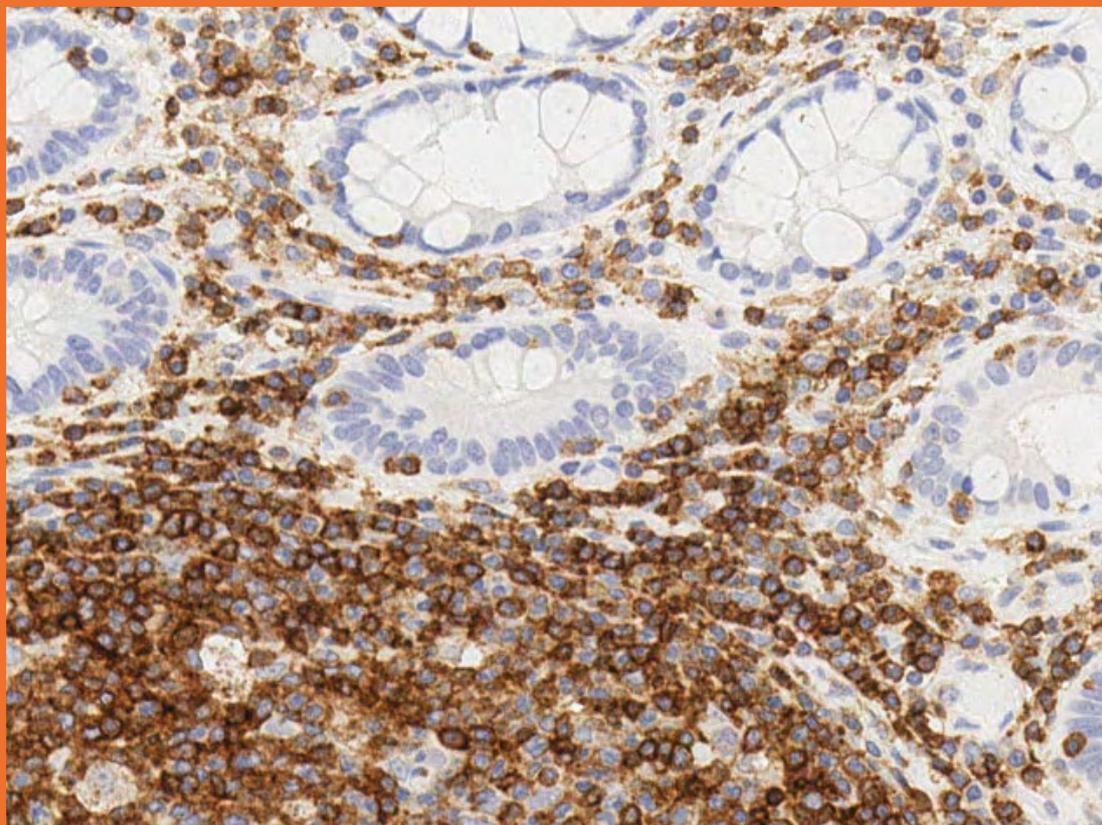


Enhanced validation data

Anti-TREM1 recombinant antibody – ab225861



Enhanced validation of Anti-TREM1 recombinant antibody [EPR22060-229] – ab225861

Enhanced validation designed for your needs

We understand the challenge of finding the right antibody clone – highly specific and sensitive to your intended target – at early selection stages of your development program. To de-risk this clone selection process for you, we generated enhanced validation data for our best recombinant antibody clones to some of the most promising targets.

Our enhanced validation gives you an extra level of confidence in an antibody clone

- Provides additional data on the specificity and sensitivity of our recombinant antibodies in immunohistochemistry (IHC) and other relevant techniques
- Carried out in a custom manner, specific both to the target and the relevant research & clinical settings
- Builds upon our high-quality standard validation

Our framework for enhanced validation

- Our enhanced validation focuses on generating detailed IHC expression profiles for promising immuno-oncology targets in selected formalin-fixed paraffin-embedded (FFPE) human normal tissues and cancer tissue microarrays (TMAs).
- In this study, we demonstrate the sensitivity and specificity of anti-TREM1 recombinant antibody ab225861 in IHC in selected tissues and TMAs using a BOND™ RX Research Stainer (Leica®) and DISCOVERY ULTRA system (Roche Diagnostics).
- A multiplex (duplex) assay was also developed using the DISCOVERY ULTRA system (Roche Diagnostics).
- A quantitative H-score analysis of TREM1 expression was performed using the artificial intelligence (AI)-driven digital image analysis software Visiopharm® (Visiopharm A/S).

Target overview

HGNC symbol

TREM1

Approved name

Triggering receptor expressed on myeloid cells 1

Chromosomal location

6p21.1

Function

- As an amplifier of inflammation, TREM1 plays a critical role in the pathogenesis of many diseases involving inflammation^{1,2}.
- TREM1 expression in tumors infiltrating myeloid cells contributes to tumor stroma inflammation, tumor progression, immunosuppression, and resistance to therapy³.
- TREM1 and TREM2 expression was increased in T cells in patients with COVID-19 during the acute phase of SARS-COV-2 infection. The percentage of TREM-1⁺CD14⁺ monocytes was slightly higher in the asymptomatic or recovered group than in the moderate and severe COVID-19 group^{4,5}.
- Peri-necrotic zones of glioblastoma are enriched with TREM1⁺ microenvironments¹². Enhanced TREM1 expression is associated with poor patient outcomes and is associated with tumor grade^{6,7}.
- A key role for TREM1 has also been found in chronic inflammatory bowel disease (IBD)⁸.

Tissue specificity

- Expressed by neutrophils, monocytes and some tissue macrophages, such as alveolar macrophages⁹.
- TREM1 is selectively expressed in neutrophils and, to a lower extent in CD14^{high} monocytes and found to be negative in CD14^{low} monocytes, dendritic cells (DCs) or lymphocytes in peripheral blood¹⁰.

Enhanced validation data

Cellular localization

- Cell membrane; also secreted.

Target information above in part from: UniProt accession Q9NP99

The UniProt Consortium

The Universal Protein Resource (UniProt) in 2010

[Nucleic Acids Res. 38:D142-D148 \(2010\)](#)

Materials and methods

Human tissues were selected based on the target's expression and its current relevance to ongoing research and clinical trials. Gene expression was further analyzed for oncology targets in cBioPortal for Cancer Genomics using the Cancer Genome Atlas (TCGA) PanCancer Atlas datasets¹¹⁻¹⁴.

Tissue microarray (TMA)	Cores	Cases	Normal/ Benign cases	Cancer cases	Source (#catalog number)
Multi-normal ^(a)	40	37	37	0	In-house TMA
Multi-cancer ^(b)	40	35	1	34	In-house TMA
Glioblastoma	-	1	0	1	In-house tissue
COVID-19	-	1	0	0	In-house tissue
Lung cancer	96	48	3	45	Pantomics (#LUC1022)
Colon cancer	102	102	22	80	Pantomics (#COC1021)
Nasopharyngeal cancer	96	96	0	96	Pantomics (#NPC1507)
Colitis	-	1	0	0	Pantomics (#COLO2)

Table 1. List of human TMAs used in the enhanced validation. All tissues were sourced from Abcam-approved tissue suppliers.

a) The multi-normal TMA consists of the following tissues from two donors: colon, cerebellum, small intestine mucosa, tonsil, stomach, testis, prostate, lung, skeletal muscle, breast, heart, skin, endometrium, spleen, pancreas, lymph node, kidney. Placenta and liver was from a single donor.

b) The multi-cancer TMA consists of the following tissues from two donors: seminoma, prostate adenocarcinoma, bladder carcinoma, renal cell carcinoma, melanoma, stomach adenocarcinoma, pancreatic adenocarcinoma, hepatocellular carcinoma, ovaria carcinoma, cervical cancer, head and neck carcinoma and endometrial cancer. The following tissues were from single donors: lung (squamous cell carcinoma (SCLC) and non-squamous cell carcinoma (NSCLC)), colon (adenocarcinoma and invasive adenocarcinoma), breast (ductal carcinoma and invasive lobular carcinoma), B-cell lymphoma, T-cell lymphoma, gliomas (grade II and IV) and placenta.

Enhanced validation data

Step	Reagents	Method
Deparaffinization	DISCOVERY Wash (RUO)	Standard
Cell conditioning	ULTRA Cell Conditioning Solution (ULTRA CC1)	64 min, 100°C
Pre-primary peroxidase inhibitor	OptiView Peroxidase Inhibitor	4 min
Primary antibody	Anti-TREM1 antibody [EPR22060-229] - Ab225861 diluted in Bond™ primary antibody diluent (#AR9352) to final concentration of 0.5 µg/mL	16 min, 37°C
Counterstain	Hematoxylin II	8 min
Post counterstain	Bluing Reagent	4 min

Table 2 . IHC staining protocol on the DISCOVERY ULTRA (Roche Diagnostics) instrument. Staining was performed using standard conditions with OptiView DAB IHC Detection kit (#760-700).

Step	Reagents	Method
Deparaffinization	DISCOVERY Wash (RUO)	Standard
Cell conditioning	ULTRA Cell Conditioning Solution (ULTRA CC1)	64 min, 95°C
DISC inhibitor	DISCOVERY Inhibitor (#760-4840)	8 min
1 st Primary antibody	Anti-TREM1 antibody [EPR22060-229] - Ab225861 diluted in Bond™ primary antibody diluent (#AR9352) to final concentration of 0.5 µg/mL	16 min, 37°C
1 st Linking antibody	DISCOVERY Anti-Rb HQ (#760-4815)	12 min, 37°C
1 st Enzyme conjugate	DISCOVERY Anti-HQ HRP (#760-4820)	12 min
1 st HRP-driven chromogen	DISCOVERY Purple kit (RUO) (#760-229)	12 min
Dual sequence antibody Denaturation	ULTRA Cell Conditioning Solution (ULTRA CC2)	8 min, 100°C
2 nd Primary antibody	Anti-CD14 antibody [SP192] - ab230903 diluted in Bond™ primary antibody diluent (#AR9352) to final concentration of 0.5 µg/mL	16 min, 37°C
2 nd Linking antibody	DISCOVERY Anti-Rb HQ (#760-4815)	12 min, 37°C
2 nd Enzyme conjugate	DISCOVERY Anti-HQ HRP (#760-4820)	12 min
2 nd HRP driven chromogen	DISCOVERY Teal kit (RUO) (#760-247) Teal HRP H202	4 min
	DISCOVERY Teal kit (RUO) (#760-247) Teal HRP Act	12 min
Counterstain	N/A	-

Table 3. Duplex IHC staining protocol on the DISCOVERY ULTRA (Roche Diagnostics) instrument. Staining was performed using standard conditions with DISCOVERY Purple kit (RUO) (#760-229) and DISCOVERY Teal HRP kit (#760-247). These translucent chromogens shift in color when both are present in the same cell and sub-cellular compartment. Co-localized DISCOVERY Purple and DISCOVERY Teal combine to form an indigo-blue-to-deep-purple color.

Enhanced validation data

Step	Reagents	Method
Dewax	Bond™ dewax solution (AR922), alcohol, BOND wash solution (AR9590)	Dewax
Antigen retrieval	Bond™ epitope retrieval ER2 solution (AR9640)	HIER with ER2 (pH 9.0), 20 min, 100°C

Step	Reagents	Number of washes	Time (minutes)
Peroxide block	3-4% (v/v) Hydrogen peroxide	-	5
Wash	Bond™ wash solution	3x	0
Primary antibody	Anti-TREM1 antibody [EPR22060-229]- Ab225861 diluted in Bond™ primary antibody diluent (#AR9352) to final concentration of 0.5 µg/mL	-	15
Wash	Bond™ wash solution	4x	0
Secondary antibody	Bond™ polymer refine detection (DS9800)	-	8
Wash	Bond™ wash solution	2x	4
	Deionized water	1x	0
Visualization	Mixed DAB refine (DS9800)	1x	0
	Mixed DAB refine (DS9800)	-	10
Wash	Deionized water	3x	0
Counterstain	Hematoxylin (DS9800)	-	5
	Deionized water	1x	0
Wash	Bond™ wash solution	1x	0
	Deionized water	1x	0

Table 4. IHC staining protocol on BOND™ RX Research Stainer (Leica®). The protocol used is the same as the default IHC protocol F on BOND™ RX Research Stainer (Leica®), apart from the standard post-primary step, which has been excluded from our protocol. All steps were performed at room temperature.

Leica® is a registered trademark of Leica Microsystems IR GmbH.
BOND™ is a trademark of Leica Biosystems Melbourne Pty. Ltd.

Staining intensity analysis

TREM1 staining intensity analysis was performed using the artificial intelligence (AI)- driven digital image analysis software Visiopharm® (Version: 2023.09). TMA slides were de-arrayed and the tissue within each core was detected. Tissue detection and artefact exclusion were performed using models with DeepLabv3+ architecture. The graphical representation was generated using GraphPad Prism 10.

IHC staining	Corresponding intensity score	Relative average DAB intensity (AU)
Negative	0	0-10
Weak	1+	< 80
Moderate	2+	80-160
Strong	3+	> 160

Table 5. Intensity scoring. The mean DAB intensity was measured for each core with an analytical range from 0 (+) to 250±2 (-) where a low mean DAB intensity score inversely corresponds to high expression. For the graphical representation, the relative average DAB intensity was calculated using the formula (Relative average DAB intensity= 250±2 - mean DAB intensity) and is represented in arbitrary units (AU).

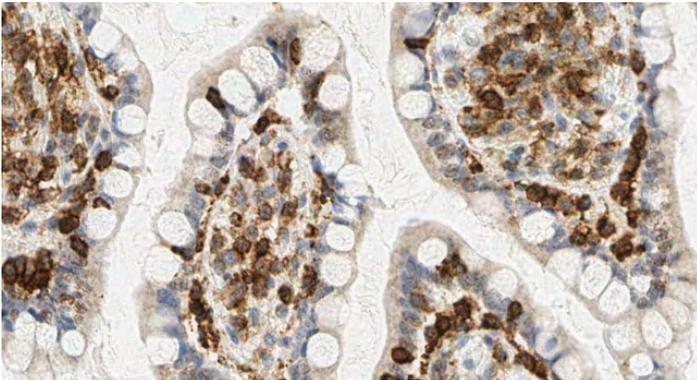
Visiopharm® is a registered trademark of Visiopharm A/S.

TREM1 expression in multi-normal TMA (DISCOVERY ULTRA)

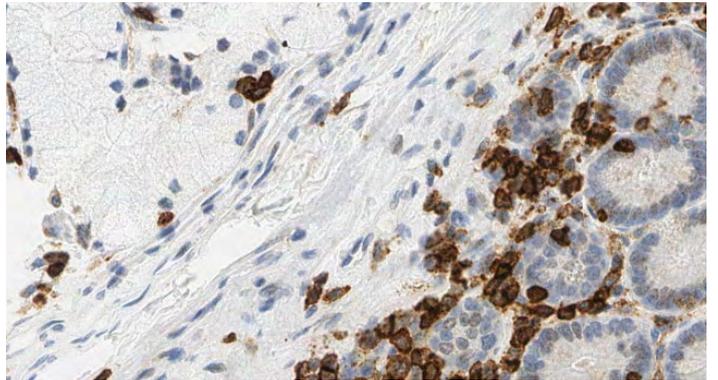
Below are the representative images of selected tissues from the multi-normal TMA. TREM1 expression was detected in the colon, small intestine, skin, tonsil, testis, prostate, endometrium, and stomach. Expression was very minimal to absent from the heart and brain.

