



**Training session : impact of biofilms in vet dermatology & useful Dermoscent® products**

- A **biofilm** is a **community of microorganisms** that bind **together** and secrete an **adhesive and protective matrix**, giving them remarkable **resistance capabilities**.



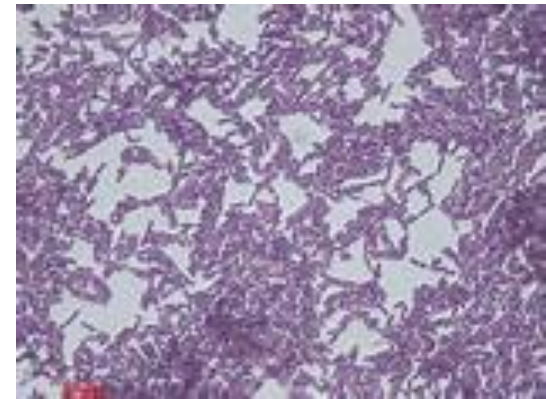
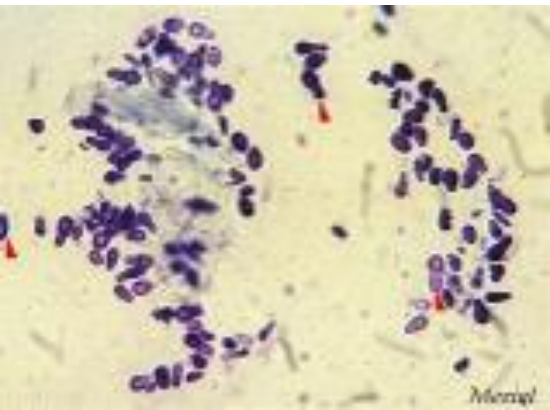
# Microorganisms capable of biofilm

