

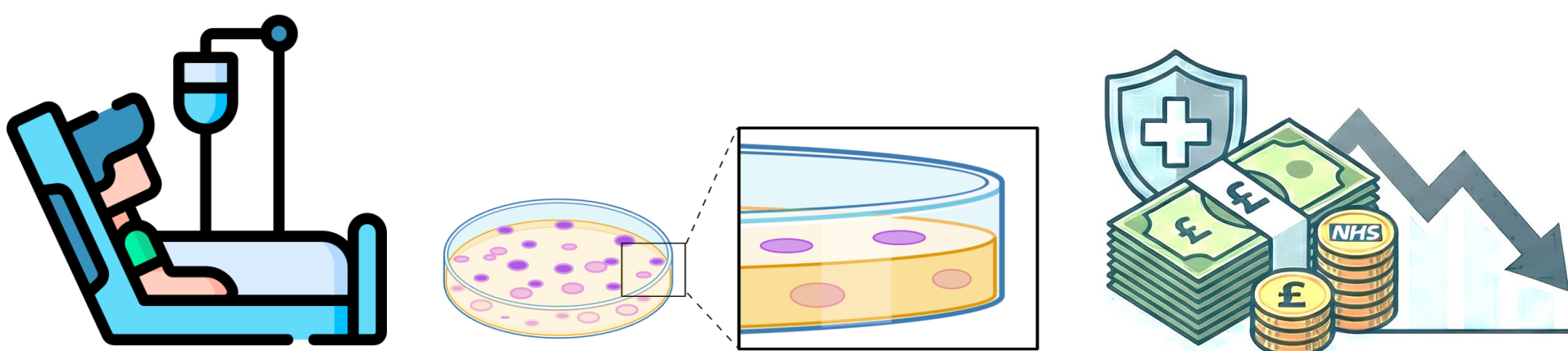
Ending the Infection Crisis in Neonatal Care: Sustainable Materials to Save Lives and NHS Costs

Developing the next generation of 'passive' anti-biofilm medical devices to prevent fatal infections in premature babies, saving the NHS billions in treatment costs while eliminating reliance on toxic petrochemicals.

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1. THE COST OF INFECTION

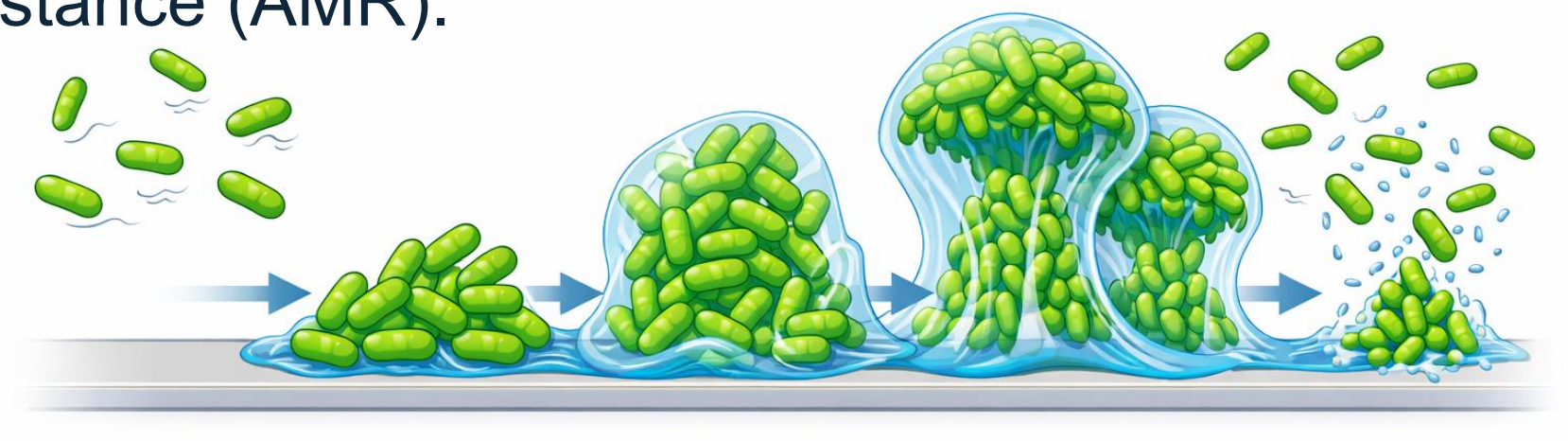
834,000 NHS patients infected annually.
28,500 deaths directly linked to HAIs. (2016/2017)
£2.7 Billion spent on treating preventable infections.*
Top Infections: Respiratory (**22.8%**) and UTIs (**17.2%**).