TREM1

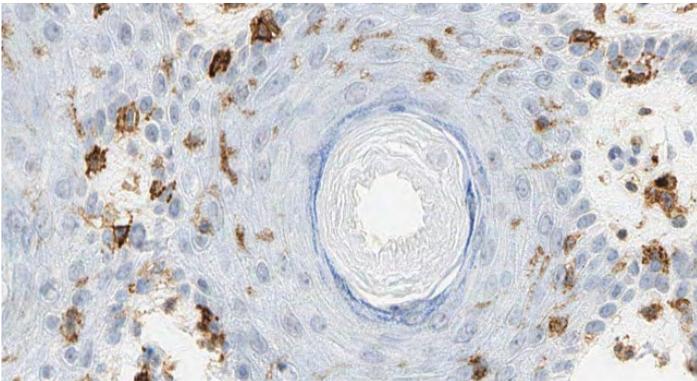
Colon



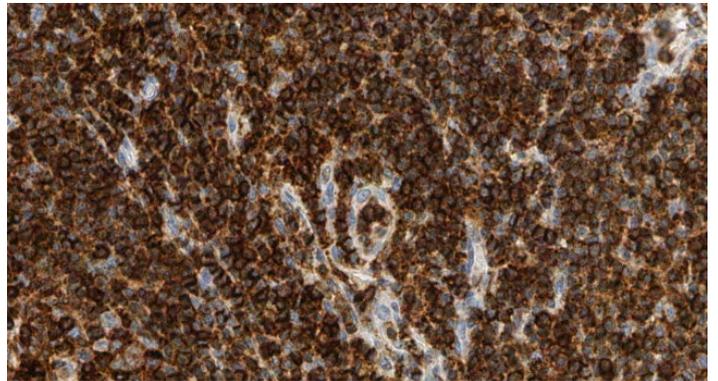
Small intestine



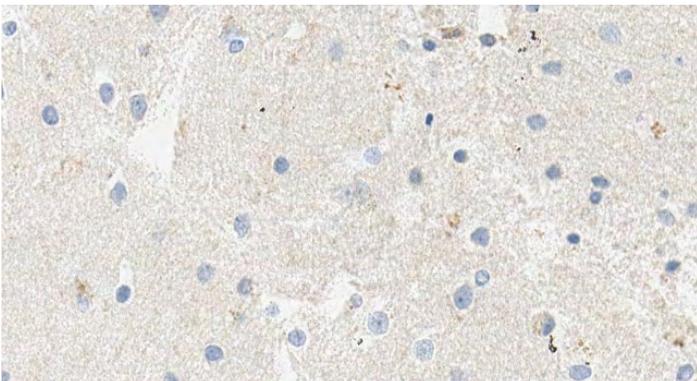
Skin



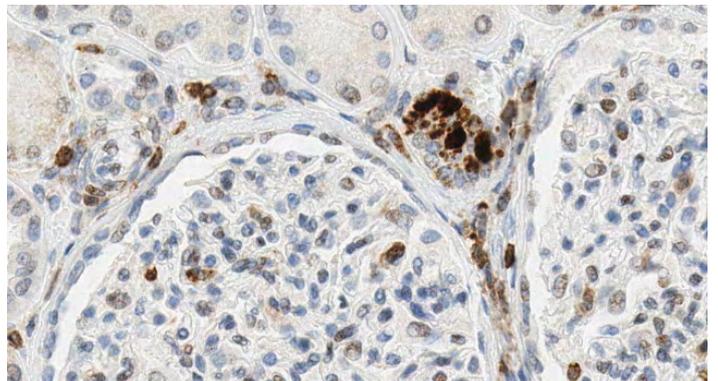
Tonsil



Brain

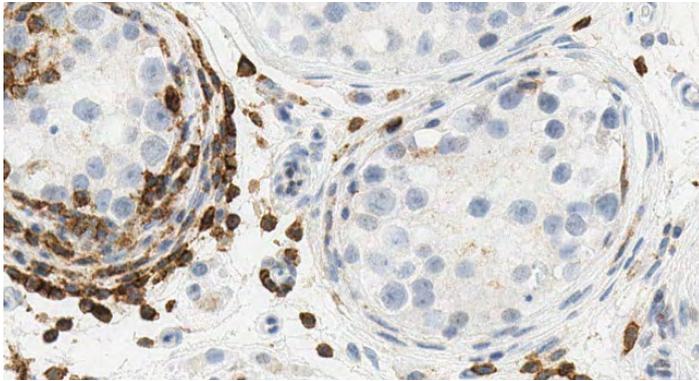


Kidney

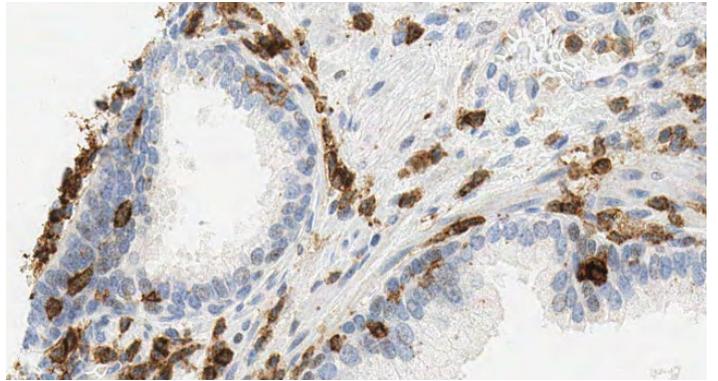


TREM1

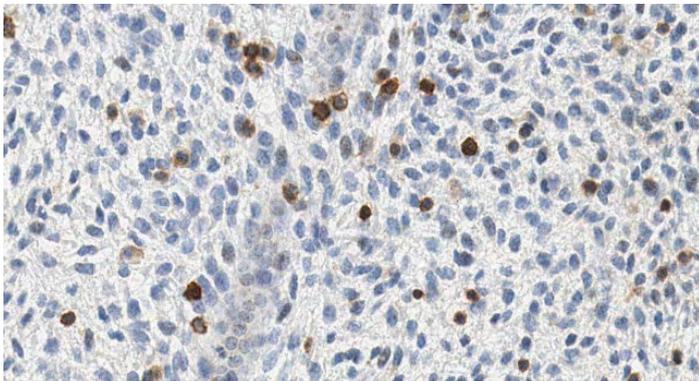
Testis



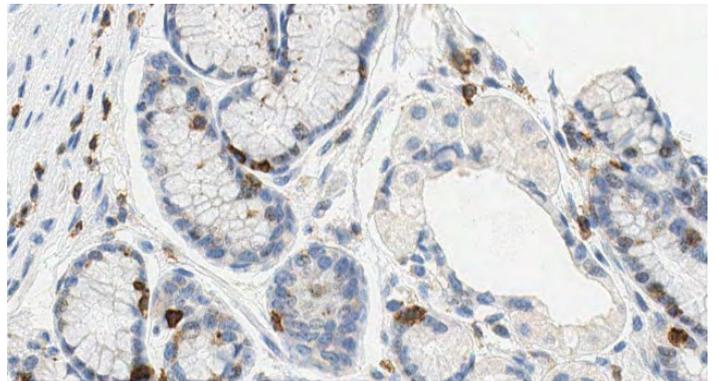
Prostate



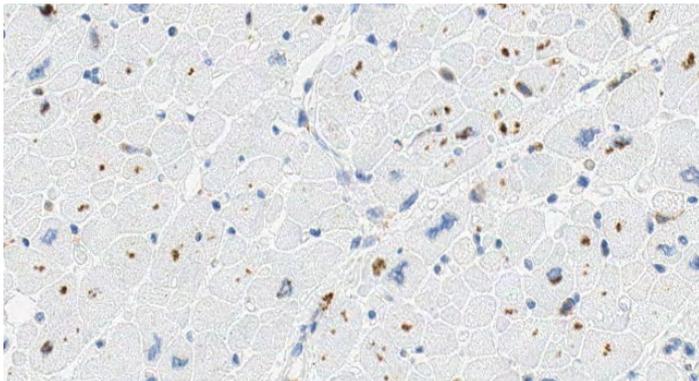
Endometrium



Stomach



Heart



Isotype control

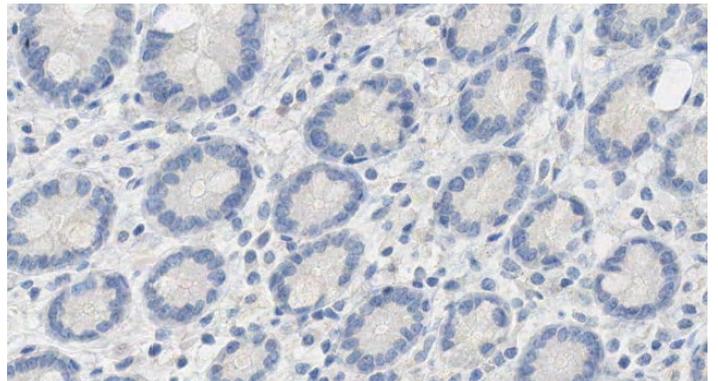


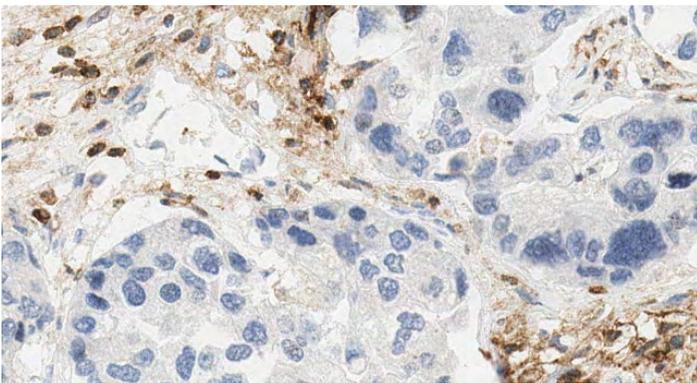
Figure 1. TREM1 expression in human normal tissue. IHC staining of multi-normal human tissues using anti-TREM1 (ab225861) or anti-rabbit IgG-isotype control antibody (ab172730). Positive staining in brown; nuclear hematoxylin counterstain in blue. Slides were scanned at 20x on Aperio® AT2 and imaged at 20x on Aperio® ImageScope.

TREM1 expression in multi-cancer TMA (DISCOVERY ULTRA)

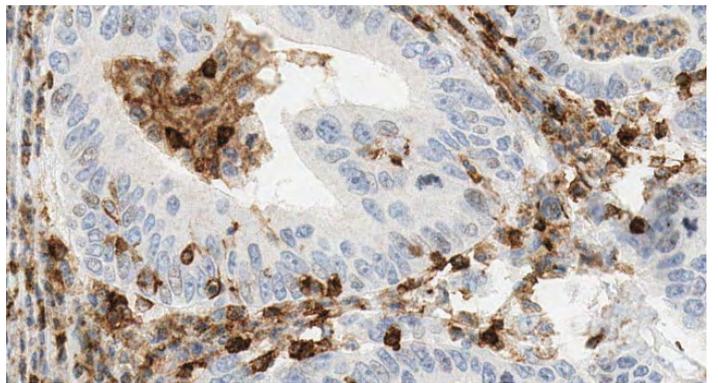
Below are the representative images of selected tissues from the multi-cancer TMA. TREM1 expression was detected in breast fibroadenoma, stomach adenocarcinoma, colon adenocarcinoma, seminoma, prostate adenocarcinoma, low-grade gliomas, pancreatic adenocarcinoma, melanoma, cervical carcinoma, and T cell lymphoma.

