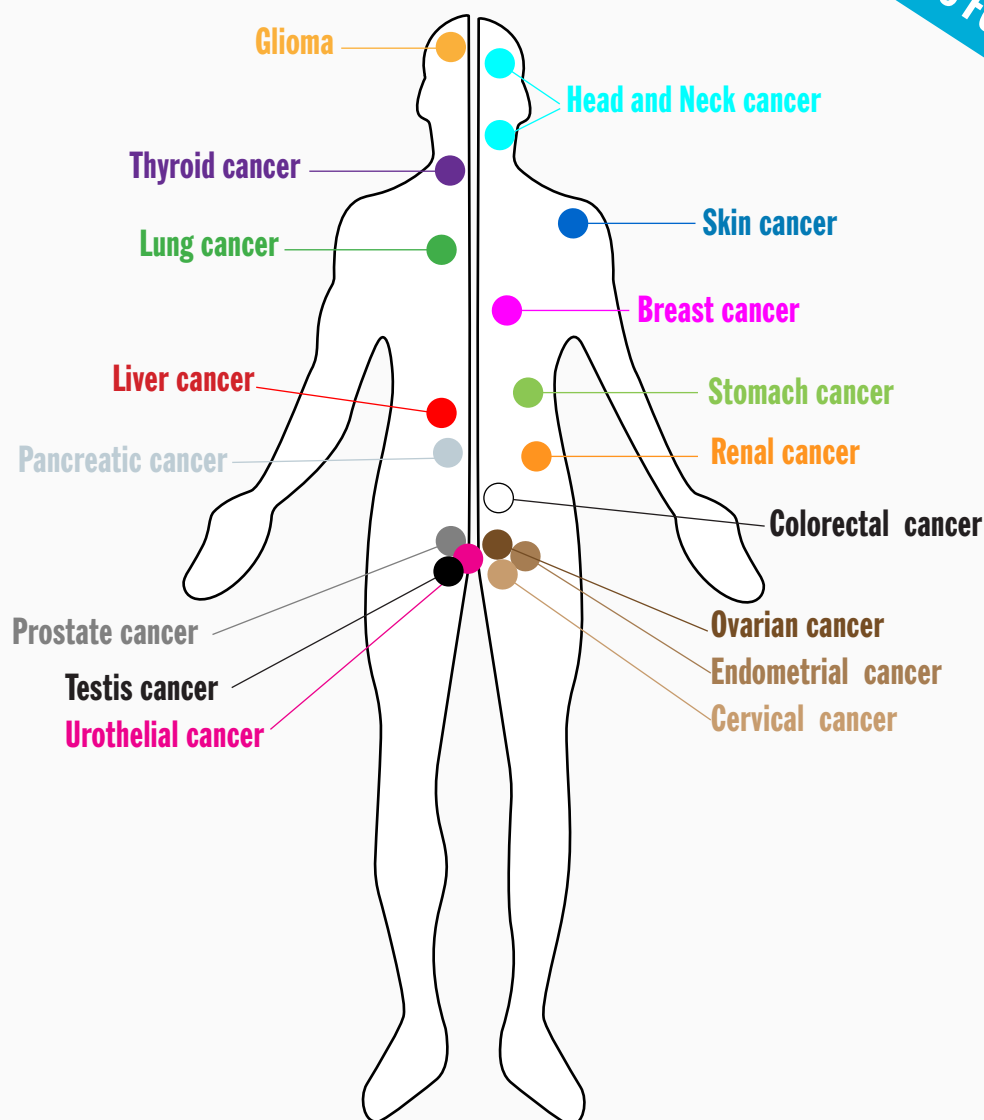


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**FULL CATALOG - MARKERS FOR 17 CANCER TYPES**



# TRIPLE A POLYCLONALS ANTIBODIES FOR CANCER RESEARCH

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# PRIMARY ANTIBODIES



## **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. Available as **25 µL** and **100 µL** unit size.



## **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. Available as **25 µL** and **100 µL** unit size.

# CONTROL ANTIGENS

## **PrEST Antigens**

PrEST Antigens™ are the immunogens used for the generation of Triple A Polyclonals and PrecisA Monoclonals, for use as blocking agents and positive assay controls together with the corresponding antibody. The protein-specific PrEST sequences are designed to have a sequence identity as low as possible to other human proteins. The product numbers of PrEST control antigens start with "**APrEST**" and they are specified on the product pages for all antibodies under "related products".

# ENHANCED VALIDATION



At Atlas Antibodies, we extensively validate our antibodies in IHC, WB, and ICC-IF. Enhanced Validation is performed as an additional layer of security in an application and context-specific manner.

Enhanced validation offers increased security of antibody specificity in a defined context.

This is ensured by using the ideal validation method for each combination of protein, sample, and application. Enhanced Validation follows the guidelines proposed by the International Working Group for Antibody Validation (IWGAV).



## RECOMBINANT EXPRESSION VALIDATION

The antibody binding is verified using and over-expressed or tagged version of the target protein.



## ORTHOGONAL VALIDATION

The antibody is validated by comparing the results with a non-antibody based method across multiple samples.



## VALIDATION BY INDEPENDENT ANTIBODIES

The antibody specificity is demonstrated by comparing two antibodies targeting different regions of the same protein.



## GENETIC VALIDATION

Antibody specificity is confirmed by downregulating the target protein at a genetic level using siRNA.



## MIGRATION CAPTURE MS VALIDATION

The staining pattern and the protein size detected by the antibody is compared with results obtained by a capture Mass Spectrometry (MS) method.

[LEARN MORE ABOUT  
ENHANCED VALIDATION](#)

# THE HUMAN PROTEIN ATLAS



The Human Protein Atlas is a Swedish-based program initiated in 2003 with the aim to map all the human proteins in cells, tissues and organs using an 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 Human Protein Atlas consists of six separate parts, each focusing on a particular aspect of the genome-wide analysis of human proteins:

The [Tissue Atlas](#) shows the distribution of proteins across all major tissues and organs in the human body.

The [Cell Atlas](#) shows the subcellular localization of proteins in single cells.

The [Pathology Atlas](#) shows the impact of protein levels for survival of patients with cancer.

The [Brain Atlas](#) explores the protein expression in the mammalian brain by integration of data from three mammalian species: human, pig and mouse.

The [Blood Atlas](#) shows the cell types and proteome of human blood.

The [Single Cell Type Atlas](#) contains single cell RNA sequencing data and immunohistochemically stained sections from 13 different human tissues.

**LEARN MORE ABOUT  
THE HUMAN PROTEIN ATLAS**

# Unfavorable and favorable genes

## Created by the Human Protein Atlas

The Human Protein Atlas project, is an integration of antibody-based imaging, proteomics, and transcriptomics with the aim of mapping all the human proteins in cells, tissues and organs.

Our Triple A Polyclonals are developed within the Human Protein Atlas project ([proteinallas.org](http://proteinallas.org)), and are affinity-purified, reproducible, selective, and specific for their target proteins through an enhanced validation process.

## The Pathology Atlas

The Pathology Atlas contains mRNA and protein expression data from 17 different forms of human cancer. Correlation analyses based on mRNA expression levels of human genes in cancer tissue and the clinical outcome for almost

8000 cancer patients is presented in a gene-centric manner, including more than 18000 Kaplan-Meier plots with high significance ( $p < 0.001$ ).

Analysis of each protein and its corresponding cancer type in patients, using immunohistochemistry (IHC) analysis based on tissue microarrays (TMAs), is presented for a majority of the protein-coding genes.

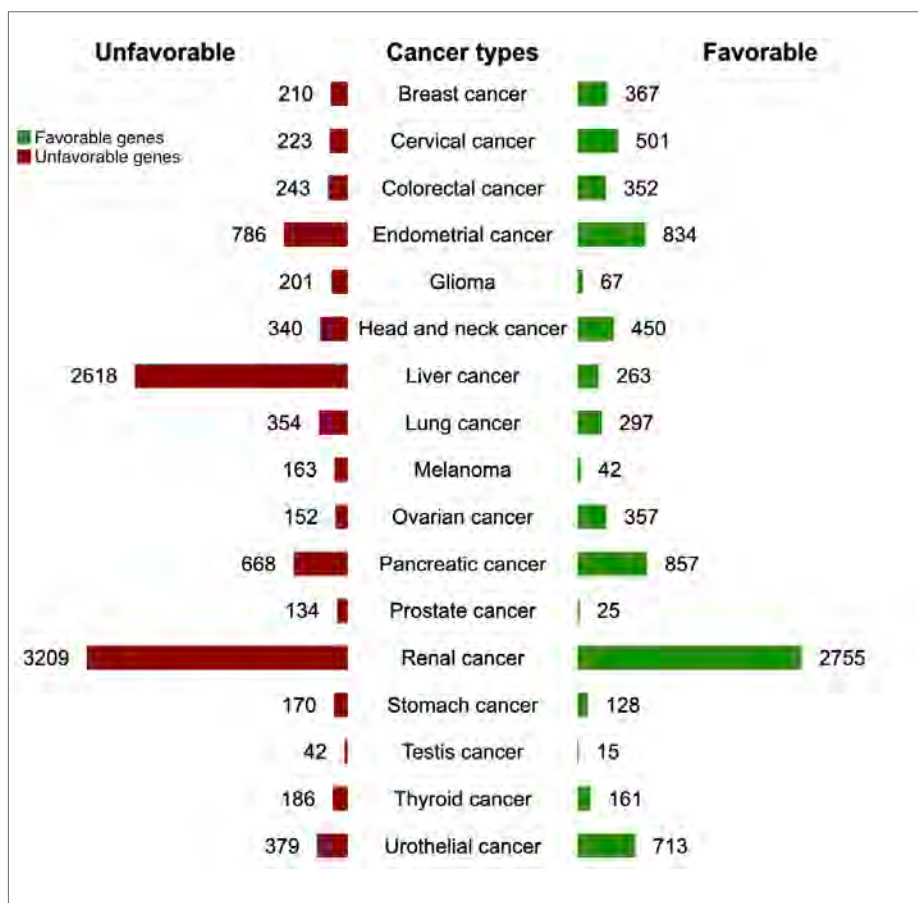
## Correlation analysis and prognostic genes

Correlation analysis resulted in more than 10,000 prognostic genes. The number of prognostic genes with regard to cancer type and association with the favorable or unfavorable clinical outcome are summarized in the schematic below.

All transcriptomics data has been retrieved from the Cancer Genome Atlas and all proteomics data has been generated in-house using the same antibodies as in protein expression profiling in normal human tissues.

A gene is considered prognostic if correlation analysis of gene expression and clinical outcome resulted in Kaplan-Meier plots with high significance ( $p < 0.001$ ). A gene may be prognostic in more than one cancer type.

This catalog, based on the Pathology Atlas, contains a selection of our Triple A Polyclonals antibodies that are suitable markers for 17 human cancer types.



For **unfavorable genes**, higher relative expression levels at diagnosis give significantly **lower** overall survival for patients.

For **favorable genes**, higher relative expression levels at diagnosis give significantly **higher** overall survival for patients.

The schematic on the left, from The Pathology Atlas, shows the number of unfavorable and favorable genes for 17 human cancer types.

To explore the full atlas visit The Human Protein Atlas webpage at [proteinallas.org](http://proteinallas.org).

# Breast cancer

Breast cancer is the most common invasive cancer form in women worldwide and the leading cause of cancer-related mortality in women. The global age-adjusted incidence rate for breast cancer is 124 per 100,000 women per year.

Male breast cancer is exceedingly rare and accounts for around 1% of cases. Although the rate of breast cancer diagnosis increased during the 1990's, it has decreased since the year 2000 and the overall breast cancer death rate has dropped steadily in the western world.

The majority of breast cancers develop sporadically, but for 5-10% of patients there is a hereditary component. The most well known genes associated with increased breast cancer risk are BRCA1 and BRCA2. Women with abnormal BRCA1 or BRCA2 experience up to 60% risk to develop breast cancer by the age of 90.

Other risk factors include early menarche and late menopause. Pregnancy has been reported to decrease risk, probably due to the changes in breast tissue.

Breast cancer forms in tissues of the breast, usually the ducts (tubes that carry milk to the nipple) and lobules (glands where the milk is produced). Based on the presumed site of origin and morphology, breast cancer is broadly classified as ductal or lobular cancers.

The transcriptome analysis shows that 72% (n=14227) of all human genes (n=19670) are expressed in breast cancer.

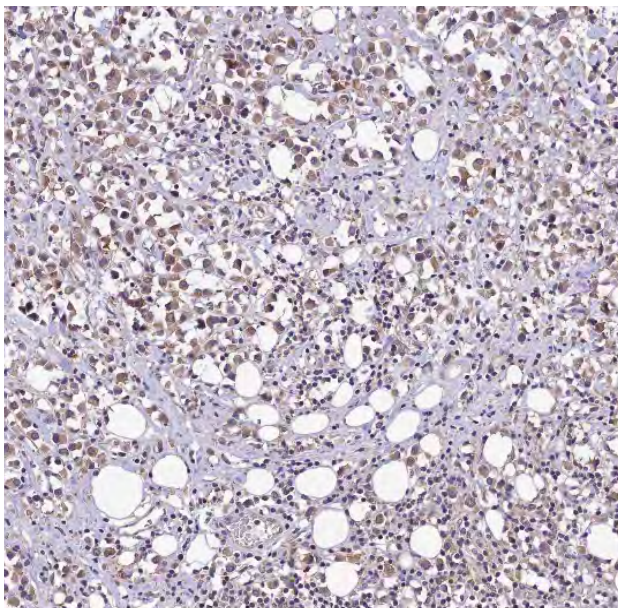
158 genes show some level of elevated expression in breast cancer compared to other cancers .

There are 210 genes associated with unfavorable prognosis in breast cancer.

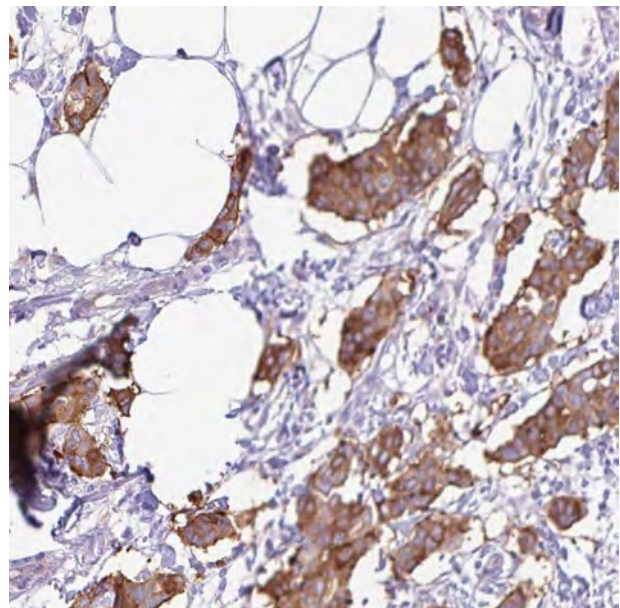
There are 367 genes associated with favorable prognosis in breast cancer.

Data collected from 1075 patients (1063 females and 12 males).

The most significant genes related to unfavorable and favorable prognosis are listed in Tables 1 and 2.



**Figure 1.** Immunohistochemistry using the anti-PGK1 (HPA045385) antibody on breast duct carcinoma (female, age 61) shows a moderate cytoplasmic/nuclear staining of tumor cells, in brown.



**Figure 2.** Immunohistochemistry using the anti-TPD52 (HPA062167) antibody on breast duct carcinoma (female, age 62) shows a moderate cytoplasmic/membranous staining of tumor cells, in brown.

**Table 1. Top genes with highest significance associated with unfavorable prognosis in breast cancer.**

| Product Name | Alternative Gene Names | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|------------------------|------------|------------------------|-----------------------------------|
| Anti-ATG4A   | APG4A, AUTL2           | HPA064759  | WB, ICC-IF             | 91% / 88%                         |
| Anti-ATP5B   | ATPSB                  | HPA001520  | IHC*, WB*, ICC-IF      | 95% / 95%                         |
| Anti-CD24    | CD24A                  | HPA045879  | ICC-IF                 | 49% / 45%                         |
| Anti-DCTPP1  | CDA03, MGC5627, RS21C6 | HPA002832  | IHC, WB*, ICC-IF       | 80% / 78%                         |
| Anti-FAM173B | -                      | HPA074513  | ICC-IF                 | 87% / 84%                         |
| Anti-LIMCH1  | LIMCH1A, LMO7B         | HPA063840  | IHC, WB*, ICC-IF       | 95% / 95%                         |
| Anti-LRP11   | bA350J20.3, MANSC3     | HPA064002  | ICC-IF                 | 81% / 79%                         |
| Anti-MORC4   | FLJ11565, ZCW4, ZCWCC2 | HPA000395  | IHC*, WB, ICC-IF       | 66% / 67%                         |
| Anti-PCMT1   | -                      | HPA003239  | IHC, WB*, ICC-IF       | 94% / 94%                         |
| Anti-PDSS2   | bA59I9.3, C6orf210     | HPA029685  | IHC, WB, ICC-IF        | 90% / 91%                         |
| Anti-PGK1    | -                      | HPA045385  | IHC                    | 97% / 97%                         |
| Anti-PTGES3  | cPGES, p23, TEBP       | HPA038672  | IHC*, WB*, ICC-IF      | 97% / 97%                         |
| Anti-RAB5B   | -                      | HPA068337  | WB, ICC-IF             | 100% / 93%                        |
| Anti-RTN4IP1 | NIMP                   | HPA036357  | IHC, WB                | 91% / 91%                         |
| Anti-SPDYC   | Ringo2                 | HPA039891  | IHC                    | 28% / 28%                         |
| Anti-TAGLN2  | HA1756, KIAA0120       | HPA001925  | IHC, WB, ICC-IF        | 95% / 95%                         |
| Anti-TIMM17A | TIM17, TIM17A          | HPA010083  | IHC, WB, ICC-IF        | 92% / 95%                         |
| Anti-TPD52   | D52, hD52, N8L         | HPA062167  | IHC*, WB, ICC-IF       | 80% / 84%                         |
| Anti-TRMT2B  | CXorf34, FLJ12687      | HPA035120  | IHC, WB                | 78% / 32%                         |
| Anti-XRCC4   | -                      | HPA006801  | IHC*, WB*, ICC-IF      | 67% / 63%                         |

**Table 2. Top genes with highest significance associated with favorable prognosis in breast cancer**

| Product Name  | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-APOBEC3D | APOBEC3E, ARP6             | HPA055116  | IHC                    | 37% / 33%                         |
| Anti-ARID5A   | MRF-1, RP11-363D14         | HPA023879  | IHC, WB, ICC-IF        | 72% / 71%                         |
| Anti-C6orf141 | MGC46457                   | HPA036199  | IHC, ICC-IF            | 34% / 36%                         |
| Anti-CA3      | CAIII, Car3                | HPA021775  | IHC*, WB*              | 89% / 89%                         |
| Anti-CCL19    | CKb11, ELC, MIP-3b, SCYA19 | HPA067758  | IHC*                   | 76% / 76%                         |
| Anti-DEF6     | IBP, SLAT, SWAP70L         | HPA038976  | IHC*, WB*              | 91% / 90%                         |
| Anti-GSTK1    | GST13                      | HPA006311  | IHC*                   | 75% / 77%                         |
| Anti-JCHAIN   | IGCJ, IGJ, JCH             | HPA044132  | IHC*                   | 79% / 80%                         |
| Anti-MAP2K6   | MEK6, MKK6, SAPKK3         | HPA031134  | IHC*, WB, ICC-IF       | 98% / 97%                         |
| Anti-NEFH     | -                          | HPA061615  | IHC*                   | 88% / 94%                         |
| Anti-NFKBIA   | IKBA, MAD-3, NFKBI         | HPA029207  | IHC, WB, ICC-IF        | 89% / 88%                         |
| Anti-NFKBIE   | IKBE                       | HPA005941  | IHC, WB, ICC-IF        | 74% / 71%                         |
| Anti-PEX10    | RNF69                      | HPA049458  | ICC-IF                 | 36% / 38%                         |
| Anti-PIGR     | -                          | HPA012012  | IHC*, WB               | 65% / 67%                         |
| Anti-SERPINA1 | A1A, A1AT, PI, PI1         | HPA000927  | IHC*, WB*, ICC-IF      | 62% / 67%                         |
| Anti-SGK3     | SGK2, SGK1                 | HPA027146  | IHC                    | 96% / 96%                         |
| Anti-SNX22    | FLJ13952                   | HPA038470  | IHC, ICC-IF            | 96% / 96%                         |
| Anti-TFPI2    | PP5, REF1, TFPI-2          | HPA049158  | IHC*                   | 47% / 47%                         |
| Anti-ZMYM6    | MYM, ZBED7, ZNF198L4       | HPA071865  | ICC-IF                 | 80% / 82%                         |
| Anti-ZNF385B  | FLJ25270, ZNF533           | HPA046086  | WB, ICC-IF             | 88% / 87%                         |

\* Products with enhanced validation for indicated application

## Cervical cancer

Cervical cancer is the third most common type of cancer in women worldwide. The survival rate varies greatly depending on the cancer stage.

With treatment at the earlier stages, survival rates are much higher:

- 80 to 90% of women with stage I
- 50 to 65% of women with stage II are alive 5 years after diagnosis.

However, survival rates falls significantly at late stages:

- 25 to 35% of women with stage III
- 15% or lower of women with stage IV are alive after 5 years after diagnosis.

Two strains of Human Papilloma Virus (HPV), that can spread through sexual intercourse, are the cause of nearly all cervical cancers.

Risk factors include having sex at an early age, multiple sexual partners, smoking and poor socio-economic status. There is an approved vaccine for the prevention of HPV infection.

Most cervical cancers are squamous cell carcinomas originating from the squamous epithelium of the distal portion of the cervix.

Cancers arising from the columnar cells in the endocervical channel (defined as adenocarcinomas) are more rare.

The transcriptome analysis shows that 71% (n=14005) of all human genes (n=19670) are expressed in cervical cancer.

