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# Surface Fouling and Allergen Control

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# Introduction

- Why is surface fouling important?
  - Surface bound protein.
  - Cross contamination.
  - Affects detection.

# Introduction

- What to consider?
  - Surfaces.
  - Environment.
  - Allergen.

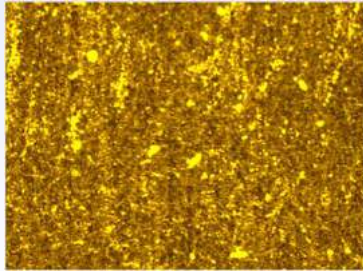
# Surfaces

- Surface properties:
  - Topography.
  - Chemistry.
  - Physicochemistry.
  - Heterogeneity.
  - Potential.

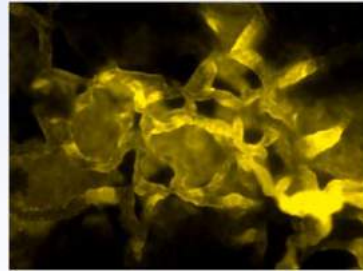
# Surface Conditioning

- As soon as a surface is used it becomes conditioned.
- This changes the surface properties.
- The environment will also affect biochemical interactions.

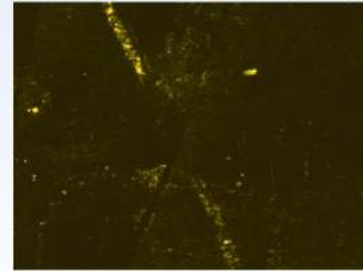
# Surface Conditioning



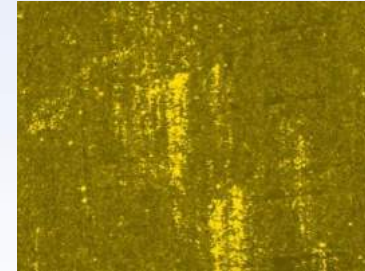
Meat



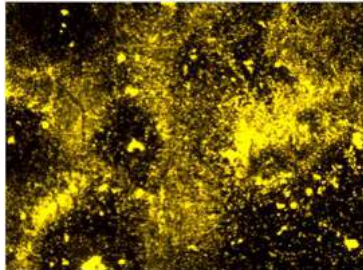
Cholesterol



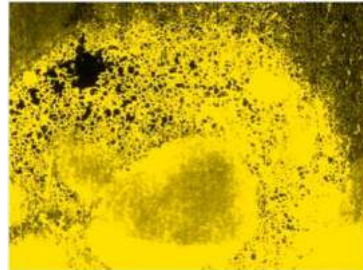
BSA



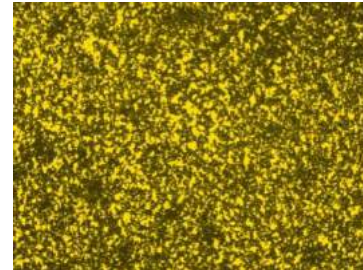
Glycogen



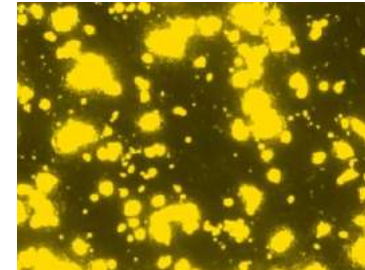
Fish



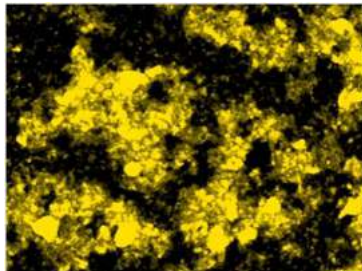
Fish oil



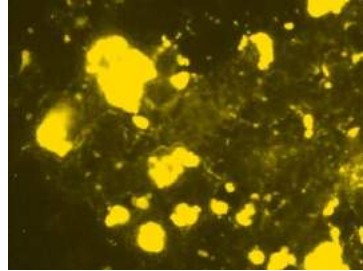
Fish protein



Starch



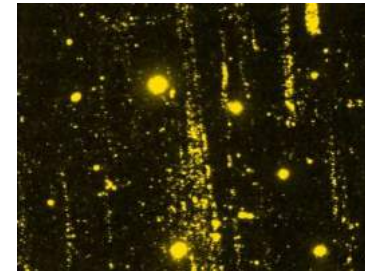
Cheese



Fatty acids



Casein

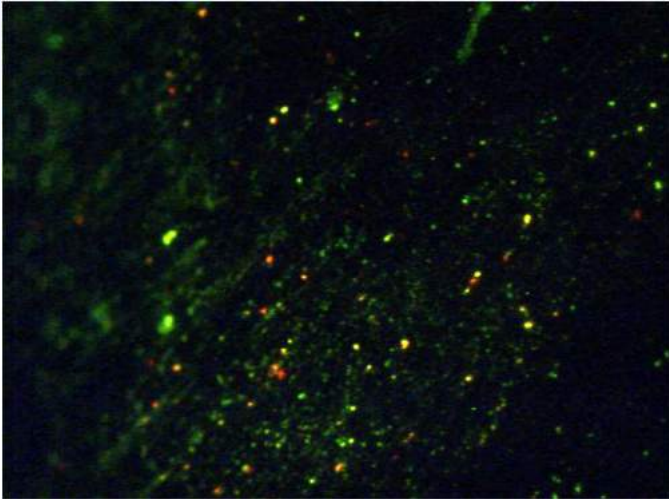


Lactose

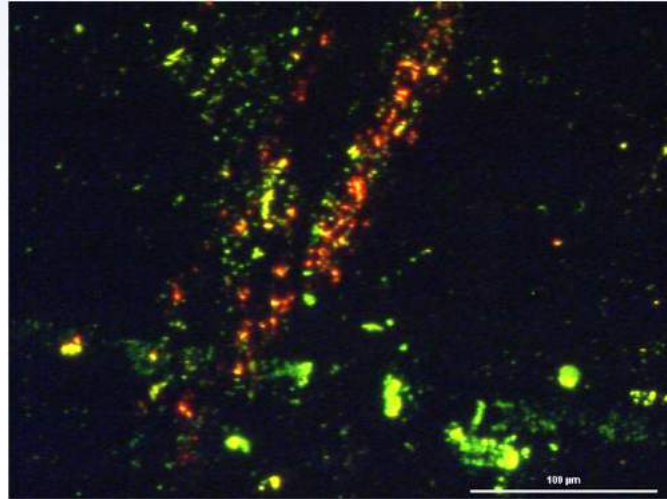
How clean is a clean surface?



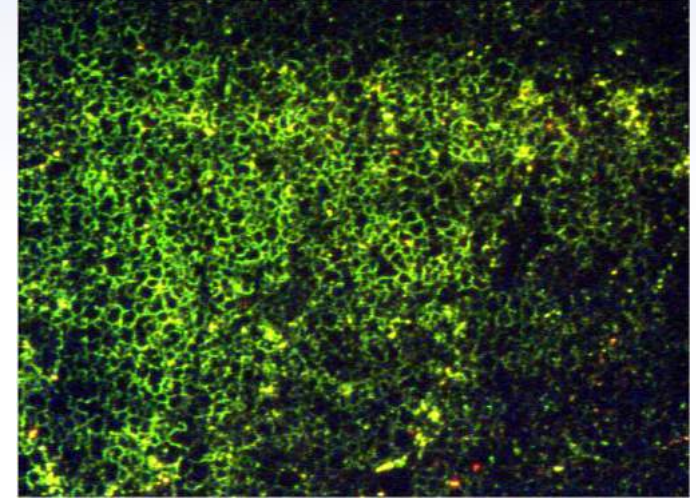
# Surface Conditioning



Clean stainless steel  
(from factory)