TREM1

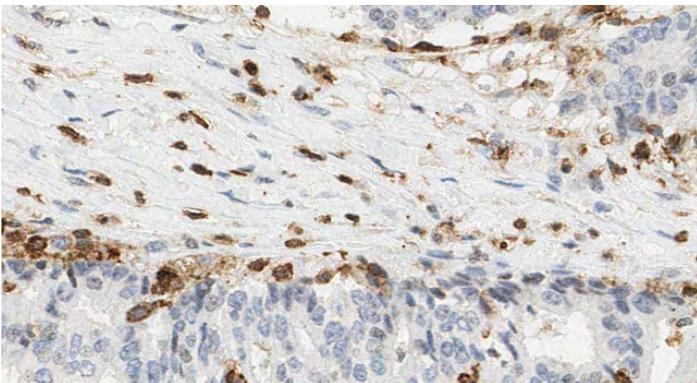
Breast fibroadenoma



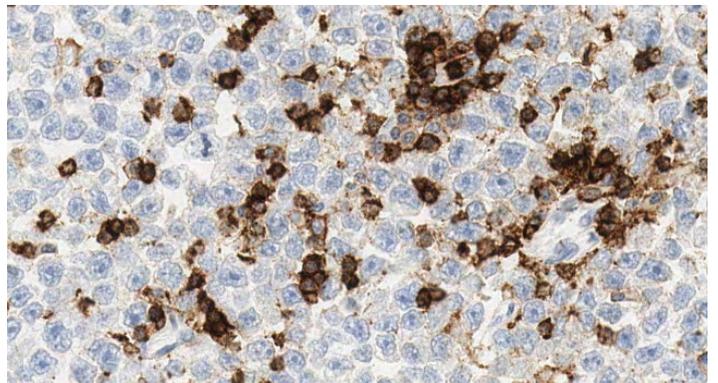
Stomach adenocarcinoma



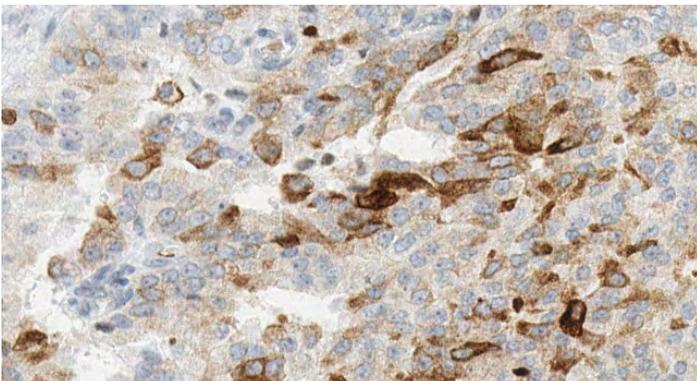
Colon adenocarcinoma



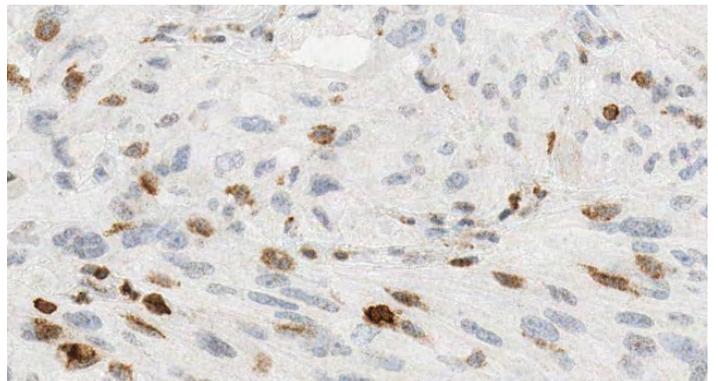
Seminoma



Prostate adenocarcinoma

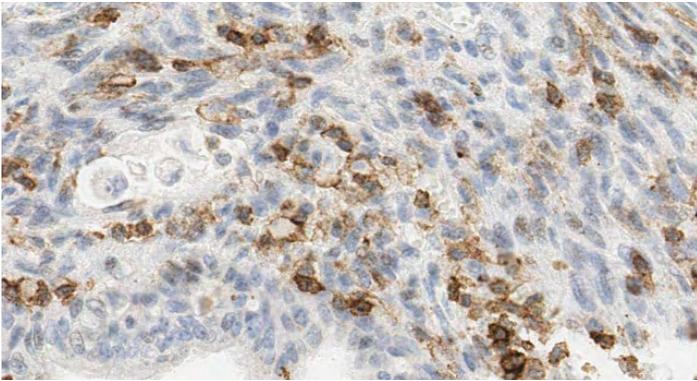


Low grade glioma

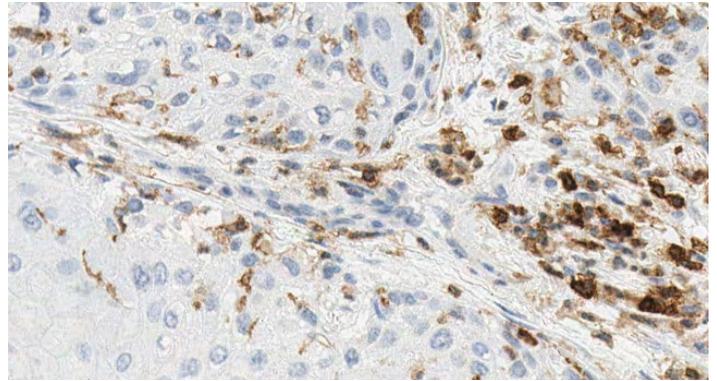


TREM1

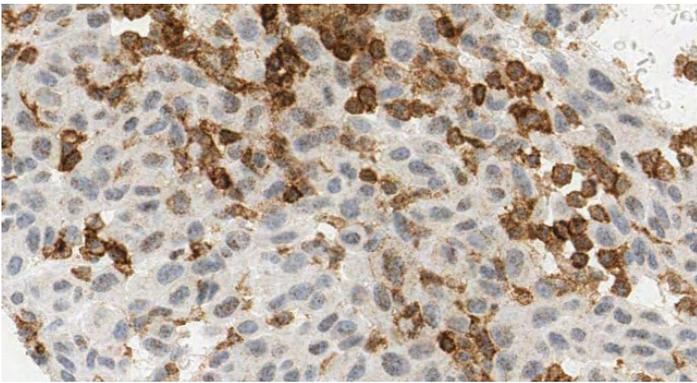
Pancreatic adenocarcinoma



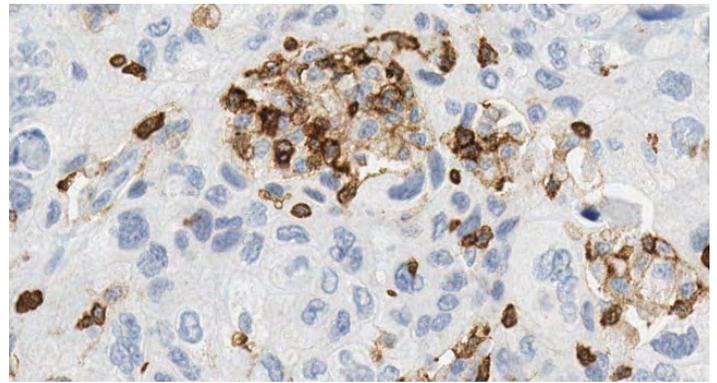
Lung squamous cell carcinoma



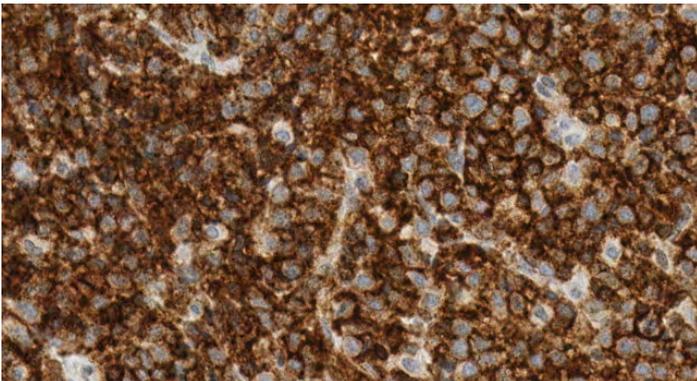
Melanoma



Cervical cancer



T cell lymphoma



T cell lymphoma - Isotype control

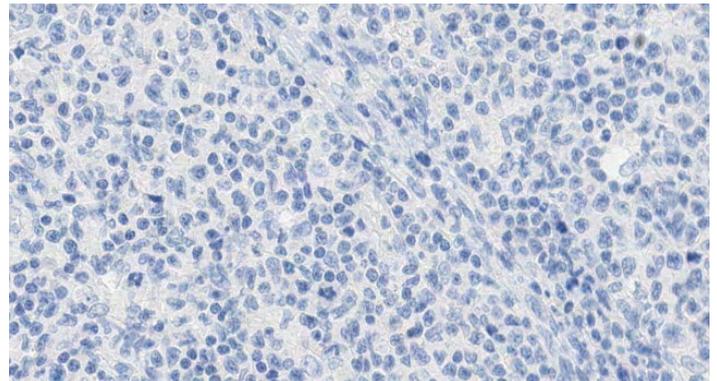


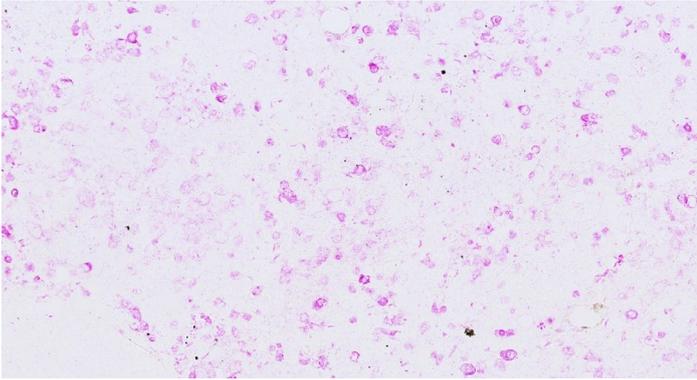
Figure 2. TREM1 expression in cancer. IHC staining of multi-cancer human tissues using anti-TREM1 (ab225861) or anti-rabbit IgG-isotype control antibody (ab172730). Positive staining in brown; nuclear hematoxylin counterstain in blue. Slides were scanned at 20x on Aperio® AT2 and imaged at 20x on Aperio® ImageScope.

TREM1 expression in COVID-19 (DISCOVERY ULTRA)

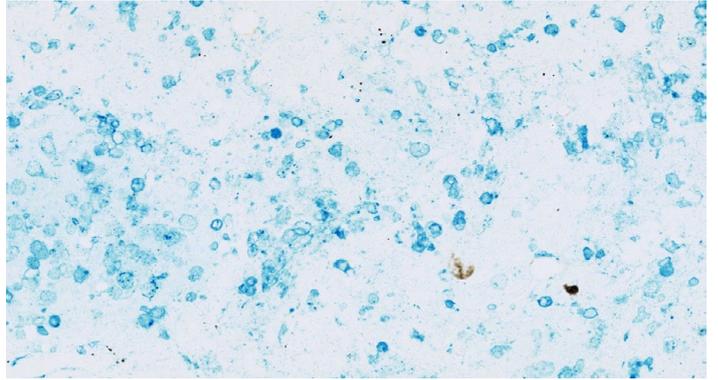
Below are representative images of TREM1 and CD14 from different regions of interest within the same COVID-19 tissue, imaged using a duplex chromogenic assay.

COVID19

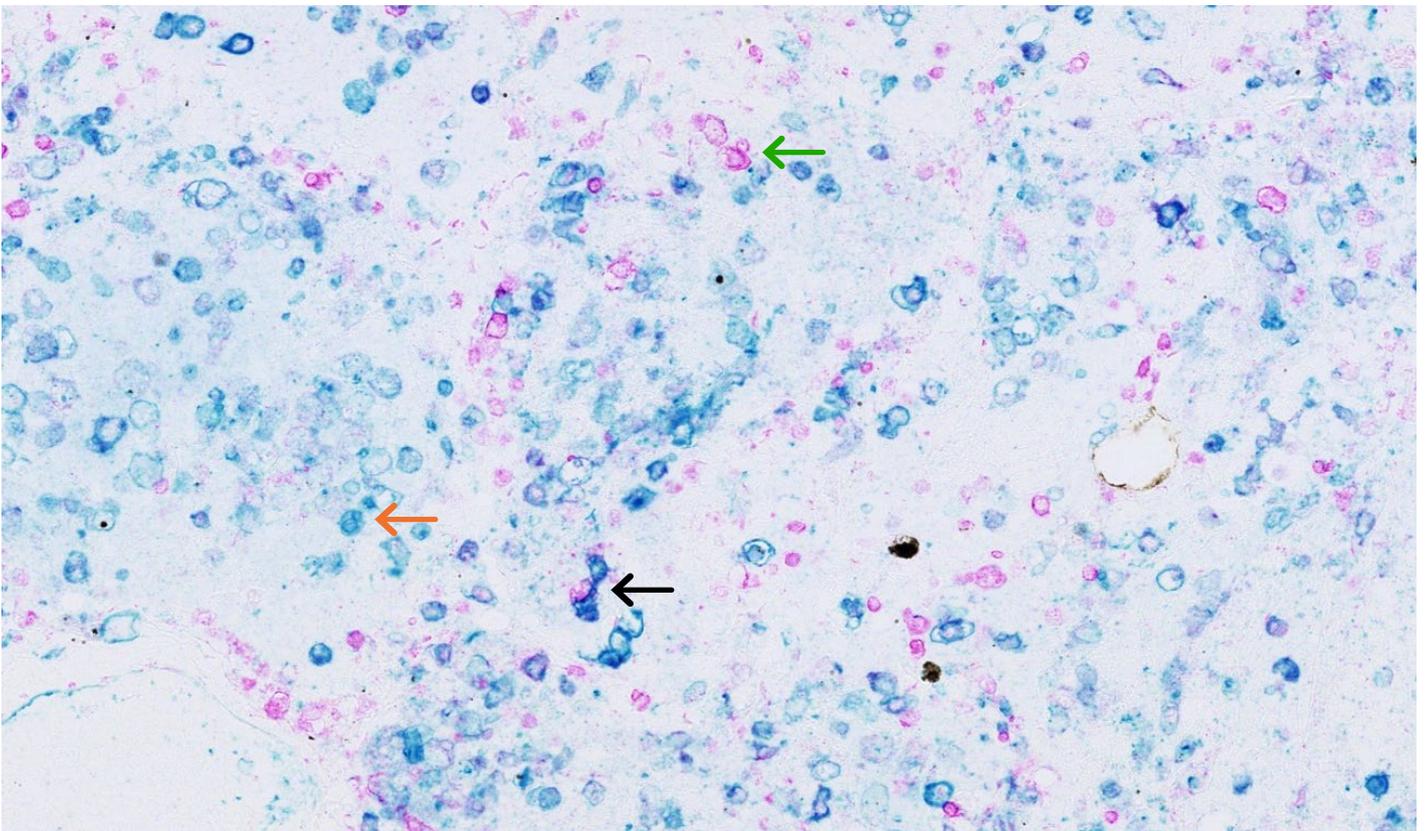
TREM1 (a)



CD14 (b)

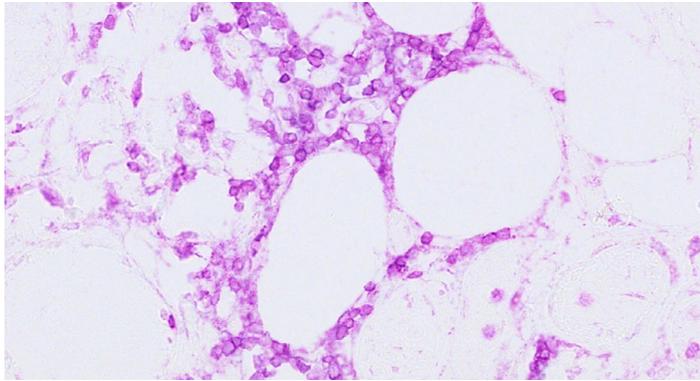


TREM1 / CD14 / TREM1 & CD14 (c)

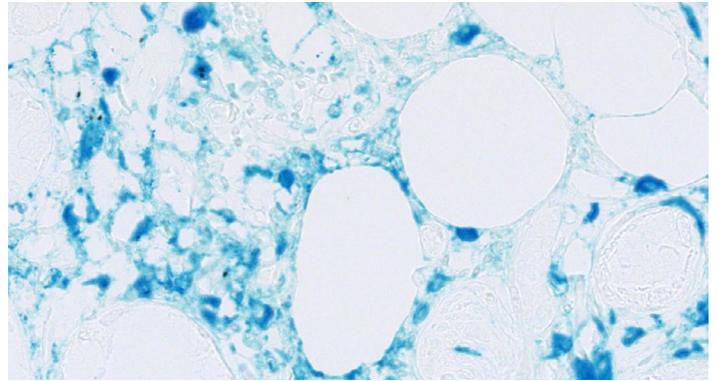


COVID19

TREM1 (d)



CD14 (e)



TREM1 / CD14 / TREM1 & CD14 (f)

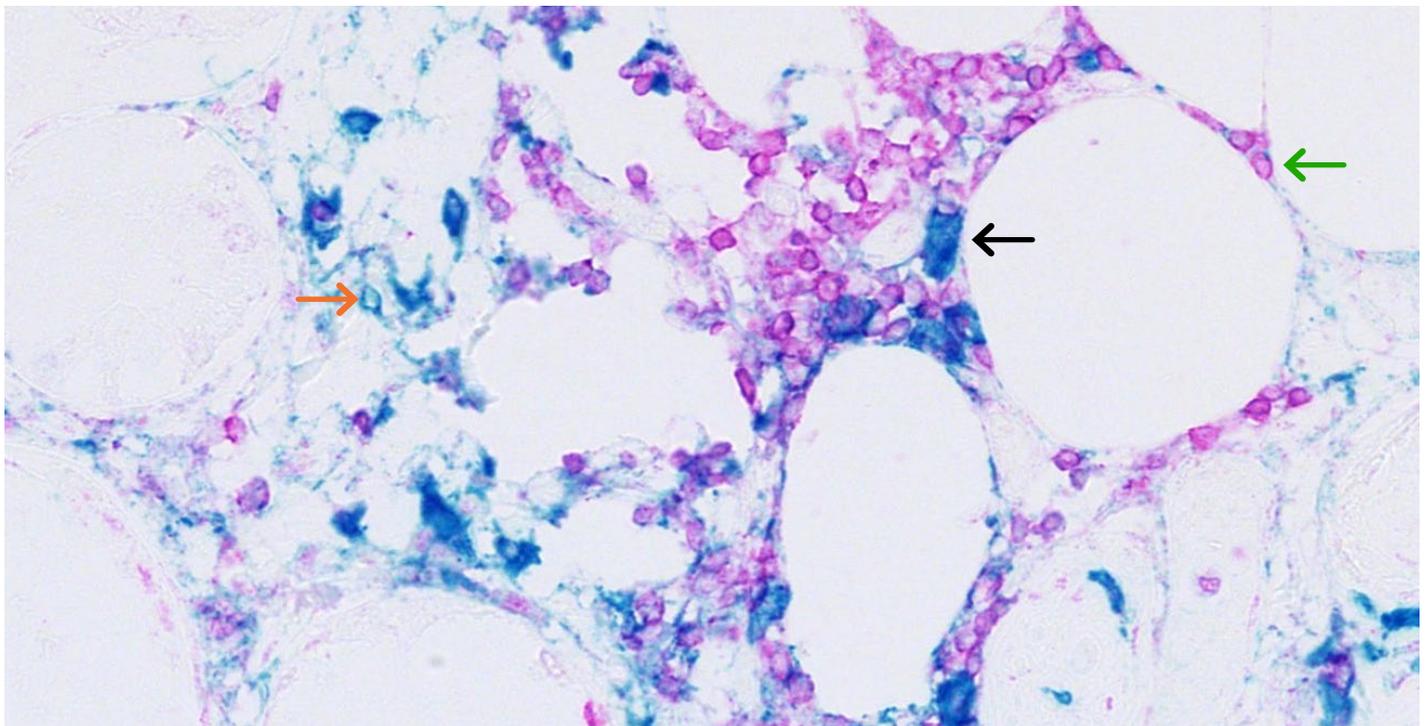


Figure 3. TREM1 and CD14 expression using a duplex co-localization assay. IHC staining of sequential sections of human COVID-19 tissue. The green, orange, and black arrows represent TREM1+ (purple), CD14+ (teal), and TREM1+CD14+ (blue) cells. The table below describes the staining conditions used in the duplex assay.

Figure	1 st Primary antibody (purple)	2 nd Primary antibody (teal)
3 (a & d)	TREM1	IHC diluent
3 (b & e)	IHC diluent	CD14
3 (c & f)	TREM1	CD14

Slides were scanned at 40x on NanoZoomer® S360 (Hamamatsu Photonics K.K.) and imaged at 20x (a-c) and 40x (d-f) on Aperio® ImageScope.

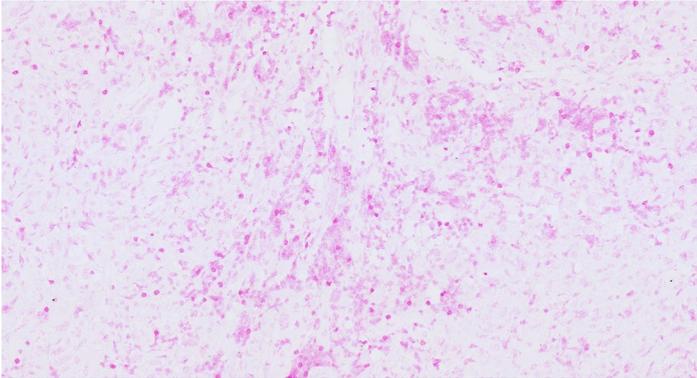
NanoZoomer® is a registered trademark of Hamamatsu Photonics K.K.

