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# M5 CytoKERATIN 18

For life science research only. Not for use in diagnostic procedures. FOR IN VITRO USE ONLY.

Store at 2 – 8 °C

**200 tests (Prod. No. PEV-10600)**  
Mouse monoclonal antibody (Clone M5)  
For the detection of Cytokeratin 18

## 1. Product Description

Name: M5 CytoKERATIN 18 monoclonal antibody  
Clone: M5  
Isotype: Mouse IgG2b  
Immunogen: Cytokeratin 18 fragments purified from human carcinomas.  
Epitope: Internal on CK18 fragment aa284-396.

### 1.1 Formulation

Clear solution. 20 µg of M5 CytoKERATIN 18 antibody provided in 200 µl PBS containing 0.1 % BSA, PEG, sucrose and 0.09 % sodium azide.

### 1.2 Specificity

M5 CytoKERATIN 18 antibody recognizes an internal formalin-resistant epitope on human cytoKERATIN 18 (CK18) cytoskeletal protein.

### 1.3 Recommended applications

- Immunocytochemistry (ICC)
- Flow cytometry (FACS)
- Western blot (WB)
- Immunoprecipitation (IP)
- Immunohistochemistry (IHC) including formalin-fixed and paraffin-embedded tissue (FFPE) and cryostat/frozen sections (FS).

### 1.4 Working solution

M5 CytoKERATIN 18 antibody is provided in a convenient stock solution. Use a dilution 1:100 in Incubation Buffer (final concentration 1.0 µg/ml).

### 1.5 Storage and stability

The M5 CytoKERATIN 18 antibody is provided in a ready-to-use format and is stable at 2 – 8 °C through the expiration date printed on the label. Alternatively, it can be stored in aliquots at -20 °C. The antibody is shipped at ambient temperature.

**Note:** Repeated freezing and thawing should be avoided.

### 1.6 Quality control

The M5 CytoKERATIN 18 antibody is function tested using a cellular model: HeLa cells analysed by immunocytochemistry and flow cytometry. FFPE tissue sections obtained from human prostate cancer analysed by immunohistochemistry.

## M5 CytoKERATIN 18 Antibody – Overview

Benefits	Features
Exceptional broad range of applications, including FFPE.	Suitable for WB, IP, ICC, IHC (PS/FS) ELISA, FC on endogenous native CK18.
Specificity for simple epithelial (i.e. carcinoma) cells and tissue.	Expression pattern of CK18 is restricted to cells of epithelial origin. Lymphoid, fibroblast and neuronal cells are not detected by M5 CytoKERATIN 18 antibody.

## 2. Background Information

### 2.1 Cytokeratins

In eukaryotic cells, the cytoskeleton is composed of three different types of morphologically distinct filamentous structures: microfilaments, intermediate filaments (IF), and microtubules. The integrated cytoskeletal network formed by the three filament systems is responsible for the mechanical integrity of the cell and is a critical participant in several cellular processes, such as cell division, motility, and cell–cell contact.

For the intermediate filament (IF) protein family based on their characteristics, such as, sequence similarities and patterns of expression, a classification system divided into several groups has been implemented. Intermediate filament types I and II constitute the cytoKERATINS (acidic and basic proteins, respectively), while the type III IF group includes desmin, vimentin, and glial fibrillary acidic proteins. Type IV includes the neurofilament proteins (NF-L, NF-M, and NF-H) and internexin, while type V proteins are known as nuclear lamins, exclusive to the cell nuclei.

The remaining IF proteins, sometimes called type VI, include filensin and phakinin. The epithelial cytoKERATINS (IF types I and II) are conserved phylogenetically and are closely related, biochemically and immunologically. CytoKERATINS 1–8 constitute the type II group (53–68 kDa, neutral to basic protein components), while cytoKERATINS 9–20 constitute the type I group (40–56 kDa, acidic proteins). This dual nature of the cytoKERATINS is functionally important as the cytoKERATIN proteins assemble into obligate non-covalent heterodimers containing one cytoKERATIN protein of type I and one cytoKERATIN protein of type II in stoichiometric amounts such as cytoKERATINS 8 and 18 [1–3].

### 2.2 Cytokeratins as biomarkers in epithelial cancer

CytoKERATINS, belonging to the intermediate filament (IF) protein family, are particularly useful tools in oncology diagnostics. More than 20 different cytoKERATINS have been identified, of which cytoKERATINS 8, 18, and 19 are the most abundant in simple epithelial cells. Upon release from dying cells, cytoKERATINS provide useful markers for epithelial malignancies, distinctly reflecting ongoing cellular turnover.

Certain cytoKERATINS, the most prominent example being CytoKERATIN-18, are substrates for lethal caspase activation and the subsequent release of defined protein fragments occurs during apoptotic cell death. The clinical value of determining different soluble cytoKERATIN protein fragments in body fluids lies in the early detection of recurrence and the fast assessment of the efficacy of therapy response in epithelial cell carcinomas [4–7].