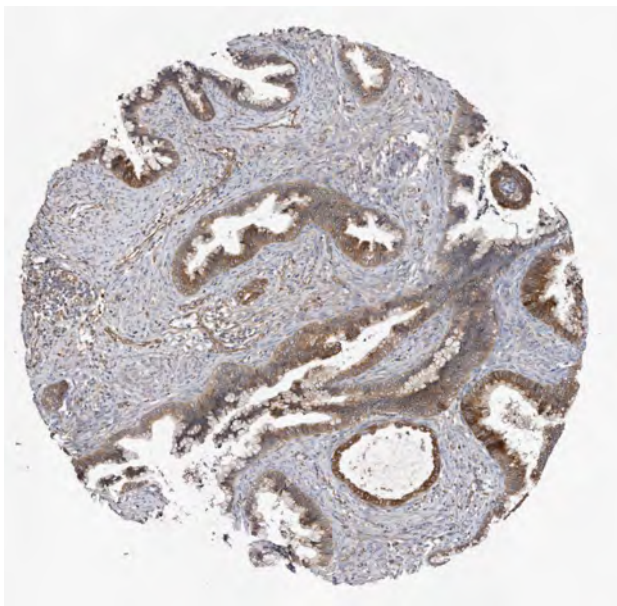
108 genes show some level of elevated expression in cervical cancer compared to other cancers

There are 223 genes associated with unfavorable prognosis in cervical cancer.

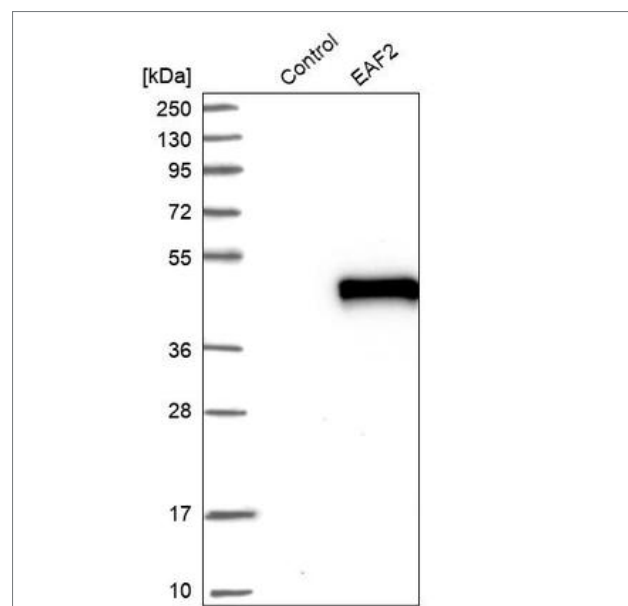
There are 501 genes associated with favorable prognosis in cervical cancer.

Data collected from 291 patients with squamous cell carcinoma or adenocarcinoma.

The most significant genes related to unfavorable and favorable prognosis are listed in Tables 3 and 4.



**Figure 3.** Immunohistochemistry using the anti-PON2 antibody (HPA029193) on cervix adenocarcinoma (female, age 44) shows a moderate cytoplasmic/nuclear staining of tumor cells, in brown.



**Figure 4.** Western blot analysis using the anti-EAF2 antibody (HPA008411) in control (vector only transfected HEK293T lysate) and EAF2 over-expression lysate (Co-expressed with a C-terminal myc-DDK tag (~3.1 kDa) in mammalian HEK293T cells, LY413036).

**Table 3. Top genes with highest significance associated with unfavorable prognosis in cervical cancer**

| Product Name | Alternative Gene Names    | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|---------------------------|------------|------------------------|-----------------------------------|
| Anti-AIG1    | AIG-1, dJ95L4.1, FLJ10485 | HPA060766  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-ASL     | -                         | HPA016646  | IHC*, WB*              | 92% / 86%                         |
| Anti-C1orf74 | FLJ25078                  | HPA028496  | IHC, WB, ICC-IF        | 79% / 76%                         |
| Anti-CXCL8   | 3-10C, GCP1, IL-8, NAP1   | HPA057179  | IHC, WB, ICC-IF        | 51% / 49%                         |
| Anti-EGLN1   | C1orf12, HIFPH2, SM-20    | HPA022129  | IHC, ICC-IF            | 94% / 96%                         |
| Anti-ERG     | erg-3, p55                | HPA046598  | IHC                    | 96% / 97%                         |
| Anti-ESD     | -                         | HPA039700  | IHC, WB, ICC-IF        | 90% / 88%                         |
| Anti-FASN    | FAS, SDR27X1              | HPA006461  | IHC*, WB*, ICC-IF      | 64% / 68%                         |
| Anti-FUT11   | MGC33202                  | HPA014033  | IHC, ICC-IF            | 87% / 89%                         |
| Anti-GALNT2  | GalNAc-T2                 | HPA011222  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-ITGA5   | CD49e, FNRA               | HPA002642  | IHC*, WB*              | 85% / 82%                         |
| Anti-LOXL2   | WS9-14                    | HPA036257  | ICC-IF                 | 87% / 86%                         |
| Anti-MOCS1   | MOCOD                     | HPA045783  | IHC, WB, ICC-IF        | 98% / 98%                         |
| Anti-P4HA2   | C-P4Halp(II)              | HPA016997  | IHC*, WB*, ICC-IF      | 90% / 91%                         |
| Anti-PRKCDBP | CAVIN3, HSRBC, MGC20400   | HPA073327  | ICC-IF                 | 53% / 57%                         |
| Anti-PON2    | -                         | HPA029193  | IHC*, WB*              | 91% / 89%                         |
| Anti-SPRYD7  | C13orf1, CLLD6            | HPA043934  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-SUMF2   | DKFZp5661024              | HPA024040  | IHC*                   | 76% / 77%                         |
| Anti-TAF1A   | SL1, TAFI48               | HPA054334  | IHC, ICC-IF            | 87% / 84%                         |
| Anti-TGFBI   | BIGH3, CDB1, LCD1         | HPA017019  | IHC*, WB               | 88% / 87%                         |

**Table 4. Top genes with highest significance associated with favorable prognosis in cervical cancer.**

| Product Name   | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|----------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-AKR1A1    | ALR, DD3                    | HPA019649  | IHC, WB*, ICC-IF       | 94% / 94%                         |
| Anti-CETN1     | CEN1, CETN                  | HPA028956  | IHC                    | 96% / 97%                         |
| Anti-DDX49     | FLJ10432                    | HPA041870  | IHC, WB                | 99% / 91%                         |
| Anti-EAF2      | BM040, TRAITS, U19          | HPA008411  | IHC*, WB*              | 93% / 89%                         |
| Anti-F8A1      | DXS522E, F8A                | HPA046960  | IHC, WB                | 92% / 95%                         |
| Anti-ISCU      | hnifU, lscU, ISU2, NIFUN    | HPA038602  | IHC, ICC-IF            | 99% / 99%                         |
| Anti-KIF22     | Kid, KNSL4, OBP-1, OBP-2    | HPA041076  | IHC, WB*               | 90% / 89%                         |
| Anti-MEI1      | MGC40042, SPATA38           | HPA049240  | IHC                    | 86% / 81%                         |
| Anti-NCAPH2    | 384D8-2, CAP-H2, hCAP-H2    | HPA069056  | IHC*, WB*, ICC-IF      | 81% / 82%                         |
| Anti-NMRAL1    | FLJ25918, HSCARG, SDR48A1   | HPA041353  | IHC, WB*, ICC-IF       | 80% / 85%                         |
| Anti-PLA1A     | ps-PLA1                     | HPA059740  | ICC-IF                 | 71% / 68%                         |
| Anti-PRSS36    | FLJ90661                    | HPA036079  | IHC                    | 79% / 78%                         |
| Anti-PCNA      | -                           | HPA030522  | IHC*, WB, ICC-IF       | 99% / 100%                        |
| Anti-RIBC2     | C22orf11, FLJ25720          | HPA003210  | IHC                    | 72% / 76%                         |
| Anti-SH3GLB2   | KIAA1848                    | HPA021438  | IHC, WB, ICC-IF        | 100% / 98%                        |
| Anti-SLC2A8    | GLUT8, GLUTX1               | HPA011935  | IHC                    | 83% / 77%                         |
| Anti-TEX30     | C13orf27                    | HPA053545  | IHC*, WB               | 95% / 94%                         |
| Anti-TARDBP    | ALS10, TDP-43               | HPA017284  | IHC, WB, ICC-IF        | 96% / 32%                         |
| Anti-TNFRSF13C | BAFFR, CD268                | HPA003246  | IHC*, WB*              | 57% / 49%                         |
| Anti-ZER1      | C9orf60, Hzyg, ZYG, ZYG11BL | HPA048464  | WB*, ICC-IF            | 98% / 98%                         |

\* Products with enhanced validation for indicated application

# Colorectal cancer

Colorectal cancer is the third most common cancer in the world and the fifth leading cause of cancer-related mortality.

Environmental factors, including meat consumption, are contributing risk factors. The overall mortality is approximately 50%.

The surgical stage at diagnosis is the most important factor for predicting prognosis and the survival rate varies greatly depending on the stage. The 5-year survival rate is more than 90% for stage I and less than 10% for stage IV. Most colorectal cancer cases are detected at an advanced stage. Bleeding and hematochezia are two of the most common symptoms associated with rectal lesions.

Colorectal cancer is considered to originate from normal colon epithelium that develops into precursor lesions termed adenomas that subsequently may progress to invasive colorectal adenocarcinomas with metastatic potential.

Depending on the origin site, colorectal cancer is divided into two subtypes:

- COAD: colon adenocarcinomas
- READ: rectum adenocarcinomas.

The transcriptome analysis shows that 69% (n=13488) of all human genes (n=19670) are expressed in colorectal cancer.

170 genes show some level of elevated expression in colorectal cancer compared to other cancers

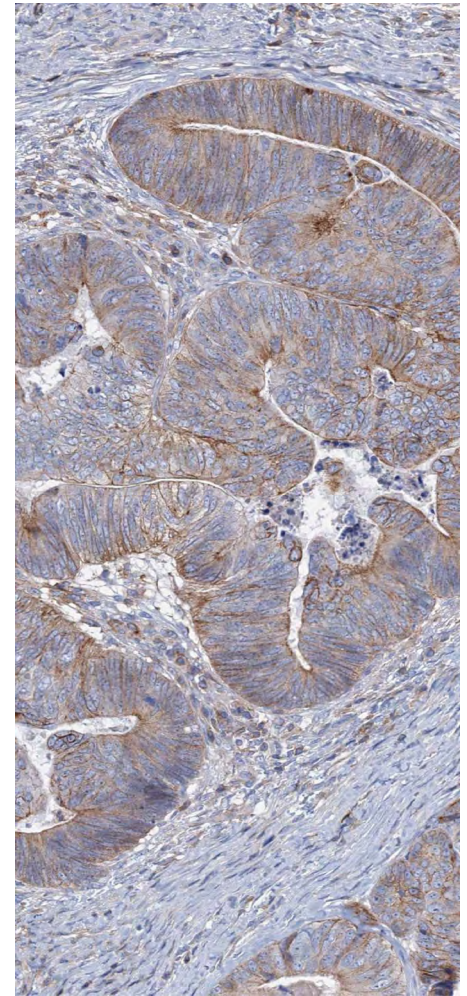
There are 243 genes associated with unfavorable prognosis in colorectal cancer.

There are 352 genes associated with favorable prognosis in colorectal cancer.

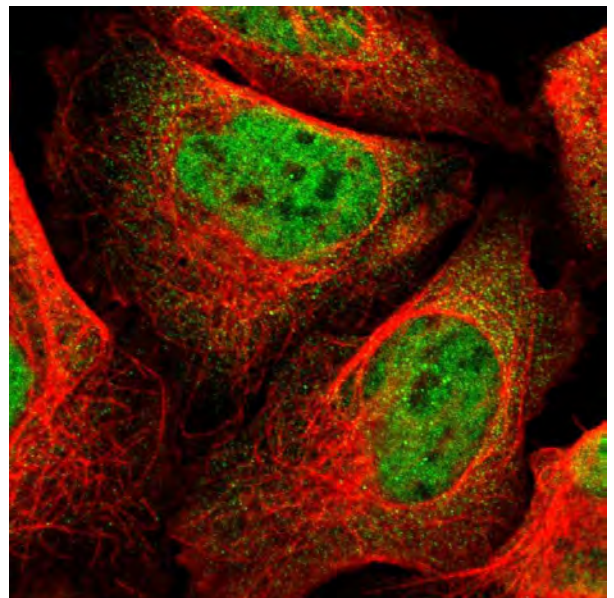
Data collected from 597 patients in total:

438 COAD (204 females and 234 males) and  
159 READ (71 females and 88 males).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 5 and 6.



**Figure 5.** Immunohistochemistry using the anti-LRCH4 antibody (HPA037668) on colon adenocarcinoma (female, age 67) shows a moderate cytoplasmic/membranous staining of tumor cells, in brown.



**Figure 6** Immunofluorescent staining of human cell line U-2 OS using the anti-RBM3 antibody (HPA003624) shows localization to nucleoplasm, in green. Microtubules are shown in red.

**Table 5. Top genes with highest significance associated with unfavorable prognosis in colorectal cancer.**

| Product Name | Alternative Gene Names    | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|---------------------------|------------|------------------------|-----------------------------------|
| Anti-ARHGAP4 | p115, RhoGAP4, SrGAP4     | HPA001012  | IHC*, WB               | 70% / 72%                         |
| Anti-ARL8A   | ARL10B, FLJ45195, Gie2    | HPA038759  | IHC, WB                | 97% / 97%                         |
| Anti-ASB6    | -                         | HPA004341  | IHC, WB                | 88% / 43%                         |
| Anti-CLK3    | clk3                      | HPA046817  | IHC, WB, ICC-IF        | 98% / 100%                        |
| Anti-CNPY3   | CAG4A, TNRC5              | HPA016560  | IHC, WB*               | 89% / 88%                         |
| Anti-CRACR2B | EFCAB4A, MGC45840         | HPA046217  | IHC, WB*               | 77% / 77%                         |
| Anti-DAPK1   | DAPK                      | HPA040472  | IHC                    | 96% / 96%                         |
| Anti-DPP7    | DPPII                     | HPA021282  | IHC, WB, ICC-IF        | 87% / 83%                         |
| Anti-EGFL7   | ZNEU1                     | HPA050716  | IHC                    | 75% / 75%                         |
| Anti-EXOC3L4 | C14orf73                  | HPA043661  | IHC, WB                | 66% / 67%                         |
| Anti-FAM69B  | C9orf136, MGC20262        | HPA046812  | IHC                    | 94% / 93%                         |
| Anti-HSPA1A  | HSP70-1, HSPA1            | HPA052504  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-INAFM1  | PRR24                     | HPA064015  | IHC                    | 45% / 45%                         |
| Anti-LRCH4   | LRN, LRRN1                | HPA037667  | IHC*, ICC-IF           | 80% / 79%                         |
| Anti-NPDC1   | CAB-, CAB1, DKFZp586J0523 | HPA008189  | IHC, ICC-IF            | 87% / 85%                         |
| Anti-PAQR6   | FLJ22672, PRdelta         | HPA073505  | WB, ICC-IF             | 26% / 26%                         |
| Anti-POFUT2  | C21orf80, FUT13, KIAA0958 | HPA044297  | IHC                    | 97% / 97%                         |
| Anti-RHBDD2  | NPD007, RHBDL7            | HPA051960  | IHC, WB*, ICC-IF       | 86% / 84%                         |
| Anti-SEMA4C  | Semacl1, Semaf, SEMAI     | HPA011090  | IHC                    | 89% / 89%                         |
| Anti-SPAG4   | CT127, SUN4               | HPA048393  | IHC                    | 89% / 89%                         |

**Table 6. Top genes with highest significance associated with favorable prognosis in colorectal cancer.**

| Product Name | Alternative Gene Names    | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|---------------------------|------------|------------------------|-----------------------------------|
| Anti-ABCD3   | PMP70, PXMP1, ZWS2        | HPA032027  | IHC*, ICC-IF           | 96% / 96%                         |
| Anti-AP3B1   | ADTB3A, HPS2              | HPA038737  | IHC, ICC-IF            | 82% / 80%                         |
| Anti-CASP6   | MCH2                      | HPA011337  | IHC*, WB*, ICC-IF      | 91% / 91%                         |
| Anti-CLCC1   | MCLC                      | HPA013210  | IHC*, ICC-IF           | 79% / 81%                         |
| Anti-DDX46   | KIAA0801, Prp5, PRPF5     | HPA036554  | IHC, WB*               | 95% / 96%                         |
| Anti-DLAT    | DLTA, PDC-E2              | HPA040786  | IHC*, WB*, ICC-IF      | 91% / 93%                         |
| Anti-EIF4A3  | DDX48, EIF4AIII, KIAA0111 | HPA021878  | IHC*, W, ICC-IF        | 97% / 99%                         |
| Anti-FBXO7   | Fbx, FBX7, PARK15         | HPA032113  | WB, ICC-IF             | 79% / 79%                         |
| Anti-GRSF1   | -                         | HPA036985  | IHC*, WB*, ICC-IF      | 83% / 80%                         |
| Anti-HOOK1   | HK1                       | HPA018537  | IHC*, WB               | 94% / 94%                         |
| Anti-NGLY1   | FLJ11005, PNG1            | HPA036825  | IHC                    | 87% / 87%                         |
| Anti-NOL11   | DKFZP586L0724             | HPA022010  | IHC, WB, ICC-IF        | 86% / 87%                         |
| Anti-PARS2   | DKFZp727A071              | HPA028314  | IHC, WB*               | 78% / 78%                         |
| Anti-PRPSAP1 | PAP39                     | HPA062396  | ICC-IF                 | 100% / 100%                       |
| Anti-PSMA5   | ZETA                      | HPA028398  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-RBM3    | IS1-RNPL                  | HPA003624  | IHC, WB*, ICC-IF       | 94% / 96%                         |
| Anti-SORT1   | Gp95, NT3                 | HPA006889  | IHC*, WB*              | 89% / 89%                         |
| Anti-TEX2    | HT008, KIAA1738, TMEM96   | HPA057116  | ICC-IF                 | 100% / 100%                       |
| Anti-USP53   | KIAA1350                  | HPA035844  | IHC, ICC-IF            | 67% / 66%                         |
| Anti-ZYG11B  | FLJ13456, ZYG11           | HPA028156  | IHC, ICC-IF            | 100% / 100%                       |

\* Products with enhanced validation for indicated application

# Endometrial cancer

Endometrial cancer is the fifth most common cancer in women, and one of the most common forms of gynecological cancer in developed countries.

The incidence of endometrial cancer is rising due to the increased life expectancy and the epidemic of obesity. The 5-year survival rate in patients without metastatic disease varies from 74% to 91%.

Around 80% of endometrial cancers represent endometrioid histology. These are considered hormone dependent and the prognosis of endometrioid cancers is generally favorable. The majority of endometrial cancers are detected at an early stage with the disease restricted to the uterus.

Endometrial cancer originates from the endometrium - the mucosal lining of the uterus.

The common form of endometrial cancer, referred to as

- type 1 (or estrogen-related endometrial cancer), which usually occurs in younger, premenopausal women and tends to be of lower histological grade.

- type 2 (or non-estrogen-related endometrial cancer) which occurs in postmenopausal women, and is the more aggressive form of endometrial cancer.

The transcriptome analysis shows that 73% (n=14315) of all human genes (n=19670) are expressed in endometrial cancer.

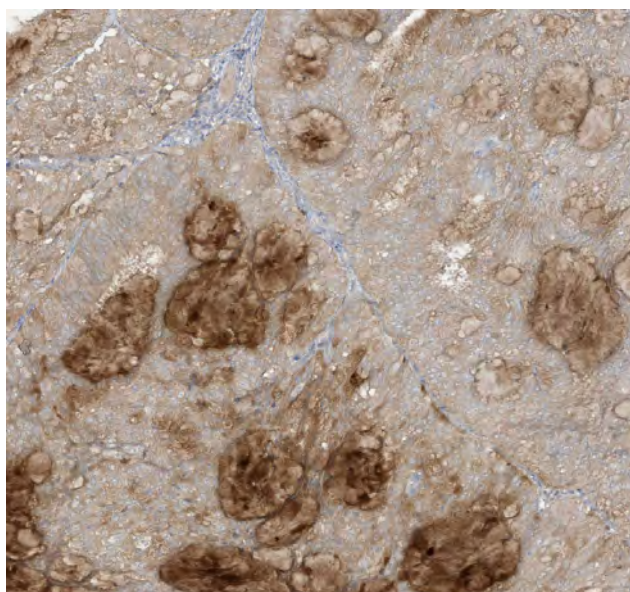
192 genes show some level of elevated expression in endometrial cancer compared to other cancers.

There are 786 genes associated with unfavorable prognosis in endometrial cancer.

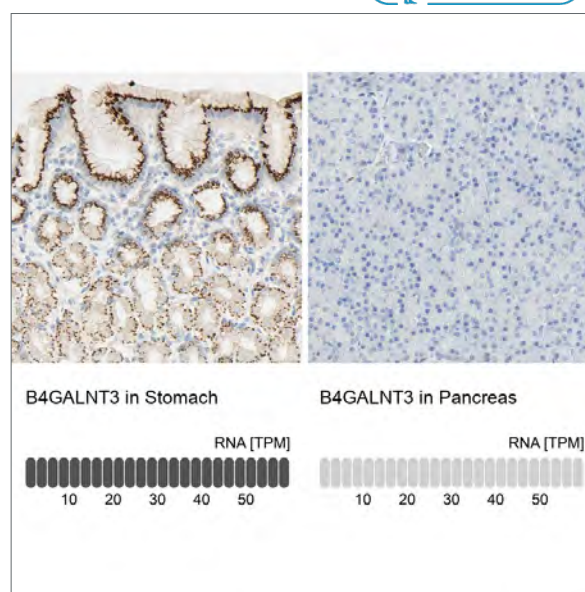
There are 834 genes associated with favorable prognosis in endometrial cancer.

Data collected from 541 female patients.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 7 and 8.



