Distribution of cell junctions proteins in the descending colon of *Muc2* mice

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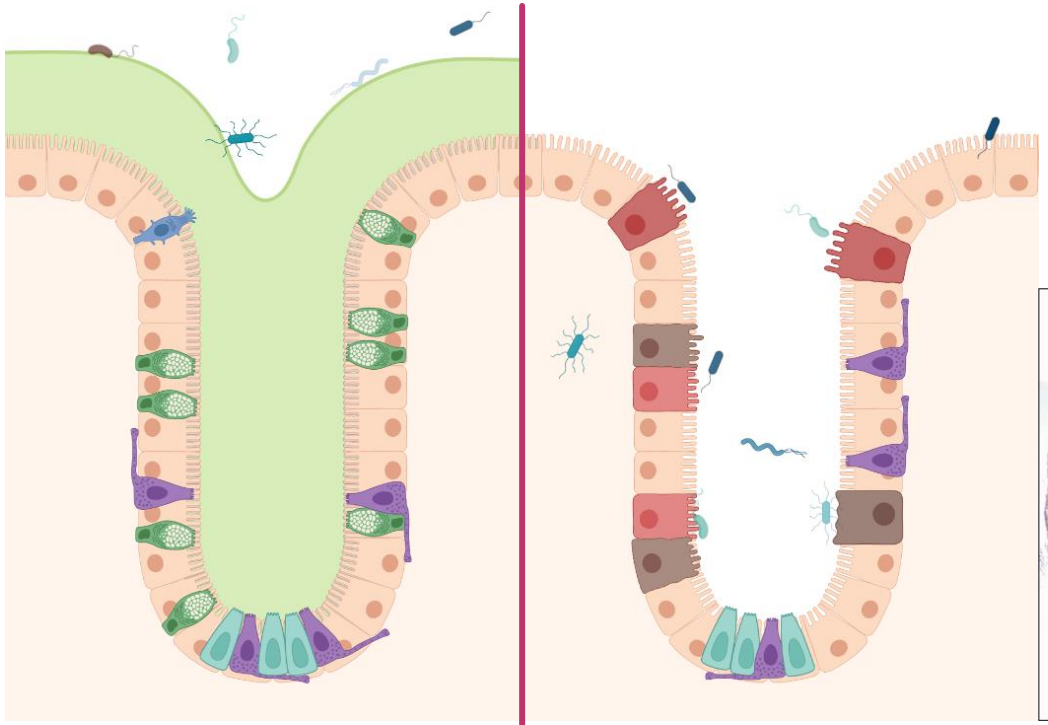
Introduction: *Muc2* mice and leaky gut

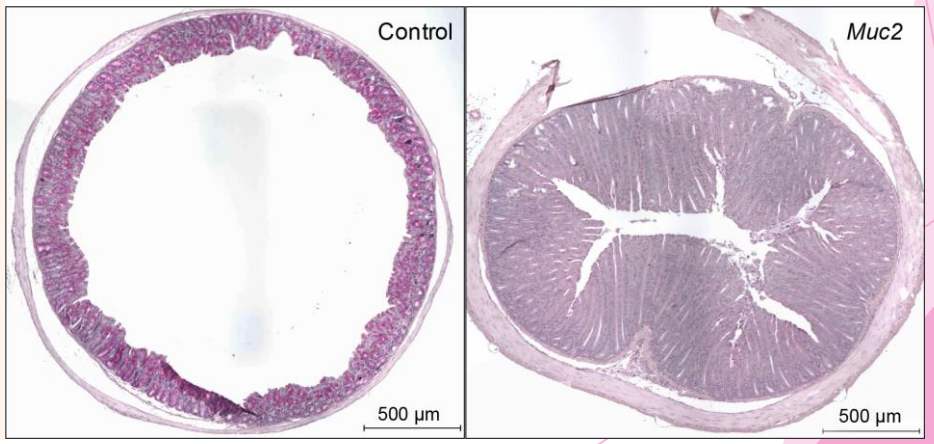
***Muc2*-knockout mice** strain is an experimental model of inflammatory bowel disease. These animals lack Mucin 2 protein which is the prevalent component of intestinal mucus layer protecting the gut surface from luminal antigens. *Muc2* mice exhibit **leaky gut syndrome** characterized by high intestinal barrier permeability and chronic inflammation.



Healthy colon
(with mucus)

Muc2$^{-/-}$ colon
(without mucus)

In leaky gut syndrome cell contacts are disturbed, so antigens overpass epithelium and cause inflammation.



