

# The Interactions of *Listeria monocytogenes* with Barriers of the Intestinal Epithelial Lining

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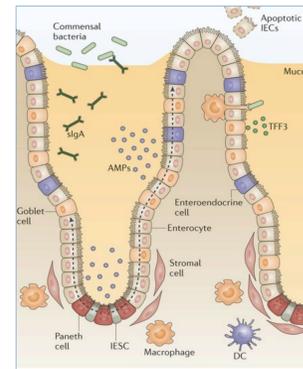
While the human gut must be sufficiently permeable to allow for the intake of essential nutrients, it must also create defensive barriers, both chemical and physical, that prevent the movement of commensal or pathogenic bacteria into the epithelial host cells lining the gut. These include:

- Short-Chain Fatty Acids (SCFAs)
- Epithelial cells lining the gut
- Antimicrobial Peptides
- Mucus layer

Physically defensive barrier

Thick layer of mucus that forms between the interior of the intestine and the apical side of epithelial cells

Overlays the human epithelial cells lining along the lumen of the gut



<https://www.stemcell.com/life-science/metabolomics/enzyme-explorer/learning-center/structural-protein/mucin.html>

Lance W. Peterson and David Artis

## Research Goal

- The overarching goal of my thesis is to understand how an enteric pathogen like *Listeria* overcomes the physical and chemical barriers defending the intestinal epithelium under physiologically relevant conditions.
- One of four main questions: Can *Listeria* survive in the presence of Mucus or antimicrobial peptides such as Nisin?

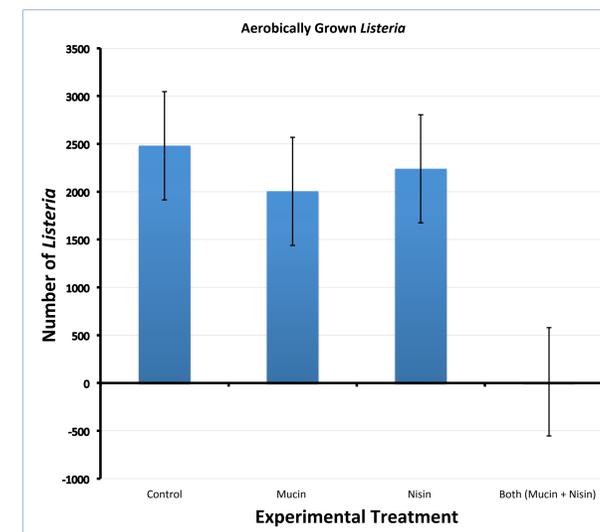
## Methods: Antimicrobial Survival Test

- Grew *Listeria* in overnight culture in both aerobic and anaerobic conditions
- After ~18 hours, prepared bacteria with HEPES buffer to normalize cell count and combined this prepared bacteria in mixtures with the following experimental treatments:

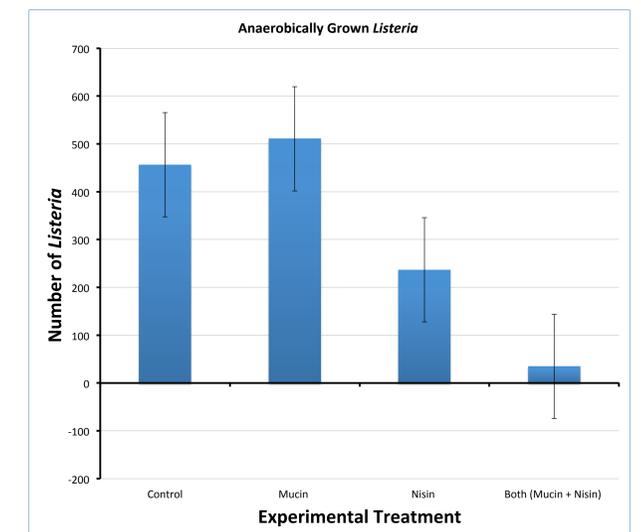
Mucin + HEPES Buffer  
Nisin + HEPES Buffer  
Mucin + Nisin + HEPES Buffer  
HEPES Buffer only

- Allowed mixtures to incubate in 37° C for one hour
- Plated the mixtures and allowed these to incubate for 48 hours, after which the amount of surviving *Listeria* was counted

## Results



For aerobically grown *Listeria*, the presence of mucin decreases *Listeria* survival in the presence of nisin



The survival of anaerobically grown *Listeria* decreases in the presence of nisin, an effect that is enhanced by the presence of mucin

**Conclusion: *Listeria* can survive in mucus or in nisin but the presence of mucus decreases *Listeria* survival in nisin.**

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