91215	IHC*, ICC-IF	N.D.	IgG1
Transcription regulation	Anti-ZEB1	AMAb90510	IHC, WB*, ICC-IF	N.D.	IgG1
Transcription regulation	Anti-SIX1	AMAb90544	IHC, WB*, ICC-IF	N.D.	IgG1
Transcription regulation	Anti-ZNF703	AMAb90789	IHC, WB*	PGDKAGFRVP	IgG1
Transcription regulation	Anti-TP63	AMAb91224	IHC, WB	MQYLPQHTIETYRQQ	IgG1
Migration/Motility	Anti-CDH2	AMAb91220	IHC*, WB*,ICC-IF	ENPYFAPNPK	IgG1
Migration/Motility	Anti-FN1	AMAb91223	IHC, WB	GRWKCDPVDQ	IgG1
Migration/Motility	Anti-MMP9	AMAb90804	IHC, WB	VPDLGRFQTF	IgG1
Migration/Motility	Anti-MMP9	AMAb90805	IHC, WB	RGESKSLGPALLLLQ	IgG1
Migration/Motility	Anti-MMP9	AMAb90806	IHC	RGESKSLGPALLLLQ	IgG2b

* Products with enhanced validation for indicated application

Related Publications

1. Lamouille S *et al*. Molecular mechanisms of epithelial-mesenchymal transition. 2014 *Nat Rev Mol Cell Biol.* 15(3):178-196

2. Chambers AF *et al*. 2002. Dissemination and growth of cancer cells in metastatic sites. *Nat Rev Cancer* 2(8):563-572.

Finding biomarkers for colorectal cancer research

Colorectal Cancer

Colorectal cancer is one of the most common types of cancer. Each year, approximately one million new cases are detected, and nearly 600,000 deaths can be attributed to this disease worldwide.

Today, surgery is the only curative treatment for colorectal cancer, but adjuvant therapy may significantly improve patient survival.

For adjuvant treatment to be successful, it is essential to correctly identify patients that will benefit from treatment. For colon cancer, which accounts for approximately 70 % of colorectal cancer cases, adjuvant therapy is recommended for stage III and high-risk stage II diseases. For patients with stage II colon cancer, it is thus of utmost importance to find biomarkers that can separate high-risk disease from the low-risk disease.

Colorectal Cancer Biomarkers

The Human Protein Atlas (HPA) project, discovered several potential prognostic and diagnostic biomarkers. By staining of both healthy- and tumor tissue samples, proteins with a tissue-specific expression have been identified. Also, proteins with a differential expression in colorectal tissue samples from different patients have been identified. These potential biomarkers have subsequently been analyzed in larger patient cohorts, and their prognostic potential evaluated.

Some of the most promising markers are briefly described below.

RBM3

The RNA-binding motif protein 3 (RBM3) is an RNA- and DNA-binding protein, whose function has not been fully elucidated. It has been shown that the protein is expressed as an early event in mild hypothermia, and also in other conditions relating to cellular stress, such as glucose deprivation and hypoxia. During stress, RBM3 is thought to protect the cells by aiding in maintenance of protein synthesis needed for survival. Recently, it has also been shown that RBM3 attenuates stem cell-like properties in prostate cancer cells.

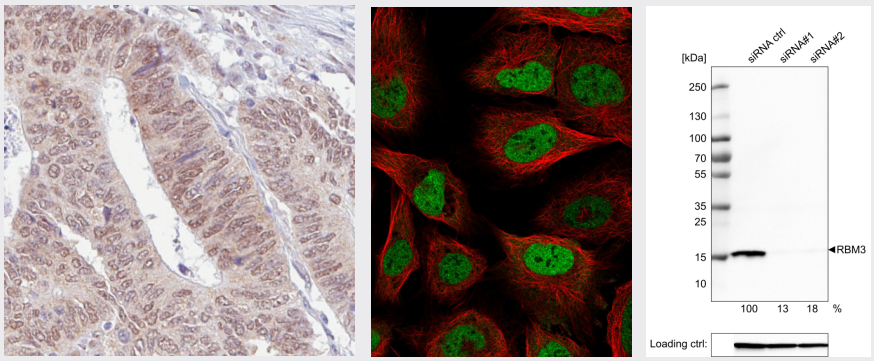
The RNA-binding protein RBM3 was identified via the Human Protein Atlas as an oncology biomarker through the differential expression pattern observed within several investigated cancers.