**Figure 7.** Immunohistochemistry using the anti-LRRN2 antibody (HPA029124) on endometrium adenocarcinoma (female, age 81) shows a medium cytoplasmic/membranous staining of tumor cells, in brown.



**Figure 8.** Immunohistochemistry analysis in human stomach and pancreas tissues using the anti-B4GALNT3 (HPA011404) antibody. Corresponding B4GALNT3 RNA-seq data are presented for the same tissues. Orthogonal validation of protein expression using IHC by comparison to RNA-seq data of corresponding target in high and low expression tissues.

**Table 7. Top genes with highest significance associated with unfavorable prognosis in endometrial cancer.**

| Product Name  | Alternative Gene Names        | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-------------------------------|------------|------------------------|-----------------------------------|
| Anti-ADA      | -                             | HPA001399  | IHC*, WB, ICC-IF       | 85% / 83%                         |
| Anti-ASS1     | ASS, CTLN1                    | HPA020934  | IHC*, WB*, ICC-IF      | 95% / 97%                         |
| Anti-CDKN2A   | ARF, MTS1, p14, p14ARF        | HPA047838  | ICC-IF                 | 44% / 43%                         |
| Anti-DAGLA    | C11orf11, DAGLALPHA, KIAA0659 | HPA062497  | IHC                    | 100% / 100%                       |
| Anti-ERBB2    | CD340, HER2, NEU, NGL         | HPA001383  | IHC, WB, ICC-IF        | 82% / 81%                         |
| Anti-FAM110B  | C8orf72, MGC39325             | HPA008318  | IHC, WB, ICC-IF        | 96% / 95%                         |
| Anti-GGH      | -                             | HPA025226  | IHC, WB                | 77% / 73%                         |
| Anti-GPRIN2   | KIAA0514, MGC15171            | HPA038129  | IHC, ICC-IF            | 73% / 68%                         |
| Anti-HIF3A    | bHLHe17, IPAS, MOP7           | HPA041141  | IHC                    | 72% / 70%                         |
| Anti-IGSF1    | IGDC1, INHBP, KIAA0364        | HPA035582  | IHC*                   | 99% / 97%                         |
| Anti-KHK      | -                             | HPA007040  | IHC*, WB               | 91% / 88%                         |
| Anti-L1CAM    | CD171, HSAS, MIC5, S10        | HPA005830  | IHC*                   | 75% / 75%                         |
| Anti-LRRN2    | GAC1, LRANK1, LRRN5           | HPA029124  | IHC, WB*               | 85% / 85%                         |
| Anti-MAP1LC3C | ATG8J                         | HPA072670  | ICC-IF                 | 50% / 50%                         |
| Anti-MARK4    | FLJ90097, KIAA1860, PAR-1D    | HPA039186  | IHC, ICC-IF            | 90% / 92%                         |
| Anti-MBOAT2   | FLJ14415, FLJ90298, OACT2     | HPA014836  | IHC, WB*               | 70% / 70%                         |
| Anti-MGAT4A   | GnT-4a, GnT-Iva               | HPA007608  | IHC*, WB, ICC-IF       | 93% / 95%                         |
| Anti-PTX3     | TNFAIP5, TSG-14               | HPA069320  | IHC                    | 85% / 90%                         |
| Anti-RNF44    | KIAA1100                      | HPA038981  | IHC, WB, ICC-IF        | 75% / 38%                         |
| Anti-TRIM46   | FLJ23229, TRIFIC              | HPA030389  | ICC-IF                 | 97% / 97%                         |

**Table 8. Top genes with highest significance associated with favorable prognosis in endometrial cancer.**

| Product Name  | Alternative Gene Names         | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|--------------------------------|------------|------------------------|-----------------------------------|
| Anti-B4GALNT3 | B4GalNacT3, FLJ16224, FLJ40362 | HPA011404  | IHC*                   | 60% / 57%                         |
| Anti-CCDC159  | -                              | HPA047126  | IHC                    | 70% / 73%                         |
| Anti-CRELD2   | MGC11256                       | HPA000603  | IHC                    | 78% / 79%                         |
| Anti-DHRS7B   | CGI-93, MGC8916, SDR32C1       | HPA012132  | IHC, WB*               | 81% / 81%                         |
| Anti-GPR108   | LUSTER2                        | HPA041924  | IHC, ICC-IF            | 70% / 72%                         |
| Anti-HEXA     | -                              | HPA054583  | IHC, WB*               | 81% / 82%                         |
| Anti-HMG20B   | BRAF25, SMARCE1r, SOXL         | HPA050220  | ICC-IF                 | 93% / 93%                         |
| Anti-MSX1     | HOX7, HYD1, OFC5               | HPA073604  | IHC*                   | 93% / 93%                         |
| Anti-NXNL2    | C9orf121                       | HPA045526  | IHC                    | 88% / 86%                         |
| Anti-P2RX4    | P2X4                           | HPA039494  | IHC*, WB, ICC-IF       | 83% / 77%                         |
| Anti-PGR      | NR3C3, PR                      | HPA004751  | IHC*                   | 88% / 88%                         |
| Anti-PLPP2    | LPP2, PAP-2c, PPAP2C           | HPA055540  | IHC, ICC-IF            | 47% / 50%                         |
| Anti-SAMM50   | CGI-51, OMP85, TOB55, TRG-3    | HPA034537  | IHC*, WB, ICC-IF       | 96% / 95%                         |
| Anti-SCGB2A1  | LPHC, MGB2, UGB3               | HPA034584  | IHC*, WB*              | 35% / 32%                         |
| Anti-SERINC2  | FKSG84, PRO0899, TDE2          | HPA005974  | IHC*, WB               | 77% / 74%                         |
| Anti-SLC47A1  | FLJ10847, MATE1                | HPA021987  | IHC*                   | 49% / 51%                         |
| Anti-SPAG4    | CT127, SUN4                    | HPA048393  | IHC                    | 89% / 89%                         |
| Anti-SPDEF    | bA375E1.3, PDEF                | HPA055707  | ICC-IF                 | 79% / 79%                         |
| Anti-STX18    | Ufe1                           | HPA003019  | IHC, ICC-IF            | 88% / 87%                         |
| Anti-ZAP70    | SRK, STD, ZAP-70               | HPA003134  | IHC*, WB               | 88% / 87%                         |

\* Products with enhanced validation for indicated application

# Glioma

Intracranial tumors comprise approximately 2% of all adult cancers, but form a larger fraction within the group of childhood tumors.

Gliomas are tumors with an estimated origin from glial cells, accounting for approximately 80% of all malignant intracranial tumors. Gliomas are classified according to cell type of origin, differentiation and malignancy grade.

According to cell type of origin, differentiation and malignancy grade, gliomas are classified as:

- astrocytoma,
- oligodendrocytoma
- ependymoma.

Survival time after diagnosis with glioma varies significantly depending on grade. The prognosis for high-grade gliomas is poor due to limited possibilities of curative treatment.

The most common form of glioma is astrocytoma, representing approximately 50% of all gliomas.

Grade IV astrocytoma, also known as glioblastoma or glioblastoma multiforme (GBM) is the most common and aggressive glioma with a very poor 5-year survival (less than 5%).

There is currently no cure for GBM but it is normally treated with surgery followed by chemotherapy and radiotherapy to increase the length of survival.

The transcriptome analysis shows that 72% (n=14217) of all human genes (n=19670) are expressed in glioma.

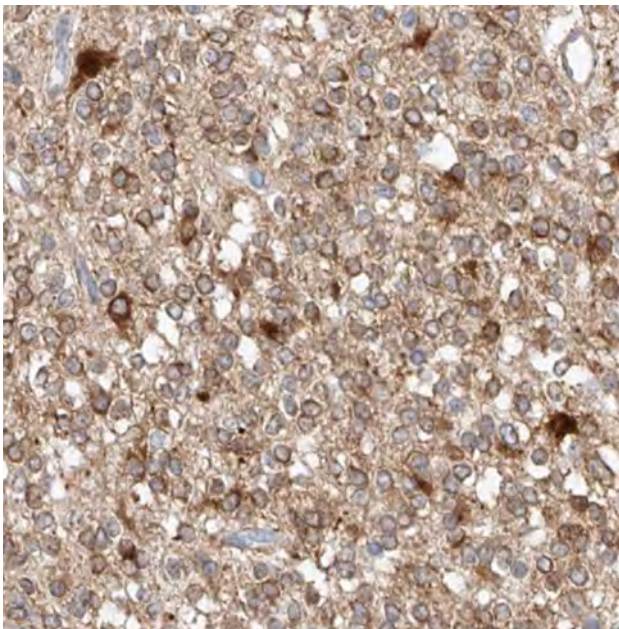
682 genes show some level of elevated expression in glioma compared to other cancers.

There are 201 genes associated with unfavorable prognosis in GBM.

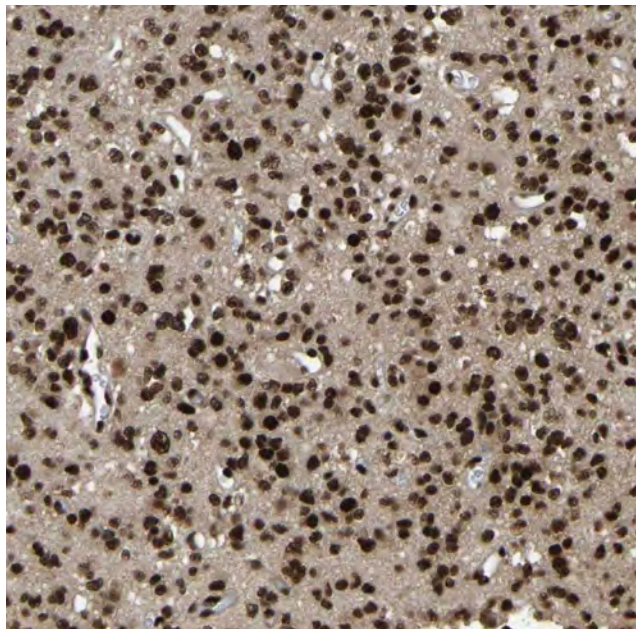
There are 67 genes associated with favorable prognosis in GBM.

Data collected from 153 patients (54 females and 99 males).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 9 and 10.



**Figure 9.** Immunohistochemistry using the anti-REEP2 antibody (HPA031813) on high grade glioma (male, age 34) shows a strong cytoplasmic/membranous staining of tumor cells, in brown.



**Figure 10.** Immunohistochemistry using the anti-TBL1XR1 antibody (HPA019182) on high grade glioma (male, age 38) shows a strong nuclear staining of tumor cells, in brown.

Table 9. Top genes with highest significance associated with unfavorable prognosis in glioma.

| Product Name | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-ADAM15  | MDC15                      | HPA011633  | IHC, WB                | 82% / 84%                         |
| Anti-ARMC10  | MGC3195, SVH               | HPA011036  | IHC*, WB*, ICC-IF      | 89% / 83%                         |
| Anti-CEND1   | BM88, FLJ90066             | HPA042527  | IHC*, WB*              | 75% / 74%                         |
| Anti-DBNL    | HIP-55, SH3P7              | HPA020265  | IHC*, WB*              | 95% / 95%                         |
| Anti-EN2     | -                          | HPA045646  | ICC-IF                 | 87% / 87%                         |
| Anti-FAM174A | TMEM157, UNQ1912           | HPA019539  | IHC, WB*, ICC-IF       | 100% / 100%                       |
| Anti-HPCA    | -                          | HPA043245  | IHC                    | 100% / 100%                       |
| Anti-KDELR2  | ELP-1, ERD2.2              | HPA016459  | IHC                    | 29% / 28%                         |
| Anti-LRR61   | FLJ31392, HSPC295, MGC3036 | HPA019355  | IHC, WB*, ICC-IF       | 89% / 90%                         |
| Anti-MED10   | L6, MGC5309, NUT2, TRG20   | HPA042795  | WB*, ICC-IF            | 100% / 100%                       |
| Anti-PGBD5   | DKFZp761A0620, FLJ11413    | HPA065010  | ICC-IF                 | 92% / 93%                         |
| Anti-PODNL1  | FLJ23447, SLRR5B           | HPA042807  | IHC                    | 81% / 81%                         |
| Anti-PTPRN   | IA-2                       | HPA007179  | IHC*                   | 77% / 81%                         |
| Anti-RPL39L  | RPL39L1                    | HPA047105  | IHC                    | 95% / 95%                         |
| Anti-RPP25   | FLJ20374                   | HPA046900  | IHC, WB, ICC-IF        | 84% / 85%                         |
| Anti-SLC6A6  | TAUT                       | HPA016488  | IHC*                   | 78% / 78%                         |
| Anti-STC1    | STC                        | HPA023918  | IHC                    | 100% / 100%                       |
| Anti-TSPAN13 | NET-6, TM4SF13             | HPA007426  | IHC, ICC-IF            | 89% / 87%                         |
| Anti-WFDC2   | EDDM4, HE4, WAP5           | HPA042302  | IHC*, WB, ICC-IF       | 63% / 41%                         |
| Anti-ZBED6CL | C7orf29                    | HPA019724  | IHC, WB*               | 29% / 30%                         |

Table 10. Top genes with highest significance associated with favorable prognosis in glioma.

| Product Name  | Alternative Gene Names    | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|---------------------------|------------|------------------------|-----------------------------------|
| Anti-ETNPPL   | AGXT2L1                   | HPA044546  | IHC*, WB*              | 64% / 65%                         |
| Anti-EFCAB7   | KIAA1799, RP4-534K7.1     | HPA029611  | IHC, ICC-IF            | 90% / 87%                         |
| Anti-MARS2    | mtMetRS, SPAX3            | HPA035589  | IHC, ICC-IF            | 92% / 93%                         |
| Anti-MIER1    | hMI-ER1, KIAA1610, MI-ER1 | HPA019589  | IHC*, ICC-IF           | 97% / 96%                         |
| Anti-MTHFD2   | -                         | HPA049657  | IHC                    | 88% / 85%                         |
| Anti-NEUROD1  | BETA2, BHF-1, MODY6       | HPA003278  | IHC, WB*               | 98% / 97%                         |
| Anti-PATZ1    | MAZR, ZNF278, ZSG         | HPA047893  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-RCOR3    | FLJ10876                  | HPA007413  | IHC*, ICC-IF           | 96% / 97%                         |
| Anti-RRAGA    | FIP-1, RAGA               | HPA003734  | IHC, WB, ICC-IF        | 99% / 99%                         |
| Anti-SAMD13   | -                         | HPA058929  | IHC*, ICC-IF           | 100% / 50%                        |
| Anti-SLC39A10 | FLJ90515, KIAA1265        | HPA036512  | IHC, ICC-IF            | 93% / 93%                         |
| Anti-SOX21    | SOX25                     | HPA048337  | IHC                    | 96% / 37%                         |
| Anti-STARD7   | GTT1                      | HPA064958  | ICC-IF                 | 97% / 95%                         |
| Anti-TBL1XR1  | C21, DC42, IRA1           | HPA019182  | IHC*, WB, ICC-IF       | 96% / 97%                         |
| Anti-ZBTB6    | ZID, ZNF482               | HPA076894  | ICC-IF                 | 88% / 86%                         |
| Anti-ZFP1     | FLJ34243, ZNF475          | HPA044916  | ICC-IF                 | 70% / 76%                         |
| Anti-ZNF322   | HCG12, ZNF388, ZNF489     | HPA046692  | IHC, ICC-IF            | 58% / 62%                         |
| Anti-ZNF420   | FLJ32191                  | HPA059675  | IHC, ICC-IF            | 31% / 31%                         |
| Anti-ZNF639   | ANC-2H01, ZASC1           | HPA049023  | IHC, ICC-IF            | 87% / 86%                         |
| Anti-ZNF821   | -                         | HPA036372  | IHC*, ICC-IF           | 74% / 77%                         |

\* Products with enhanced validation for indicated application

# Head and neck cancer

Head and neck cancer arises in the nasal cavity, sinuses, lips, mouth, salivary glands, throat, or larynx (voice box). Head and neck cancers are common in several regions of the world where tobacco usage and alcohol consumption is high.

Head and neck cancers comprise approximately 10% of all newly diagnosed cancers in the western world, but one-third in India. The variation in incidence between regions is mostly related to the relative distribution of major risk factors such as tobacco and alcohol consumption. Head and neck cancer has a 5-year survival rate of approximately 60%, depending on locations on primary tumor and grade.

There is increasing evidence that viruses might contribute to the cause of head and neck cancer. DNA from human papillomavirus (HPV) has been detected in cancerous tissue from the head and neck and infection with

Epstein-Barr virus is associated with nasopharyngeal cancer.

Surprisingly, patients with advanced forms of cancer in the upper portion of the throat have a better outcome if the tumor is positive for HPV. The occurrence of head and neck cancer in young adults and that falls to non-users of tobacco and alcohol suggests that genetic predisposition may be a possible etiological factor.

Most head and neck cancers arise from squamous epithelium and are squamous cell carcinomas of different histologic grades. The tumor cells in well-differentiated cancers closely resemble normal squamous epithelium, whereas poorly differentiated cancers are difficult to classify as being of squamous epithelial origin.

Salivary gland tumors (mainly adenocarcinomas) comprise a minority of head and neck tumors.

The transcriptome analysis shows that 69% (n=13629) of all human genes (n=19670) are expressed in head and neck cancer.

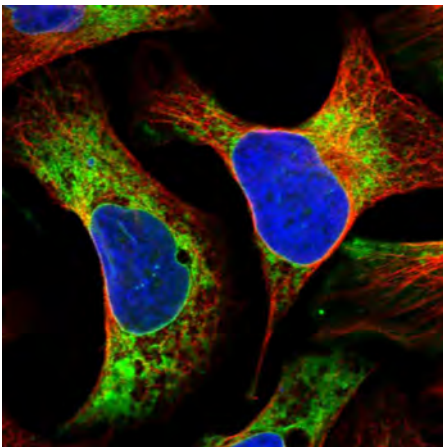
269 genes show some level of elevated expression in head and neck cancer compared to other cancers.

There are 340 genes associated with unfavorable prognosis in head and neck cancer.

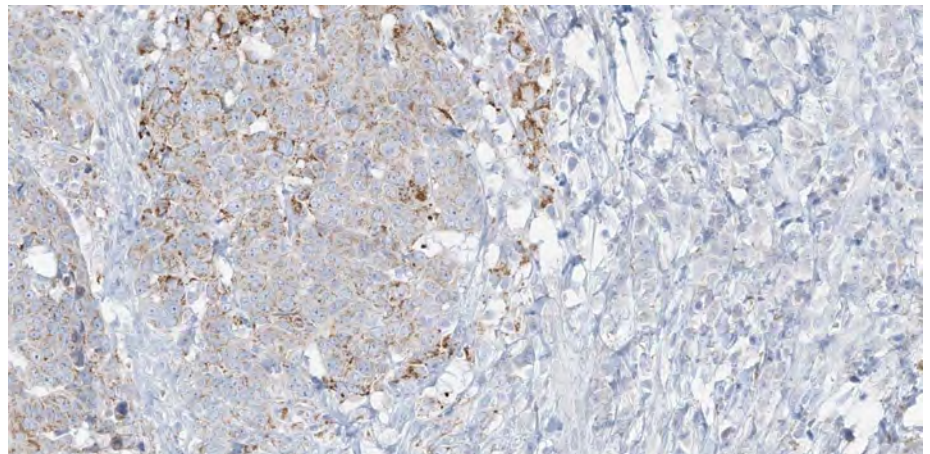
There are 450 genes associated with favorable prognosis in head and neck cancer.

Data collected from 499 patients with head and neck cancer.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 11 and 12.



**Figure 11.** Immunofluorescent staining of human cell line U-2 OS with the anti-LRRC59 (HPA030827) antibody showing localization to endoplasmic reticulum, in green.



**Figure 12.** Immunohistochemical staining using the anti-ZDHHC4 antibody (HPA032124) on squamous cell carcinoma (head-neck cancer tissue from male age 66) showing a medium cytoplasmic/membranous staining in tumor cells, in brown.

