

Improving survival in premature infants: development of anti-biofilm feeding tubes

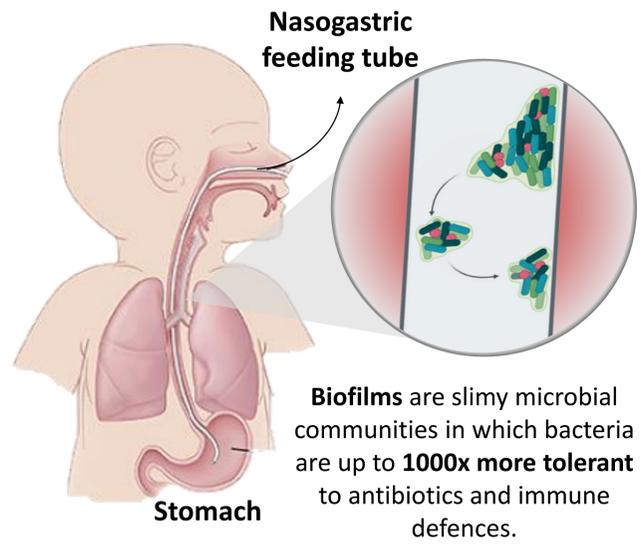
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1 The problem: medical device-related infections in neonatal intensive care

- 1 in 10 babies in the world is born premature¹**, requiring intensive use of medical devices to remain alive.
- Devices are colonised by microbes that form **biofilms** on their surfaces, leading to **severe infections**.
- Up to **56% of neonatal deaths** are related to hospital-acquired infections². Surviving babies are affected by **life-long disabilities**.

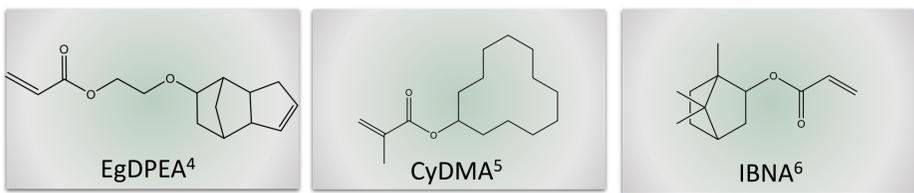
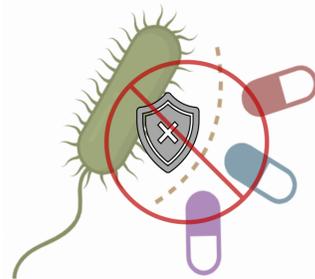


- Most premature babies require **feeding tubes** to receive the nutrition necessary for development and health.
- Up to **89% of neonatal feeding tubes** become colonised by bacteria³.
- Biofilms attached to feeding tubes may cause **feeding intolerance, gastrointestinal or systemic infection**.

“We aim to reduce the infection risk associated with feeding tubes among high-risk preterm infants by developing a polymer coating resistant to biofilm formation.”

2 Why anti-biofilm polymers?

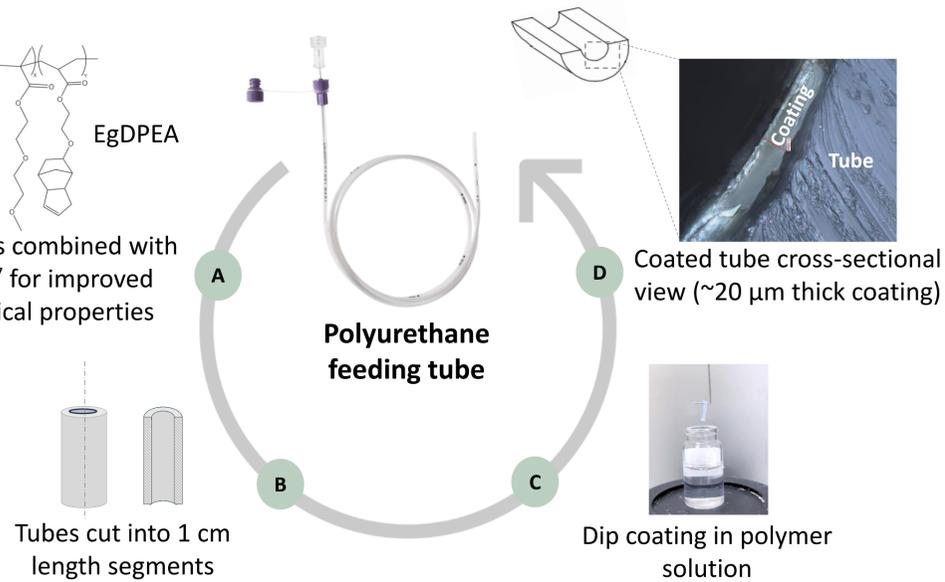
Prevention is better than cure!
These **biocompatible materials** have been recently discovered to **prevent** biofilm formation instead of killing bacteria, helping to refrain the advance of **bacterial resistance**.