The levels of RBM3 expression were found to have a significant correlation to patient survival in breast, colon, ovarian, testicular, prostate and urothelial cancer as well as in malignant melanoma.

RBM3 as a prognostic biomarker in colon cancer

RBM3 was shown to be a prognostic marker in colorectal cancer in two independent patient cohorts, with a significantly improved survival for patients with high levels of RBM3 expression in their tumors. When analyzing stage II patients separately, similar results were obtained.

This indicates that RBM3 may be used as a biomarker for aid in deciding which stage II patients would benefit from adjuvant treatment.



The Anti-RBM3 (AMAb90655) antibody shows nuclear positivty by IHC in cancer cells in human colorectal tumor samples and nuclear staining by ICC-IF in U2-OS cells. By WB, the AMAb90655 antibody signal is down regulated using target specific siRNA probes in U-251 cells.

RBM3 as a treatment predictive biomarker

The RBM3 protein has also been shown to be a treatment predictive marker for platinum based treatment. Chemotherapy with oxaliplatin is commonly used in colorectal cancer treatment.

Related Publications

Zeng Y *et al.* (2013) Stress response protein RBM3 attenuates the stem-like properties of prostate cancer cells by interfering with CD44 variant splicing. *Cancer Res.* Jul 1;73(13):4123-33.

Ehlén A *et al.* Expression of the RNA-binding protein RBM3 is associated with a favourable prognosis and cisplatin sensitivity in epithelial ovarian cancer. *J Transl Med.* 2010 Aug 20;8:78.

Hjelm B *et al.* High nuclear RBM3 expression is associated with an improved prognosis in colorectal cancer. *Proteomics Clin Appl.* 2011 Dec;5(11-12):624-35.

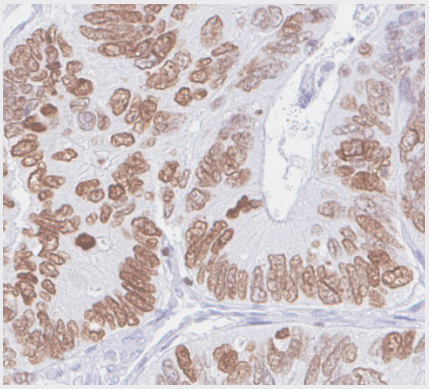
Boman K *et al.* Decreased expression of RNA-binding motif protein 3 correlates with tumour progression and poor prognosis in urothelial bladder cancer. *BMC Urol.* 2013, 13:17.

SATB2 – A diagnostic biomarker for tumors of colorectal origin

Cell- and cancer-type specific proteins are rare. The special AT-rich sequence-binding protein SATB2 has been identified as having a very selective expression pattern. In cells of epithelial lineages, SATB2 is expressed in glandular cells lining the lower gastrointestinal tract and expression is retained in a large majority of primary and metastatic colorectal cancers. Thus, SATB2 is a promising diagnostic biomarker for tumors of colorectal origin.

In a previously published study by Magnusson *et al* it was shown, by analyzing more than 1,800 tumor samples, that SATB2 expression is largely preserved in cells of colorectlal cancer origin. More than 85% of all colorectal cancers showed distinct SATB2 immunostaining and when used in combination with Cytokeratin 20 analysis, SATB2 identified more than 95% of all tumors with colorectal origin.

These promising data suggested that the combination of SATB2 and CK20 should be tested in an unbiased clinical study to further validate the initial findings. In a recent publication by Dragomir *et al*, the expression of SATB2 was analyzed in over 800 consecutive clinical cases for which CK20 immunostaining was considered necessary to obtain a final diagnosis. In this study, SATB2 showed 93% sensitivity and 77% specificity to determine a cancer of colorectal origin and in combination with CK7 and CK20, the specificity increased to 100%. SATB2 thus provides a new and advantageous supplement to current standards for clinical differential diagnosis.



Immunohistochemical staining of human colorectal tumor with Anti-SATB2 antibody (AMAb90635) shows strong nuclear staining in tumor cells.

Related Publications

Magnusson K *et al*. SATB2 in combination with cytokeratin 20 identifies over 95% of all colorectal carcinomas. *Am J Surg Pathol*. 2011 Jul;35(7):937-48.