**Table 11. Top genes with highest significance associated with unfavorable prognosis in head and neck cancer.**

| Product Name | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-AIG1    | AIG-1, dJ95L4.1, FLJ10485   | HPA060766  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-CAMK2N  | CaMKIINalpha                | HPA050835  | ICC-IF                 | 96% / 96%                         |
| Anti-CTTN    | EMS1                        | HPA057242  | IHC, WB, ICC-IF        | 96% / 97%                         |
| Anti-DDX19A  | DDX19L, FLJ11126            | HPA045252  | IHC, WB                | 88% / 88%                         |
| Anti-EFNB2   | EPLG5, Htk-L, HTKL, LERK5   | HPA008999  | IHC, WB, ICC-IF        | 97% / 97%                         |
| Anti-HK1     | -                           | HPA007044  | IHC, WB*               | 97% / 94%                         |
| Anti-KARS    | DFNB89, KARS1, KARS2        | HPA041345  | IHC*, WB*, ICC-IF      | 94% / 90%                         |
| Anti-LIMA1   | EPLIN                       | HPA023871  | IHC*, WB*, ICC-IF      | 74% / 74%                         |
| Anti-LRRRC59 | FLJ21675, PRO1855           | HPA030827  | IHC*, WB, ICC-IF       | 93% / 93%                         |
| Anti-MANF    | ARMET, ARP                  | HPA011175  | IHC, WB, ICC-IF        | 97% / 97%                         |
| Anti-NDFIP1  | MGC10924, N4WBP5            | HPA009682  | IHC, WB                | 92% / 90%                         |
| Anti-PCTP    | STARD2                      | HPA022979  | IHC, ICC-IF            | 79% / 78%                         |
| Anti-PGK1    | -                           | HPA045385  | IHC                    | 97% / 97%                         |
| Anti-SEC14L2 | C22orf6, KIAA1186, SPF, TAP | HPA064466  | IHC, ICC-IF            | 81% / 81%                         |
| Anti-SGCE    | DYT11                       | HPA074790  | WB, ICC-IF             | 94% / 96%                         |
| Anti-STC2    | STC-2                       | HPA045372  | IHC, WB*, ICC-IF       | 72% / 68%                         |
| Anti-TCEAL8  | MGC45400, WEX3              | HPA059115  | IHC, ICC-IF            | 71% / 71%                         |
| Anti-TMCO1   | HP10122, TMCC4              | HPA054768  | ICC-IF                 | 100% / 100%                       |
| Anti-TMED2   | P24A, RNP24                 | HPA014060  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-ZDHHHC4 | FLJ10479, ZNF374            | HPA032124  | IHC, WB                | 74% / 74%                         |

**Table 12. Top genes with highest significance associated with favorable prognosis in head and neck cancer.**

| Product Name | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-CCR7    | BLR2, CD197, CMKBR7, EBI1  | HPA031383  | ICC-IF                 | 83% / 85%                         |
| Anti-CD6     | CD301, CLECSF13, HML, HML2 | HPA021937  | IHC, WB*               | 71% / 71%                         |
| Anti-CD27    | S152, TNFRSF7, Tp55        | HPA038936  | IHC*, WB               | 68% / 66%                         |
| Anti-CLEC14A | C14orf27                   | HPA039468  | IHC, WB*, ICC-IF       | 64% / 64%                         |
| Anti-FGD3    | FLJ00004, ZFYVE5           | HPA021018  | IHC, ICC-IF            | 73% / 72%                         |
| Anti-GZMM    | LMET1, MET1                | HPA015624  | IHC*                   | 81% / 78%                         |
| Anti-IRF4    | LSIRF, MUM1                | HPA002038  | IHC*, WB               | 90% / 90%                         |
| Anti-JCHAIN  | IGCJ, IGJ, JCH             | HPA044132  | IHC*                   | 79% / 80%                         |
| Anti-PITPNM3 | ACKR6, CORD5, NIR1, RDGBA3 | HPA022432  | IHC*, ICC-IF           | 90% / 91%                         |
| Anti-PPFIA3  | KIAA0654, LPNA3, MGC126567 | HPA043567  | IHC*                   | 92% / 94%                         |
| Anti-S1PR4   | EDG6                       | HPA060601  | ICC-IF                 | 83% / 83%                         |
| Anti-SMIM14  | C4orf34, FLJ13289          | HPA051299  | IHC                    | 100% / 97%                        |
| Anti-SZT2    | C1orf84, FLJ10387, SZT2A   | HPA029012  | IHC                    | 72% / 71%                         |
| Anti-TPSB2   | -                          | HPA049153  | IHC, WB                | 70% / 73%                         |
| Anti-TYK2    | JTK1                       | HPA005157  | IHC, WB, ICC-IF        | 64% / 63%                         |
| Anti-ZAP70   | SRK, STD, ZAP-70           | HPA003134  | IHC*, WB               | 88% / 87%                         |
| Anti-ZNF266  | HZF1                       | HPA054110  | IHC, ICC-IF            | 50% / 44%                         |
| Anti-ZNF414  | MGC15716, Zfp414           | HPA053769  | IHC, ICC-IF            | 49% / 53%                         |
| Anti-ZNF557  | MGC4054                    | HPA029291  | IHC, ICC-IF            | 59% / 46%                         |
| Anti-ZNF846  | -                          | HPA034617  | IHC, WB                | 42% / 42%                         |

\* Products with enhanced validation for indicated application

# Liver Cancer

Liver cancer is the 6th most common cancer and the third leading in cancer death worldwide. It is associated with a poor prognosis due to the lack of early detection.

Hepatocellular carcinoma is the most common type of primary liver cancer. The overall median survival is 4 months and the overall 5-year survival rate is 3%.

The tumor predominantly affects males who are over 50 years of age. Risk factors include infection with hepatotropic viruses such as hepatitis B and C viruses, liver cirrhosis, liver cell dysplasia, exposure to aflatoxins and inborn errors of metabolism.

Serum elevation of  $\alpha$ -fetoprotein occurs in a large proportion of patients (up to 75%) with hepatocellular carcinoma. Most tumors are detected at an advanced stage are not suitable for liver transplantation.

Cholangiocarcinomas, also known as intrahepatic bile duct cancers, are relatively rare and account for 10-20% of all cases.

Cholangiocarcinomas occur in older individuals, usually after the age of 60, and have an overall mean survival time of less than 2 years.

This type of tumor has been associated with parasitic infestation of the liver (clonorchis sinensis), multiple bile duct hamartomas, intrahepatic lithiasis and congenital hepatic fibrosis.

In general, most patients with cholangiocarcinoma show no symptoms until the disease has progressed to a late stage with local spread or metastasis.

The transcriptome analysis shows that 66% (n=12948) of all human genes (n=19670) are expressed in liver cancer.

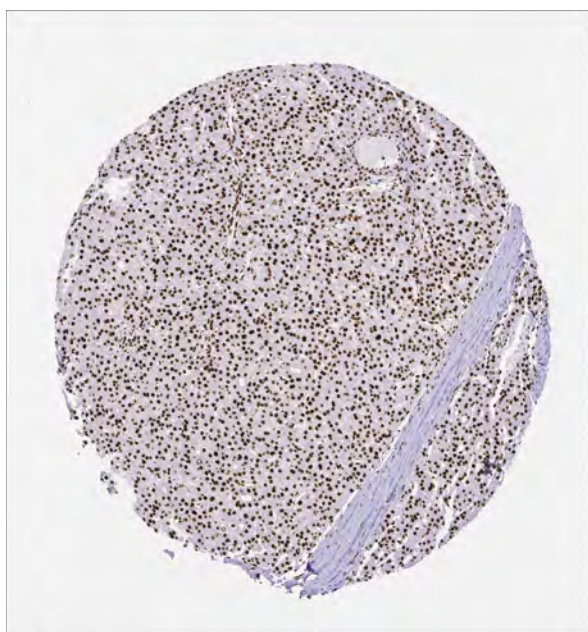
487 genes show some level of elevated expression in liver cancer compared to other cancers

There are 2618 genes associated with unfavorable prognosis in liver cancer.

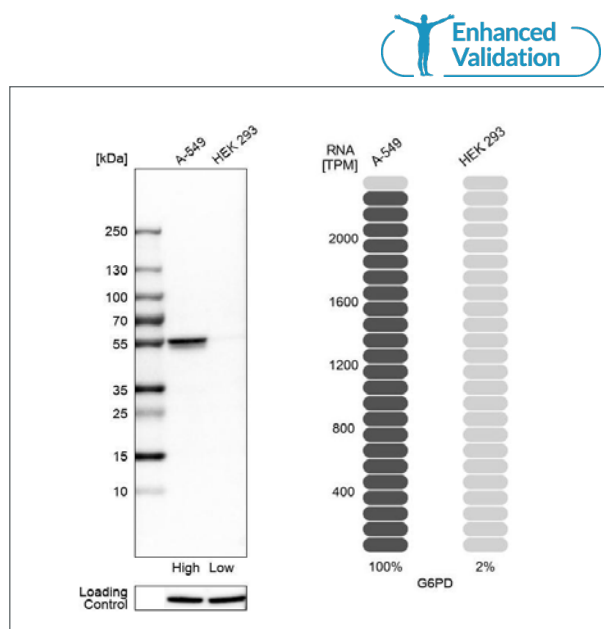
There are 263 genes associated with favorable prognosis in liver cancer.

Data collected from 365 patients in total (119 females and 246 males).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 13 and 14.



**Figure 13.** Immunohistochemistry using the anti-SFPQ antibody (HPA054689) on hepatocellular carcinoma (male, age 67) shows a strong nuclear staining of tumor cells, in brown.



**Figure 14.** Western blot analysis in human cell lines A-549 and HEK293 using anti-G6PD antibody. Corresponding G6PD RNA-seq data are presented for the same cell lines. Loading control: anti-HSP90B1. Orthogonal validation of protein expression using WB by comparison to RNA-seq data of corresponding target in high and low expression cell lines.

Table 13. Top genes with highest significance associated with unfavorable prognosis in liver cancer.

| Product Name | Alternative Gene Names         | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|--------------------------------|------------|------------------------|-----------------------------------|
| Anti-CAD     | -                              | HPA057266  | WB*, ICC-IF            | -                                 |
| Anti-CCT4    | Cctd                           | HPA029349  | IHC*, WB, ICC-IF       | 99% / 99%                         |
| Anti-CCT5    | KIAA0098                       | HPA005958  | IHC*, WB*, ICC-IF      | 97% / 97%                         |
| Anti-CDCA8   | BOR, DasraB, FLJ12042          | HPA028120  | IHC*, WB*, ICC-IF      | 64% / 66%                         |
| Anti-EIF5B   | FLJ10524, IF2, KIAA0741        | HPA040095  | ICC-IF                 | 81% / 81%                         |
| Anti-G6PD    | G6PD1                          | HPA000247  | IHC*, WB*, ICC-IF      | 96% / 96%                         |
| Anti-GTPBP4  | FLJ10690, NGB, NOG1            | HPA039618  | IHC, WB*, ICC-IF       | 93% / 93%                         |
| Anti-GTSE1   | B99, GTSE-1                    | HPA060544  | IHC                    | 56% / 57%                         |
| Anti-HDAC2   | RPD3, YAF1                     | HPA011727  | IHC, WB*, ICC-IF       | 97% / 95%                         |
| Anti-HILPDA  | C7orf68, FLJ21076, HIG-2, HIG2 | HPA010515  | IHC, ICC-IF            | 76% / 68%                         |
| Anti-INTS13  | ASUN, C12orf11, NET48          | HPA039543  | IHC                    | 99% / 99%                         |
| Anti-KDM1A   | AOF2, BHC110, LSD1             | HPA053660  | ICC-IF                 | 100% / 100%                       |
| Anti-KIF20A  | RAB6KIFL                       | HPA036910  | IHC, WB*               | 78% / 77%                         |
| Anti-KPNA2   | IPOA1, QIP2, RCH1, SRP1alpha   | HPA041270  | IHC*, WB, ICC-IF       | 92% / 94%                         |
| Anti-PSMD1   | P112, Rpn2, S1                 | HPA036736  | IHC*, WB, ICC-IF       | 100% / 100%                       |
| Anti-RBM28   | FLJ10377                       | HPA026672  | IHC*, WB, ICC-IF       | 94% / 94%                         |
| Anti-SFPQ    | PPP1R140, PSF                  | HPA047513  | IHC*, WB*, ICC-IF      | 100% / 100%                       |
| Anti-SNX5    | -                              | HPA051187  | IHC, WB                | 99% / 99%                         |
| Anti-TRMT6   | CGI-09, GCD10, MGC5029         | HPA047032  | IHC, WB, ICC-IF        | 91% / 89%                         |
| Anti-YARS    | tyrRS, YRS, YTS                | HPA018954  | IHC*, WB*, ICC-IF      | 95% / 93%                         |

Table 14. Top genes with highest significance associated with favorable prognosis in liver cancer.

| Product Name | Alternative Gene Names | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|------------------------|------------|------------------------|-----------------------------------|
| Anti-ALDH2   | -                      | HPA051065  | IHC, WB                | 92% / 96%                         |
| Anti-ANXA10  | ANX14                  | HPA005469  | IHC*, WB               | 95% / 97%                         |
| Anti-APOC1   | -                      | HPA051518  | IHC                    | 65% / 65%                         |
| Anti-APOH    | B2G1, BG               | HPA001654  | IHC*, WB*, ICC-IF      | 76% / 85%                         |
| Anti-BDH1    | BDH, SDR9C1            | HPA030947  | IHC*, WB, ICC-IF       | 90% / 91%                         |
| Anti-CLEC3B  | TN, TNA                | HPA034794  | IHC, WB                | 82% / 83%                         |
| Anti-CHP1    | CHP, p22, p24, Sid470p | HPA006616  | IHC, ICC-IF            | 98% / 98%                         |
| Anti-CYP2C9  | CYP2C10, P450IIC9      | HPA015066  | IHC, WB                | 79% / 75%                         |
| Anti-GHR     | GHBP                   | HPA057705  | ICC-IF                 | 68% / 74%                         |
| Anti-HAGH    | GLO2, GLXII, HAGH1     | HPA061143  | IHC, WB                | 93% / 89%                         |
| Anti-HMGCS2  | -                      | HPA027442  | IHC*, WB*, ICC-IF      | 81% / 79%                         |
| Anti-KNG1    | BDK, BK, KNG           | HPA001645  | IHC*, WB*              | 59% / 58%                         |
| Anti-LCAT    | -                      | HPA044767  | WB*, ICC-IF            | 88% / 89%                         |
| Anti-LIMS2   | -                      | HPA058340  | IHC*, WB, ICC-IF       | 75% / 71%                         |
| Anti-MARC2   | FLJ20605, MOSC2        | HPA015085  | IHC*, WB               | 74% / 74%                         |
| Anti-MTHFS   | HsT19268               | HPA054177  | IHC, WB, ICC-IF        | 79% / 79%                         |
| Anti-PDE2A   | -                      | HPA031192  | IHC*                   | 99% / 97%                         |
| Anti-PON1    | ESA, PON               | HPA001610  | IHC, WB                | 78% / 76%                         |
| Anti-RBP4    | -                      | HPA001641  | IHC                    | 90% / 90%                         |
| Anti-UPB1    | BUP1                   | HPA000728  | IHC*, WB*              | 86% / 85%                         |

\* Products with enhanced validation for indicated application

# Lung Cancer

Lung cancer is the most prevalent cancer in the world and the leading cause of cancer-related deaths. Smoking is accepted as the major risk factor, responsible for 70-90% of all lung cancer cases, although the etiology of lung cancer appears multifactorial with both environmental and genetic factors playing a role.

Lung cancer patients have a poor outcome with a 5-year survival rate of 13.6% among men and 19.4% among women across all stages. The poor prognosis is partly explained by late diagnosis, but also by lack of effective treatments.

Based on histology, lung cancer is primarily divided into:

- SCLC: small cell lung cancer
- NSCLC: non-small cell lung cancer.

SCLC originates from neuroendocrine cells and accounts for approximately 15% of all primary lung cancers.

This extremely rapidly proliferating cancer is generally treated with

chemotherapy with an initial good response which unfortunately in most cases is followed by resistance to treatment and poor survival outcome.

NSCLC is suggested to originate from bronchogenic or alveolar cells. It is the most common form of primary lung cancer and represents approximately 80-85% of all lung cancer cases.

Based on histology, NSCLC can further be divided into different subtypes, with adenocarcinoma and squamous cell carcinoma being most common.

Treatment for NSCLC is mainly based on the tumor extent. In principle, limited stage tumors are surgically treated, sometimes with the addition of chemotherapy and radiotherapy whereas tumors with advanced stages are palliatively treated with a combination of cytotoxic drugs and recently developed targeted drugs.

Unfortunately, the treatment effect is limited and the majority of patients experience only modest

survival prolongation.

The transcriptome analysis shows that 74% (n=14627) of all human genes (n=19670) are expressed in lung cancer.

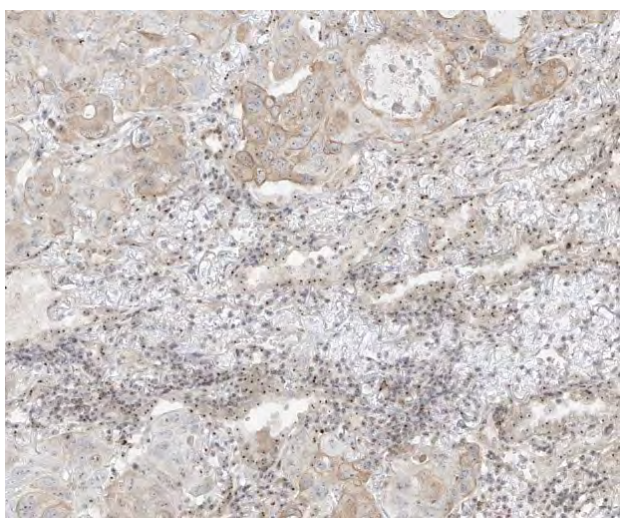
97 genes show some level of elevated expression in lung cancer compared to other cancers.

There are 354 genes associated with unfavorable prognosis in lung cancer.

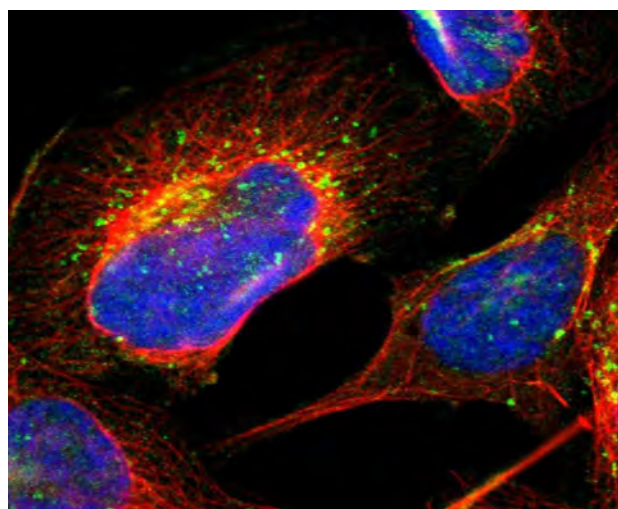
There are 297 genes associated with favorable prognosis in lung cancer.

Data collected from 994 patients in total: 494 patients with squamous cell carcinoma (LUSC) and 500 patients with adenocarcinoma (LUAD). The total dataset included 398 females and 596 males.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 15 and 16.



**Figure 15.** Immunohistochemistry using the anti-ZNF512 antibody (HPA031430) on lung cancer (Squamous cell carcinoma) (female, age 73) shows a moderate cytoplasmic/membranous staining of tumor cells, in brown.



**Figure 16.** Immunofluorescent staining of human cell line U-2 OS using the anti-RAAGA antibody (HPA003734) shows localization to the Golgi apparatus & vesicles, in green. Microtubules in red and nuclei in blue.

Table 15. Top genes with highest significance associated with unfavorable prognosis in lung cancer.

| Product Name  | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-BCAR3    | NSP2, SH2D3B               | HPA014858  | IHC, WB*, ICC-IF       | 79% / 81%                         |
| Anti-CMIP     | -                          | HPA054424  | WB*, ICC-IF            | 100% / 100%                       |
| Anti-COL22A1  | -                          | HPA024830  | IHC, ICC-IF            | 99% / 99%                         |
| Anti-FLNC     | ABP-280, ABPL, FLN2        | HPA006135  | IHC*, ICC-IF           | 99% / 99%                         |
| Anti-FSTL3    | FLRG, FSRP                 | HPA045378  | IHC, ICC-IF            | 84% / 85%                         |
| Anti-GALNT2   | GalNAc-T2                  | HPA011222  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-GPRIN1   | GRIN1, KIAA1893            | HPA070892  | IHC*, ICC-IF           | 75% / 33%                         |
| Anti-IER5L    | bA247A12.2                 | HPA021327  | ICC-IF                 | 97% / 96%                         |
| Anti-ITGB1    | CD29, FNRB, GPIIA, MSK12   | HPA059297  | IHC*, WB               | 91% / 91%                         |
| Anti-L1CAM    | CD171, HSAS, HSAS1, MASA   | HPA005830  | IHC*                   | 75% / 75%                         |
| Anti-LDHAL6B  | LDH6B, LDHAL6, LDHL        | HPA053962  | IHC*                   | 48% / 30%                         |
| Anti-LOXL2    | WS9-14                     | HPA036257  | ICC-IF                 | 87% / 86%                         |
| Anti-MYO1E    | HuncM-IC, MGC104638, MYO1C | HPA023886  | IHC, WB                | 94% / 92%                         |
| Anti-PLCD3    | -                          | HPA053665  | IHC, WB                | 96% / 95%                         |
| Anti-PLIN3    | M6PRBP1, PP17, TIP47       | HPA006427  | IHC, WB*, ICC-IF       | 71% / 71%                         |
| Anti-PTX3     | TNFAIP5, TSG-14            | HPA069320  | IHC                    | 85% / 90%                         |
| Anti-RCN1     | FLJ37041, PIG20, Rcal, RCN | HPA038474  | IHC, WB*, ICC-IF       | 92% / 92%                         |
| Anti-SERPINE1 | PAI, PAI1, PLANH1          | HPA050039  | IHC, ICC-IF            | 84% / 83%                         |
| Anti-SP6      | Epfm, KLF14                | HPA024516  | WB, ICC-IF             | 95% / 96%                         |
| Anti-STK24    | MST-3, MST3, STE20, STK3   | HPA026502  | IHC*, WB*, ICC-IF      | 93% / 92%                         |

Table 16. Top genes with highest significance associated with favorable prognosis in lung cancer.

| Product Name | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-ANKRD65 | -                          | HPA065720  | IHC*, WB, ICC-IF       | 57% / 51%                         |
| Anti-CLIC6   | CLIC1L, CLIC5              | HPA065285  | IHC                    | 35% / 35%                         |
| Anti-FAM117A | -                          | HPA022531  | IHC, ICC-IF            | 85% / 86%                         |
| Anti-GKN1    | AMP18, BRICD1, CA11        | HPA047684  | IHC*                   | 74% / 77%                         |
| Anti-GC      | DBP, hDBP, VDBP            | HPA001526  | IHC*, WB               | 69% / 64%                         |
| Anti-GNG7    | FLJ00058                   | HPA057790  | IHC                    | 100% / 100%                       |
| Anti-HLF     | MGC33822                   | HPA068156  | ICC-IF                 | 94% / 94%                         |
| Anti-LRIG1   | DKFZP586O1624, LIG-1, LIG1 | HPA011846  | IHC, WB*, ICC-IF       | 74% / 74%                         |
| Anti-NSMCE4A | C10orf86, FLJ20003, NSE4A  | HPA037459  | IHC, WB, ICC-IF        | 87% / 87%                         |
| Anti-PPFIBP2 | Cclp1                      | HPA001935  | IHC*, ICC-IF           | 76% / 80%                         |
| Anti-RFXAP   | -                          | HPA032035  | ICC-IF                 | 96% / 96%                         |
| Anti-SLC11A2 | DCT1, DMT1, NRAMP2         | HPA032140  | IHC, ICC-IF            | 85% / 88%                         |
| Anti-SLC47A1 | FLJ10847, MATE1            | HPA021987  | IHC*                   | 49% / 51%                         |
| Anti-SMIM4   | C3orf78                    | HPA047771  | IHC, ICC-IF            | 97% / 37%                         |
| Anti-THYN1   | THY28                      | HPA038732  | IHC, WB, ICC-IF        | 93% / 93%                         |
| Anti-TMEM168 | DKFZp564C012, FLJ13576     | HPA020389  | IHC                    | 92% / 93%                         |
| Anti-TTC39B  | C9orf52, FLJ33868          | HPA054804  | IHC                    | 94% / 94%                         |
| Anti-USP4    | UNP, Unph                  | HPA018499  | IHC, WB, ICC-IF        | 88% / 83%                         |
| Anti-ZNF77   | pT1                        | HPA023397  | IHC, ICC-IF            | 39% / 41%                         |
| Anti-ZNF512  | KIAA1805                   | HPA031430  | IHC, ICC-IF            | 91% / 91%                         |

\* Products with enhanced validation for indicated application

# Melanoma

Malignant melanoma is the leading cause of skin-related death in Caucasians, but rare in populations with darker pigmented skin color. The incidence has increased dramatically during the last decades, with an almost four-fold increase in the Nordic countries in the time period 1964-2003.

