

abcam

# Antibody recommendation program

Intestinal permeability – tight junction  
expression in critical illness (sepsis)

# Research project

## 1. Scientific background

The gut is hypothesized to play a central role in the progression of sepsis and multiple organ dysfunction syndromes. A critical illness, like sepsis, alters gut integrity by increasing epithelial apoptosis and permeability and by decreasing epithelial proliferation and mucus integrity. The intestinal hyper-permeability of the gut occurs when any of these disease processes alters the expression of epithelial tight junction protein.

Claudins function as major constituents of the tight junction complexes that regulate the permeability of epithelia. While some claudin family members play essential roles in the formation of impermeable barriers, others mediate the permeability to ions and small molecules. Often, several claudin family members are coexpressed and interact with each other, and this determines the overall permeability.

## 2. Project description

This project covers

- The analysis of the expression of the major tight junction proteins in healthy, septic, and treated groups
- The investigation of the expression level of tight junction proteins in different parts of the intestine
- The correlation analysis to altered luminal mucus production, including reduced thickness, diminished luminal coverage, and poor adherence

## 3. Keywords

Intestinal permeability, tight junctions, sepsis

# Experimental design

## 1. Research needs and requirements

- Type of samples
  - Mice tissue: colon, small intestine
  - Tissue sections from healthy, treated, and septic groups
- Major applications
  - Western blot, IHC/ICC/IF
- Requested targets
  - Claudin-1, -2, -3, -5, -7, and -8
  - Tricellulin
  - Occluding
  - Bcl-2

## 2. Suggested literature

- Bischoff S et al. Intestinal permeability – a new target for disease prevention and therapy. *BMC Gastroenterol* 14,189 (2014).
- Farré R., Vicario M. Abnormal barrier function in gastrointestinal disorders. *Gastrointestinal Pharmacology*, 193-217 (2016).
- Sung Hee Lee. Intestinal Permeability Regulation by Tight Junction: Implication on Inflammatory Bowel Diseases. *Intest Res* 13(1), 11-18 (2015).
- Li Q et al. Disruption of tight junctions during polymicrobial sepsis in vivo. *J Pathol* 218(2), 210-221 (2009).

# Product recommendations

## Claudin-1

Claudin-1 is required to prevent the paracellular diffusion of small molecules through tight junctions in the epidermis and is required for the normal barrier function of the skin. Claudin-1 is required for normal water homeostasis and to prevent excessive water loss through the skin, probably via an indirect effect on the expression levels of other proteins, since Claudin-1 itself seems to be dispensable for water barrier formation in keratinocyte tight junctions (PubMed:23407391).

### **Product recommended: Anti-Claudin 1 antibody (ab15098)**

Datasheet: [www.abcam.com/ab15098](http://www.abcam.com/ab15098)

Description: Rabbit polyclonal to Claudin 1

Suitable for: IHC-Fr, ICC/IF, WB, IHC-FoFr, IHC-P

Reacts with: mouse

Antibody cited in:

Kyoko OO *et al.* Expressions of tight junction proteins Occludin and Claudin-1 are under the circadian control in the mouse large intestine: implications in intestinal permeability and susceptibility to colitis. *PLoS One* 9, e98016 (2014).

Süren D *et al.* Loss of tight junction proteins (Claudin 1, 4, and 7) correlates with aggressive behavior in colorectal carcinoma. *Med Sci Monit* 20, 1255-62 (2014).

DiTommaso T *et al.* Keratin 76 is required for tight junction function and maintenance of the skin barrier. *PLoS Genet* 10, e1004706 (2014).

Vanuytsel T *et al.* From intestinal permeability to dysmotility: the biobreeding rat as a model for functional gastrointestinal disorders. *PLoS One* 9, e111132 (2014).

Lai CM *et al.* Directional release of reovirus from the apical surface of polarized endothelial cells. *MBio* 4, e00049-13 (2013).

## Claudin-2

Claudin-2 plays a major role in tight junction-specific obliteration of the intercellular space, through calcium-independent cell-adhesion activity.

### **Product recommended: Anti-Claudin 2 antibody (ab53032)**

Datasheet: [www.abcam.com/ab53032](http://www.abcam.com/ab53032)

Description: Rabbit polyclonal to Claudin 2

Suitable for: ICC/IF, IHC-P, WB

Reacts with: mouse

Antibody cited in:

Dominguez JA *et al.* Inhibition of IKK $\beta$  in enterocytes exacerbates sepsis-induced intestinal injury and worsens mortality. *Crit Care Med* 41, e275-85 (2013).

## Claudin-3

Claudin-3 plays a major role in tight junction-specific obliteration of the intercellular space, through calcium-independent cell-adhesion activity.

### **Product recommended: Anti-Claudin 3 antibody (ab15102)**

Datasheet: [www.abcam.com/ab15102](http://www.abcam.com/ab15102)

Description: Rabbit polyclonal to Claudin 3

Suitable for: ICC/IF, IHC-P, WB

Reacts with: mouse

Antibody cited in:

Morris LM *et al.* Mouse middle ear ion homeostasis channels and intercellular junctions. *PLoS One* 7, e39004 (2012).