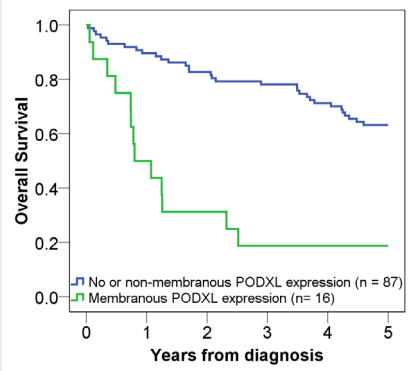
Dragomir A *et al*. The role of SATB2 as a diagnostic marker for tumors of colorectal origin: results from a pathology-based clinical prospective study. *Am J Clin Pathol*. 2013 In press.

PODXL - An independent factor for poor prognosis and treatment stratification

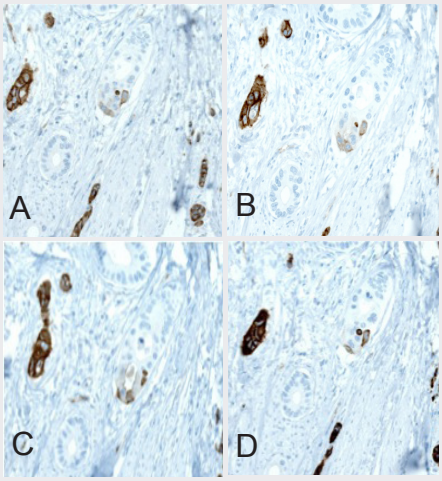
Podocalyxin-like 1 (PODXL) is a cell-adhesion glycoprotein and stem cell marker that has been associated with aggressive tumor phenotype and adverse outcome in several cancer types.

In a number of recently published papers, Larsson *et al* have demonstrated that membraneous expression of PODXL is associated with unfavourable clinicopathological characteristics and independently predicts a poor prognosis in colorectal cancer (CRC). This has been demonstrated in three independent patient cohorts in total comprising more than 1,000 patients. The results clearly demonstrate the potential utility of PODXL as a biomarker for more precise prognostication and treatment stratification in CRC.

Boman *et al* have investigated the prognostic impact of membraneous PODXL expression in almost 500 cases of urothelial cancer. They concluded that PODXL is indeed an independent risk factor for progressive disease and death in patients with urothelial cancer and that this warrant further studies to fully evaluate the use of PODXL as a biomarker for improved treatment stratification of bladder cancer patients.



Kaplan–Meier estimates of 5-year Overall Survival (OS) according to PODXL expression in a urothelial cancer patient cohort of 110 individuals.



Immunohistochemical staining of PODXL protein in colorectal tumor tissue using HPA002110 (A), AMAb90643 (B), AMAb90644 (C) and AMAb90667 (D) antibodies.

Related Publications

Larsson A *et al*. Overexpression of podocalyxin-like protein is an independent factor of poor prognosis in colorectal cancer. *Br J Cancer* 2011 Aug 23;105(5):666-72.

Larsson A *et al*. Validation of podocalyxin-like protein as a biomarker of poor prognosis in colorectal cancer. *BMC Cancer*. 2012 Jul 8;12:282.

Boman K *et al*. Membraneous expression of podocalyxin-like protein is an independent factor of poor prognosis in urothelial bladder cancer. *Br J Cancer*. 2013 Jun 11;108(11), 2321-2328.

Co-Development Program

Research remains at the heart of Atlas Antibodies. We welcome customers to contact us for possible collaborations on both existing and future product offerings.

Atlas Antibodies invite you to participate in our Monoclonal Antibody Development Program. If you are looking for mouse monoclonal antibodies currently not available in our catalog, and if you are interested in developing the antibody together with us, please send in your project proposal to us.

Upon agreement to proceed with a collaboration, Atlas Antibodies will develop and produce the monoclonal antibody using the same procedures as for PrecisA Monoclonals. As part of this procedure, we epitope map all our clones to obtain unique clones with defined epitopes for final characterization.

The selection of the optimal clones for specific applications is made in collaboration with you. Antibodies will be sent to you for additional characterization in your laboratory, or Atlas Antibodies will make the characterization at our facilities with your expert input and/or material.

Atlas Antibodies cover all other development costs. If the project results in a commercialized product, it will be added to Atlas Antibodies PrecisA Monoclonal product portfolio and available to you.

All antibodies will be used for staining of a multitude of human tissues by the Human Protein Atlas (HPA) project, and these results will be available on the HPA web portal.

Benefits of the program

Atlas Antibodies take the full development cost while you get a discounted antibody with proven functionality in your experimental set-up.

For more information and/or requests for participating in the program, you are welcome to contact us at contact@atlasantibodies.com.