### 2.3 Cytokeratins during apoptosis and necrosis

The morphological features of apoptosis such as cell shrinkage, nuclear fragmentation, and apoptotic body formation arise from the cleavage of specific cellular (“death”) substrates by caspases.

Specific to apoptosis one consequence of this cleavage is the exposure of a C-terminal neo-epitope (at cleavage site Asp-396) in cytoKERATIN 18 (designated “M30”), which is not present in the cytoKERATIN 8/18 complex in vital or necrotic epithelial cells. The biological significance of cytoKERATIN cleavage during apoptosis is not fully understood, although it has been suggested that caspase cleavage of the cytoKERATIN proteins is likely to facilitate the formation of apoptotic bodies and amplify the apoptotic signal.

*In vitro* experiments have shown that cellular release of cytoKERATIN 18 fragments into the extracellular space occurs as a consequence of caspase cleavage and thereby can serve as markers of apoptosis, using the M30 Cyto-DEATH™ antibody or the M30 Apoptosense® ELISA [8–12].

### 3. Procedures and Materials required

#### 3.1 Procedure for immunohistochemistry

##### 3.1.1 Introduction

The following procedure describes the detection of CK18 with M5 CytoKERATIN 18 antibody in immunohistochemistry for paraffin-embedded tissue in a three step method for maximal sensitivity.

If using other detection methods or sample material, conditions may vary and may have to be adapted.

##### Preparation of working solutions

The following table lists the working solutions needed to perform the immunohistochemistry staining procedure.

Working solution	Composition	Stability Storage
Washing Buffer	PBS containing 0.05 % Tween-20	4 weeks at 2–8 °C
Incubation Buffer	PBS containing 1 % BSA	4 weeks at 2–8 °C
Antigen retrieval	Tris 10 mM, pH 9.0 0.05 % Tween-20	4 weeks at 2–8 °C

##### Preparation of antibody working solution

Dilute M5 CytoKERATIN 18 antibody stock solution 1:100 in Incubation Buffer (final concentration 1.0 µg/ml).

**Note:** The antibody solutions should be free of precipitate; if necessary, centrifuge vial at high speed prior to use.

##### Preparation of sample material

Before starting the immunohistochemical protocol, dewax paraffin-embedded tissue sections as described in the following table.

Step	Action
1	Place paraffin-embedded sections into an incubator at 37 °C over night to air-dry.
2	For deparaffinization of FFPE tissue slides, process as follows at 15–25 °C for 3 min each: 3 x in xylol 2 x in ethanol (96%) 1 x in ethanol (80%) 1 x in methanol freshly prepared with H <sub>2</sub> O <sub>2</sub> (3 %) for 10 min.
3	Rinse 3 x for 10 min in PBS containing 0.05 % Tween-20.

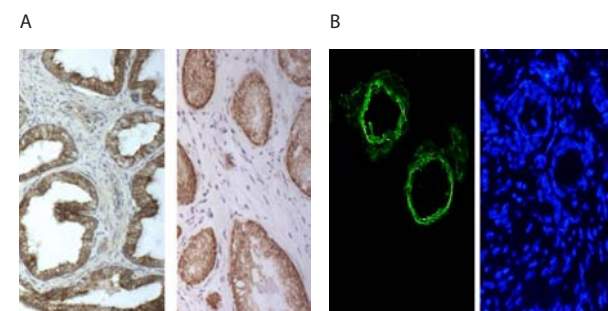
**Note:** The sections should not be allowed to dry during this procedure.

#### 3.1.2 Immunohistochemistry protocol

**Note:** For optimal results it is recommended to follow the method for antigen retrieval described in the table below.

Step	Action
1	Autoclave tissue section slides 10 min at 121 °C. Let cool down in antigen retrieval buffer 30 min at 15–25 °C. Place in PBS plus 0.05 % Tween-20 for 10 min at 15–25 °C.
2	Incubate with blocking solution i.e. PBS containing 5 % normal serum (i.e. from goat, if secondary antibody from goat).
3	Remove blocking solution and add 100 µl M5 CytoKERATIN 18 antibody working solution for 30 min at 15–25 °C in a humid chamber.
4	Wash slides in Washing Buffer (use 3 separate jars and dip 3 x into each jar).
5	Cover the section with 100 µl of anti-mouse-IgG biotin according to your preferred optimized procedure for the reagent from your selected supplier. Incubate for 30 min at 37°C in a humid chamber.
6	Wash slides in Washing Buffer (use 3 separate jars and dip 3 x into each jar).
7	Cover the section with 100 µl of streptavidin-POD according to your established optimized procedure for the reagent from your selected supplier (i.e. ABC reagent from Vectorlabs). Incubate for 30 min at 15–25 °C in a humid chamber.
8	Wash slides in Washing Buffer (use 3 separate jars and dip 3 x into each jar). Dehydrate depending on used substrate, i.e. for DAB.
9	Incubate slides in a freshly prepared substrate solution (i.e. AEC) at 15–25 °C until a clearly visible color develops (1–5 min). A negative control should not show any development of color during the incubation period.
10	Stop the reaction by extensive rinsing in double distilled water.
11	Subsequently, counterstain the preparation and mount sections i.e. in Aquatex for AEC, or in Vectamount for DAB.