TREM1 expression in glioblastoma (DISCOVERY ULTRA)

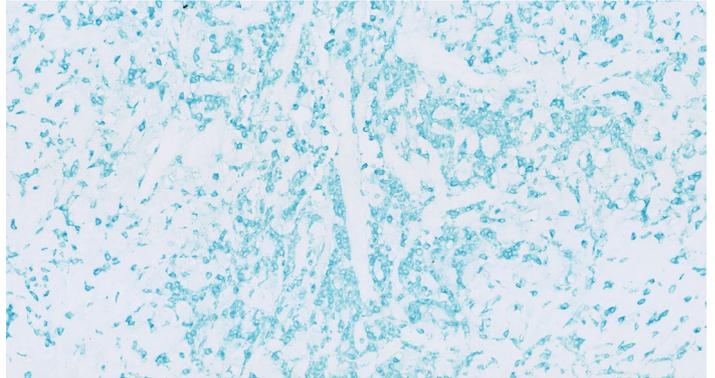
Below are representative images of TREM1 and CD14 from different regions of interest within the same glioblastoma tissue, imaged using a duplex chromogenic assay.

Glioblastoma

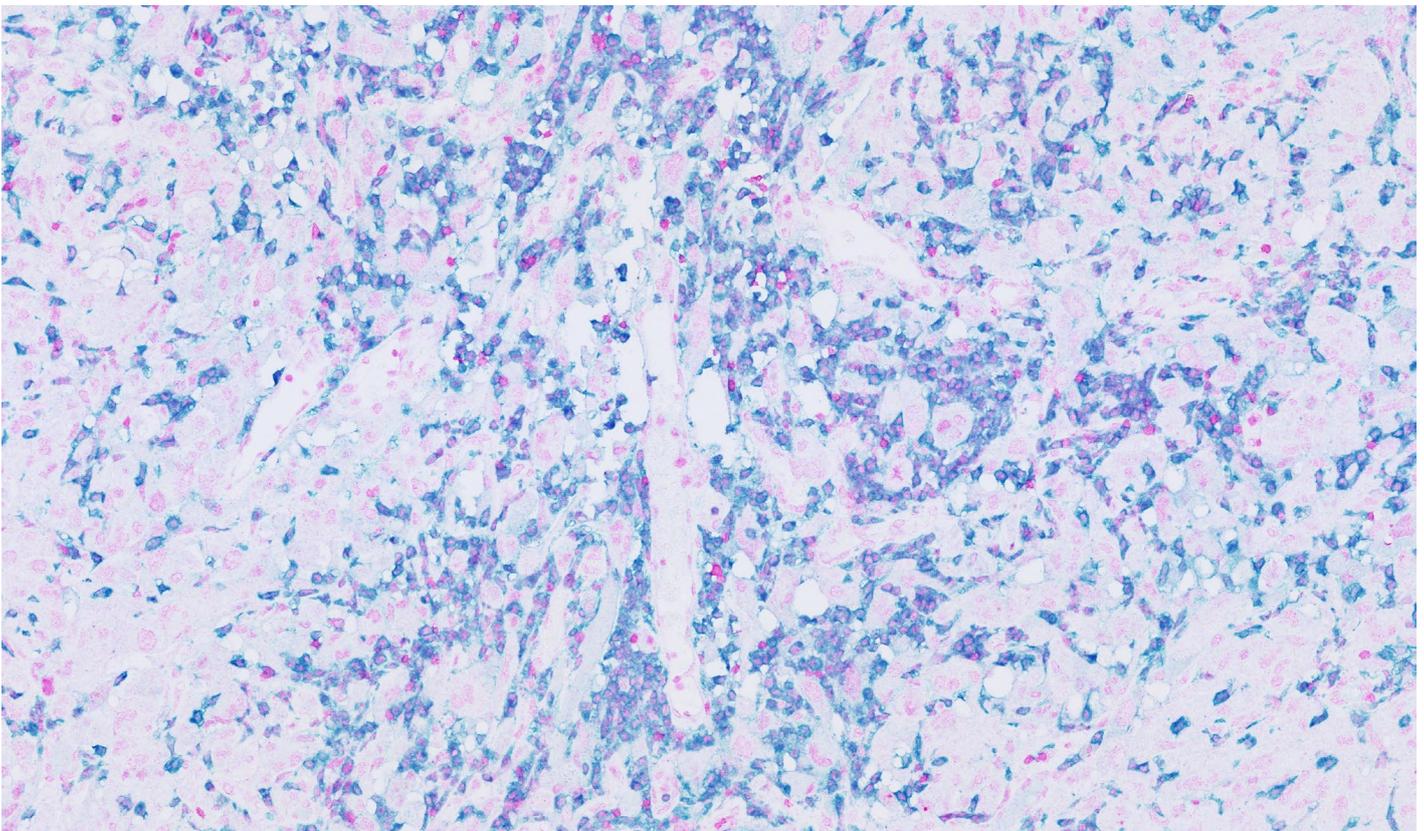
TREM1 (a)



CD14 (b)

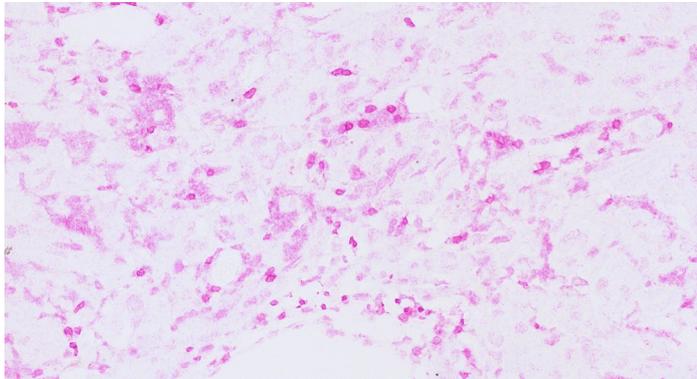


TREM1 / CD14 / TREM1 & CD14 (c)

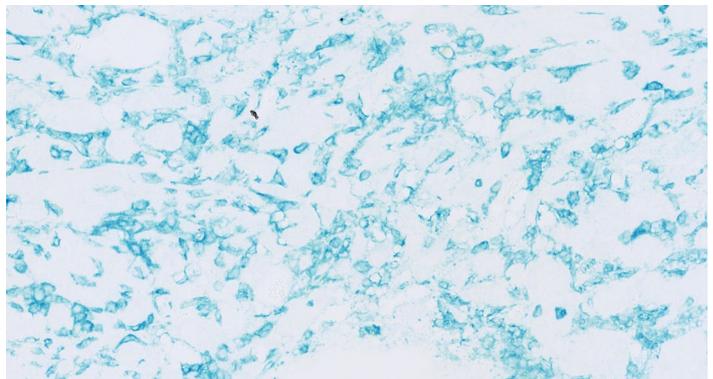


Glioblastoma

TREM1 (d)



CD14 (e)



TREM1 / CD14 / TREM1 & CD14 (f)

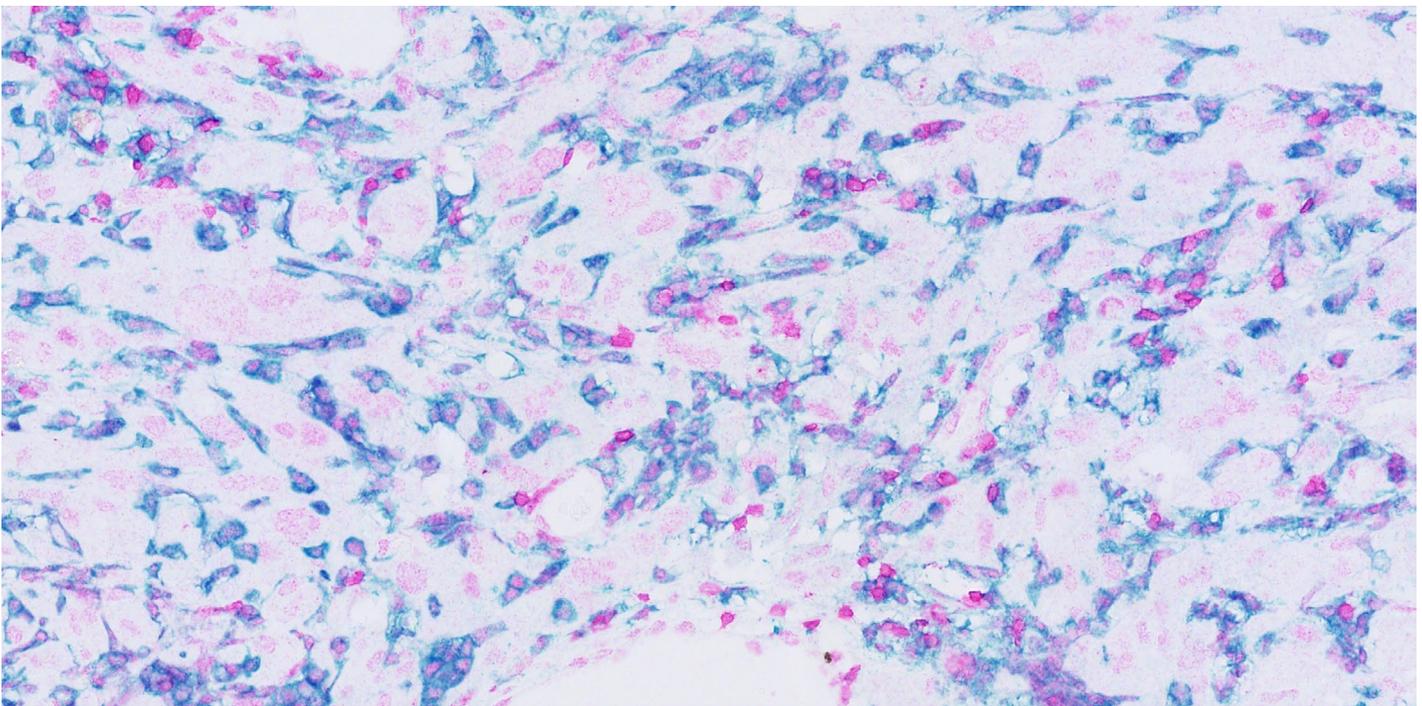


Figure 4. TREM1 and CD14 expression using a duplex co-localization assay. IHC staining of sequential sections of human glioblastoma tissue. The table below describes the staining conditions used in the duplex assay.

Figure	1 st Primary antibody (purple)	2 nd Primary antibody (teal)
4 (a & d)	TREM1	IHC diluent
4 (b & e)	IHC diluent	CD14
4 (c & f)	TREM1	CD14

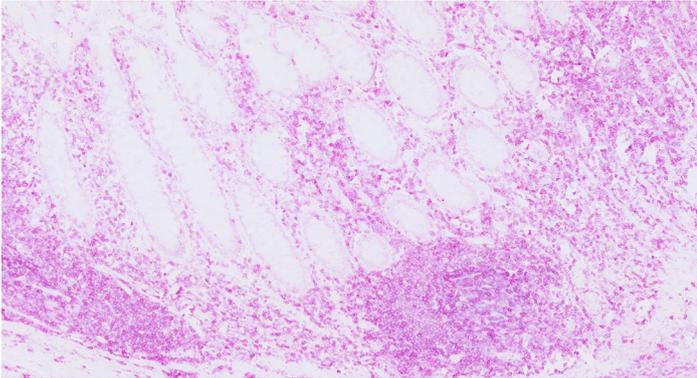
Slides were scanned at 40x on NanoZoomer® S360 (Hamamatsu Photonics K.K.) and imaged at 10x (a-c) and 20x (d-f) on Aperio® ImageScope.

TREM1 expression in ulcerative colitis (DISCOVERY ULTRA)

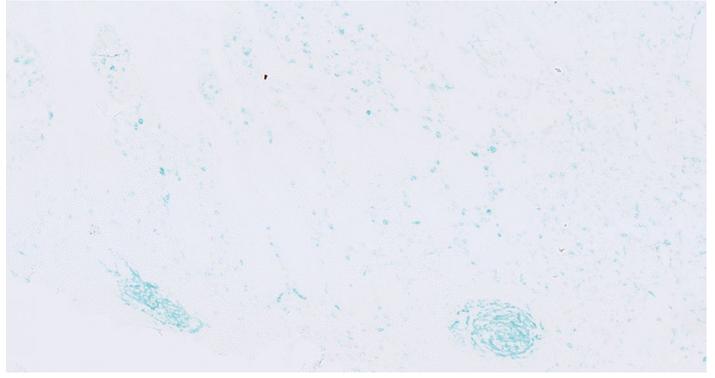
Below are representative images of TREM1 and CD14 from different regions of interest within the same colitis tissue, imaged using a duplex chromogenic assay.

Colitis

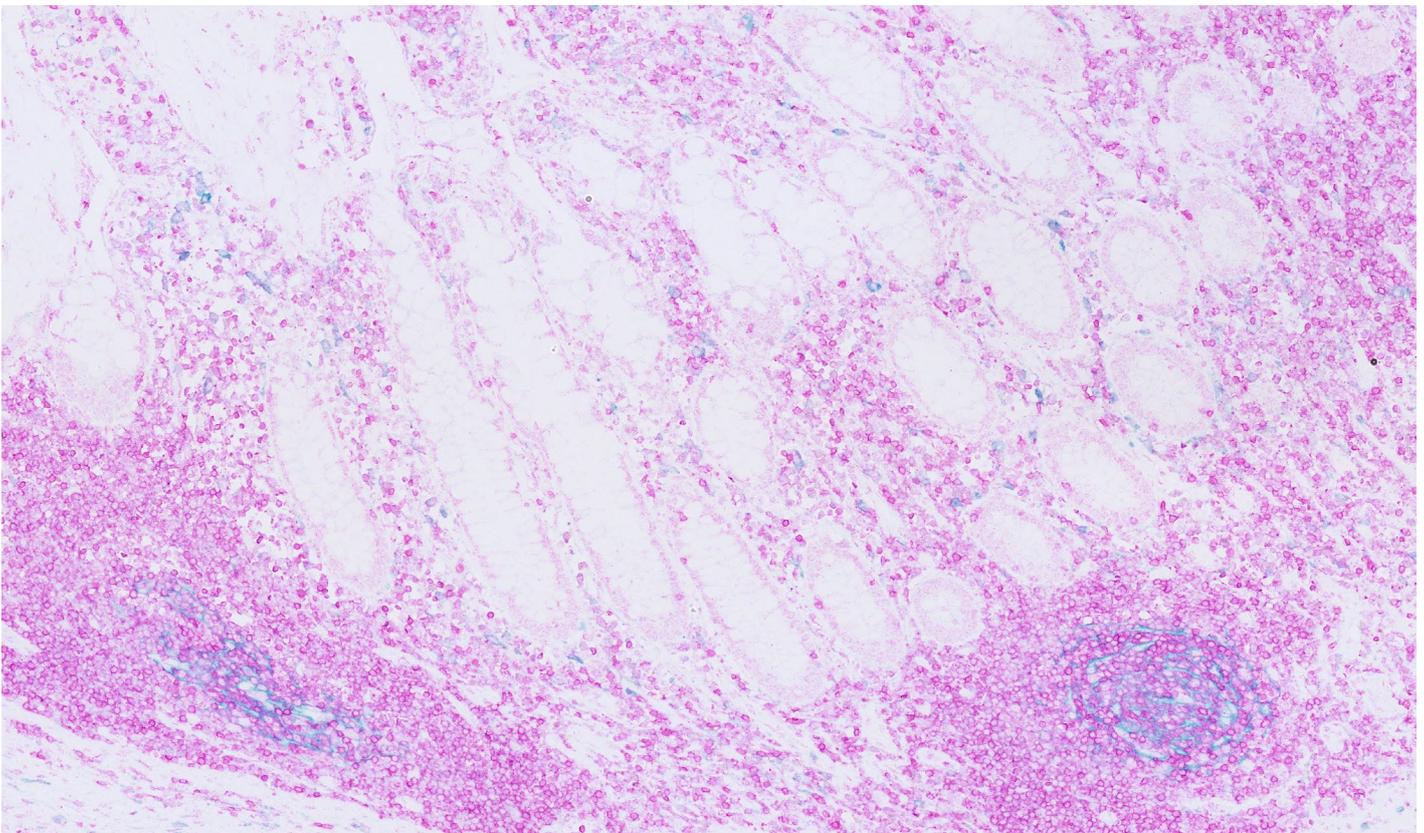
TREM1 (a)



CD14 (b)

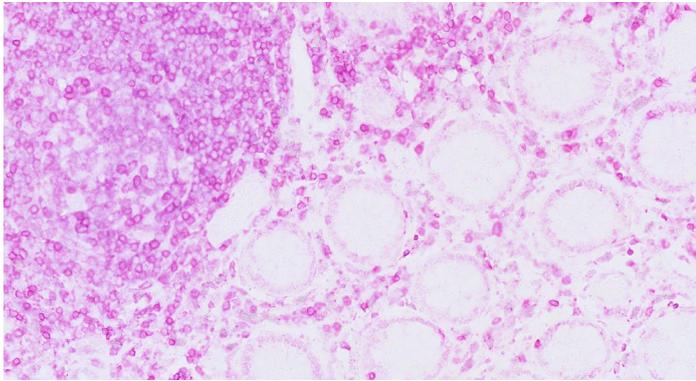


TREM1 / CD14 / TREM1 & CD14 (c)