Charoenphandhu N *et al.* Chronic metabolic acidosis upregulated claudin mRNA expression in the duodenal enterocytes of female rats. *Life Sci* 80, 1729-37 (2007).

## Claudin-5

Claudin-5 lays a major role in tight junction-specific obliteration of the intercellular space.

### **Product recommended: Anti-Claudin 5 antibody (ab15106)**

Datasheet: [www.abcam.com/ab15106](http://www.abcam.com/ab15106)

Description: Rabbit polyclonal to Claudin 5

Suitable for: ICC/IF, IHC-P, IHC-Fr, WB

Reacts with: mouse

## Claudin-7

Claudin-7 lays a major role in tight junction-specific obliteration of the intercellular space.

### **Product recommended: Anti-Claudin 7 antibody (ab27487)**

Datasheet: [www.abcam.com/ab27487](http://www.abcam.com/ab27487)

Description: Rabbit polyclonal to Claudin 7

Suitable for: ICC/IF, IHC-P, IHC-Fr, WB

Reacts with: mouse

Antibody cited in:

Süren D *et al.* Loss of tight junction proteins (Claudin 1, 4, and 7) correlates with aggressive behavior in colorectal carcinoma. *Med Sci Monit* 20, 1255-62 (2014).

Wang H *et al.* Multimerization of adenovirus serotype 3 fiber knob domains is required for efficient binding of virus to desmoglein 2 and subsequent opening of epithelial junctions. *J Virol* 85, 6390-402 (2011).

Kohno Y *et al.* Expression of claudin7 is tightly associated with epithelial structures in synovial sarcomas and regulated by an Ets family transcription factor, ELF3. *J Biol Chem* 281, 38941-50 (2006).

## Claudin-8

Claudin-8 plays a major role in tight junction-specific obliteration of the intercellular space.

**Product recommended: Anti-Claudin 8 antibody [EPR12680(2)] (ab183738)**

Datasheet: [www.abcam.com/ab183738](http://www.abcam.com/ab183738)

Description: Rabbit monoclonal to Claudin 8

Suitable for: IHC-P.

Not tested for WB and ICC. Please contact us to participate in our Abtrial program and test this antibody without financial risk (see page 10).

Reacts with: Mouse

## Tricellulin

Tight junctions (TJ) prevent leakage of solutes through the paracellular pathway of epithelial cells. Tricellulin (TRIC), also known as MARVELD2, is an integral membrane protein concentrated at the vertically oriented TJ strands of tricellular contacts. It plays a role in the formation of the epithelial barriers.

**Product recommended: Anti-MARVELD2 antibody - C-terminal (ab200810)**

Datasheet: [www.abcam.com/ab200810](http://www.abcam.com/ab200810)

Description: Rabbit polyclonal to MARVELD2 – C-terminal

Suitable for: ICC, WB.

Not tested for IHC. Please contact us to participate in our Abtrial program and test this antibody without financial risk (see page 10).

Reacts with: Mouse

## Occludin

Occludin may play a role in the formation and regulation of the tight junction (TJ) paracellular permeability barrier. It can induce adhesion when expressed in cells lacking tight junctions.

### **Product recommended: Anti-Occludin antibody (ab168986)**

Datasheet: [www.abcam.com/ab168986](http://www.abcam.com/ab168986)

Description: Rabbit polyclonal to Occludin

Suitable for: IHC-P, WB.

Not tested for ICC. Please contact us to participate in our Abtrial program and test this antibody without financial risk (see page 10).

Reacts with: Mouse

Antibody cited in:

Bauskar A *et al.* Clusterin Seals the Ocular Surface Barrier in Mouse Dry Eye. *PLoS One* 10, e0138958 (2015).

## Bcl-2

Bcl-2 suppresses apoptosis in a variety of cell systems including factor-dependent lymphohematopoietic and neural cells. Bcl-2 regulates cell death by controlling the mitochondrial membrane permeability. Bcl-2 appears to function in a feedback loop system with caspases. It inhibits caspase activity either by preventing the release of cytochrome c from the mitochondria and/or by binding to the apoptosis-activating factor (APAF-1). It may attenuate inflammation by impairing NLRP1-inflammasome activation, hence CASP1 activation and IL1B release (PubMed:17418785).

### **Product recommended: Anti-Bcl-2 antibody [EPR17509] (ab182858)**

Datasheet: [www.abcam.com/ab182858](http://www.abcam.com/ab182858)

Description: Rabbit monoclonal to Bcl-2

Suitable for: IHC-P, ICC/IF, WB.

Reacts with: Mouse



# Protocols and troubleshooting

## Western blot

**Protocols:** <http://www.abcam.com/tag/western%20blot%20protocols>

**Troubleshooting:** <http://www.abcam.com/protocols/western-blot-troubleshooting-tips>

## IHC/ICC:

**Protocols:** <http://www.abcam.com/tag/ihc%20protocols>

**Troubleshooting:** <http://www.abcam.com/protocols/troubleshooting-and-using-controls-in-ihc-and-icc>

# Contact information

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# Abcam information

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