#### 3.1.3 Immunohistochemistry results



**Figure: A.** Detection of CK18 in formalin-fixed and paraffin-embedded (left panel) or frozen (right panel) section from a human prostate tissue showing confined epithelial staining for CK18 with M5 CytoKERATIN 18. Secondary detection with anti-mouse IgG-biotin, streptavidin-POD and DAB as substrate.

**B.** Frozen section from a human prostate tissue shows confined staining for CK18 in epithelial cells using M5 CytoKERATIN 18 (left panel) and nuclear counterstain with DAPI (right panel). Secondary detection with anti-mouse IgG -ALEXA-488.

Images by courtesy of Claudia Strele, Tissuegnostics, Vienna, Austria.

## 3.2 Procedure for immunofluorescence and flow cytometry

### 3.2.1 Introduction

The following procedure describes the detection of CK18 with M5 CytoKERATIN 18 antibody in immunofluorescence and flow cytometry. If using other detection methods or sample material, conditions may vary and may have to be adapted.

### Preparation of antibody working solution

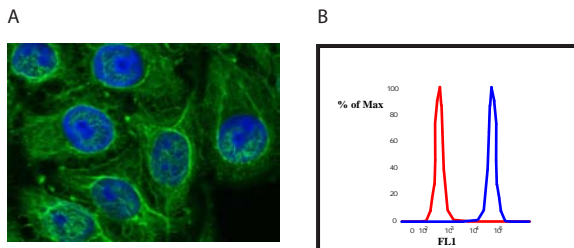
Dilute M5 CytoKERATIN 18 antibody stock solution 1:100 in Incubation Buffer (final concentration 1.0 µg/ml).

**Note:** The antibody solutions should be free of precipitate; if necessary, centrifuge vial at high speed prior to use.

### 3.2.2 Immunofluorescence and flow cytometry protocol

Step	Action
1	Wash cells in PBS.
2	Fix cells in ice-cold pure methanol at -20 °C for 30 min.
3	Wash cells with Washing Buffer twice.
4	Remove Washing Buffer.
5	Incubate with 100 µl M5 CytoKERATIN 18 antibody working solution for 30 min at 15–25 °C.
6	Wash cells with Washing Buffer twice.
7	Examine the cells on a slide under the fluorescence microscope, or dilute cells in 0.5 ml PBS and store samples in the dark until analysis by flow cytometry.

### 3.2.3 Immunofluorescence and flow cytometry results



**Figure:** A. HeLa (human cervical cancer) cells were fixed in methanol and stained with M5 CytoKERATIN 18 antibody followed with goat anti-mouse IgG F(ab)<sub>2</sub>-FITC or goat anti-mouse-IgG-ALEXA-488 before being analyzed by fluorescence microscopy or B. by flow cytometry, respectively (blue line, compared to staining with isotype control antibody red line).

## 4. Appendix

CK18 positive cell lines and tissues successfully analyzed with M5 CytoKERATIN 18 antibody:

### Human epithelial cell lines:

Breast cancer:	MDA-MB-231, MCF-7, HBL100, HT29, T47D
Colon cancer:	WIDr, HCT116, SW480, SW620
Prostate cancer:	PC3, LNCAP, DU145
Cervical cancer:	HeLa
Liver cancer:	HepG2
Lung cancer:	A431
Head & neck cancer:	SCC9, SCC25

### Human epithelial tissues:

Breast, lung, liver, prostate, colon, pancreas, intestine, kidney, salivary gland, trophoblast, endometrium, bladder, oral epithelium.

## 5. Related Products

Most versatile *in vitro* tool for the detection of epithelial apoptosis:

M30 CytoDEATH™ Monoclonal Antibody:	Prod. No. PEV-10700
M30 CytoDEATH™ Monoclonal Antibody Biotin:	Prod. No. PEV-10750
M30 CytoDEATH™ Monoclonal Antibody FITC:	Prod. No. PEV-10800
M30 CytoDEATH™ Monoclonal Antibody Red (Flow):	Prod. No. PEV-10850
M6 CytoKERATIN 18 Monoclonal Antibody:	Prod. No. PEV-10650

Apoptosis biomarker assay for *in vivo* detection of carcinoma cell death:  
M30-Apoptosense® ELISA: Prod. No. 10010

Cell death biomarker assay for *in vivo* detection of carcinoma cell death:  
M65 ELISA®: Prod. No. 10020

Apoptosis biomarker assay for *in vitro* detection of carcinoma cell death:  
M30 CytoDeath™ ELISA: Prod. No. 10900

## 6. References

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