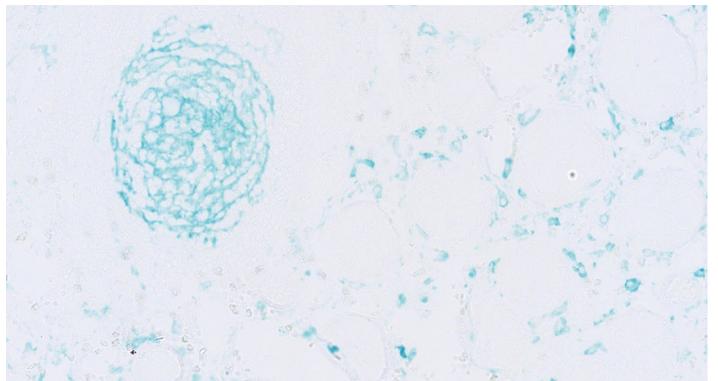


Colitis

TREM1 (d)



CD14 (e)



TREM1 / CD14 / TREM1 & CD14 (f)

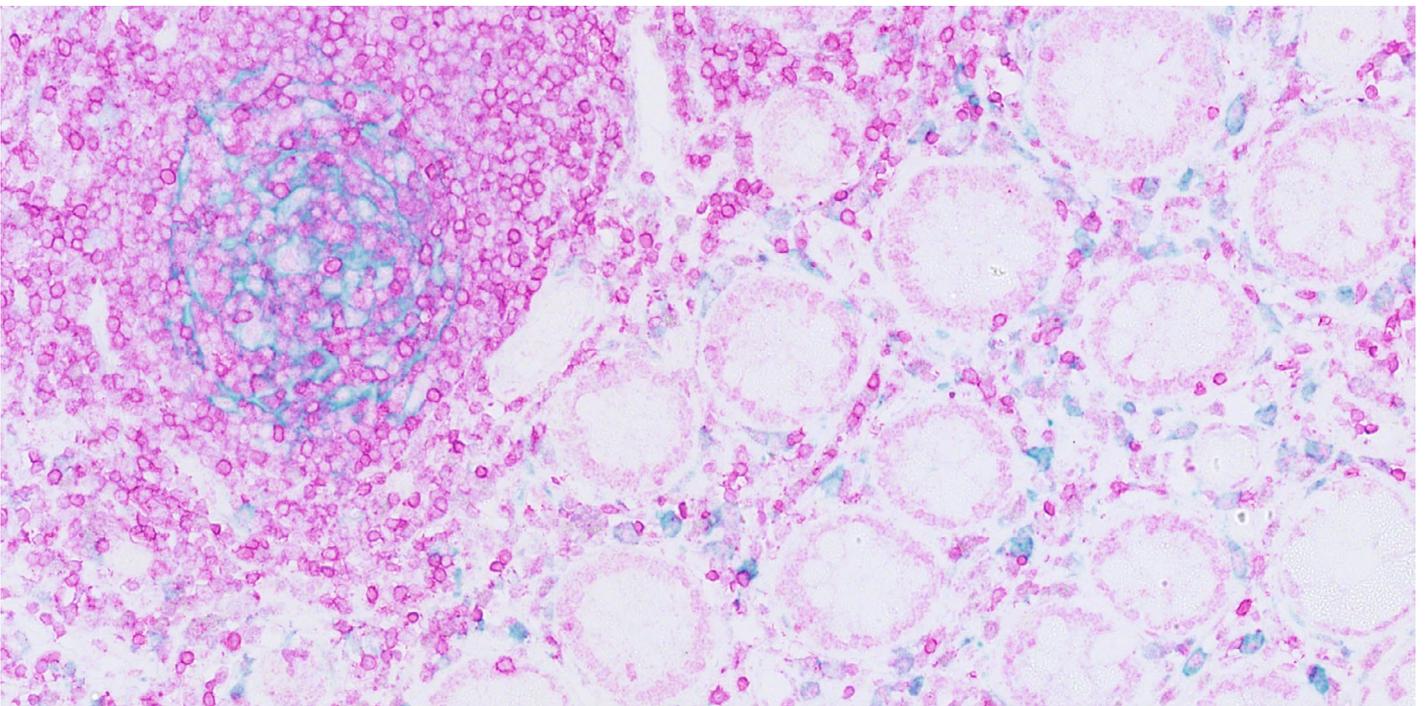


Figure 5. TREM1 and CD14 expression using a duplex co-localization assay. IHC staining of sequential sections of human ulcerative colitis tissue. The below table describes the staining conditions used in the duplex assay.

Figure	1 st Primary antibody (purple)	2 nd Primary antibody (teal)
5 (a & d)	TREM1	IHC diluent
5 (b & e)	IHC diluent	CD14
5 (c & f)	TREM1	CD14

Slides were scanned at 40x on NanoZoomer® S360 (Hamamatsu Photonics K.K.) and imaged at 10x (a-c) and 20x (d-f) on Aperio® ImageScope.

TREM1 expression in cancer (BOND™ RX)

TREM1 expression varied in the analyzed cancer TMAs, with nasopharyngeal cancer showing the highest relative DAB intensity and colon cancer the lowest. The staining intensity of cohorts of cancer subtypes was also evaluated separately in scatter plots (with SD). The IHC images corresponding to orange data points are shown in Figures 7-9.

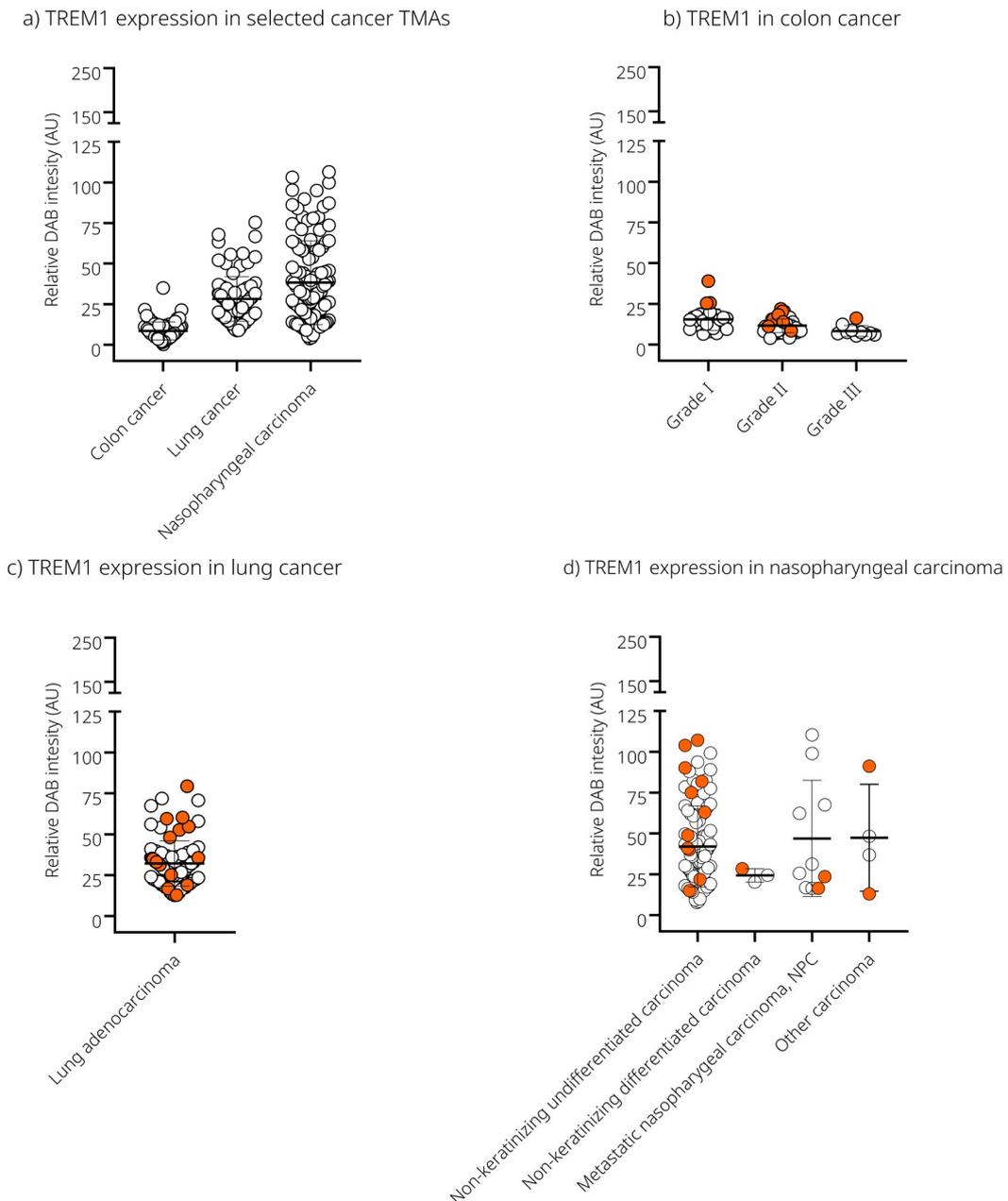


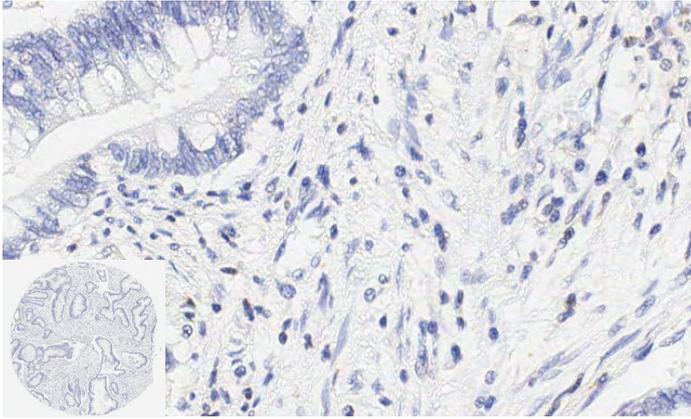
Figure 6. TREM1 protein expression in a selection of cancer TMAs.

- (a)** The scatter plot (with SD) summarizes the relative average DAB intensity of TREM1 expression in TMA cores.
- (b)** Relative average DAB intensity from 86 cores/cases of colon cancer (grade I (includes grade 1 & 1.5) adenocarcinoma (27), grade II (includes grade 2 & 2.5) adenocarcinoma (41) and grade III) adenocarcinoma (10).
- (c)** Relative average DAB intensity from 88 cores/cases of lung adenocarcinoma.
- (d)** Relative average DAB intensity from 113 TMA cores/cases of nasopharyngeal cancer (non-keratinizing undifferentiated carcinoma (96), non-keratinizing differentiated carcinoma (3), metastatic nasopharyngeal carcinoma, NPC (10), and others (keratinizing differentiated carcinoma (1), non-keratinizing differentiated carcinoma, no tumor cells (1), squamous cell carcinoma (2)).

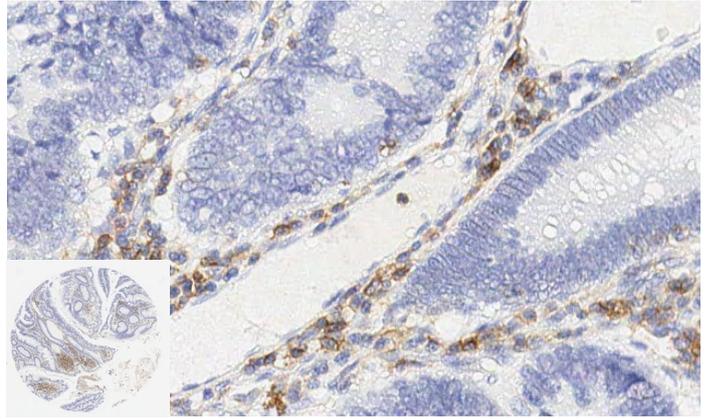
TREM1 expression in colon cancer TMA (BOND™ RX)

Below are the representative images of the human colon cancer TMA showing weak to strong TREM1 expression.

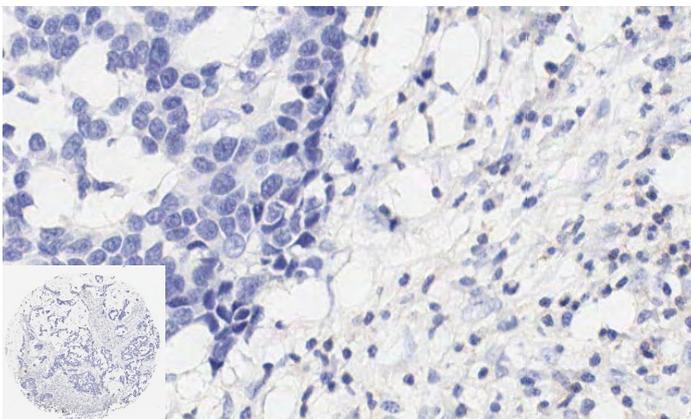
Papillary adenocarcinoma
(7.25 ; 0)



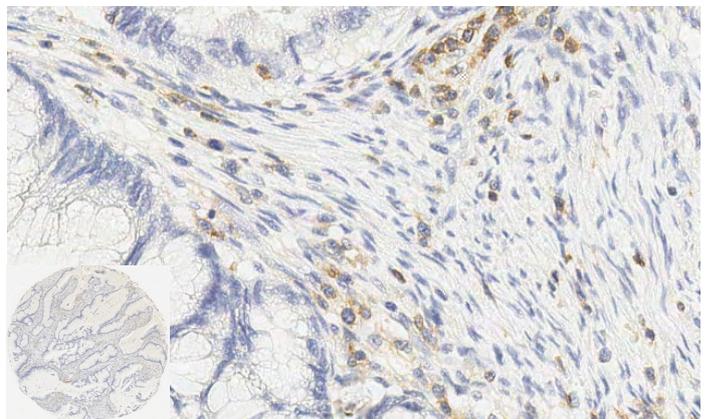
Papillary adenocarcinoma
(19.47 ; 1+)



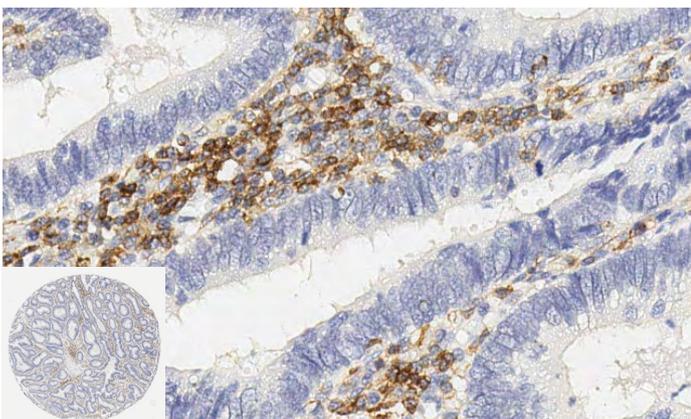
Mucinous adenocarcinoma
(7.70 ; 0)



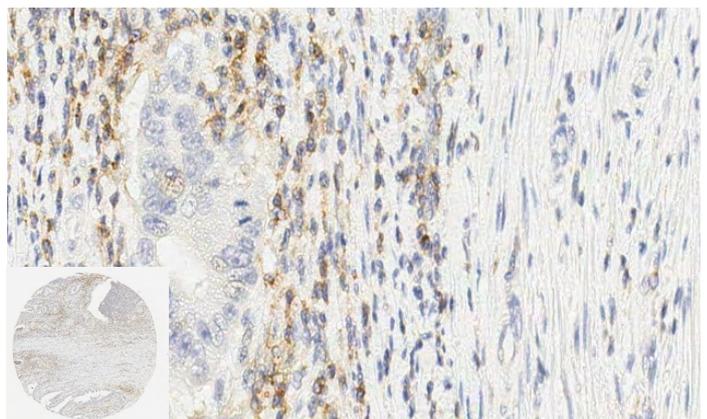
Mucinous adenocarcinoma
(19.21 ; 1+)