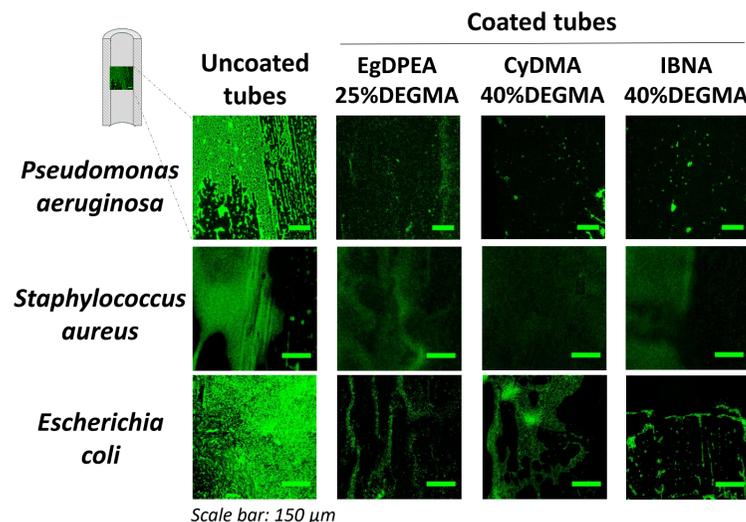
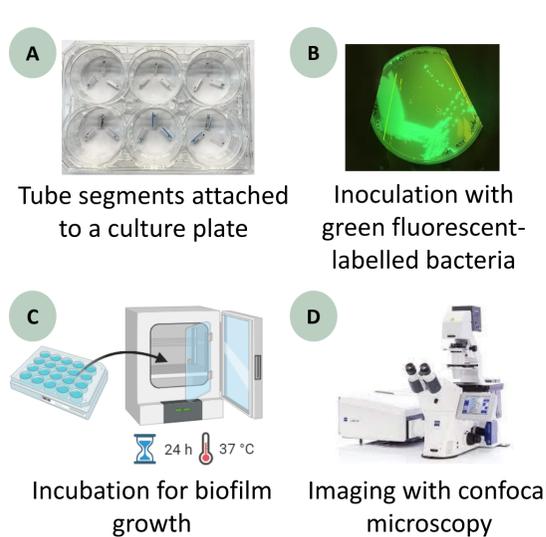
Monomers composing anti-biofilm polymers

3 Coating development

DEGMA
EgDPEA
Monomers combined with DEGMA⁷ for improved mechanical properties



4 Investigation of biofilm formation on the surface of feeding tubes



Images showing biofilms (green) attached to the surface of feeding tubes

Biofilm formation is reduced up to 95% on coated feeding tubes

Future work
Considering real-world conditions is important! The performance of the coated feeding tubes is currently being evaluated in the presence of milk.

¹World Health Organization. Born too soon: decade of action on preterm birth. 2023; ²World Health Organization. Global report on the epidemiology and burden of sepsis. 2020; ³LA Parker et al. Front. Nutr. 2022; ⁴Ethylene glycol dicyclopentenyl ether acrylate (A Hook et al. Nature Biotech. 2012); ⁵Cyclododecyl methacrylate (A Dundas et al. Adv Mat. 2019); ⁶Isobornyl acrylate (T Singh et al. Biomaterials 2020); ⁷Di(ethylene glycol) methyl ether methacrylate (K Adlington et al. Biomacromol. 2016).