The increased incidence reflects in part different UV exposure behavior in the population, but hereditary risk factors including skin type are also important.

Short intermittent exposure with sunburns appears to be the main risk factor. Other important risk factors include the number of melanocytic nevi and the number of dysplastic melanocytic nevi.

Primary cutaneous malignant melanoma is thought to develop in a multi-step process. Precursor lesions, such as dysplastic melanocytic nevi develop into a melanoma in situ stage and further into invasive melanoma and eventually metastatic melanoma.

Invasive malignant melanoma is traditionally divided into four principal histopathological subgroups based on the microscopical appearance: superficial spreading melanoma (SSM), nodular malignant melanoma (NMM), lentigo maligna melanoma (LMM) and acral lentiginous melanoma (ALM).

The transcriptome analysis shows that 69% (n=13491) of all human genes (n=19670) are expressed in melanoma.

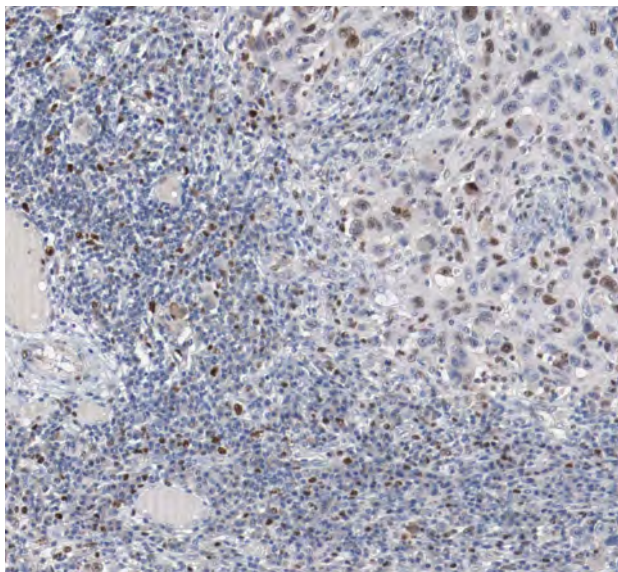
260 genes show some level of elevated expression in melanoma compared to other cancers.

There are 163 genes associated with unfavorable prognosis in melanoma.

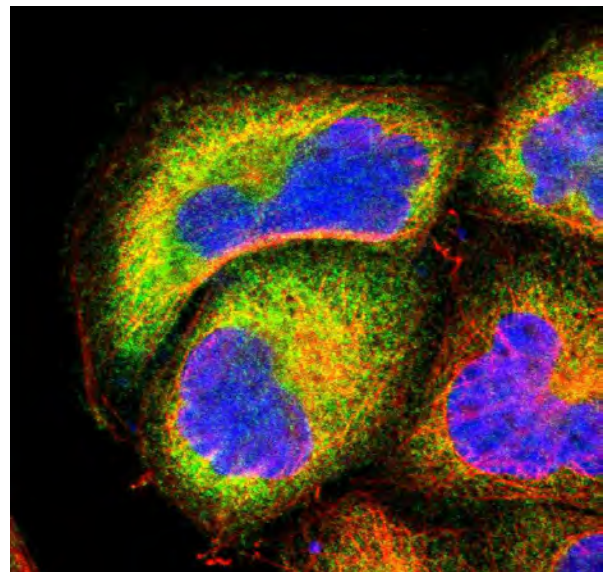
There are 42 genes associated with favorable prognosis in melanoma.

Data collected from 102 patients with skin cutaneous melanoma in total. The total dataset included 42 females and 60 males.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 17 and 18.



**Figure 17.** Immunohistochemistry using the anti-MCM6 antibody (HPA004818) on melanoma (male, age 53) shows a moderate nuclear staining of tumor cells, in brown.



**Figure 18.** Immunofluorescent staining of human cell line A-431 using the anti-NFkB2 antibody (HPA008422) shows localization to cytosol, in green. Microtubules in red and nuclei in blue.

**Table 17. Top genes with highest significance associated with unfavorable prognosis in skin cancer (melanoma).**

| Product Name  | Alternative Gene Names  | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-------------------------|------------|------------------------|-----------------------------------|
| Anti-CCNB2    | HsT17299                | HPA008873  | IHC*, WB, ICC-IF       | 81% / 27%                         |
| Anti-CDC5L    | CDC5, hCDC5, PCDC5RP    | HPA011361  | IHC, WB, ICC-IF        | 99% / 98%                         |
| Anti-KCTD14   | MGC2376                 | HPA041118  | IHC*, WB*              | 67% / 70%                         |
| Anti-MARK3    | CTAK1, KP78, PAR-1A     | HPA024652  | IHC, WB                | 93% / 91%                         |
| Anti-MAT2A    | MATA2, MATII, SAMS2     | HPA043028  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-MCM3     | -                       | HPA004790  | IHC, WB, ICC-IF        | 99% / 99%                         |
| Anti-MCM6     | Mis5                    | HPA004818  | IHC*, WB*, ICC-IF      | 97% / 97%                         |
| Anti-MED20    | PRO0213, TRFP           | HPA040717  | IHC, ICC-IF            | 99% / 99%                         |
| Anti-NUDT15   | FLJ10956, MTH2          | HPA038969  | IHC                    | 90% / 90%                         |
| Anti-PAPSS2   | ATPSK2                  | HPA071224  | ICC-IF                 | 85% / 81%                         |
| Anti-PUS7     | FLJ20485                | HPA024116  | IHC, WB, ICC-IF        | 95% / 95%                         |
| Anti-RCC2     | TD-60                   | HPA072281  | IHC                    | 93% / 92%                         |
| Anti-SFSWAP   | SFRS8, SWAP             | HPA039362  | IHC, ICC-IF            | 90% / 90%                         |
| Anti-SKP2     | FBL1, FBXL1, p45        | HPA051196  | WB*, ICC-IF            | 88% / 88%                         |
| Anti-STK38    | KIAA0965, NDR2          | HPA051324  | ICC-IF                 | 100% / 100%                       |
| Anti-TDG      | -                       | HPA052263  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-TICRR    | C15orf42, SLD3, Treslin | HPA046746  | ICC-IF                 | 44% / 43%                         |
| Anti-TIMELESS | hTIM, TIM, TIM1         | HPA060655  | IHC*, WB, ICC-IF       | 85% / 84%                         |
| Anti-ZNF544   | AF020591                | HPA002732  | IHC, ICC-IF            | 73% / 72%                         |
| Anti-ZNF551   | DKFZp686H1038           | HPA038187  | ICC-IF                 | 42% / 40%                         |

**Table 18. Top genes with highest significance associated with favorable prognosis in skin cancer (melanoma)**

| Product Name | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-CD2     | SRBC                        | HPA003883  | IHC*, WB*              | 63% / 67%                         |
| Anti-CD3E    | -                           | HPA040957  | IHC*, WB               | 43% / 50%                         |
| Anti-CD5     | LEU1, T1                    | HPA060839  | IHC*                   | 61% / 64%                         |
| Anti-CD7     | GP40, LEU-9, Tp40, TP41     | HPA039079  | IHC*                   | 33% / 32%                         |
| Anti-CXCR3   | CD183, CKR-L2, GPR9, IP10-R | HPA045942  | IHC*                   | 67% / 67%                         |
| Anti-DLGAP4  | DAP4, KIAA0964, SAPAP4      | HPA054105  | IHC, WB                | 96% / 98%                         |
| Anti-DOK2    | Dok-2, p56dok-2             | HPA066571  | IHC*                   | 66% / 66%                         |
| Anti-EGR3    | PILOT                       | HPA006206  | IHC                    | 100% / 100%                       |
| Anti-GNLY    | D2S69E, LAG-2, LAG2, NKG5   | HPA058021  | IHC*                   | 28% / 28%                         |
| Anti-IDO1    | IDO, INDO                   | HPA023072  | IHC*, WB*              | 58% / 57%                         |
| Anti-IKZF3   | Aiolos, ZNFN1A3             | HPA024377  | IHC*, ICC-IF           | 77% / 77%                         |
| Anti-LCK     | -                           | HPA003494  | IHC*, WB, ICC-IF       | 95% / 95%                         |
| Anti-NFKB2   | LYT-10, NF-kB2, p105, p52   | HPA008422  | IHC*, WB*, ICC-IF      | 93% / 92%                         |
| Anti-NR1D1   | ear-1, THRA1, THRAL         | HPA007935  | IHC, ICC-IF            | 96% / 96%                         |
| Anti-OTUD7B  | CEZANNE, ZA20D1             | HPA027045  | IHC, WB, ICC-IF        | 86% / 87%                         |
| Anti-SDC3    | N-syndecan, SYND3           | HPA048085  | WB, ICC-IF             | 76% / 78%                         |
| Anti-SIT1    | SIT                         | HPA018506  | IHC*                   | 77% / 78%                         |
| Anti-SLAMF6  | CD352, KALI, NTBA, SF2000   | HPA051903  | IHC, WB                | 45% / 52%                         |
| Anti-SPOCK2  | KIAA0275, testican-2        | HPA044605  | IHC, WB*               | 86% / 85%                         |
| Anti-SPN     | CD43, GPL115, LSN           | HPA055244  | IHC*                   | 65% / 65%                         |

\* Products with enhanced validation for indicated application

# Ovarian cancer

Epithelial carcinoma of the ovary is one of the most common gynecologic malignancies and the fifth most frequent cause of cancer death in women. 50% of all ovarian cancers are diagnosed in women older than 65 years of age.

Approximately 5 to 10% of ovarian cancers are familial and women with mutations in the genes BRCA1 or BRCA2 have about a 50% higher risk of developing ovarian cancer.

Ovarian cancer is typically denoted as a silent cancer since symptoms occur late in the course of the disease. A majority of ovarian epithelial cancers are diagnosed during or after abdominal exploration to investigate a pelvic or abdominal mass detected on physical examination.

By the time of discovery, approximately 70% of the tumors have spread beyond the ovary and are in such cases rarely curable by surgical resection or surgery combined with postoperative chemotherapy and/or radiation therapy. The dismal prognosis has stimulated research efforts for early detection of ovarian cancer.

Ovarian epithelial cancer is bilateral (involving both ovaries) in one-third to one-half of the cases.

The FIGO (International Federation of Gynaecology and Obstetrics) staging system recognizes four stages for ovarian cancer. Patients with Stage I tumors have a 5-year survival of 80%, while the 5-year survival of Stage IV patients is merely 8%.

The transcriptome analysis shows that 72% (n=14227) of all human genes (n=19670) are expressed in ovarian cancer.

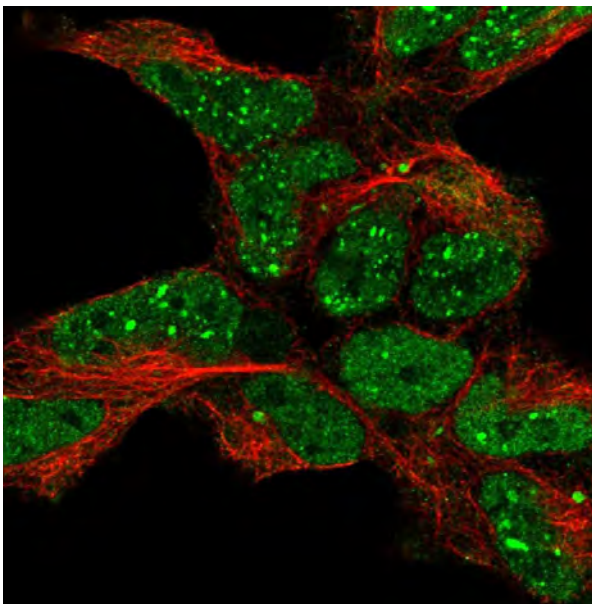
151 genes show some level of elevated expression in ovarian cancer compared to other cancers

There are 152 genes associated with unfavorable prognosis in ovarian cancer.

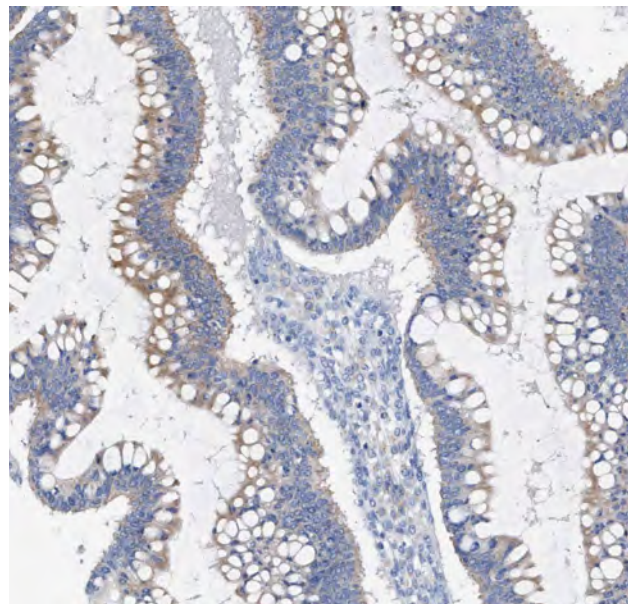
There are 357 genes associated with favorable prognosis in ovarian cancer.

Data collected from 373 females with ovarian serous cystadenocarcinoma.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 19 and 20.



**Figure 19.** Immunofluorescent staining of human cell line HEK 293 using the anti-TDP2 antibody (HPA008422) shows localization to nucleoplasm, nuclear bodies & aggresome, in green. Microtubules in red.



**Figure 20.** Immunohistochemistry using the anti-MCM6 antibody (HPA004818) on ovary cystadenocarcinoma, mucinous (female, age 73) shows a moderate cytoplasmic/ membranous staining of tumor cells, in brown.

**Table 19. Top genes with highest significance associated with unfavorable prognosis in ovarian cancer.**

| Product Name  | Alternative Gene Names        | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-------------------------------|------------|------------------------|-----------------------------------|
| Anti-AGFG1    | HRB, RAB, RIP                 | HPA008741  | IHC, WB, ICC-IF        | 97% / 94%                         |
| Anti-CST4     | -                             | HPA044763  | IHC                    | 58% / 58%                         |
| Anti-DAGLB    | DAGLBETA, KCCR13L             | HPA069377  | WB, ICC-IF             | 78% / 80%                         |
| Anti-FAM20C   | DMP4, IMAGE:4942737           | HPA019823  | ICC-IF                 | 87% / 87%                         |
| Anti-FAM98C   | FLJ44669                      | HPA040930  | IHC, WB, ICC-IF        | 70% / 70%                         |
| Anti-FANCD2   | FA-D2, FACD, FAD, FANCD       | HPA063742  | ICC-IF                 | 72% / 76%                         |
| Anti-FCGBP    | FC(GAMMA)BP                   | HPA003517  | IHC*                   | 82% / 80%                         |
| Anti-JMY      | FLJ37870                      | HPA043308  | IHC, WB                | 91% / 87%                         |
| Anti-KRT7     | CK7, K2C7, K7, SCL            | HPA007272  | IHC*, WB*              | 90% / 90%                         |
| Anti-LYVE1    | LYVE-1, XLKD1                 | HPA042953  | IHC, WB                | 63% / 61%                         |
| Anti-PC       | PCB                           | HPA043922  | IHC*, WB*, ICC-IF      | 97% / 97%                         |
| Anti-PI3      | ELAFIN, SKALP, WAP3           | HPA017737  | IHC*                   | 31% / 31%                         |
| Anti-PPTC7    | TA-PP2C                       | HPA039335  | IHC, WB*, ICC-IF       | 99% / 99%                         |
| Anti-RCBTB1   | CLLD7, CLLL7, FLJ10716        | HPA056783  | ICC-IF                 | 100% / 100%                       |
| Anti-RIPK4    | ANKK2, ANKRD3, DIK, PKK       | HPA030942  | IHC*                   | 90% / 91%                         |
| Anti-RPL7A    | L7A, SURF3, TRUP              | HPA046794  | ICC-IF                 | 100% / 100%                       |
| Anti-RPS6KA2  | HU-2, RSK, RSK3               | HPA045061  | IHC, ICC-IF            | 90% / 88%                         |
| Anti-SLC39A13 | FLJ25785                      | HPA043971  | IHC                    | 92% / 88%                         |
| Anti-SOGA1    | C20orf117, FLJ44670, KIAA0889 | HPA043992  | IHC, ICC-IF            | 89% / 89%                         |
| Anti-TGFBI    | BIGH3, CDB1, LCD1             | HPA017019  | IHC*, WB               | 88% / 87%                         |

**Table 20. Top genes with highest significance associated with favorable prognosis in ovarian cancer.**

| Product Name  | Alternative Gene Names   | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|--------------------------|------------|------------------------|-----------------------------------|
| Anti-AADAC    | CES5A1, DAC              | HPA002911  | IHC                    | 73% / 69%                         |
| Anti-ACOT13   | HT012, THEM2             | HPA019881  | IHC, WB, ICC-IF        | 92% / 90%                         |
| Anti-AP1S2    | MRXS5, PGS, SIGMA1B      | HPA049894  | IHC*                   | 96% / 44%                         |
| Anti-C18orf21 | HsT3108, PNAS-124        | HPA065505  | IHC, WB, ICC-IF        | 65% / 63%                         |
| Anti-CCDC160  | -                        | HPA044684  | IHC                    | 46% / 46%                         |
| Anti-CACYBP   | S100A6BP, SIP            | HPA057038  | ICC-IF                 | 94% / 94%                         |
| Anti-FAM166B  | -                        | HPA045540  | IHC                    | 66% / 25%                         |
| Anti-FMC1     | C7orf55, HSPC268         | HPA050553  | IHC, WB*, ICC-IF       | 93% / 96%                         |
| Anti-GPR27    | SREB1                    | HPA029395  | WB, ICC-IF             | 91% / 91%                         |
| Anti-KLHDC9   | KARCA1                   | HPA032058  | IHC, WB*               | 81% / 80%                         |
| Anti-MAGOH    | MAGOH1, MAGOHA           | HPA043036  | IHC, WB                | 100% / 100%                       |
| Anti-MED19    | LCMR1                    | HPA040860  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-MRS2     | MRS2L                    | HPA017642  | IHC, WB                | 90% / 93%                         |
| Anti-PRR3     | CAT56, Em:AB023052.2     | HPA064061  | ICC-IF                 | 86% / 83%                         |
| Anti-SNRPD1   | HsT2456, Sm-D1, SNRPD    | HPA040516  | IHC, WB                | 100% / 100%                       |
| Anti-TDP2     | TTRAP                    | HPA074011  | ICC-IF                 | 77% / 76%                         |
| Anti-UBE2L3   | UBCH7                    | HPA062415  | IHC, WB, ICC-IF        | 100% / 51%                        |
| Anti-UTP4     | CIRH1A, KIAA1988, TEX292 | HPA043542  | ICC-IF                 | 98% / 96%                         |
| Anti-ZNF85    | HPF4, HTF1               | HPA044760  | IHC, ICC-IF            | 35% / 35%                         |
| Anti-ZNF429   | -                        | HPA004139  | ICC-IF                 | 31% / 31%                         |

\* Products with enhanced validation for indicated application

# Pancreatic cancer

Pancreatic cancer is the 11th most common cancer globally and is associated with poor prognosis. Estimated 5-year survival rate is less than 5% and pancreatic cancer accounts for 4% of all deaths that occur worldwide each year.

The risk of pancreatic cancer increases with age and the tumor is slightly more common in women than in men. Most patients suffering from pancreatic cancer are above 50 years of age and pain, jaundice and weight loss are the most common symptoms.

The cause of pancreatic cancer is unknown. However, pancreatic cancer is more common in people with diabetes and chronic pancreatitis (persistent inflammation in the pancreas) as well as in tobacco smokers.

Pancreatic exocrine tumors are the most common form of pancreatic cancer, accounting for 95% of cases, with ductal adenocarcinoma being the most prevalent exocrine cancer.

Pancreatic endocrine tumors constitute the remaining 5% of reported cases. Due to diffuse symptoms, pancreatic cancer is often detected at such a late stage of the disease that curative surgery is not possible.

In addition to local spread in the pancreas and surrounding tissues, pancreatic cancer often spreads to regional lymph nodes and to the liver. Over 80% of all patients have metastasis at the time of diagnosis.

The transcriptome analysis shows that 74% (n=14468) of all human genes (n=19670) are expressed in pancreatic cancer.