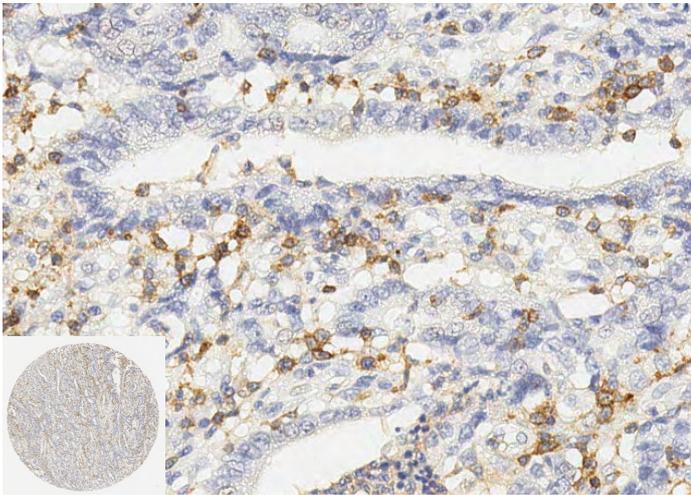
Grade I adenocarcinoma
(25.30 ; 1+)



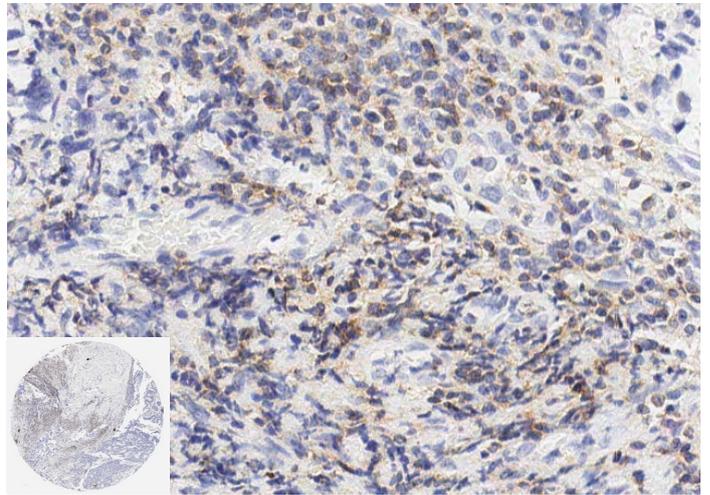
Grade I / II adenocarcinoma
(25.63 ; 1+)



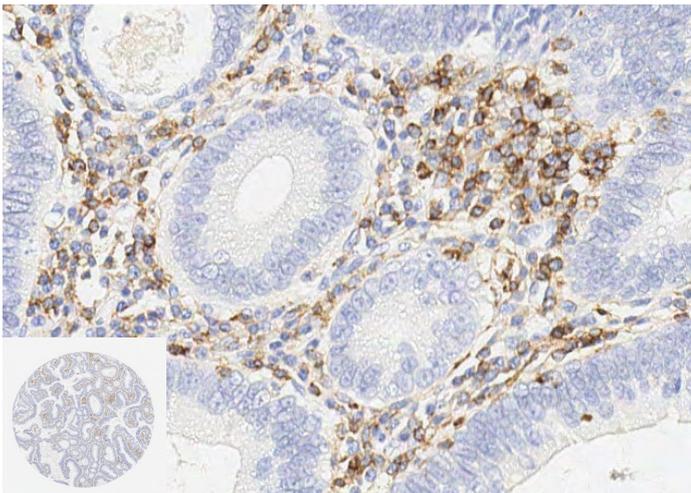
Grade I / II adenocarcinoma
(38.96 ; 1+)



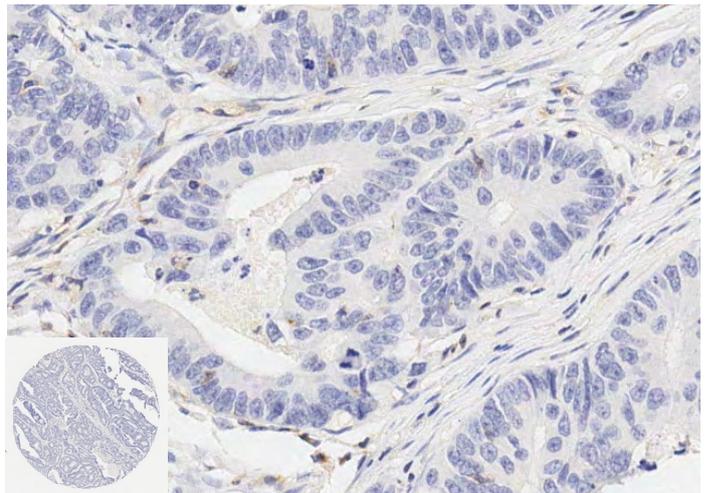
Grade II adenocarcinoma
(18.21 ; 1+)



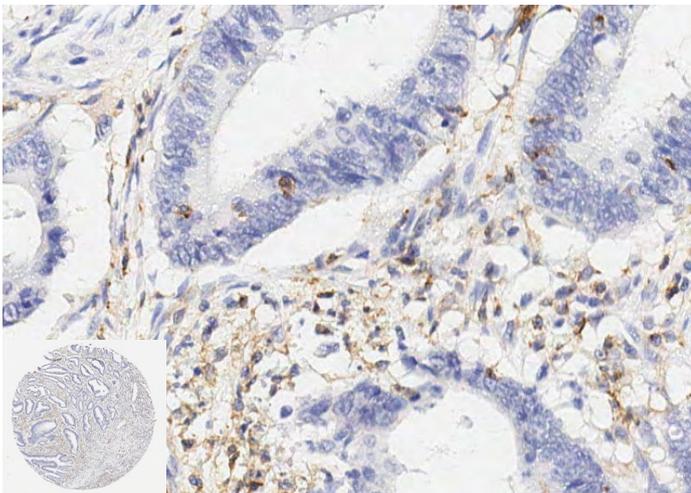
Grade II adenocarcinoma
(15.67 ; 1+)



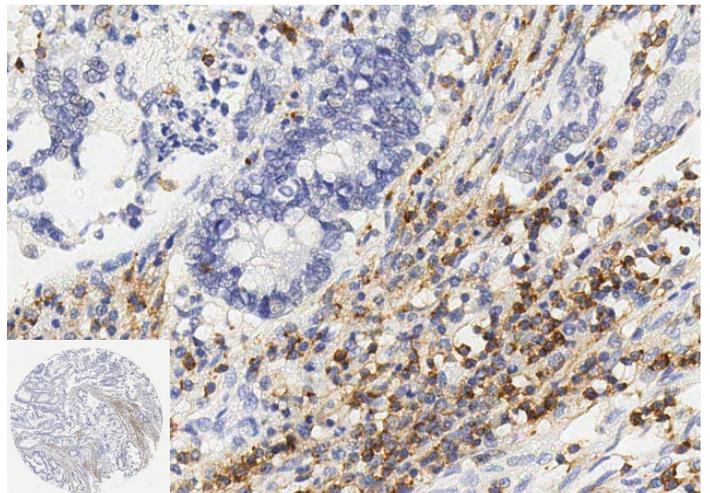
Grade II adenocarcinoma
(11.05 ; 1+)



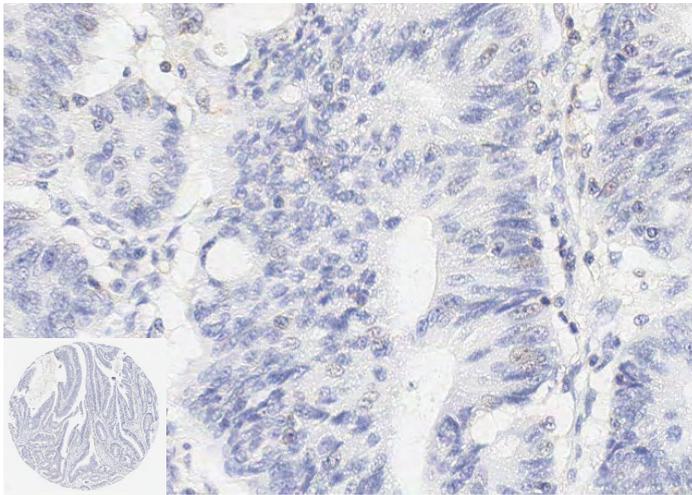
Grade II adenocarcinoma
(20.40 ; 1+)



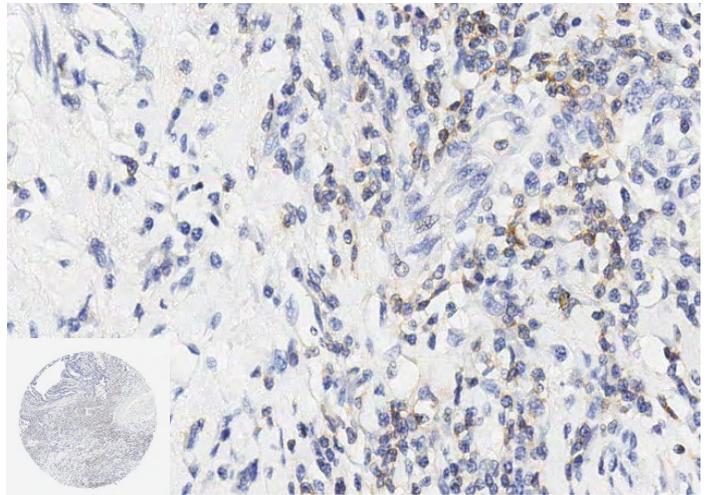
Grade II adenocarcinoma
(21.92 ; 1+)



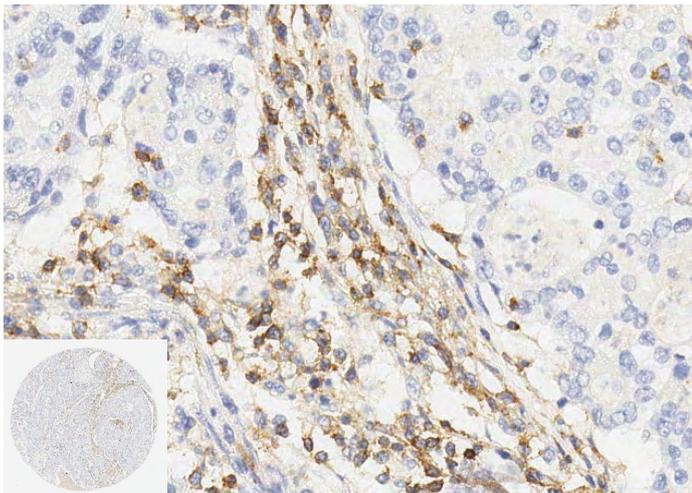
Grade II / III adenocarcinoma
(8.38 ; 0)



Grade II / III adenocarcinoma
(13.87 ; 1+)



Grade III adenocarcinoma
(16.13 ; 1+)



Isotype control - Colon adenocarcinoma

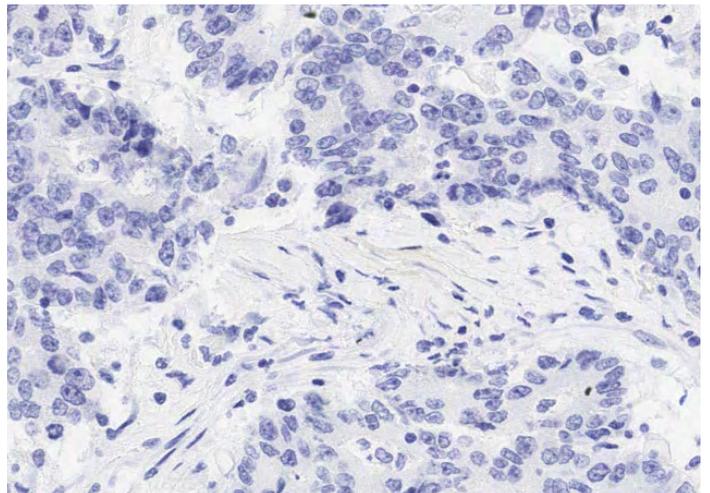
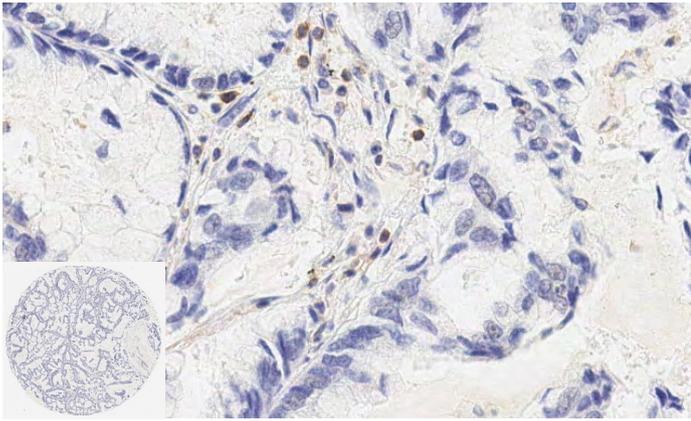


Figure 7. TREM1 expression in colon cancer. IHC images showing TREM1 staining with relative average DAB intensity and corresponding intensity score (a-o) and anti-rabbit IgG-isotype control antibody (ab172730) (p). Positive staining in brown; nuclear hematoxylin counterstain in blue. Slides were scanned at 20x (whole core insets at 5x) on Aperio® AT2 and imaged at 20x on Aperio® ImageScope.

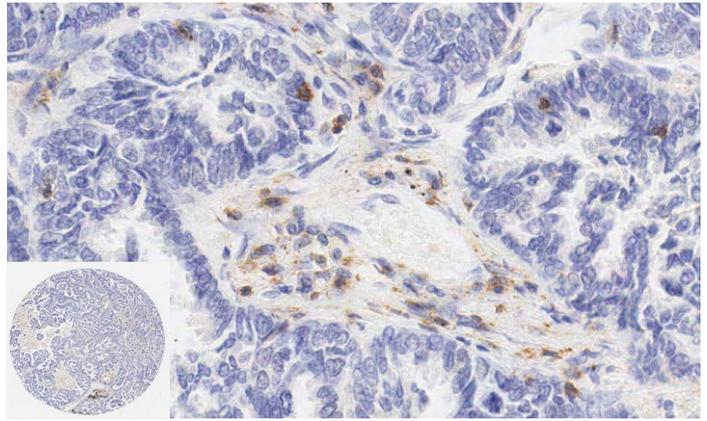
TREM1 expression in lung cancer TMA (BOND™ RX)

Below are the representative images of the human lung cancer TMA showing weak to strong TREM1 expression.