*Pseudomonas  
aeruginosa*

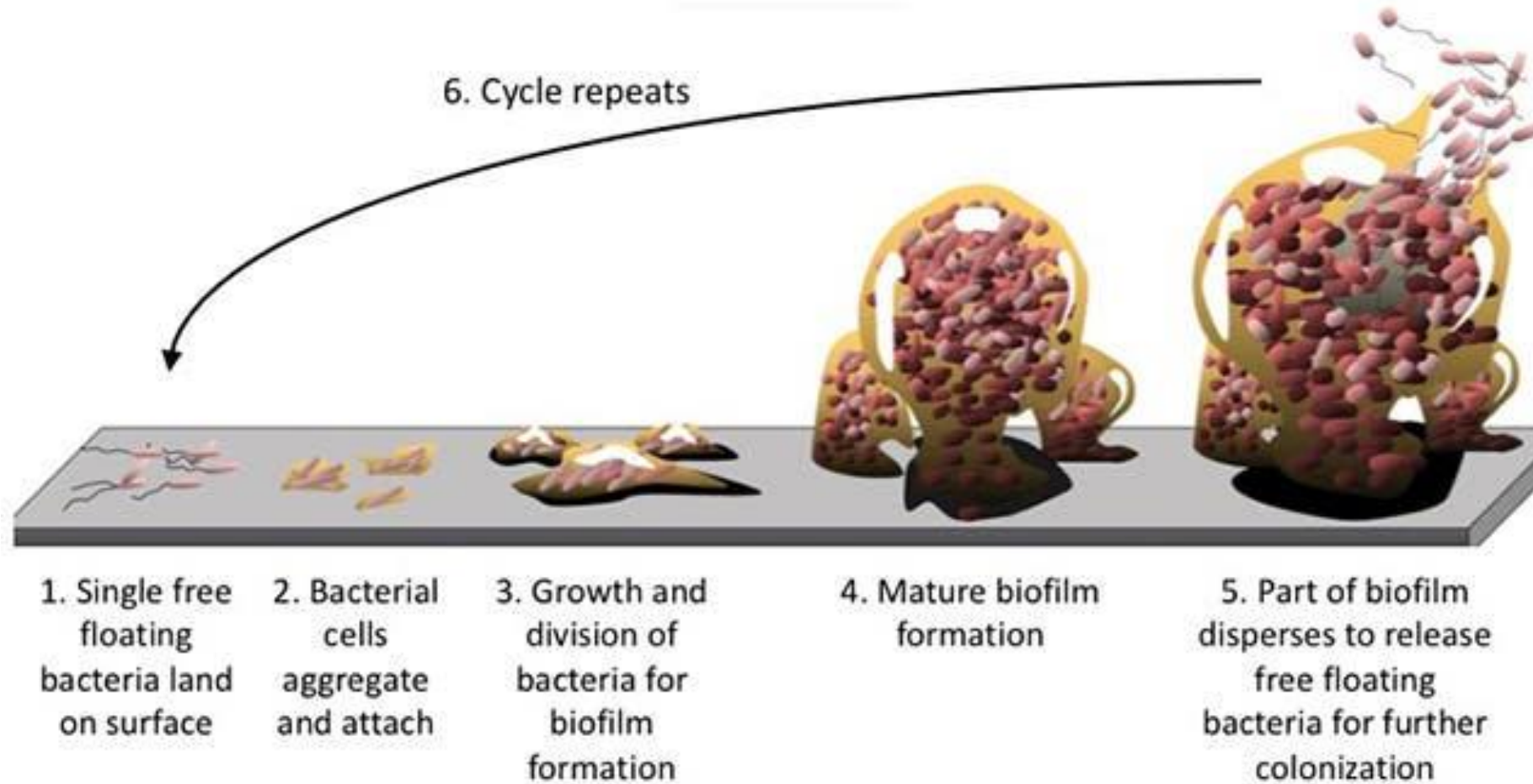
*E. Colie*

*Staphylococcus spp*

*Malassezia  
pachydermatis*  
(yeast)



# Formation steps of biofilm



# Where can we find biofilm in vet dermatology?



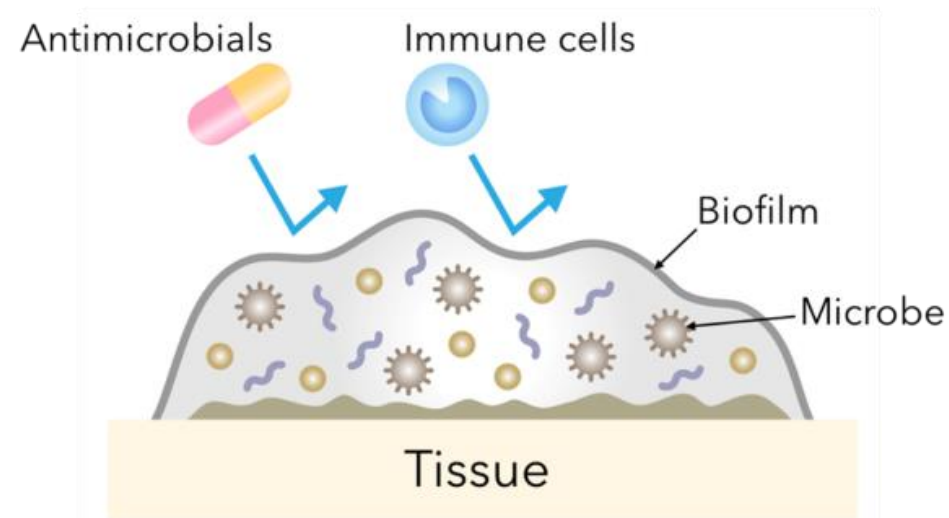
In the skin  
ie: skin infections, bite  
wound...



In ears  
ie: otitis externa with biofilm

# Why are biofilms a threat?

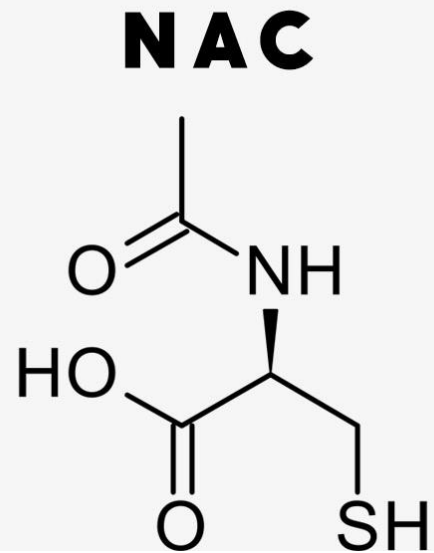
- They contribute to the **phenomenon of antibiotic resistance** through several mechanisms <sup>5</sup>:
  - \* The adhesive and protective matrix **limits the effectiveness of antibiotics.**
  - \* **Expulsion of certain antibiotics** from the matrix via efflux pumps.
  - \* Collaboration between bacteria that **reduces their receptivity to antibiotics.**
- They are responsible of **failure treatment**
- They are responsible of **chronic infections/chronic otitis...**