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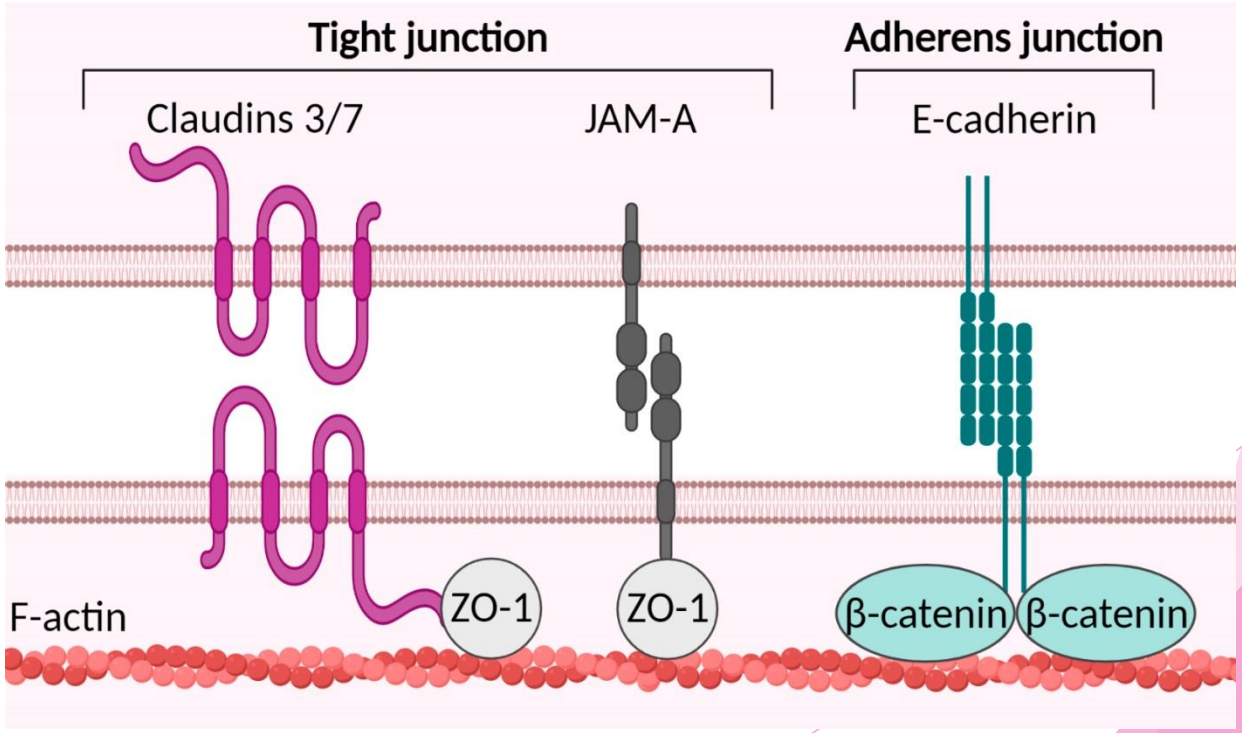
Introduction: tight and adherens junctions

Tight junctions (TJ) are the most apical connections between enterocytes. **Adherens junctions** (AJ) localize more basal than TJ. We have previously shown that TJ and AJ are impaired in *Muc2* IBD model, but expression levels of their proteins are not altered [Borisova et al., 2020].

Objective: In this report, we aimed to assess the localization of several cell junction proteins in the descending colon of *Muc2*$^{-/-}$ mice, namely:

TJ:
- Claudin 3
- Claudin 7
- JAM-A
- ZO-1

AJ:
- E-cadherin
- ß-catenin



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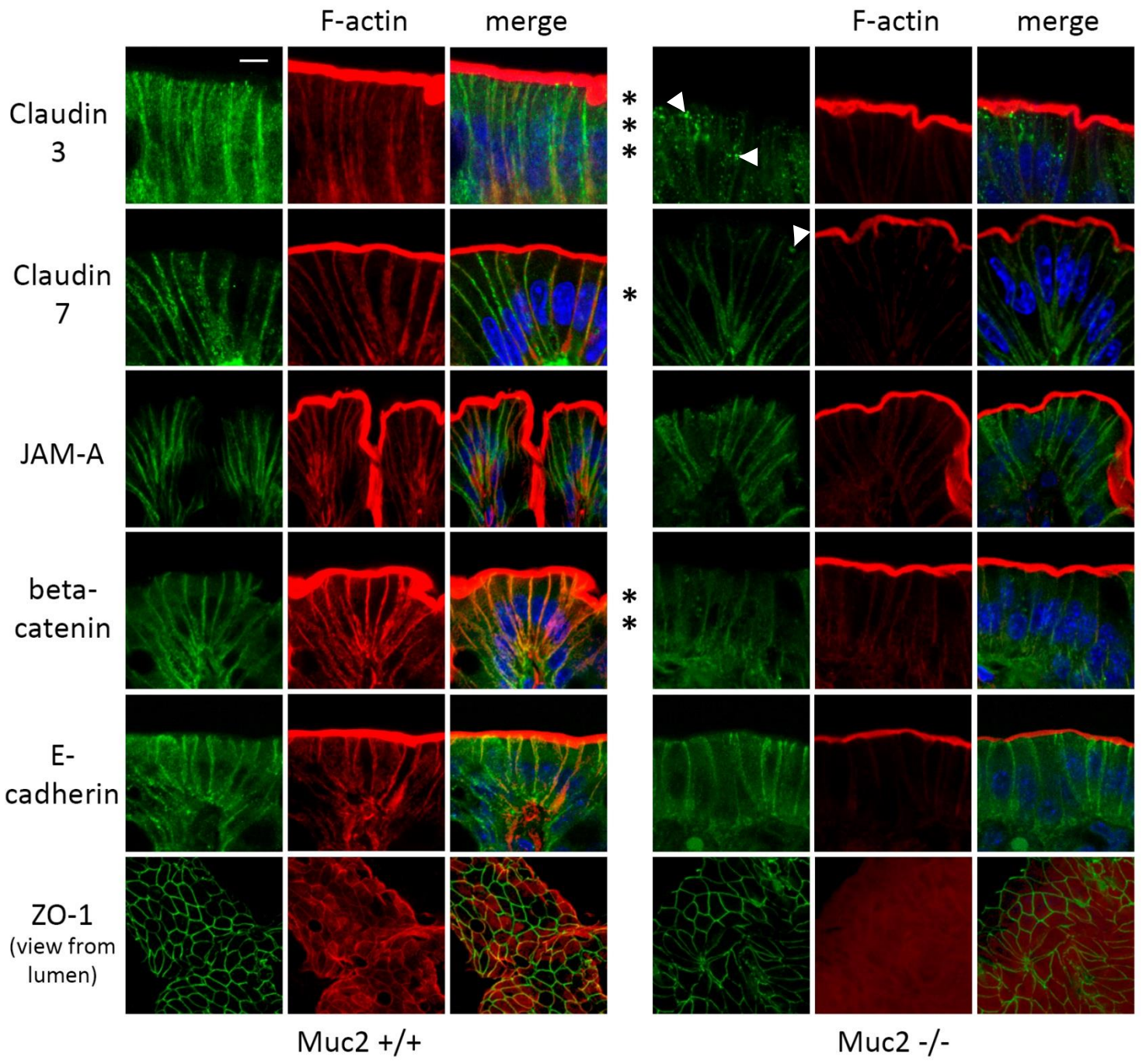
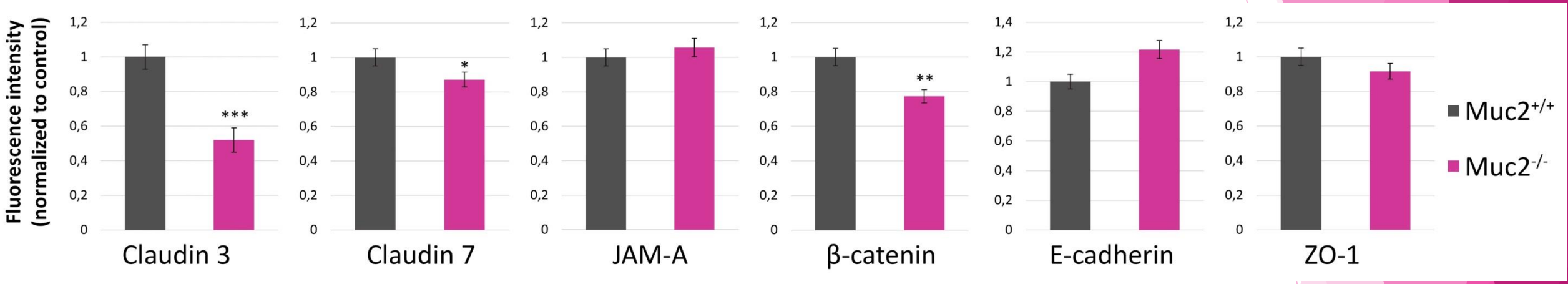
Results

1. **Β-catenin, Claudins 3 and 7** are less abundant at lateral membranes of enterocytes in the descending colon of *Muc2*$^{-/-}$ mice. Claudins 3 and 7 tend to form aggregates in mutant enterocytes (arrows).
2. Localization of **JAM-A, E-cadherin and ZO-1** in *Muc2*$^{-/-}$ mice appeared to be indistinguishable from those in *Muc2*$^{+/+}$ mice
3. It is confirmed that **F-actin** has impaired dynamics in *Muc2*$^{-/-}$ mice.



Results and conclusion

Quantitative analysis have proved differences in Claudin 3, Claudin 7 and β-catenin signals to be significant:



We have previously demonstrated that expression levels of Claudins, ZO-1, β-catenin and E-cadherin do not change in Muc2-defficient mice [Borisova et al., 2020]. Hence, differences we observed can not be explaned by decreases in expression levels. We suggest that in *Muc2* mice transmembrane proteins **Claudins 3 and 7 dissociate from lateral membranes into cytoplasmic vesicles, whereas β-catenin evenly redistributes from lateral membranes into the cytoplasm.**

F-actin impaired dynamics can lead to AJ' and TJ' disassembly as described before [Citalán-Madrid et al., 2017]. We suggest that the same mechanism takes place in Muc2-defficient mice.

Acknowledgment

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Thank you for your attention!