We are looking forward to hearing from you.

Collaboration project for SOX11

PrecisA monoclonals against SOX11 (AMAb90501 and AMAb90502) were developed in collaboration with Dr Antonio Martinez (Laboratory of Pathology, Hospital Clínic, University of Barcelona, Spain).

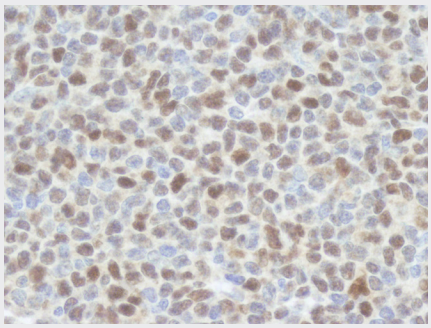
Dr. Martinez is involved in the study of aggressive lymphomas, mechanisms of transformation, progression and prognostic factors. He has collaborated in the description of transcription factors involved in B-cell development and lymphomagenesis with special emphasis in those related in late B-cell differentiation pathways such as IRF4, IRF8, XBP1 and SOX11. His lab has long expertise in the characterization of antibodies for clinical use in hematopathology.

Soldini D *et al.* Assessment of SOX11 Expression in Routine Lymphoma Tissue Sections: Characterization of New Monoclonal Antibodies for Diagnosis of Mantle Cell Lymphoma. *Am J Surg Pathol*. 2013 Oct 18.

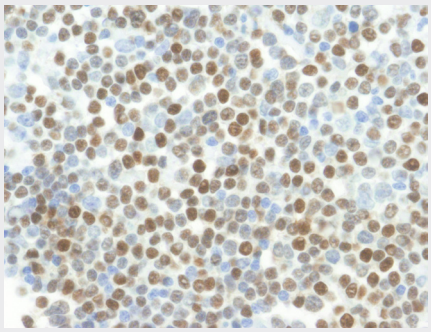
SOX11

This gene encodes a member of the group C SOX (SRY-related HMG-box) transcription factor family involved in the regulation of embryonic development and in the determination of the cell fate. The encoded protein may act as a transcriptional regulator after forming a protein complex with other proteins. The protein may function in the developing nervous system and play a role in tumorigenesis and adult neurogenesis.

Diseases associated with SOX11 include mantle cell lymphoma (MCL), lymphoblastic lymphoma, Burkitt lymphoma and malignant glioma. The diagnosis of mantle cell lymphoma can be difficult, especially in Cyclin D1 negative cases and the transcription factor SOX11 may serve as an important diagnostic marker. For this purpose, there is a need of a reliable Anti-SOX11 antibody in the clinical setting.



Tonsil involved by a Classical Mantle cell lymphoma, cyclin D1 negative in a 50 yo male. SOX11 staining (AMAb90501, clone CL0142; Atlas Antibodies).



Lymph node involvement by Classical Mantle cell lymphoma positive for Cyclin D1 in a 64 yo male. SOX11 is expressed in virtually all tumor cells. (AMAb90502, clone CL0143; Atlas Antibodies).

VERY RELIABLE ANTIBODIES

Atlas Antibodies manufactures and provides over 21,000 highly validated monoclonal and polyclonal primary antibodies and control antigens targeting the majority of human proteins for tissue and cell analysis to explore and accelerate research in biology, pathology, and medicine. The portfolio covers different research areas such as neuroscience, cancer, cell biology, stem cell & development. All our products are rigorously evaluated for specificity, reproducibility and performance and characterized for use in IHC, WB, and ICC-IF. Enhanced validation is applied as an extra level of security of antibody specificity in a defined context. Available as 25 µL and 100 µL unit size.

CREATED BY THE HUMAN PROTEIN ATLAS

With our roots in the Human Protein Atlas project, an integration of antibody-based imaging, proteomics, and transcriptomics, our antibodies are affinity-purified, reproducible, selective, and specific for their target proteins through our enhanced validation process. Our Triple A Polyclonals™ are developed within the Human Protein Atlas project.

VALIDATED BY ENHANCED VALIDATION

We take great care to validate our antibodies in IHC, WB, and ICC-IF. Our antibodies are validated in all major human tissues and organs and 20 cancer tissues. Each antibody is supported by over 500 staining images. As an additional layer of security, we perform Enhanced Validation. By using 5 different enhanced validation methods we validate our antibodies for each combination of protein, sample, and application. Discover our Triple A Polyclonals™ and PrecisA Monoclonals™ antibodies targeting the majority of human proteins in cells, tissues, and organs.