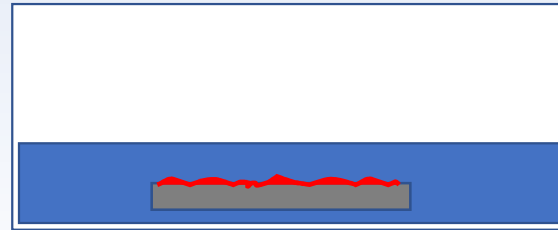
x 10 cleans



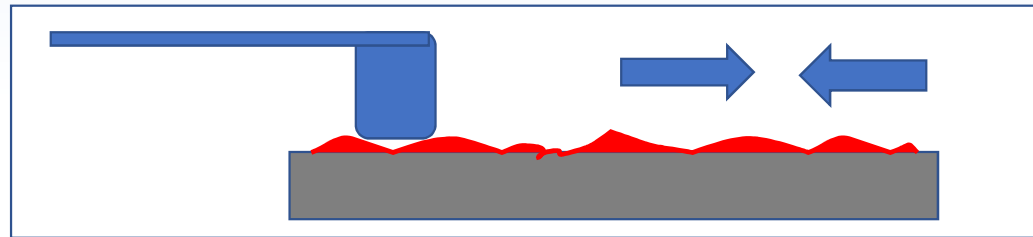
X 30 clean

# Cleaning Methods

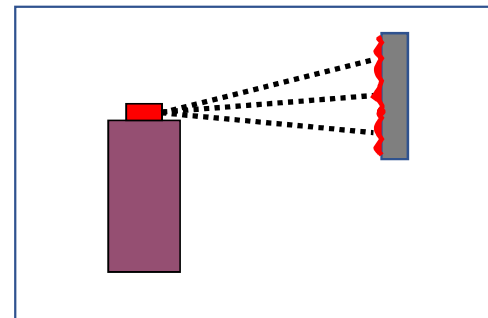
- Soak



- Wipe



- Spray



# Cleaning - Water

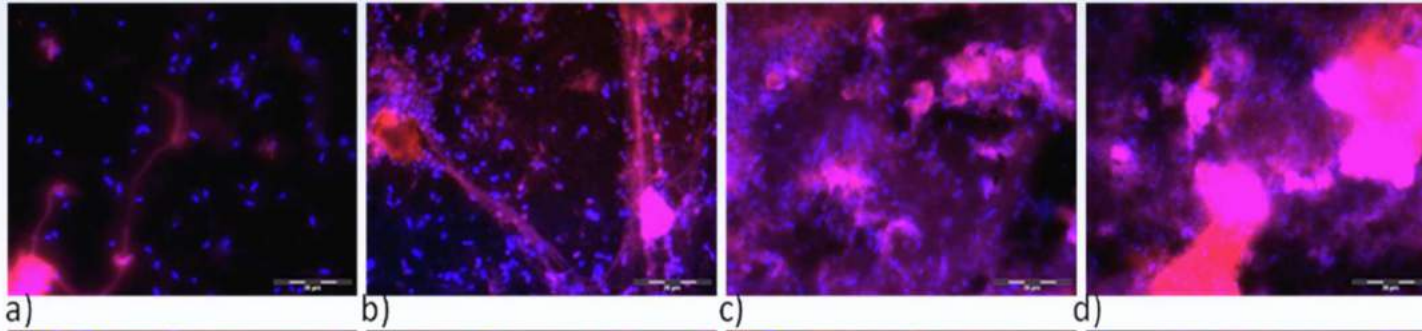
No. of Washes: 0

10

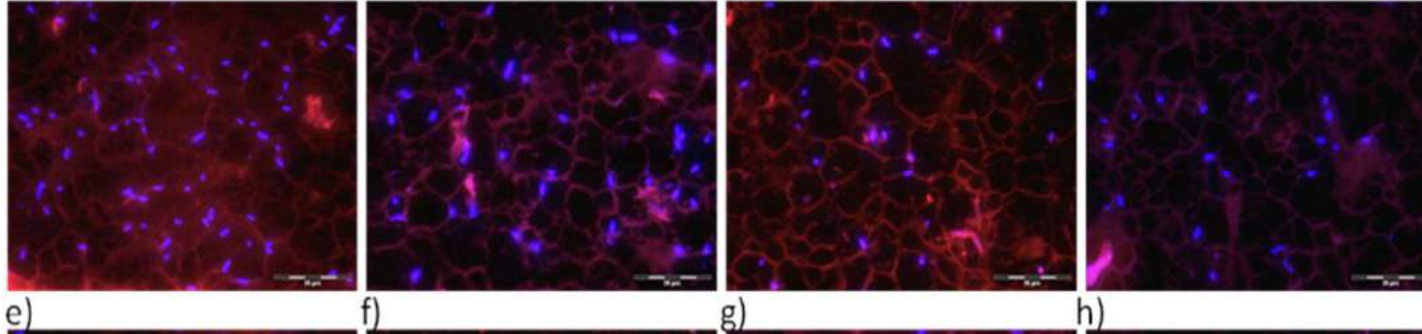
20

30

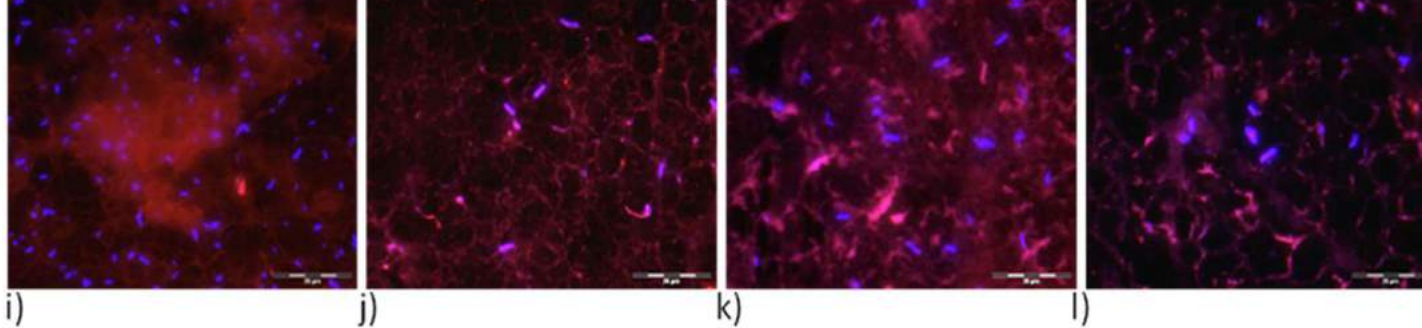
Soak



Wipe



Spray





# Cleaning - Cleaner

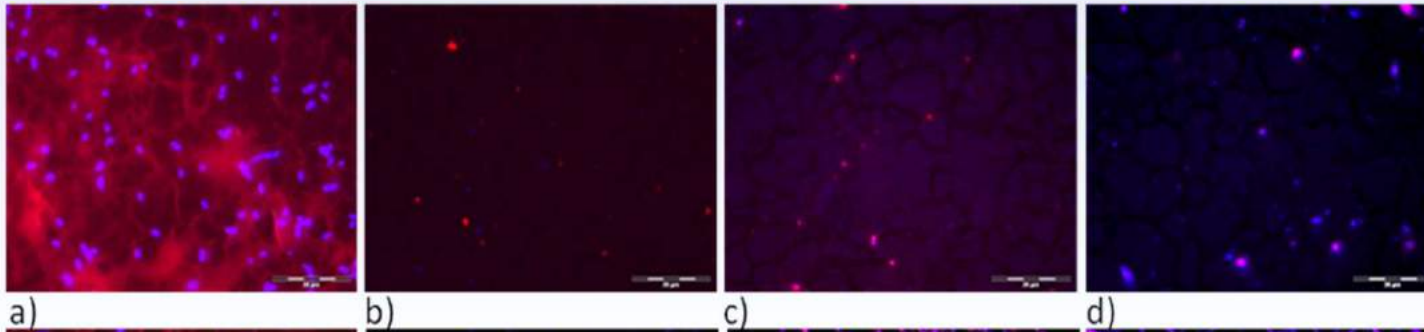
No. of Washes: 0

10

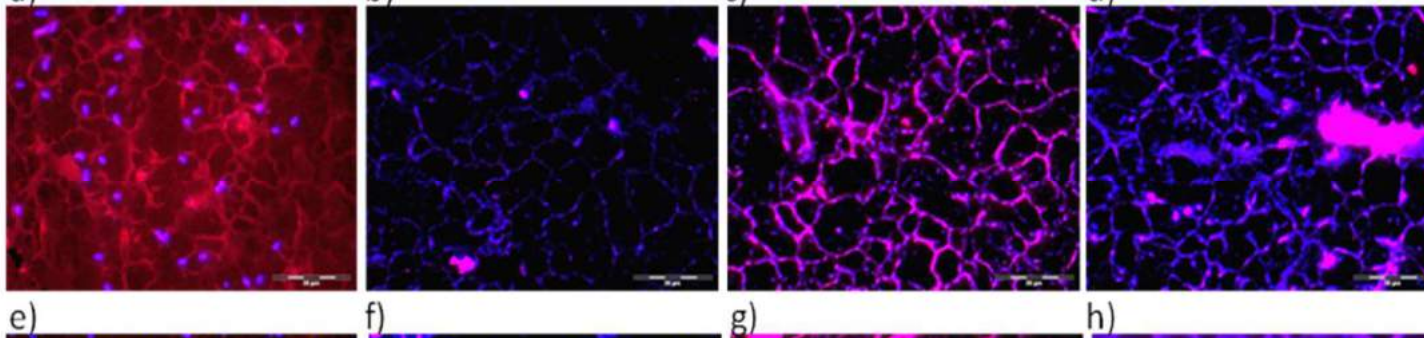
20

30

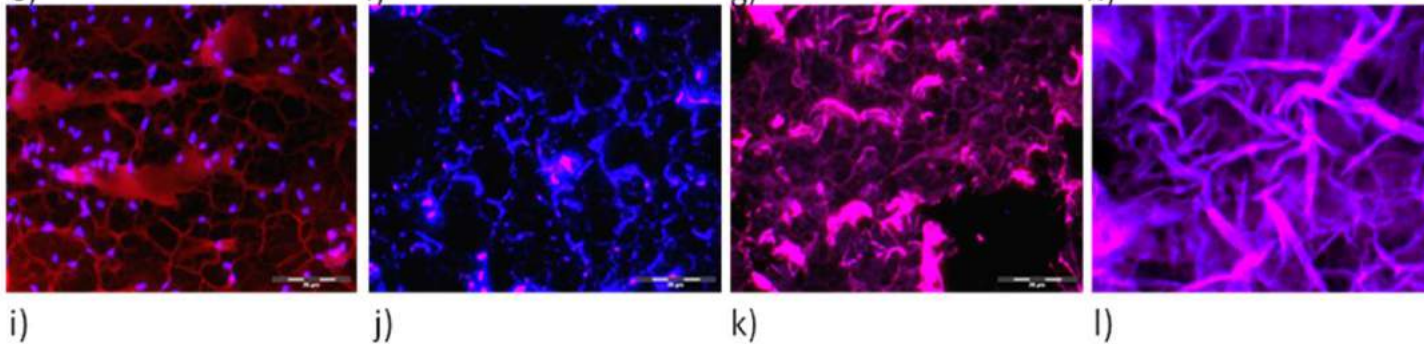
Soak



Wipe



Spray



How does surface fouling affect allergens?

# Allergens – What are they?

- Proteins that are considered antigens.