# What should we do in case of biofilm?

**Help inhibit its formation & help fragilize if it  
already exists**

# Which molecules are effective?



N-acetylcysteine



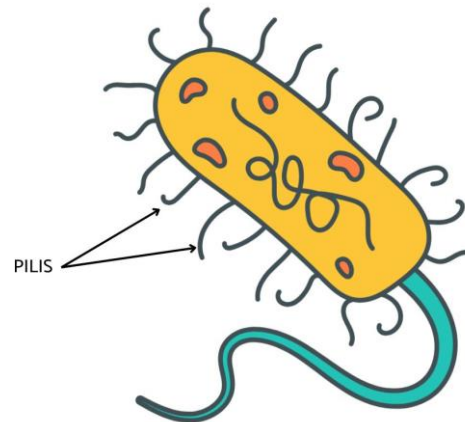
Manuka essential oil



Propolis

# How do they work?

- **N-acetylcysteine** : has mucolytic properties which means that **she is able to penetrate bacteria' membranes**. She acts on **bacterial adherence** and **inhibits the bacteria growth**. Finally, she permits to **kill bacteria**. She is also **effective** on fungal pathogens such as *Malassezia pachydermatis*.
- **Manuka essential oil** : **inhibits** the biofilm formation
- **Propolis** : It is thus capable of inhibiting *Pseudomonas aeruginosa* *biofilms* by partially inhibiting the **mobility of the bacteria's pili**.





## INDICATION

Skin infections: **pyoderma and *Malassezia* dermatitis, chin acne, etc.**

Helps:

- Cleanse & deodorize
- Purify & rebalance the skin flora
- Promote hydration and reinforce the skin barrier

### Antibiofilm



**Easy to use: rinse-free**

**Helps extend the time between shampoos**

*Twice a week, or to be included in the skin care protocol*



150 ml

# PYOclean® Mousse

## Purifying rinse-free foam



- Lipoamino acids of green apple
- Saponaria root & lichen extracts
- **N-acetylcysteine**
- **Propolis** & honey
- **Essential oils of manuka** & lavandin
- Glycerin from vegetable origin
- Hemp seed oil: rich in EFA

## INDICATION

Localized skin infections: **pyoderma and Malassezia dermatitis, chin acne, etc.**

Helps:

- Purify & rebalance the skin flora
- Limit the formation of biofilm & disrupt mature biofilm
- Hydrate and soothe the skin



**Unique antimicrobial and antibiofilm action**

**Strengthens the skin's natural defenses thanks to a prebiotic**

**Help limit the use of antibiotics**

*Twice a day as soon as the 1st clinical signs appear*

*Superficial cases: as a unique treatment*

*Severe cases: as an adjunctive care along with usual medication (antimicrobials, antifungals, etc.)*



50 ml

# PYOclean® Spray

## Purifying spray



### KEY INGREDIENTS

- Essential oil of lavandin
- **Essential oil of manuka**
- **N-acetylcysteine**
- Prebiotic agent
- Hemp seed oil: rich in EFA

# PYOclean® Oto

## Purifying & soothing ear cleanser

### INDICATION

**Prevention of recurrent erythematous-ceruminous otitis (ECO)**  
**- Complementary care for treatment of otitis externa**

Helps:

- **Cleanse & deodorize**
- **Purify thanks** to antimicrobial and antibiofilm active ingredients
- **Limit the proliferation of pathogens & rebalances skin flora**
- **Soothe** the ear canal



Hygienic and practical single-dose format

*ECO: once a day prior to the medical treatment*

*Maintenance to avoid relapses: once a week during one month and then once every two weeks as long as necessary*