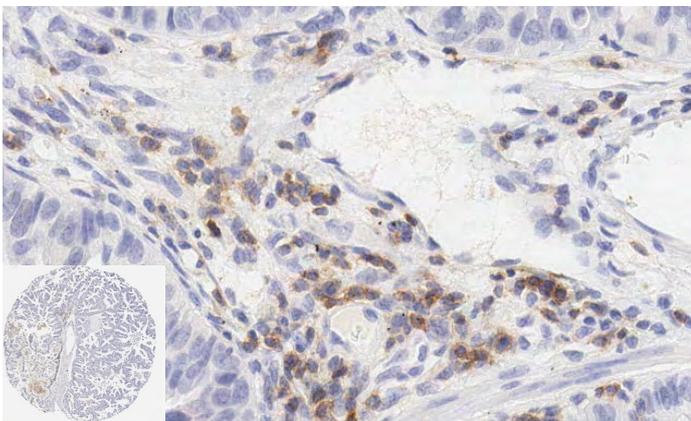
Adenocarcinoma
(12.76 ; 1+)



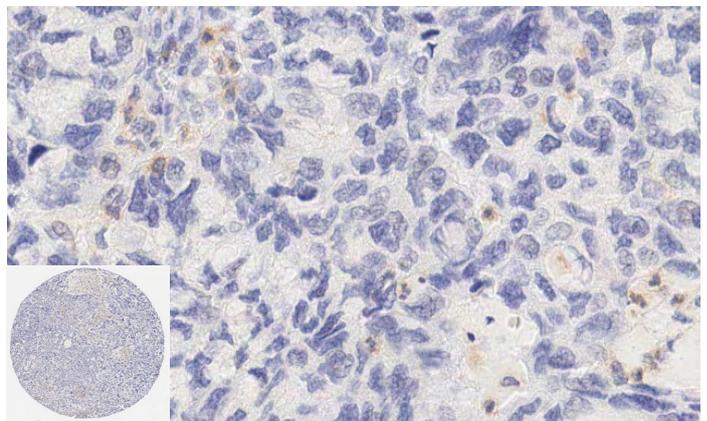
Adenocarcinoma
(12.82 ; 1+)



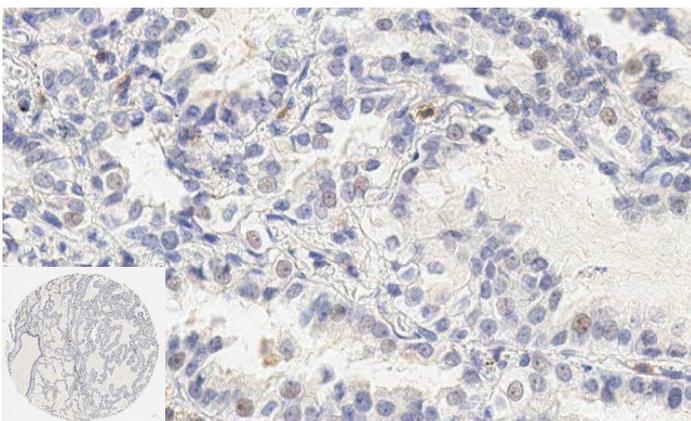
Adenocarcinoma
(16.80 ; 1+)



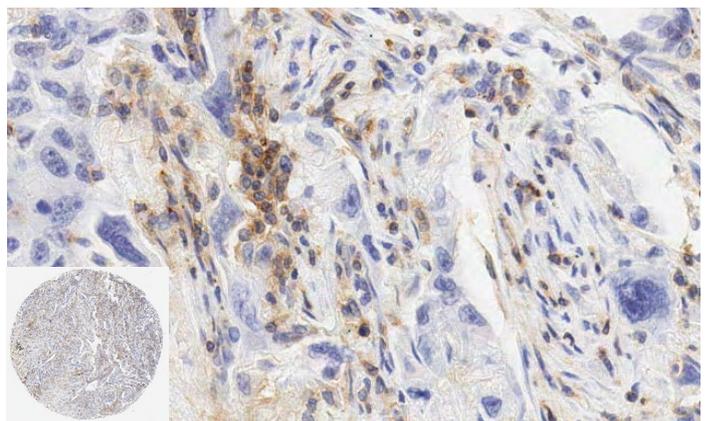
Adenocarcinoma
(18.96 ; 1+)



Adenocarcinoma
(25.23 ; 1+)

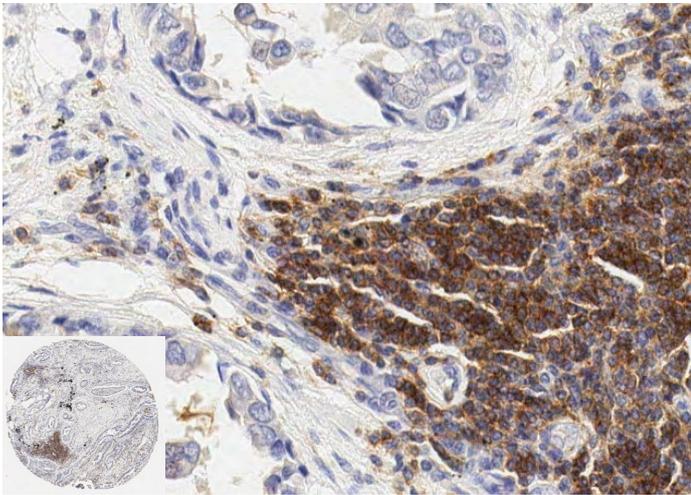


Adenocarcinoma
(31.29 ; 1+)

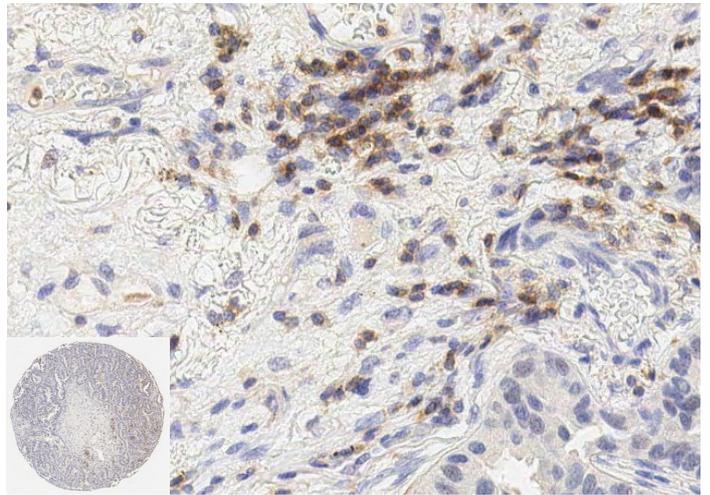


Enhanced validation data

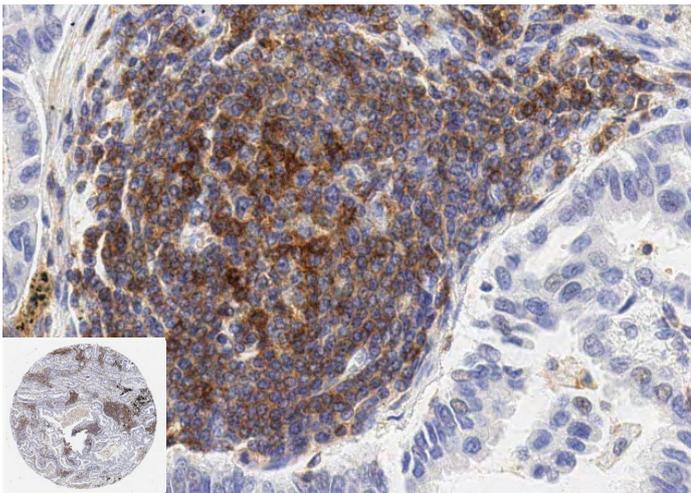
Adenocarcinoma
(33.02 ; 1+)



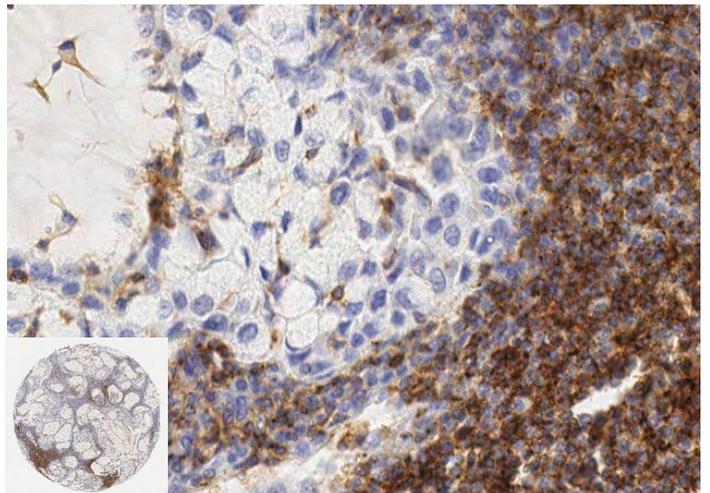
Adenocarcinoma
(34.79 ; 1+)



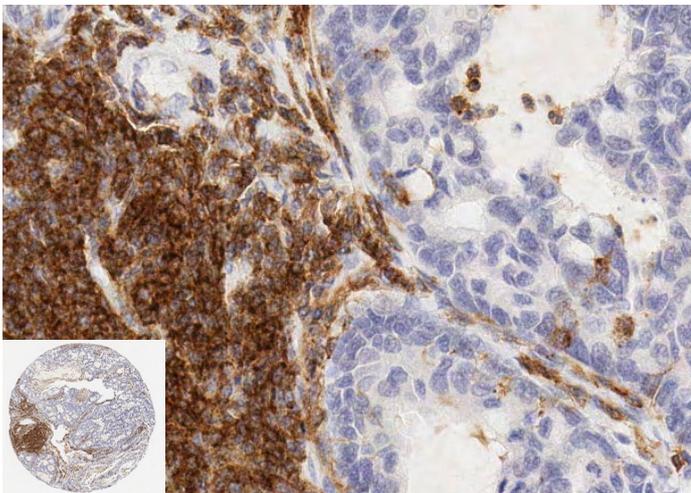
Adenocarcinoma
(35.58 ; 1+)



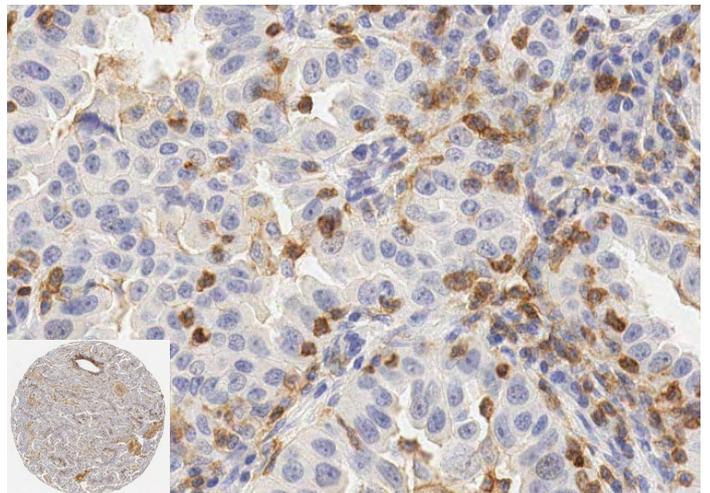
Adenocarcinoma
(48.03 ; 1+)



Adenocarcinoma
(52.70 ; 1+)

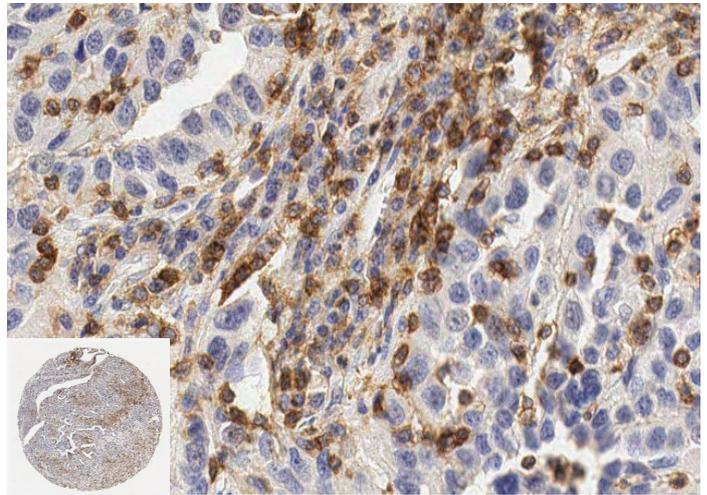
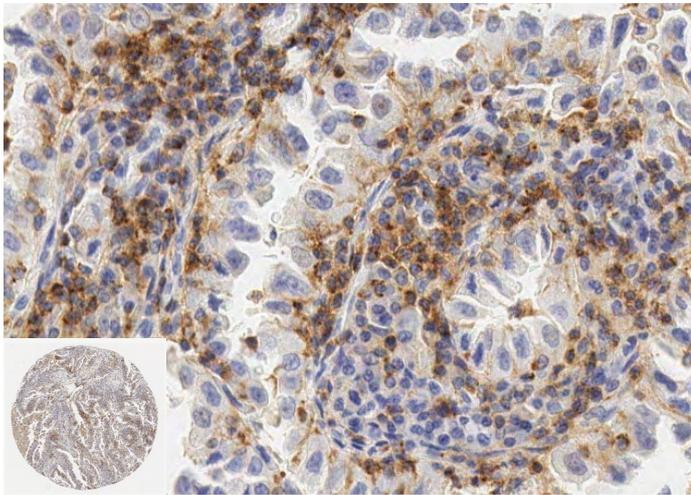


Adenocarcinoma
(54.66 ; 1+)



Adenocarcinoma
(59.56 ; 1+)

Adenocarcinoma
(60.29 ; 1+)



Adenocarcinoma
(79.33 ; 1+)

Isotype control - Lung adenocarcinoma

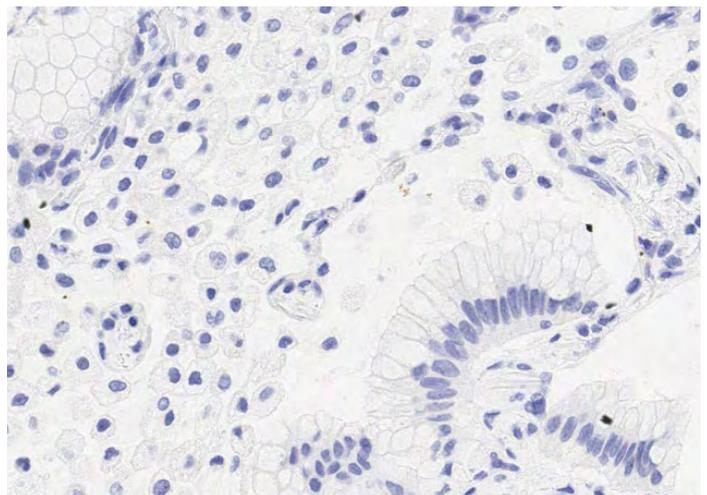
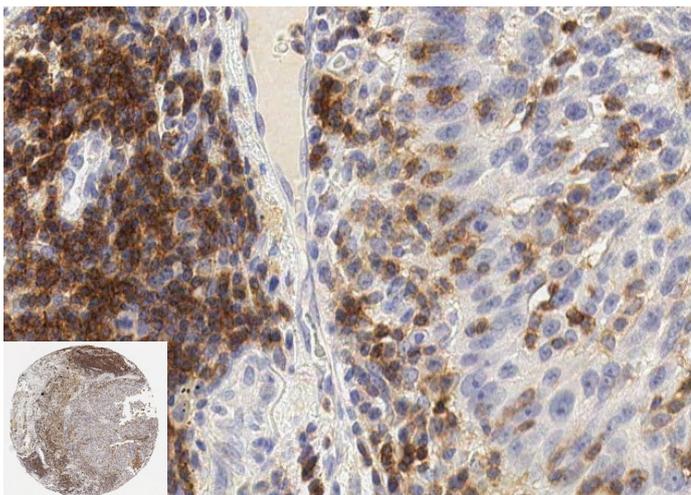
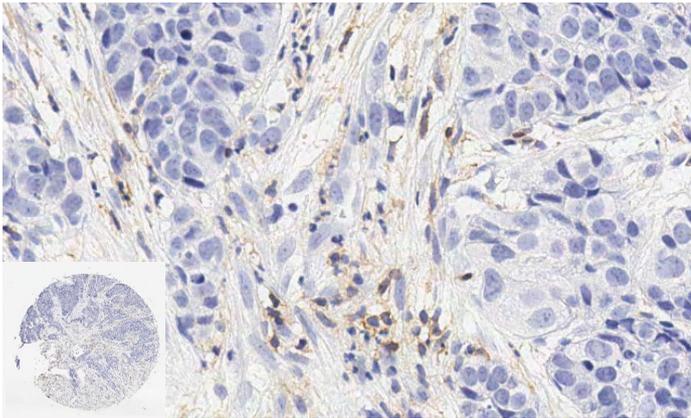


Figure 8. TREM1 expression in lung cancer. IHC images showing TREM1 staining with relative average DAB intensity and corresponding intensity score (a-o) and anti-rabbit IgG-isotype control antibody (ab172730) (p). Positive staining in brown; nuclear hematoxylin counterstain in blue. Slides were scanned at 20x (whole core insets at 5x) on Aperio® AT2 and imaged at 20x on Aperio® ImageScope.

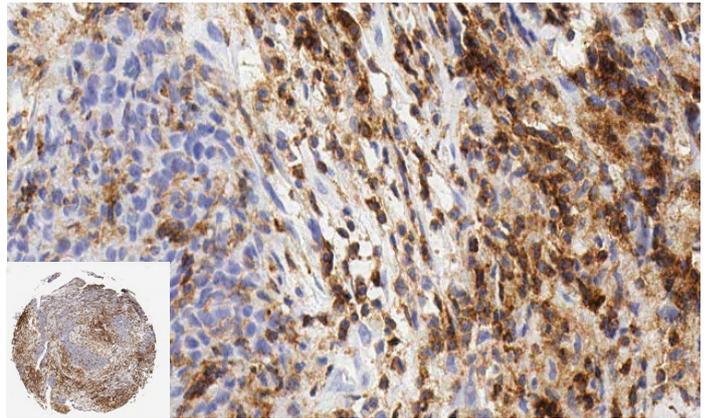
TREM1 expression in head and neck cancer TMA (BOND™ RX)

Below are the representative images of the human head and neck cancer TMA showing weak to strong TREM1 expression.