EVIDENCED BY SCIENCE

Made by researchers for researchers our products are used worldwide and referenced in 1000s of scientific peer-reviewed papers.

WE SUPPORT YOUR RESEARCH

Our scientific content and newsletter provide you with timely information about new product releases, research highlights, and much more. In addition, from our website you can download informative white papers, protocols, guides, posters, infographics, roundups of recent research papers, read blog posts and interviews.

HOW TO BUY OUR PRODUCTS

Our products are available worldwide. We deliver to all destinations in Europe (excluding Russia), US, Canada, Australia, New Zealand and Israel. We expand our offering through trusted partners worldwide.

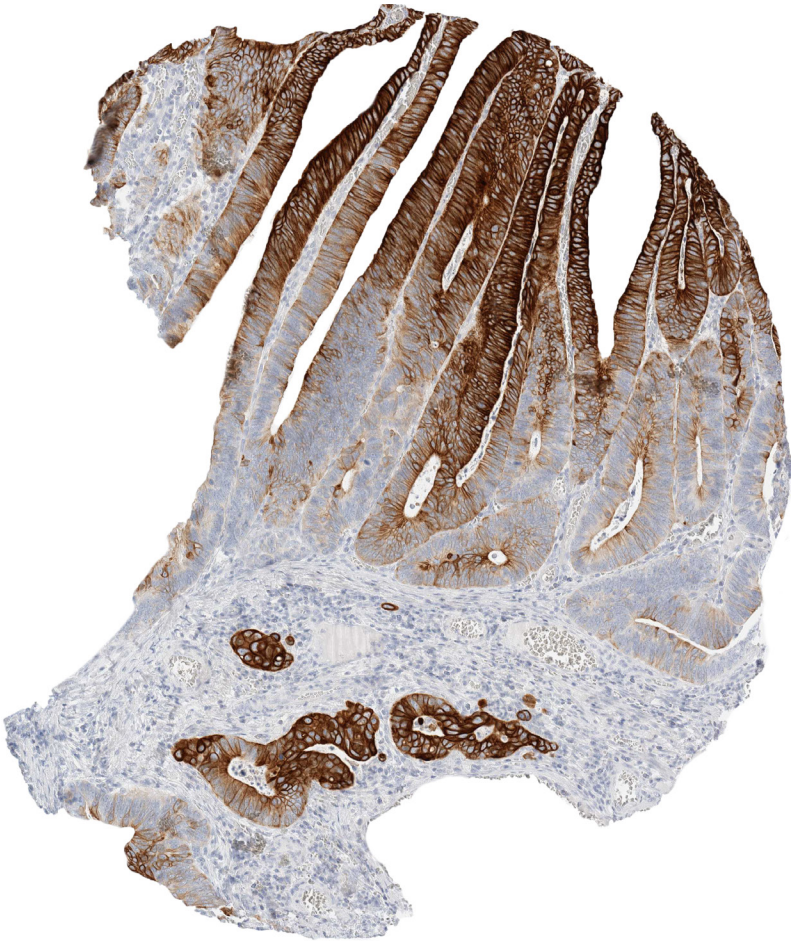
You can **shop our full catalog online** or **find your local supplier**.

Atlas Antibodies Advanced Polyclonals.
Triple A Polyclonals™ are rabbit polyclonal primary antibodies developed within the Human Protein Atlas project. IHC characterization data from 44 normal and 20 cancer tissues is available on the Human Protein Atlas portal.

Precise. Accurate.Targeted.
PrecisA Monoclonals™ are mouse monoclonal primary antibodies developed against a number of carefully selected targets. Clones are selected to recognize only unique non-overlapping epitopes and isotypes.

PrEST Antigens

Recombinant protein fragments
PrEST Antigens™ are used as immunogens for the generation of Triple A Polyclonals and PrecisA Monoclonals.



Anti-KRT20 (HPA024684) in brown in human colorectal cancer tissue.

Visit us: atlasantibodies.com
Follow us:@atlasantibodies
Contact us: contact@atlasantibodies.com

003-20220425

ATLAS ANTIBODIES

Atlas Antibodies AB
Voltavägen 13A
16869 Bromma, Sweden
atlasantibodies.com

Phone +46(0)8 54 59 58 50
contact@atlasantibodies.com
order@atlasantibodies.com
support@atlasantibodies.com