- Have epitopes that are recognised by the immune system.
- Trigger an immune response.

# Allergens – Concerns

- Life threatening to consumer
- Cost to manufacturer – monetary and reputation.
- Increase in allergen incidents.
- Serious food safety issue.

# Allergens - Biochemistry

- Properties that affect surface binding of proteins:
  - Size.
  - Charge.
  - Structure stability.
  - Structure unfolding Rate.
  - Biochemical orientation of the organic material.



# Allergens – Cleaning Chemistry

- Alkalinity – Turns protein to 'gel' and aids removal.
- Chlorinated Alkaline – Peptises proteins.
- Enzymes – Breaks down proteins.

# Allergens - Detection



**ATP**  
Adenosine  
Triphosphate



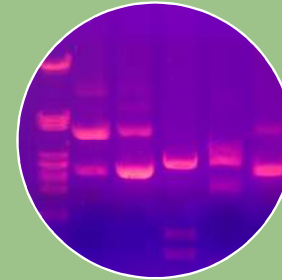
**Rapid Protein  
Detection**



**LFD**  
Lateral Flow  
Device



**ELISA**  
Enzyme Linked  
Immunesorbent Assay



**PCR**  
Polymerase Chain  
Reaction



**LC-MS**  
Liquid Chromatography  
– Mass Spectrometry

Less accurate

More accurate

# Summary

- A variety of factors influence protein – surface interactions.
- Surface fouling alters interactions.
- Adsorbed proteins are difficult to remove.

# Food for Thought

- Q: Is cooking or roasting a method of controlling allergens?
- Q: Can we deactivate an allergen during cleaning?
- Q: Can we break down an allergen so it is no longer allergenic?

# Thank you

Questions