10 single-doses

#### KEY INGREDIENTS

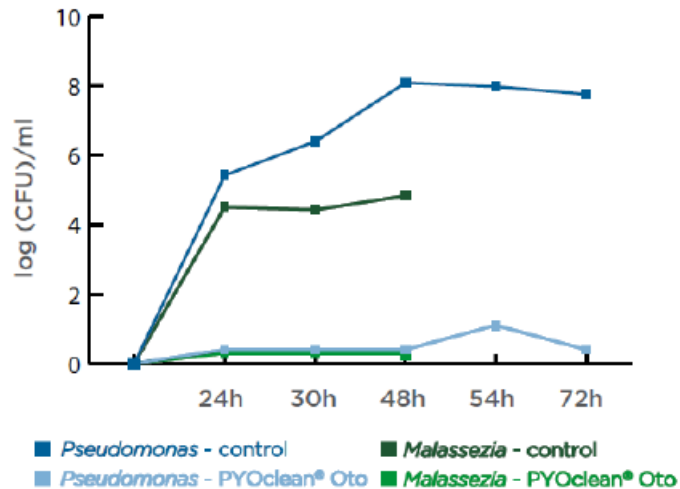
- Lipoamino acids of green apple
- **N-acetylcysteine**
- **Propolis**
- Honey
- Essential oil of red myrtle

## Evaluation of N-acetylcysteine combined with natural extracts against *Staphylococcus pseudintermedius*, *Malassezia pachydermatis* and *Pseudomonas aeruginosa*

C. Feuillolay, E. Bensignor, L. Fabriès, R. Andriantsalama, C. Roques  
Poster NAVDF 2019, Abstract Veterinary Dermatology, August 2019

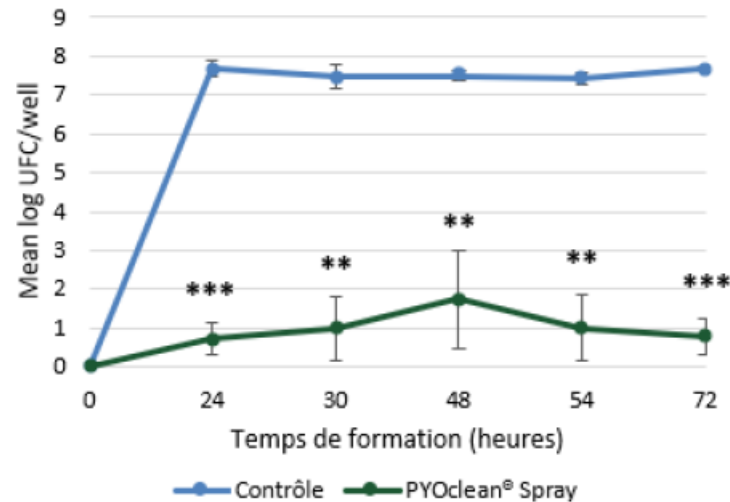
### PROTOCOL

- Test on *Malassezia pachydermatis* & *Pseudomonas aeruginosa*, often involved in otitis with PYOclean® Oto
- Test on *Staphylococcus pseudintermedius* with PYOclean® Spray
- Follow up of biofilm formation on 48 or 72h in the presence of PYOclean® Oto and PYOclean® Spray or sterile distilled water as a control, with adhering cells counting
- Follow up on performed biofilms after 240min with PYOclean® Oto

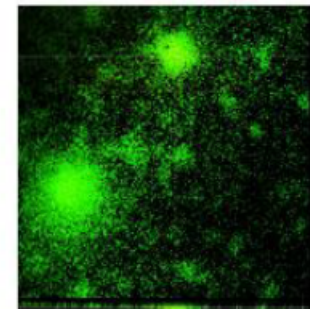


Effect of PYOclean® Oto on biofilms

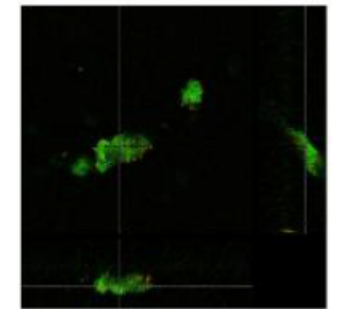
formation vs control  
Made in France by Nextmune



Effect of PYOclean® Spray on biofilm  
formation of *S.pseudintermedius* vs control



Before  
PYOclean® Oto



After 1h with  
PYOclean® Oto

Disruption of *P. aeruginosa* mature biofilm after contact with PYOclean® Oto (confocal microscopy observation)