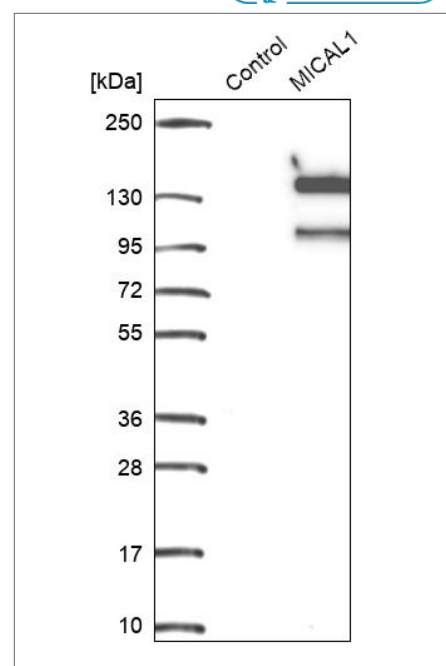
192 genes show some level of elevated expression in pancreatic cancer compared to other cancers.

There are 668 genes associated with unfavorable prognosis in pancreatic cancer.

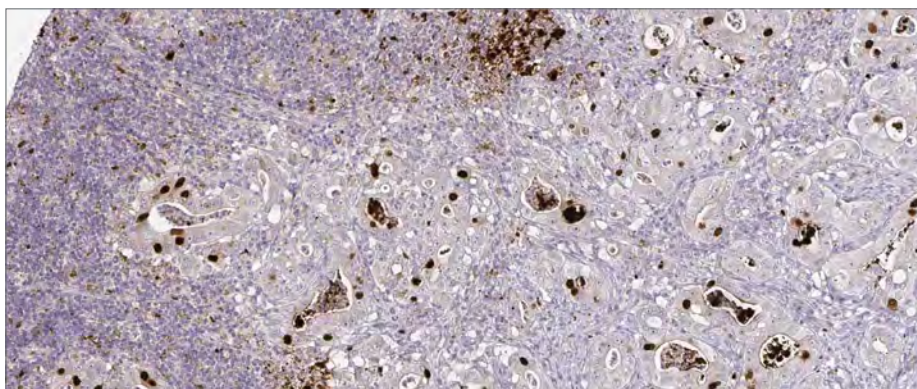
There are 857 genes associated with favorable prognosis in pancreatic cancer.

(data collected from 176 patients in total, with 80 female and 96 male patients).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 21 and 22.



**Figure 21.** Recombinant expression validation in WB using target protein overexpression. Western blot analysis using the anti-MICAL1 (HPA030178) in control (vector only transfected HEK293T lysate) and MICAL1 over-expression lysate (Co-expressed with a C-terminal myc-DDK tag (~3.1 kDa) in mammalian HEK293T cells, LY402940).



**Figure 22.** Immunohistochemistry using the anti-ANLN antibody (HPA005680) on pancreatic cancer (male, age 71) shows a strong nuclear staining of tumor cells, in brown.

**Table 21. Top genes with highest significance associated with unfavorable prognosis in pancreatic cancer.**

| Product Name | Alternative Gene Names           | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------------|------------|------------------------|-----------------------------------|
| Anti-AHNAK2  | C14orf78                         | HPA002940  | IHC*, ICC-IF           | 66% / 63%                         |
| Anti-ANLN    | ANILLIN, scra, Scraps            | HPA050556  | IHC*, WB*, ICC-IF      | 86% / 85%                         |
| Anti-ARMC10  | MGC3195, SVH                     | HPA011036  | IHC*, WB*, ICC-IF      | 89% / 83%                         |
| Anti-CA12    | HsT18816                         | HPA008773  | IHC, ICC-IF            | 88% / 88%                         |
| Anti-CDK6    | PLSTIRE                          | HPA002637  | IHC*, WB*, ICC-IF      | 92% / 92%                         |
| Anti-CHEK1   | CHK1                             | HPA044364  | ICC-IF                 | 92% / 93%                         |
| Anti-COMMD2  | HSPC042                          | HPA044190  | IHC, WB                | 92% / 90%                         |
| Anti-EPS8    | -                                | HPA003897  | IHC, ICC-IF            | 80% / 80%                         |
| Anti-FZD6    | Hfz6                             | HPA017991  | IHC, WB*, ICC-IF       | 55% / 62%                         |
| Anti-ITGB6   | -                                | HPA023626  | IHC, ICC-IF            | 90% / 88%                         |
| Anti-JAG1    | AGS, AHD, CD339, HJ1, JAGL1      | HPA021555  | IHC*                   | 94% / 93%                         |
| Anti-KPNA4   | IPOA3, MGC26703, QIP1, SRP3      | HPA045500  | IHC, WB*, ICC-IF       | 97% / 97%                         |
| Anti-LAMA3   | epiligrin, kalinin-165kDa, LAMNA | HPA009309  | IHC, ICC-IF            | 74% / 71%                         |
| Anti-LY6D    | E48                              | HPA024755  | IHC*, WB*              | 61% / 53%                         |
| Anti-MET     | DFNB97, HGFR, RCCP2              | HPA055607  | ICC-IF                 | 97% / 97%                         |
| Anti-MRPL3   | MRL3, RPML3                      | HPA043665  | IHC, WB                | 86% / 87%                         |
| Anti-MYEOV   | OCIM                             | HPA012949  | IHC, ICC-IF            | 19% / 21%                         |
| Anti-WNT7A   | -                                | HPA015719  | IHC                    | 100% / 100%                       |
| Anti-ZFP91   | PZF, ZNF757                      | HPA024037  | IHC                    | 99% / 97%                         |
| Anti-ZNF488  | FLJ32104                         | HPA035957  | IHC, WB*, ICC-IF       | 33% / 39%                         |

**Table 22. Top genes with highest significance associated with favorable prognosis in pancreatic cancer.**

| Product Name | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-ANAPC2  | APC2, KIAA1406             | HPA066539  | ICC-IF                 | 95% / 95%                         |
| Anti-ARNT2   | bHLHe1, KIAA0307           | HPA001056  | ICC-IF                 | 98% / 97%                         |
| Anti-CAMTA2  | KIAA0909                   | HPA051147  | ICC-IF                 | 90% / 90%                         |
| Anti-DEF8    | FLJ20186                   | HPA041745  | IHC                    | 97% / 97%                         |
| Anti-INPP5K  | SKIP                       | HPA031044  | IHC, WB                | 83% / 80%                         |
| Anti-LRSAM1  | FLJ31641                   | HPA021844  | IHC, WB, ICC-IF        | 89% / 88%                         |
| Anti-MAMDC4  | AEGP, DKFZp434M1411        | HPA059977  | IHC, ICC-IF            | 77% / 79%                         |
| Anti-MICAL1  | FLJ21739, MICAL, NICAL     | HPA030178  | IHC, WB*               | 74% / 72%                         |
| Anti-MUM1    | MUM-1                      | HPA048063  | IHC, ICC-IF            | 37% / 42%                         |
| Anti-PHLDB3  | FLJ40193                   | HPA043425  | IHC, ICC-IF            | 84% / 82%                         |
| Anti-PPP1R3F | Hb2E                       | HPA000244  | ICC-IF                 | 88% / 28%                         |
| Anti-SGSM2   | KIAA0397, RUTBC1           | HPA021641  | IHC, ICC-IF            | 80% / 80%                         |
| Anti-TBKBP1  | KIAA0775, ProSAPiP2        | HPA062347  | IHC, ICC-IF            | 95% / 98%                         |
| Anti-TSPOAP1 | BZRAP1, PRAX-1, RIM-BP1    | HPA024662  | IHC*                   | 60% / 59%                         |
| Anti-TSPYL2  | CDA1, DENTT, HRIHFB2216    | HPA044133  | IHC                    | 55% / 54%                         |
| Anti-USP20   | KIAA1003                   | HPA006287  | IHC, WB*               | 90% / 88%                         |
| Anti-WDR37   | KIAA0982                   | HPA037376  | IHC*, WB               | 100% / 100%                       |
| Anti-ZNF48   | FLJ31751, MGC43952, ZNF553 | HPA023806  | IHC, WB, ICC-IF        | 61% / 68%                         |
| Anti-ZNF222  | -                          | HPA004086  | IHC, WB, ICC-IF        | 38% / 31%                         |
| Anti-ZNF383  | FLJ35863                   | HPA063945  | IHC, ICC-IF            | 51% / 60%                         |

\* Products with enhanced validation for indicated application

# Prostate cancer

Prostate cancer is one of the most common malignancies in men. The vast majority of primary prostate cancer cases are adenocarcinomas, and the cancers often show characteristics such as multifocality and differentiation pattern heterogeneity.

The rate of prostate tumor growth varies and is often low. Since the median age at diagnosis is high (65-70 years), most patients, especially those with localized tumors, often die of other complications without ever having suffered significant disability from the cancer.

Approximately 15% of patients with prostate cancer are in high-risk of disease-related symptoms and death. However, certain patients may have prolonged survival even after the cancer has metastasized to distant sites.

Prostate cancer is often stimulated by hormones (androgens) and anti-hormonal therapies can be effective to limit and slow down tumor growth, while radical prostatectomy is an option for treating localized prostate cancer.

Both normal prostatic glands and prostate cancer cells express the protein PSA (encoded by the gene KLK3) and the detection of elevated levels of PSA in the blood is today heavily used as a screening tool to detect the growth of prostate cancer.

Prostate cancer can be diagnosed using rectal examination (palpation), and histological examinations of tissue biopsies using the Gleason Grade scoring system, where dominant histological characteristics of the cancer cells are used to determine the cancer stage. Immunostaining of relevant molecular markers is also important.

The transcriptome analysis shows that 70% (n=13686) of all human genes (n=19670) are expressed in prostate cancer.

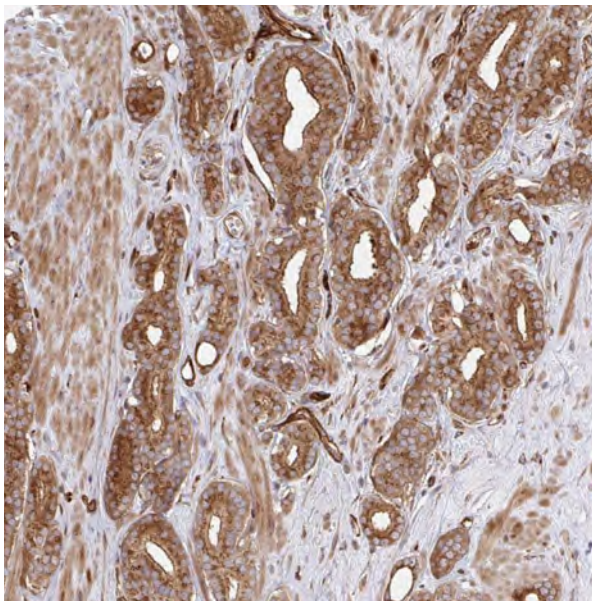
248 genes show some level of elevated expression in prostate cancer compared to other cancers

There are 134 genes associated with unfavorable prognosis in prostate cancer.

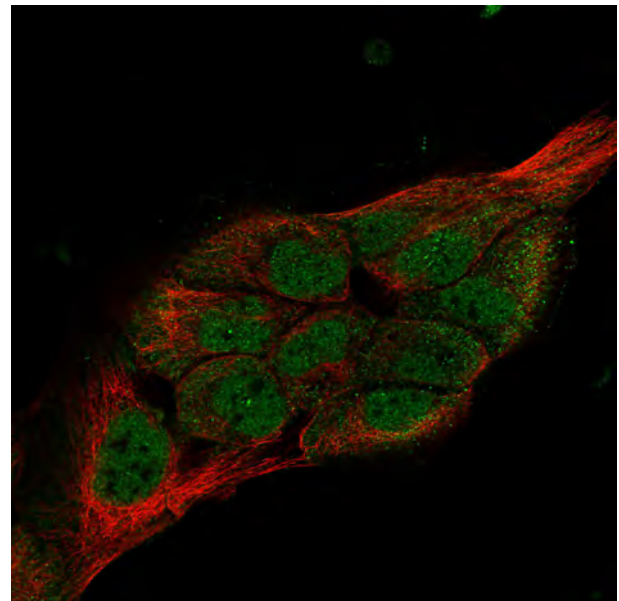
There are 25 genes associated with favorable prognosis in prostate cancer.

Data collected from 494 male patients with prostate adenocarcinoma.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 23 and 24.



**Figure 23.** Immunohistochemistry using the anti-DVL3 antibody (HPA058265) on prostate adenocarcinoma, high grade (male, age 66) shows a moderate cytoplasmic/ membranous staining of tumor cells, in brown.



**Figure 24.** Immunofluorescent staining of human cell line A-431 using the anti-MBD2 antibody (HPA067582) shows localization to nucleoplasm and cytosol, in green. Microtubules in red.

**Table 23. Top genes with highest significance associated with unfavorable prognosis in prostate cancer.**

| Product Name | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-ARRB2   | ARR2, BARR2, DKFZp686L0365 | HPA065681  | ICC-IF                 | 94% / 94%                         |
| Anti-CEP70   | BITE, FLJ13036             | HPA036942  | IHC*, WB, ICC-IF       | 78% / 74%                         |
| Anti-COPS3   | CSN3, SGN3                 | HPA021997  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-DNAJC9  | JDD1, SB73                 | HPA035215  | IHC, WB*, ICC-IF       | 93% / 93%                         |
| Anti-DVL3    | KIAA0208                   | HPA058265  | IHC, WB, ICC-IF        | 95% / 95%                         |
| Anti-FBXO45  | Fbx45                      | HPA040730  | IHC, ICC-IF            | 99% / 99%                         |
| Anti-HKR1    | ZNF875                     | HPA036126  | IHC, ICC-IF            | 29% / 34%                         |
| Anti-HOOK2   | HK2                        | HPA050351  | IHC, WB                | 85% / 84%                         |
| Anti-LMNB2   | LMN2                       | HPA047863  | IHC*, WB               | 89% / 87%                         |
| Anti-MBD1    | CXXC3, PCM1                | HPA068850  | WB, ICC-IF             | 68% / 66%                         |
| Anti-MTF2    | M96, PCL2, TDRD19A         | HPA069066  | WB, ICC-IF             | 100% / 99%                        |
| Anti-RANBP1  | HTF9A                      | HPA065931  | IHC*, ICC-IF           | 93% / 90%                         |
| Anti-RBM8A   | BOV-1C, RBM8, RBM8B, ZNRP  | HPA018403  | IHC, WB*, ICC-IF       | 100% / 100%                       |
| Anti-RNF8    | KIAA0646                   | HPA064925  | ICC-IF                 | 77% / 78%                         |
| Anti-RPAIN   | hRIP, MGC4189, RIP         | HPA031526  | IHC, WB*, ICC-IF       | 71% / 73%                         |
| Anti-SRC     | ASV, c-src, SRC1           | HPA030875  | IHC, WB*, ICC-IF       | 95% / 98%                         |
| Anti-TEX30   | C13orf27                   | HPA053545  | IHC*, WB               | 95% / 94%                         |
| Anti-USP53   | KIAA1350                   | HPA035844  | IHC, ICC-IF            | 67% / 66%                         |
| Anti-ZNF330  | HSA6591, NOA36             | HPA015705  | IHC, WB*               | 97% / 97%                         |
| Anti-ZNF654  | FLJ10997, FLJ21142         | HPA036173  | IHC, WB*, ICC-IF       | 67% / 64%                         |

**Table 24. Top genes with highest significance associated with favorable prognosis in prostate cancer.**

| Product Name  | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-AK5      | -                          | HPA019128  | IHC*, WB*, ICC-IF      | 84% / 83%                         |
| Anti-AOC1     | ABP1, DAO                  | HPA031032  | IHC, WB                | 78% / 81%                         |
| Anti-ARL2     | ARFL2                      | HPA044610  | IHC, ICC-IF            | 89% / 89%                         |
| Anti-ATP6V1E1 | ATP6E2, ATP6V1E, P31, Vma4 | HPA029196  | IHC*, WB, ICC-IF       | 98% / 99%                         |
| Anti-COMT     | -                          | HPA001169  | IHC*, WB*              | 82% / 82%                         |
| Anti-CRACR2A  | EFCAB4B, MGC4266           | HPA038686  | IHC*                   | 60% / 59%                         |
| Anti-CSR2P    | CRP2, LMO5, SmLIM          | HPA045617  | IHC                    | 100% / 100%                       |
| Anti-EPHX1    | EPHX                       | HPA020593  | IHC*, WB*              | 83% / 83%                         |
| Anti-FOS      | AP-1, c-fos                | HPA018531  | IHC, ICC-IF            | 94% / 94%                         |
| Anti-FOXQ1    | HFH1                       | HPA059700  | ICC-IF                 | 100% / 59%                        |
| Anti-GPAT4    | AGPAT6, LPAAT-zeta, TSARG7 | HPA016471  | IHC                    | 98% / 98%                         |
| Anti-HBEGF    | DTR, DTS, HEGFL            | HPA053243  | IHC                    | 76% / 80%                         |
| Anti-NTNG2    | KIAA1857, Lmnt2, NTNG1     | HPA065089  | ICC-IF                 | 100% / 100%                       |
| Anti-RFPL2    | RNF79                      | HPA048320  | ICC-IF                 | 50% / 43%                         |
| Anti-RNF122   | FLJ12526                   | HPA003888  | IHC                    | 94% / 94%                         |
| Anti-SESN1    | PA26, SEST1                | HPA073659  | ICC-IF                 | 95% / 93%                         |
| Anti-SLC35B2  | UGTrel4                    | HPA029638  | IHC                    | 89% / 91%                         |
| Anti-TMEM158  | p40BBp, RIS1               | HPA074974  | IHC                    | 96% / 96%                         |
| Anti-TSKU     | E2IG4, LRRC54, TSK         | HPA008164  | IHC, WB*, ICC-IF       | 92% / 93%                         |
| Anti-TXN2     | MT-TRX                     | HPA000994  | IHC, ICC-IF            | 91% / 89%                         |

\* Products with enhanced validation for indicated application

# Renal cancer

Most renal cancers are renal cell carcinoma, which is almost exclusively cancer of adults and it is two to three times more common in males than in females.

It is the ninth most common cancer in men and 14th most common in women worldwide. The clinical course is highly unpredictable and recurrence more than ten years after the initial resection of a primary tumor is not uncommon.

Several cases present as metastatic carcinomas of unknown primary origin. Although smoking, industrial chemicals and obesity have been implicated as risk factors, in most cases the underlying carcinogenic source is unknown.

Renal cell carcinoma consists of a family of carcinomas which are derived from the epithelium of renal tubules.

The most frequent forms are:

- clear cell renal cell carcinoma,
- papillary renal cell carcinoma,
- chromophobe renal cell carcinoma
- collecting duct carcinoma.

Approximately two thirds of all renal cell carcinomas are clear cell renal cell carcinomas and are signified by the appearance of tumor cells with abundant clear cytoplasm.

Tumors can arise anywhere in the renal cortex and are typically surrounded by a fibrous pseudocapsule.

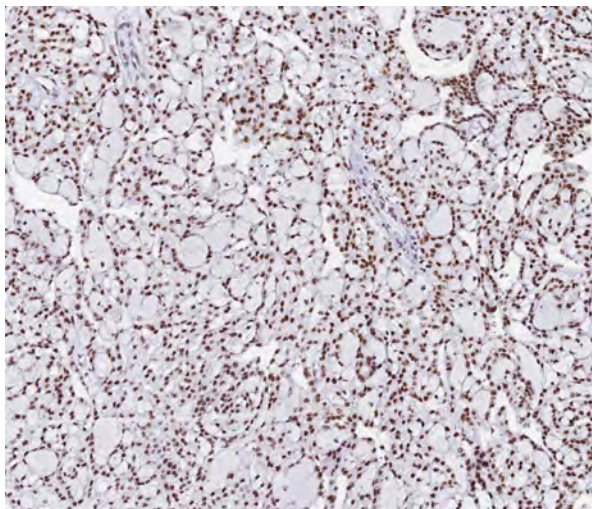
The transcriptome analysis shows that 72% (n=14124) of all human genes (n=19670) are expressed in renal cancer.

283 genes show some level of elevated expression in renal cancer compared to other cancers There are 3209 genes associated with unfavorable prognosis in renal cancer.

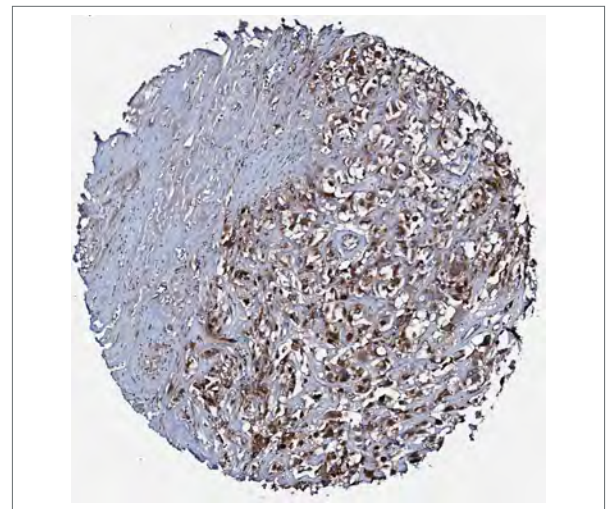
There are 2755 genes associated with favorable prognosis in renal cancer.

Data collected from 877 patients in total (286 females and 591 males): 64 patients with chromophobe renal cell carcinoma (KICH), 528 clear cell kidney carcinoma (KIRC), and 285 papillary kidney carcinoma (KIRP).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 25 and 26.



**Figure 25.** Immunohistochemistry using the anti-SNRPA1 antibody (HPA045622) on kidney adenocarcinoma (male, age 63) shows a strong nuclear staining of tumor cells, in brown.



**Figure 26.** Immunohistochemistry using the anti-ACSS3 antibody (HPA047956) on kidney adenocarcinoma (female, age 52) shows a strong cytoplasmic/membranous staining of tumor cells, in brown.