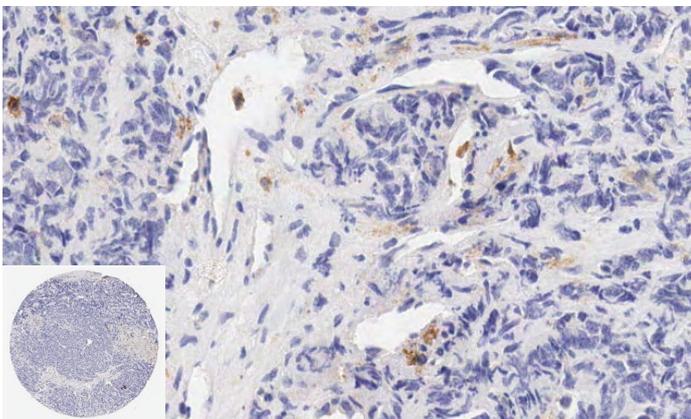
Squamous cell carcinoma
(13.02 ; 1+)



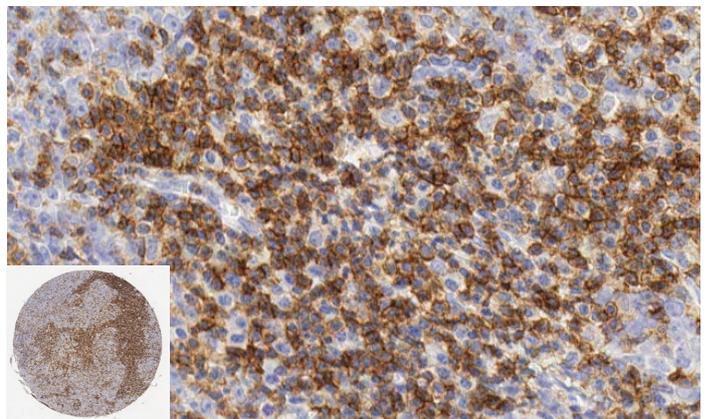
Squamous cell carcinoma
(91.26 ; 2+)



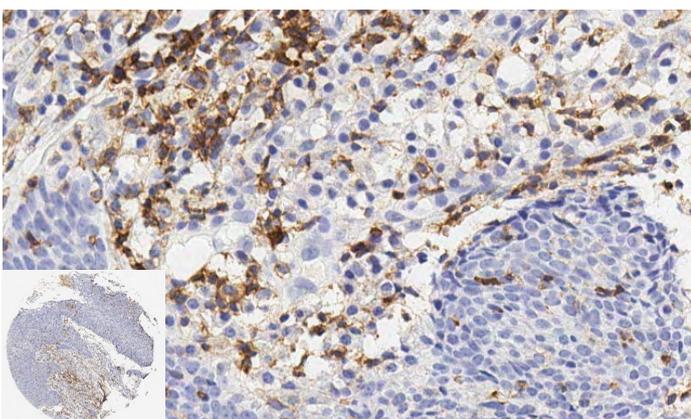
Metastatic nasopharyngeal carcinoma, NPC
(16.37 ; 1+)



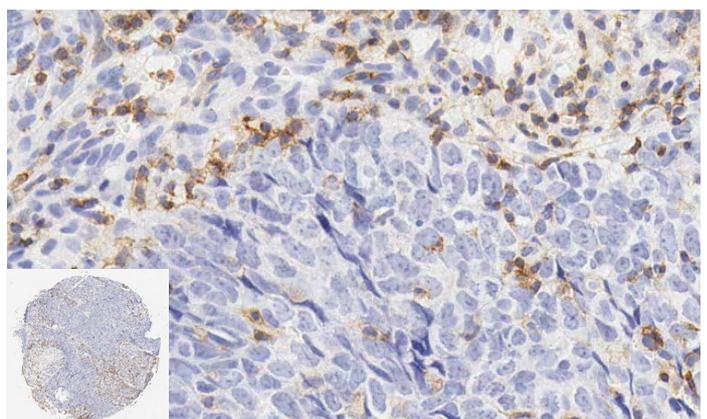
Metastatic nasopharyngeal carcinoma, NPC
(98.91 ; 2+)



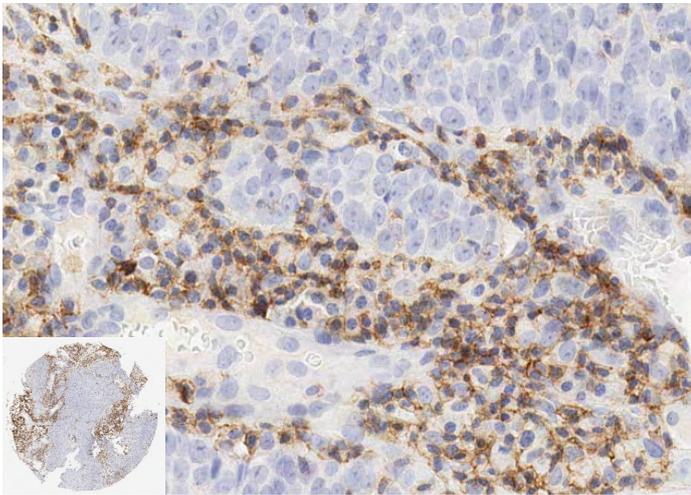
Non-keratinizing differentiated carcinoma
(28.44 ; 1+)



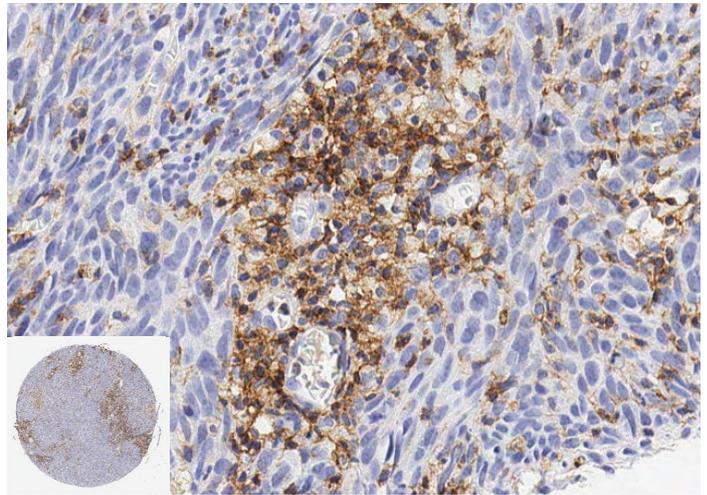
Non-keratinizing undifferentiated carcinoma
(21.82 ; 1+)



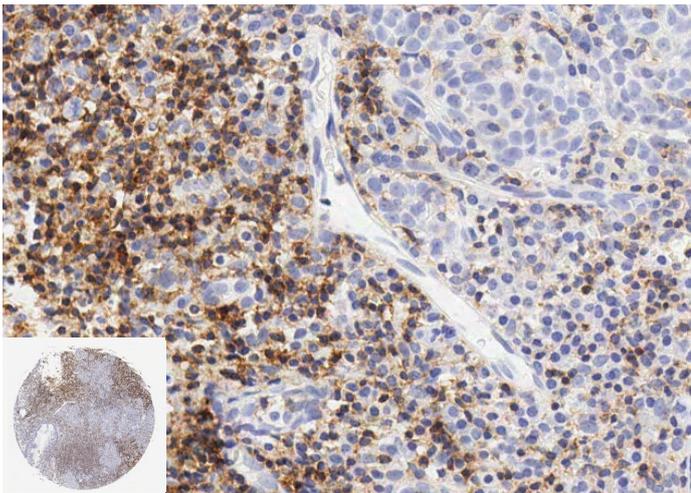
Non-keratinizing undifferentiated carcinoma
(39.96 ; 1+)



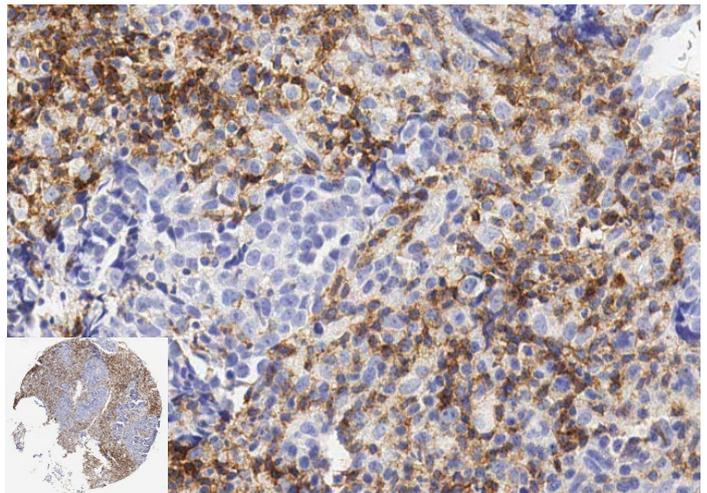
Non-keratinizing undifferentiated carcinoma
(41.05 ; 1+)



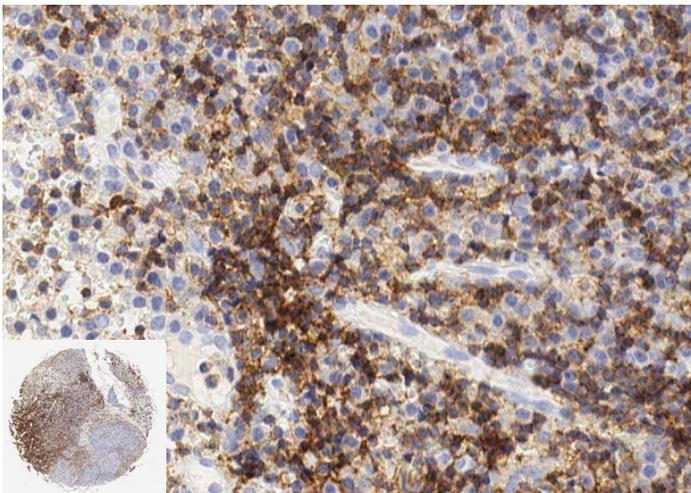
Non-keratinizing undifferentiated carcinoma
(48.96 ; 1+)



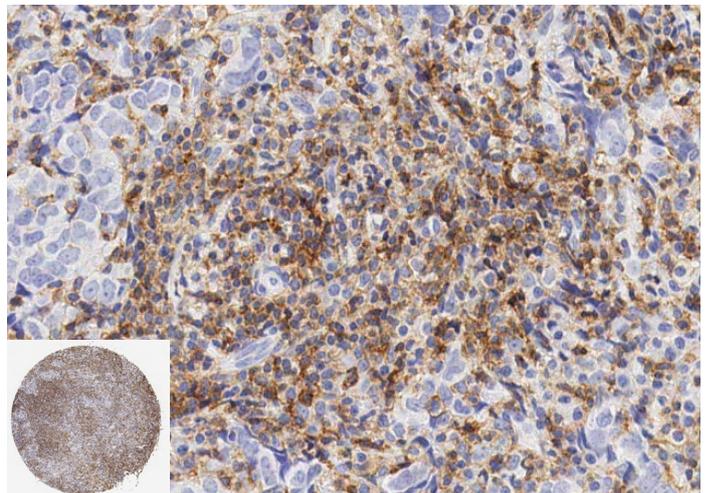
Non-keratinizing undifferentiated carcinoma
(63.10 ; 1+)



Non-keratinizing undifferentiated carcinoma
(74.95 ; 1+)

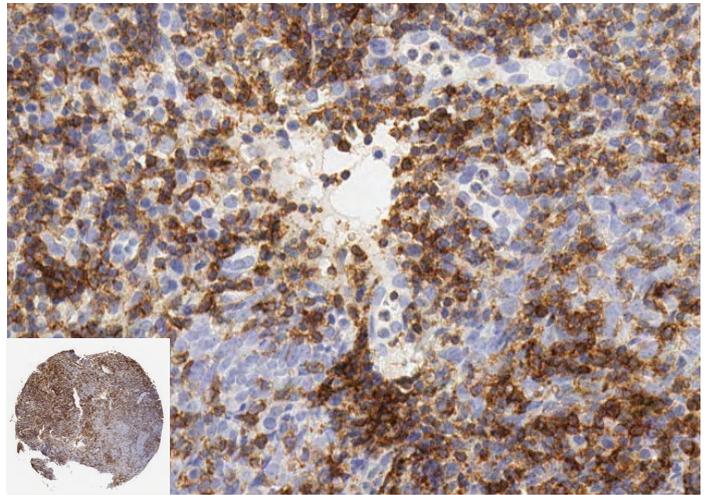
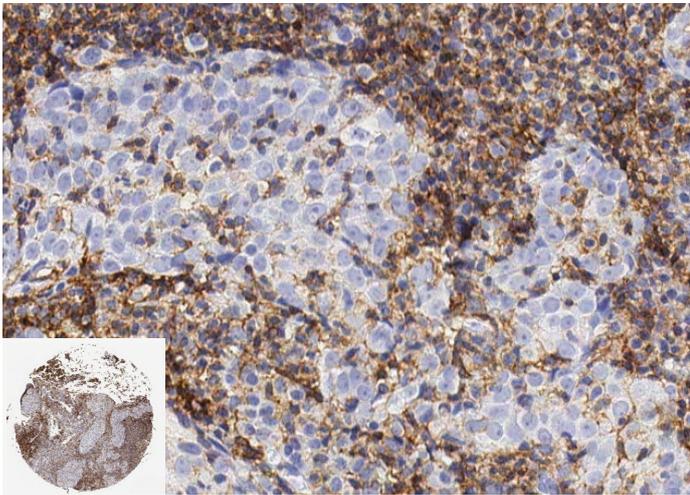


Non-keratinizing undifferentiated carcinoma
(81.91 ; 2+)



Non-keratinizing undifferentiated carcinoma
(90.13 ; 2+)

Non-keratinizing undifferentiated carcinoma
(103.86 ; 2+)



Non-keratinizing undifferentiated carcinoma
(107.11 ; 2+)

Isotype control - HNCC

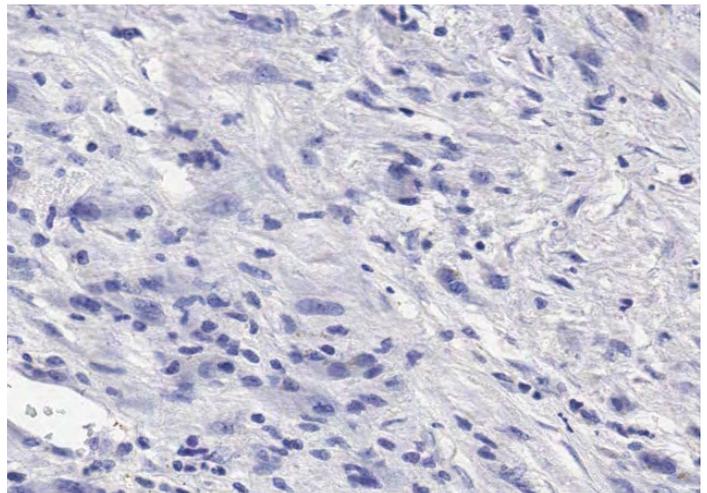
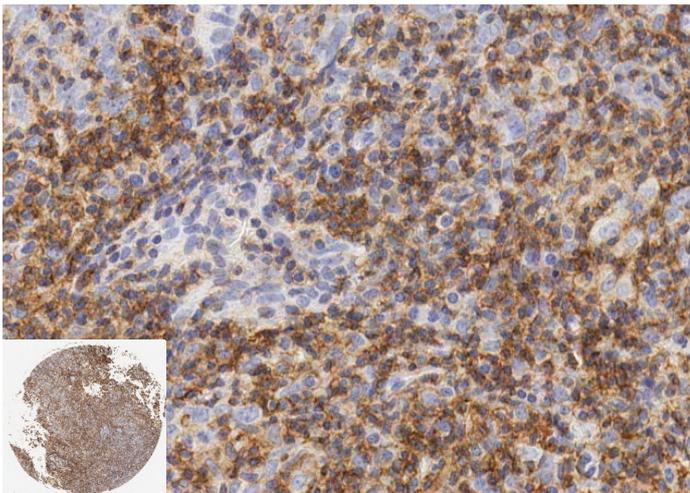


Figure 9. TREM1 expression in head and neck cancer. IHC images showing TREM1 staining with relative average DAB intensity and corresponding intensity score (a-o) and anti-rabbit IgG-isotype control antibody (ab172730) (p). Positive staining in brown; nuclear hematoxylin counterstain in blue. Slides were scanned at 20x (whole core insets at 5x) on Aperio® AT2 and imaged at 20x on Aperio® ImageScope.

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Enhanced validation data

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