Table 25. Top genes with highest significance associated with unfavorable prognosis in renal cancer.

| Product Name  | Alternative Gene Names       | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|------------------------------|------------|------------------------|-----------------------------------|
| Anti-ANLN     | ANILLIN, scra, Scraps        | HPA050556  | IHC*, WB*, ICC-IF      | 86% / 85%                         |
| Anti-CCNA2    | CCN1, CCNA                   | HPA020626  | WB*, ICC-IF            | 75% / 75%                         |
| Anti-CCNB2    | HsT17299                     | HPA008873  | IHC*, WB, ICC-IF       | 81% / 27%                         |
| Anti-CDCA5    | -                            | HPA023691  | IHC, WB, ICC-IF        | 66% / 64%                         |
| Anti-CDK1     | CDC2, CDC28A                 | HPA003387  | IHC*, WB, ICC-IF       | 98% / 98%                         |
| Anti-CEP55    | C10orf3, CT111, FLJ10540     | HPA023430  | IHC, WB, ICC-IF        | 71% / 77%                         |
| Anti-COLGALT1 | FLJ22329, GLT25D1            | HPA047821  | IHC, WB                | 90% / 88%                         |
| Anti-FKBP10   | FKBP6, FLJ23833, hFKBP65     | HPA057021  | IHC*, WB               | 87% / 88%                         |
| Anti-FOXO1    | FKHL16, HFH-11, HNF-3, INS-1 | HPA029974  | IHC                    | 73% / 75%                         |
| Anti-KIF11    | Eg5, HKSP, KNSL1, TRIP5      | HPA010568  | IHC*, WB               | 88% / 83%                         |
| Anti-KIF20A   | RAB6KIFL                     | HPA036910  | IHC, WB*               | 78% / 77%                         |
| Anti-MELK     | KIAA0175                     | HPA017214  | IHC, WB*               | 58% / 22%                         |
| Anti-PLK1     | PLK                          | HPA051638  | IHC                    | 88% / 90%                         |
| Anti-PRR11    | FLJ11029                     | HPA023923  | IHC, WB*               | 76% / 74%                         |
| Anti-RIPK2    | CARD3, CARDIAK, RICK, RIP2   | HPA015273  | IHC, WB, ICC-IF        | 73% / 73%                         |
| Anti-SPC24    | FLJ90806, SPBC24             | HPA051234  | IHC, WB, ICC-IF        | 85% / 91%                         |
| Anti-TNNT1    | ANM, NEM5, STNT, TNT         | HPA058448  | IHC*                   | 97% / 95%                         |
| Anti-TOP2A    | TOP2                         | HPA006458  | IHC*, WB               | 63% / 60%                         |
| Anti-TPX2     | C20orf2, DIL-2, p100         | HPA005487  | IHC*, WB, ICC-IF       | 84% / 86%                         |
| Anti-TRIP13   | 16E1BP                       | HPA005727  | IHC*, WB*, ICC-IF      | 88% / 89%                         |

Table 26. Top genes with highest significance associated with favorable prognosis in renal cancer.

| Product Name  | Alternative Gene Names  | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-------------------------|------------|------------------------|-----------------------------------|
| Anti-ACAT1    | ACAT, THIL              | HPA004428  | IHC*, WB*, ICC-IF      | 92% / 92%                         |
| Anti-ACO2     | ACONM                   | HPA001097  | IHC*, WB, ICC-IF       | 97% / 97%                         |
| Anti-ACSS3    | FLJ21963                | HPA047956  | IHC, WB*               | 85% / 88%                         |
| Anti-AUH      | -                       | HPA004171  | IHC*                   | 70% / 67%                         |
| Anti-C1orf210 | MGC52423                | HPA013788  | IHC, WB*               | 79% / 77%                         |
| Anti-CDS1     | -                       | HPA036187  | IHC, ICC-IF            | 91% / 91%                         |
| Anti-CRAT     | CAT1                    | HPA022815  | WB*, ICC-IF            | 91% / 91%                         |
| Anti-CRB3     | MGC17303                | HPA013835  | IHC*, ICC-IF           | 91% / 91%                         |
| Anti-GNG7     | FLJ00058                | HPA057790  | IHC                    | 100% / 100%                       |
| Anti-HADH     | HADH1, HADHSC, SCHAD    | HPA043888  | WB*, ICC-IF            | 95% / 95%                         |
| Anti-IMPA2    | -                       | HPA029561  | IHC, WB*, ICC-IF       | 92% / 91%                         |
| Anti-IRF6     | LPS, OFC6, VWS, VWS1    | HPA063121  | IHC*, WB*, ICC-IF      | 95% / 96%                         |
| Anti-KIF13B   | GAKIN, KIAA0639         | HPA025023  | IHC*, WB               | 86% / 81%                         |
| Anti-LRBA     | BGL, CDC4L, LAB300, LBA | HPA019366  | IHC, ICC-IF            | 72% / 73%                         |
| Anti-PAFAH1B1 | LIS1, MDCR, MDS, PAFAH  | HPA020036  | IHC*, ICC-IF           | 99% / 99%                         |
| Anti-PCCA     | -                       | HPA047792  | IHC*, WB               | 93% / 84%                         |
| Anti-PINK1    | PARK6                   | HPA001931  | IHC                    | 85% / 87%                         |
| Anti-TMEM25   | FLJ14399                | HPA012163  | IHC, ICC-IF            | 86% / 86%                         |
| Anti-TOLLIP   | IL-1RAcPIP              | HPA038621  | IHC*, WB*, ICC-IF      | 88% / 88%                         |
| Anti-ZNF844   | FLJ14959                | HPA046982  | IHC                    | 37% / 27%                         |

\* Products with enhanced validation for indicated application

# Stomach cancer

Stomach cancer, or gastric cancer or gastric carcinoma, is the fifth most common cancer in the world and the fourth leading cause of cancer-related mortality. The global 5-year survival rate is 20%.

Stomach cancer occurs most often in men over the age of 40 and is common in Japan, Chile, and Iceland. The main risk factor for developing this type of cancer is *Helicobacter pylori* infection.

Other risk factors include a history of adenomatous gastric polyps, chronic atrophic gastritis or pernicious anemia as well as smoking and consumption of salted, cured or smoked foods. A genetic component is present in approximately 10% of all cases.

Stomach cancer originates from the mucosa of the stomach and consist of adenocarcinoma of varying architecture, grade of differentiation and mucin content. Clinical classification into different stages is necessary for determining the most suitable therapy.

Tumors restricted to the stomach and with no metastasis are treated with a combination of surgery, chemotherapy, radiotherapy and/or target therapy. Metastasized tumors are not curable and associated with more dismal prognosis.

The transcriptome analysis shows that 73% (n=14401) of all human genes (n=19670) are expressed in stomach cancer.

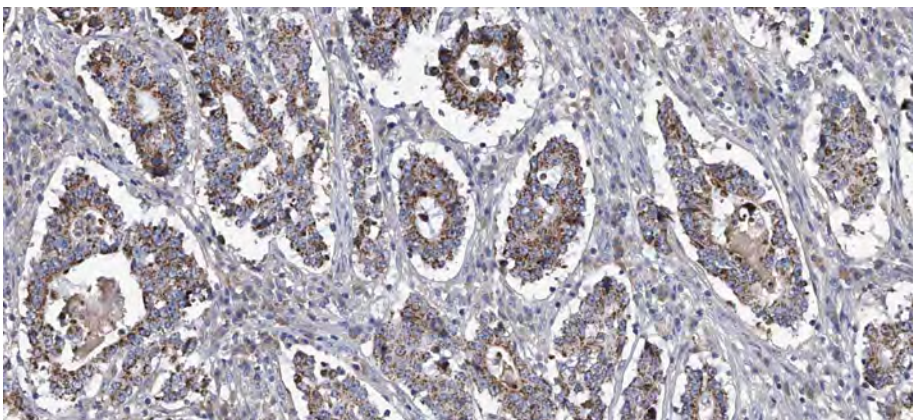
143 genes show some level of elevated expression in stomach cancer compared to other cancers

There are 170 genes associated with unfavorable prognosis in stomach cancer.

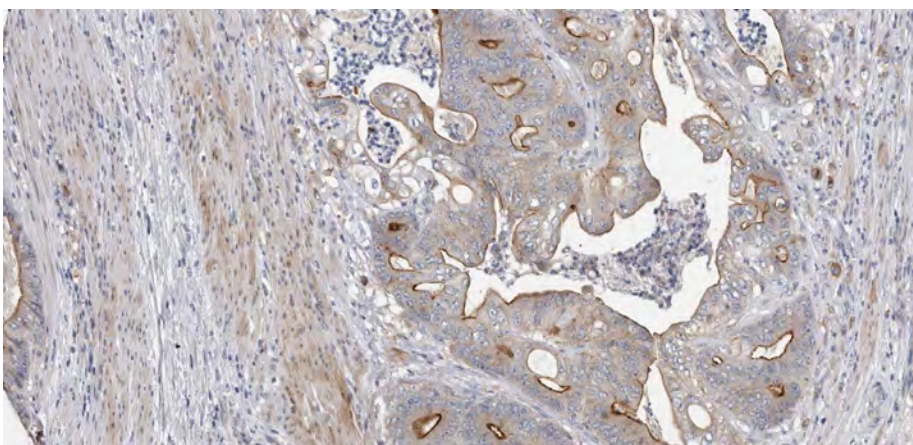
There are 128 genes associated with favorable prognosis in stomach cancer.

Data collected from 354 patients in total (125 females and 229 males).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 27 and 28.



**Figure 27.** Immunohistochemistry using the anti-NRP1 antibody (HPA030278) on stomach adenocarcinoma (male, age 59) shows a medium cytoplasmic/membranous staining of tumor cells, in brown.



**Figure 28.** Immunohistochemistry using the anti-FAM83G antibody (HPA023369) on stomach adenocarcinoma (female, age 73) shows a moderate cytoplasmic/membranous staining of tumor cells, in brown.

Table 27. Top genes with highest significance associated with unfavorable prognosis in stomach cancer.

| Product Name  | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-AKR1B1   | ALDR1, AR                   | HPA026425  | IHC*, ICC-IF           | 80% / 80%                         |
| Anti-CAST     | -                           | HPA036881  | IHC, ICC-IF            | 67% / 69%                         |
| Anti-CCPG1    | CPR8, KIAA1254              | HPA026861  | IHC                    | 76% / 73%                         |
| Anti-CD109    | CPAMD7, FLJ38569            | HPA015723  | IHC*                   | 65% / 61%                         |
| Anti-CYTL1    | C17, C4orf4                 | HPA067201  | ICC-IF                 | 78% / 78%                         |
| Anti-DUSP1    | CL100, HVH1, MKP-1, PTPN10  | HPA069577  | WB, ICC-IF             | 94% / 96%                         |
| Anti-ELL2     | -                           | HPA013569  | WB, ICC-IF             | 84% / 83%                         |
| Anti-FN1      | CIG, FINC, GFND2, LETS, MSF | HPA027066  | IHC, WB                | 95% / 95%                         |
| Anti-GJA1     | CX43, GJAL, ODD, SDTY3      | HPA035097  | IHC*                   | 96% / 97%                         |
| Anti-GPR176   | Gm1012                      | HPA039943  | IHC, WB*               | 84% / 78%                         |
| Anti-ITGAV    | CD51, MSK8, VNRA, VTNR      | HPA004856  | IHC, ICC-IF            | 88% / 90%                         |
| Anti-MATN3    | EDM5, HOA                   | HPA051250  | ICC-IF                 | 81% / 74%                         |
| Anti-NRP1     | CD304, NRP, VEGF165R        | HPA030278  | IHC                    | 97% / 92%                         |
| Anti-NT5E     | CALJA, CD73, eN, eNT, NT5   | HPA017357  | IHC, WB, ICC-IF        | 90% / 92%                         |
| Anti-OPN1SW   | BCP, BOP, CBT               | HPA013562  | IHC*                   | 88% / 88%                         |
| Anti-PPP1R3B  | FLJ14005, GL, PPP1R4        | HPA028731  | IHC                    | 83% / 88%                         |
| Anti-RNF144A  | KIAA0161, RNF144, UBCE7IP4  | HPA049939  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-SERPINE1 | PAI, PAI1, PLANH1           | HPA050039  | IHC, ICC-IF            | 83% / 84%                         |
| Anti-SLC2A3   | GLUT3                       | HPA006539  | IHC, ICC-IF            | 65% / 64%                         |
| Anti-SPRED1   | FLJ33903, PPP1R147          | HPA061805  | WB, ICC-IF             | 98% / 92%                         |

Table 28. Top genes with highest significance associated with favorable prognosis in stomach cancer.

| Product Name | Alternative Gene Names    | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|---------------------------|------------|------------------------|-----------------------------------|
| Anti-BICDL1  | BICDR-1, CCDC64, FLJ26450 | HPA061116  | IHC*, WB, ICC-IF       | 97% / 97%                         |
| Anti-C3orf62 | FLJ43654                  | HPA043328  | WB*, ICC-IF            | 74% / 79%                         |
| Anti-CSK     | -                         | HPA028425  | IHC, WB*, ICC-IF       | 98% / 95%                         |
| Anti-DPP9    | -                         | HPA036059  | IHC, ICC-IF            | 81% / 75%                         |
| Anti-FAAH    | FAAH-1                    | HPA007425  | IHC                    | 87% / 84%                         |
| Anti-FAM83G  | FLJ41564, PAWS1           | HPA023369  | IHC*, WB, ICC-IF       | 78% / 78%                         |
| Anti-MAP2K2  | MEK2, PRKMK2              | HPA051993  | IHC, WB, ICC-IF        | 100% / 98%                        |
| Anti-MEN1    | -                         | HPA030342  | IHC, ICC-IF            | 99% / 99%                         |
| Anti-MISP3   | -                         | HPA042225  | IHC                    | 35% / 29%                         |
| Anti-NCLN    | NET59, NICALIN            | HPA006625  | IHC                    | 94% / 94%                         |
| Anti-PICK1   | MGC15204, PRKCABP         | HPA067384  | ICC-IF                 | 100% / 100%                       |
| Anti-PRR15L  | ATAD4, MGC11242           | HPA022918  | IHC, ICC-IF            | 91% / 88%                         |
| Anti-SLC52A3 | C20orf54, hRFT2, RFVT3    | HPA049391  | IHC                    | 50% / 50%                         |
| Anti-TAF5    | TAF2D, TAFII100           | HPA006474  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-TIMM29  | C19orf52                  | HPA041858  | IHC, WB, ICC-IF        | 85% / 88%                         |
| Anti-TMEM259 | C19orf6, MBRL, MGC4022    | HPA042669  | IHC, WB                | 92% / 90%                         |
| Anti-TNFAIP2 | B94, EXOC3L3              | HPA030624  | ICC-IF                 | -                                 |
| Anti-TSEN54  | SEN54, SEN54L             | HPA053097  | IHC, WB                | 89% / 93%                         |
| Anti-TTC9C   | MGC29649                  | HPA055169  | IHC, ICC-IF            | 93% / 97%                         |
| Anti-ZNF101  | DKFZp570I0164, HZF12      | HPA023449  | IHC, WB                | 43% / 43%                         |

\* Products with enhanced validation for indicated application

# Testis cancer

Testis cancer constitutes approximately 1% of cancer in males. Tumors of germ cell origin account for approximately 95% of all testis cancers.

Pathology plays a key role in the management of patients with testicular tumors by allowing for accurate classification of tumors to provide the prognostic parameters needed for optimizing decisions regarding treatment and follow-up.

Testis cancer is divided into two major categories:

- seminoma
- non-seminomatous germ cell tumors.

Seminomas account for approximately 45% of all germ cell tumors and are characterized histologically by evenly spaced and relatively large uniform tumor cells with distinct cell borders.

Tumor cell nuclei are often centrally localized and show distinct nuclear membranes and one or two distinct nucleoli. The characteristic tumor stroma in seminoma is built up by a delicate fibrovascular network with thin collagenous septa containing variable amounts of small lymphocytes.

Of the non-seminomatous tumors, embryonal carcinoma accounts for 15-30% and represents the second most frequent pure type of testicular cancer.

Embryonal cancer displays an acinar, tubular, papillary or solid growth pattern with areas of necrosis, hemorrhage and fibrosis. Tumor cells are highly pleomorphic with large, irregular nuclei and indistinct cell borders.

The transcriptome analysis shows that 75% (n=14746) of all human genes (n=19670) are expressed in testis cancer.

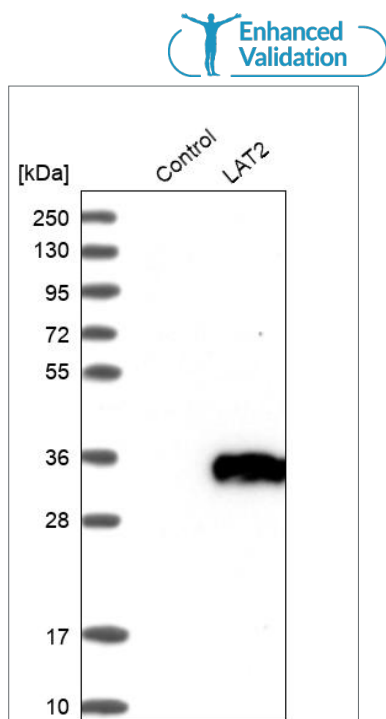
479 genes show some level of elevated expression in testis cancer compared to other cancers

There are 42 genes associated with unfavorable prognosis in testis cancer.

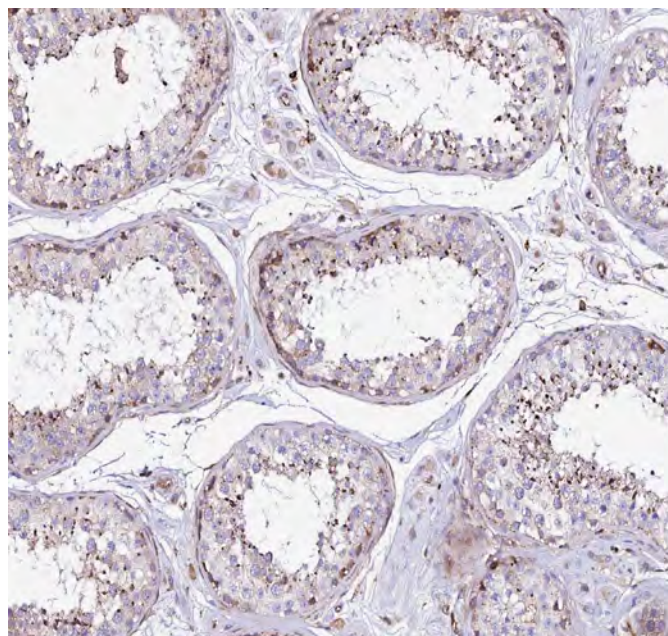
There are 15 genes associated with favorable prognosis in testis cancer.

Data collected from 134 males with seminoma or non-seminomatous germ cell tumors.

The top most significant genes related to unfavorable and favorable prognosis are listed in Tables 29 and 30.



**Figure 29.** Recombinant expression validation in WB using target protein overexpression. Western blot analysis using the anti-LAT2 antibody (HPA003462) in control (vector only transfected HEK293T lysate) and LAT2 over-expression lysate (Co-expressed with a C-terminal myc-DDK tag (~3.1 kDa) in mammalian HEK293T cells, LY410097).



**Figure 30.** Immunohistochemistry using the anti-TRPV2 antibody (HPA044993) on testis, normal tissue, (male, age 25) shows a high cytoplasmic/membranous staining in seminiferous ducts cells, and a medium cytoplasmic/membranous staining in Leydig cells, in brown.

**Table 29. Top genes with highest significance associated with unfavorable prognosis in testis cancer.**

| Product Name | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-BST2    | CD317, tetherin             | HPA017060  | IHC, ICC-IF            | 29% / 29%                         |
| Anti-CD300C  | CMRF35, CMRF35A, IGSF16     | HPA014523  | IHC, WB*               | 35% / 36%                         |
| Anti-CCR7    | BLR2, CD197, CDw197         | HPA031383  | ICC-IF                 | 83% / 85%                         |
| Anti-CLCN7   | CLC7, OPTA2, PPP1R63        | HPA043019  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-CLEC10A | CD301, HML, HML2            | HPA021937  | IHC, WB*               | 71% / 71%                         |
| Anti-CSF1R   | C-FMS, CD115, CSFR, FMS     | HPA012323  | IHC, WB, ICC-IF        | 58% / 61%                         |
| Anti-CSF3R   | CD114, GCSFR                | HPA048086  | IHC                    | 58% / 60%                         |
| Anti-FCHSD1  | FLJ00007                    | HPA043795  | IHC, ICC-IF            | 83% / 81%                         |
| Anti-FKBP15  | KIAA0674, PPP1R76, WAFL     | HPA007979  | IHC, WB                | 95% / 94%                         |
| Anti-GGA2    | KIAA1080, VEAR              | HPA043313  | WB, ICC-IF             | 60% / 64%                         |
| Anti-GIMAP1  | HIMAP1, IAN2, IMAP1, IMAP38 | HPA053441  | WB, ICC-IF             | 63% / 63%                         |
| Anti-LAT2    | HSPC046, NTAL, WBSCR15      | HPA003462  | IHC*, WB*              | 46% / 46%                         |
| Anti-LITAF   | PIG7, SIMPLE, TP53I7        | HPA006960  | IHC, WB, ICC-IF        | 87% / 89%                         |
| Anti-LY86    | dJ80N2.1, MD-1              | HPA044895  | IHC                    | 75% / 75%                         |
| Anti-PAG1    | CBP, PAG                    | HPA066527  | WB, ICC-IF             | 76% / 78%                         |
| Anti-SGSH    | HSS, MPS3A, SFMD            | HPA023451  | IHC*, WB               | 81% / 79%                         |
| Anti-SIGLEC1 | CD169, SIGLEC-1, SN         | HPA053457  | IHC                    | 72% / 68%                         |
| Anti-TBC1D2  | Armus, PARIS1, TBC1D2A      | HPA030871  | IHC, WB                | 74% / 74%                         |
| Anti-TLR4    | ARMD10, CD284, hToll, TLR-4 | HPA049174  | IHC                    | 64% / 62%                         |
| Anti-TRPV2   | VRL, VRL-1, VRL1            | HPA044993  | IHC, ICC-IF            | 71% / 59%                         |

**Table 30. Top genes with highest significance associated with favorable prognosis in testis cancer.**

| Product Name | Alternative Gene Names  | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|-------------------------|------------|------------------------|-----------------------------------|
| Anti-ARHGEF4 | ASEF, KIAA1112, STM6    | HPA018267  | IHC                    | 89% / 89%                         |
| Anti-CA9     | CAIX, MN                | HPA055207  | IHC*                   | 80% / 80%                         |
| Anti-CITED1  | MSG1                    | HPA049051  | IHC*, ICC-IF           | 77% / 76%                         |
| Anti-FUNDC1  | MGC51029                | HPA038773  | IHC, WB*               | 95% / 95%                         |
| Anti-GALNT6  | GalNAc-T6L, GALNT17     | HPA031019  | IHC, WB                | 93% / 37%                         |
| Anti-HRASLS  | H-REV107, HRASLS1       | HPA051179  | IHC, ICC-IF            | 89% / 89%                         |
| Anti-IFT52   | CGI-53, NGD2, NGD5      | HPA067423  | IHC*                   | 95% / 27%                         |
| Anti-IQCC    | FLJ10547                | HPA028686  | IHC, WB, ICC-IF        | 70% / 65%                         |
| Anti-PIN4    | EPVH, PAR14, PAR17      | HPA064504  | WB*, ICC-IF            | 97% / 97%                         |
| Anti-PRKRA   | DYT16, HSD14, PACT, RAX | HPA034996  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-PRR36   |                         | HPA062741  | IHC, ICC-IF            | 64% / 64%                         |
| Anti-SNX31   | MGC39715                | HPA024284  | IHC, WB                | 82% / 78%                         |
| Anti-TPGS2   | C18orf10, HsT3006       | HPA040596  | IHC, WB*               | 91% / 89%                         |

\* Products with enhanced validation for indicated application

# Thyroid cancer

The thyroid cancer is fairly common. The annual incidence is between 0,5-10 per 100,000 in various populations and 2-4 times more frequent in women compared to men.

The most common forms of thyroid cancer are:

- papillary carcinoma (70-80%),
- follicular carcinoma (10-20%),
- medullary carcinoma (5-10%)
- anaplastic carcinoma (2-10%).

The classification of thyroid cancer is dependent on histological features according to WHO. Thyroid tumors can also be classified according to aggressiveness into low-grade malignant, intermediate-grade malignant and high-grade malignant.

The prognosis for thyroid cancer is good, with a 10-year relative survival rate of approximately 98% for papillary carcinomas. Apart from age, where young patients have a considerably better prognosis, the size of the primary tumor and the tumor stage are the most significant prognostic factors.

For most thyroid tumors, diagnosis can be established by microscopic examination alone, although immunohistochemistry plays an important role in tumors exhibiting unusual morphological features.

The transcriptome analysis shows that 69% (n=13485) of all human genes (n=19670) are expressed in thyroid cancer.

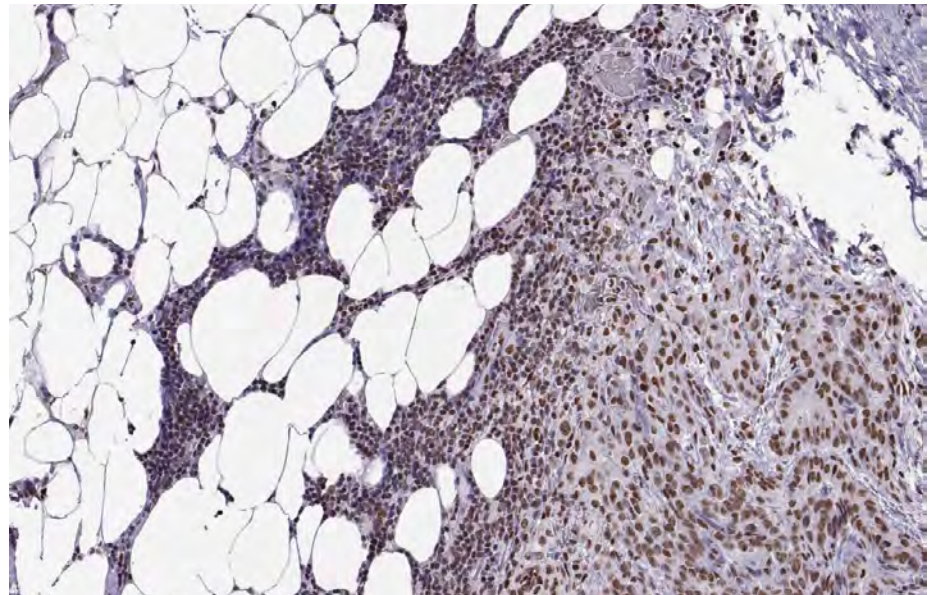
190 genes show some level of elevated expression in thyroid cancer compared to other cancers

There are 186 genes associated with unfavorable prognosis in thyroid cancer.

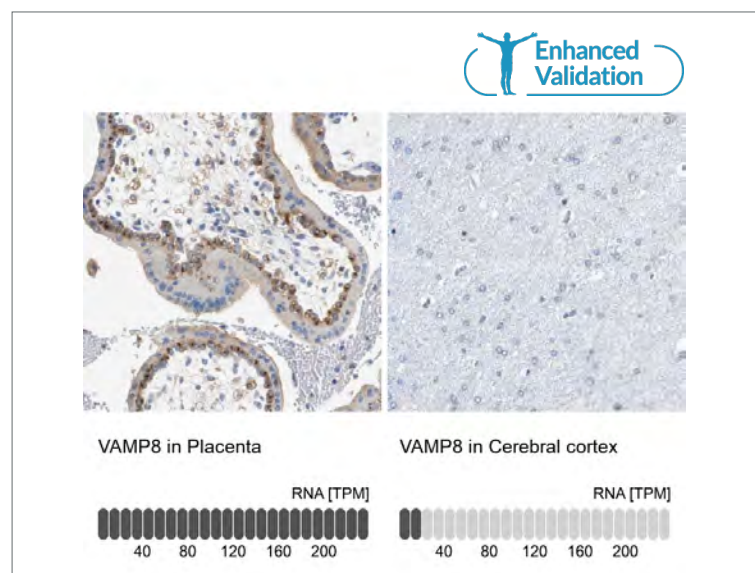
There are 161 genes associated with favorable prognosis in thyroid cancer.

Data collected from 501 patients with thyroid carcinoma (366 females and 135 males).

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 31 and 32.



**Figure 31.** Immunohistochemistry using the anti-SNAI1 antibody (HPA069985) on thyroid cancer (papillary adenocarcinoma, male, age 61) shows a high nuclear staining in tumor cells, in brown.



**Figure 32.** Orthogonal validation of protein expression using IHC by comparison to RNA-seq data of corresponding target in high and low expression tissues. Immunohistochemistry analysis in human placenta and cerebral cortex tissues using anti-VAMP8 antibody (HPA006882). Corresponding VAMP8 RNA-seq data are presented for the same tissues.

**Table 31. Top genes with highest significance associated with unfavorable prognosis in thyroid cancer.**

| Product Name  | Alternative Gene Names      | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-----------------------------|------------|------------------------|-----------------------------------|
| Anti-ALDH1B1  | ALDH5, ALDHX                | HPA021037  | IHC*, WB, ICC-IF       | 79% / 82%                         |
| Anti-BCKDHA   | MSU, OVD1A                  | HPA036640  | IHC                    | 94% / 94%                         |
| Anti-CILP     | HsT18872                    | HPA003195  | IHC                    | 91% / 89%                         |
| Anti-COPZ2    | MGC23008                    | HPA055999  | IHC                    | 92% / 92%                         |
| Anti-FAM171A1 | C10orf38, FLJ12884          | HPA051345  | IHC, ICC-IF            | 84% / 79%                         |
| Anti-FIBIN    | MGC24932                    | HPA040120  | IHC, WB*               | 95% / 95%                         |
| Anti-FKBP10   | FKBP6, FLJ20683, FLJ22041   | HPA051171  | IHC* ICC-IF            | 93% / 91%                         |
| Anti-GAS1     | -                           | HPA066902  | IHC                    | 89% / 89%                         |
| Anti-GUF1     | FLJ13220                    | HPA024222  | WB, ICC-IF             | 89% / 89%                         |
| Anti-MAP1A    | MAP1L                       | HPA039063  | IHC*                   | 70% / 73%                         |
| Anti-PAPSS2   | ATPSK2                      | HPA071224  | ICC-IF                 | 85% / 81%                         |
| Anti-PDLIM3   | ALP                         | HPA004749  | IHC*                   | 95% / 94%                         |
| Anti-PRDM16   | MEL1, MGC166915, PFM13      | HPA050343  | ICC-IF                 | 86% / 87%                         |
| Anti-PRKAB2   | -                           | HPA044342  | IHC*, WB, ICC-IF       | 93% / 94%                         |
| Anti-RINT1    | FLJ11785, RINT-1            | HPA019875  | IHC, WB                | 71% / 68%                         |
| Anti-SENP6    | KIAA0797, SUSP1             | HPA024376  | IHC, ICC-IF            | 69% / 71%                         |
| Anti-SNAI1    | SLUGH2, SNAH, SNAIL, SNAIL1 | HPA069985  | IHC                    | 82% / 82%                         |
| Anti-SYNDIG1  | C20orf39, FLJ14220, IFITMD5 | HPA044271  | ICC-IF                 | 90% / 87%                         |
| Anti-TSHZ1    | NY-CO-33, SDCCAG33, TSH1    | HPA006982  | IHC, WB, ICC-IF        | 86% / 86%                         |
| Anti-WDR37    | KIAA0982                    | HPA037376  | IHC*, WB               | 100% / 100%                       |

**Table 32. Top genes with highest significance associated with favorable prognosis in thyroid cancer.**

| Product Name   | Alternative Gene Names     | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|----------------|----------------------------|------------|------------------------|-----------------------------------|
| Anti-ADRA1B    | -                          | HPA074416  | ICC-IF                 | 96% / 94%                         |
| Anti-ANXA1     | ANX1, LPC1                 | HPA011271  | IHC*, WB*, ICC-IF      | 83% / 86%                         |
| Anti-C14orf119 | FLJ20671                   | HPA003638  | IHC*, WB               | 84% / 83%                         |
| Anti-DERA      | CGI-26, DEOC               | HPA055897  | WB, ICC-IF             | 92% / 91%                         |
| Anti-DOLK      | DK1, KIAA1094, TMEM15      | HPA066767  | ICC-IF                 | 96% / 96%                         |
| Anti-DRAP1     | NC2-alpha                  | HPA006790  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-GLTP      | -                          | HPA056461  | IHC, WB*, ICC-IF       | 96% / 96%                         |
| Anti-HECTD3    | FLJ21156                   | HPA027467  | IHC                    | 99% / 98%                         |
| Anti-INPP1     | -                          | HPA036699  | IHC, ICC-IF            | 86% / 85%                         |
| Anti-KIAA1211L | C2orf55, MGC42367          | HPA051082  | IHC                    | 78% / 74%                         |
| Anti-LPAR5     | GPR92, GPR93, KPG010, LPA5 | HPA013170  | IHC                    | 48% / 49%                         |
| Anti-MCM3      | -                          | HPA004789  | IHC, WB                | 95% / 93%                         |
| Anti-MYL12B    | MRLC2                      | HPA045244  | IHC, WB, ICC-IF        | 100% / 100%                       |
| Anti-RAB34     | RAB39, RAH                 | HPA021366  | IHC                    | 93% / 93%                         |
| Anti-SLC37A1   | -                          | HPA030418  | IHC                    | 60% / 55%                         |
| Anti-TPT1      | fortilin, TCTP             | HPA039437  | IHC, WB, ICC-IF        | 97% / 97%                         |
| Anti-TRIM21    | RNF81, Ro/SSA, RO52, SSA1  | HPA005673  | IHC, WB*, ICC-IF       | 75% / 70%                         |
| Anti-UBE2Q1    | NICE-5, PRO3094, UBE2Q     | HPA063368  | IHC, ICC-IF            | 100% / 100%                       |
| Anti-VAMP8     | EDB                        | HPA006882  | IHC*, WB               | 95% / 92%                         |
| Anti-ZCCHC12   | FLJ16123, PNMA7A, SIZN1    | HPA031016  | IHC, WB*, ICC-IF       | 76% / 74%                         |

\* Products with enhanced validation for indicated application

## Urothelial cancer

Urothelial carcinoma, also termed transitional cell carcinoma or urinary bladder cancer, is a major cause of morbidity and mortality throughout the world. The highest frequency of cancer in the urinary bladder is found among urban Caucasians in Western Europe and in the USA.

Urothelial cancer typically presents in patients over the age of 50 years and is approximately three times as common in males as in females. Smoking is considered an important risk factor.

Urothelial cancer can be divided into papillary and non-papillary tumors depending on the morphological appearance. Approximately 25% of all urothelial tumors are non-invasive papillary tumors. However, 10-15% of these patients will subsequently develop an invasive tumor.

The transcriptome analysis shows that 71% (n=14059) of all human genes (n=19670) are expressed in urothelial cancer.

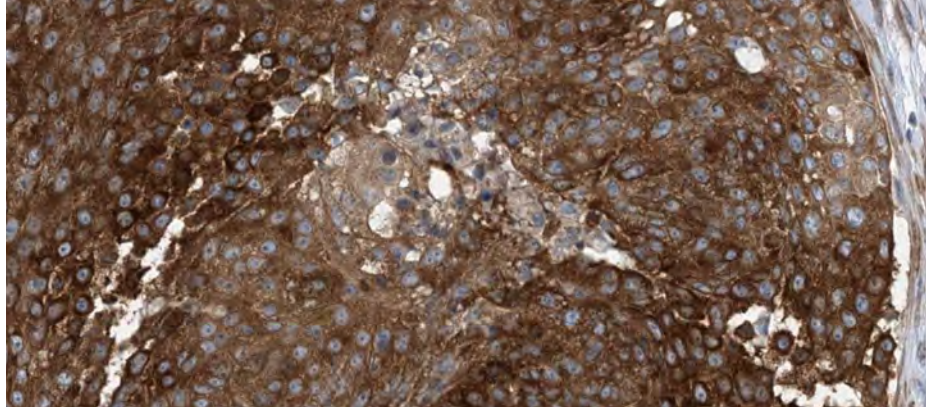
127 genes show some level of elevated expression in urothelial cancer compared to other cancers

There are 379 genes associated with unfavorable prognosis in urothelial cancer.

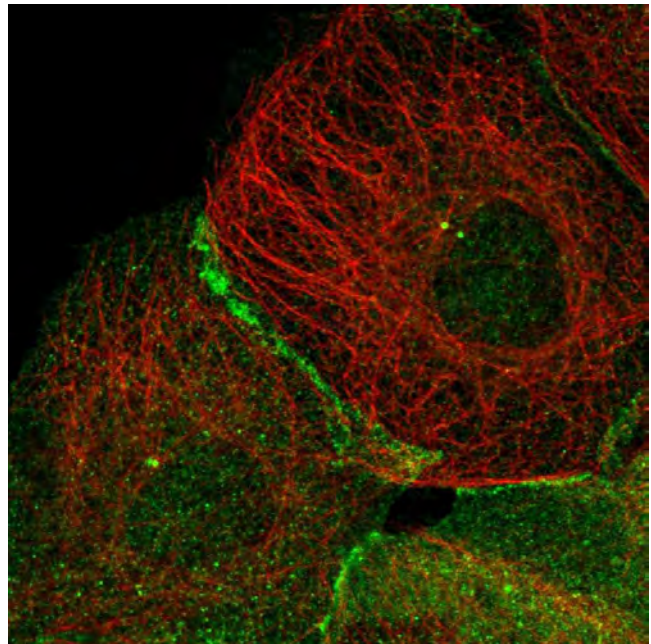
There are 713 genes associated with favorable prognosis in urothelial cancer.

Data collected from 406 patients in total. The dataset included 107 females and 299 males.

The top 20 most significant genes related to unfavorable and favorable prognosis are listed in Tables 33 and 34.



**Figure 33.** Immunohistochemistry using the anti-EHBP1 antibody (HPA035468) on urothelial carcinoma (female, age 63) shows a high cytoplasmic/membranous staining in tumor cells, in brown.



**Figure 34.** Immunofluorescent staining of human cell line A-431 using the anti-TRIM38 antibody (HPA031685) shows localization to plasma membrane, centrosome & cell junctions, in green. Microtubules in red.

**Table 33. Top genes with highest significance associated with unfavorable prognosis in urothelial cancer.**

| Product Name | Alternative Gene Names        | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|--------------|-------------------------------|------------|------------------------|-----------------------------------|
| Anti-AHNAK   | MGC5395                       | HPA019010  | IHC, ICC-IF            | 87% / 84%                         |
| Anti-ANXA1   | ANX1, LPC1                    | HPA011271  | IHC*, WB*, ICC-IF      | 83% / 86%                         |
| Anti-BAIAP2  | BAP2                          | HPA023310  | IHC*, WB, ICC-IF       | 92% / 92%                         |
| Anti-BOC     | CDON2                         | HPA060778  | ICC-IF                 | 74% / 74%                         |
| Anti-BRMS1L  | BRMS1, FLJ39177, MGC11296     | HPA046623  | ICC-IF                 | 99% / 100%                        |
| Anti-CRYAB   | CRYA2, HSPB5                  | HPA057100  | IHC*                   | 98% / 98%                         |
| Anti-DSC3    | CDHF3, DSC, DSC1, DSC2        | HPA049265  | IHC*                   | 79% / 76%                         |
| Anti-DTD2    | C14orf126, MGC9912            | HPA001117  | IHC, ICC-IF            | 84% / 85%                         |
| Anti-EHBP1   | KIAA0903, NACSIN              | HPA035468  | IHC*, WB, ICC-IF       | 69% / 76%                         |
| Anti-ECM1    | -                             | HPA027241  | IHC*, WB*              | 76% / 79%                         |
| Anti-FKBP9   | FKBP60, FKBP63                | HPA012595  | IHC, WB, ICC-IF        | 90% / 92%                         |
| Anti-GALK1   | GALK                          | HPA007094  | IHC, WB*, ICC-IF       | 89% / 89%                         |
| Anti-GAS6    | AXLLG, AXSF, FLJ34709         | HPA008275  | IHC                    | 76% / 79%                         |
| Anti-HSPB6   | FLJ32389, Hsp20, PPP1R91      | HPA044153  | IHC*, WB               | 85% / 88%                         |
| Anti-HTRA1   | ARMD7, HtrA, PRSS11           | HPA036655  | IHC, ICC-IF            | 91% / 91%                         |
| Anti-KLK5    | KLK-L2, SCTE                  | HPA014343  | IHC*                   | 72% / 72%                         |
| Anti-PLD1    | -                             | HPA042396  | IHC*, ICC-IF           | 90% / 85%                         |
| Anti-SHTN1   | KIAA1598, shootin-1, shootin1 | HPA037942  | IHC*, WB*              | 95% / 95%                         |
| Anti-SLC1A6  | EAAT4                         | HPA041505  | IHC*, ICC-IF           | 85% / 82%                         |
| Anti-TM4SF1  | L6, M3S1                      | HPA002823  | IHC                    | 75% / 77%                         |

**Table 34. Top genes with highest significance associated with favorable prognosis in urothelial cancer.**

| Product Name  | Alternative Gene Names        | Product ID | Validated Applications | Antigen seq. identity mouse / rat |
|---------------|-------------------------------|------------|------------------------|-----------------------------------|
| Anti-APOBEC3H | ARP10                         | HPA021492  | IHC                    | 48% / 51%                         |
| Anti-CCNL1    | ania-6a                       | HPA057911  | ICC-IF                 | 96% / 98%                         |
| Anti-CCNL2    | ania-6b, CCNM, PCEE, SB138    | HPA053137  | IHC, ICC-IF            | 96% / 96%                         |
| Anti-CLEC2D   | CLAX, LLT1, OCIL              | HPA017649  | IHC                    | 47% / 47%                         |
| Anti-CXorf38  | MGC39350                      | HPA050120  | IHC, WB*, ICC-IF       | 69% / 66%                         |
| Anti-GRIPAP1  | GRASP1, KIAA1167              | HPA000615  | IHC*, WB*, ICC-IF      | 99% / 99%                         |
| Anti-GSDMB    | GSDML, PRO2521                | HPA052407  | IHC*                   | 30% / 28%                         |
| Anti-IKKBK    | IKK-beta, IKK2, IKKB, NFKB1KB | HPA001249  | IHC, WB*, ICC-IF       | 89% / 87%                         |
| Anti-IL9R     | CD129                         | HPA063240  | IHC                    | 67% / 61%                         |
| Anti-LIPT1    | MGC12290, MGC13378            | HPA034802  | IHC, WB                | 75% / 77%                         |
| Anti-MITD1    | LOC129531                     | HPA036162  | IHC, WB, ICC-IF        | 81% / 80%                         |
| Anti-OFD1     | 71-7A, CXorf5, JBTS10, RP23   | HPA031104  | IHC                    | 76% / 74%                         |
| Anti-OGT      | FLJ23071, HRNT1, MGC22921     | HPA030751  | IHC, WB*               | 100% / 100%                       |
| Anti-PBX4     | -                             | HPA049859  | IHC, ICC-IF            | 57% / 63%                         |
| Anti-PTPN6    | HCPH, PTP-1C, SHP-1           | HPA001466  | IHC*, WB, ICC-IF       | 92% / 91%                         |
| Anti-TRIM38   | RNF15, RORET                  | HPA031685  | IHC, WB, ICC-IF        | 50% / 44%                         |
| Anti-ZNF182   | HHZ150, KOX14, Zfp182, ZNF21  | HPA059574  | IHC, ICC-IF            | 62% / 51%                         |
| Anti-ZNF195   | -                             | HPA030605  | IHC, ICC-IF            | 47% / 46%                         |
| Anti-ZNF524   | MGC23143                      | HPA050981  | IHC, WB*, ICC-IF       | 64% / 62%                         |
| Anti-ZNF613   | FLJ13590                      | HPA026833  | IHC, ICC-IF            | 36% / 38%                         |

\* Products with enhanced validation for indicated application

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057-210825



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