*Guest et al., BMJ Open 2020.

2. THE PROBLEM

Bacteria on medical devices form highly resistant biofilms, causing severe Healthcare-Associated Infections (HAIs). Current solutions rely on unsustainable petrochemicals and toxic "active" biocide coatings (e.g., silver) that harm vulnerable newborn babies and drive Antimicrobial Resistance (AMR).*



Stages of Biofilm Formation on a Medical Surface *Dundas et al., Adv. Mater. 2019.

3. OUR SOLUTION & METHODOLOGY

Smart, sustainable polymers engineered to stop bacteria from sticking (derived using terpenes from waste flower biomass).

Innovation: We successfully transformed reactive terpene extracts into processable, liquid polymers for medical coatings.

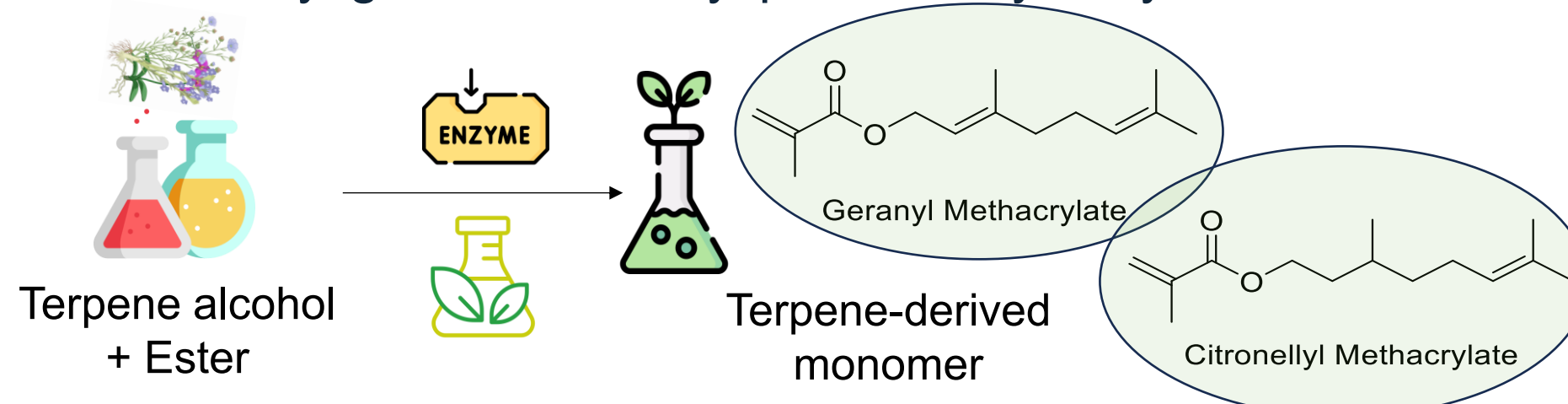
Mechanism:

"Passive" coating = Bacteria slide off

No killing = No resistance

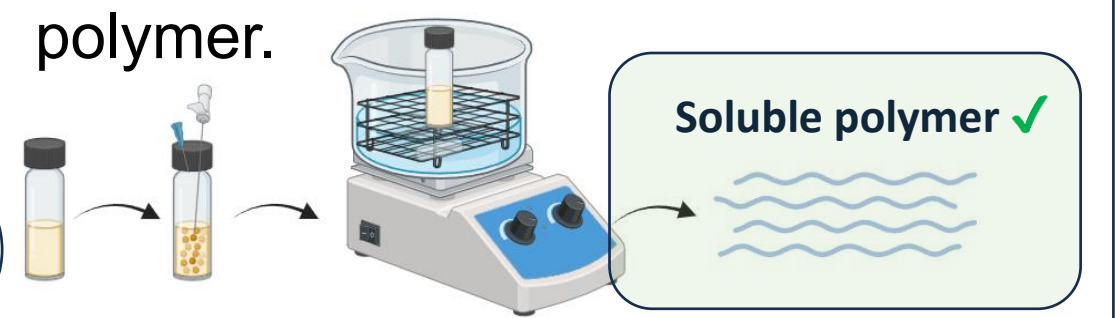
1. Monomer Synthesis – Making The Building Blocks

Eco-friendly 'green chemistry' powered by enzymes.



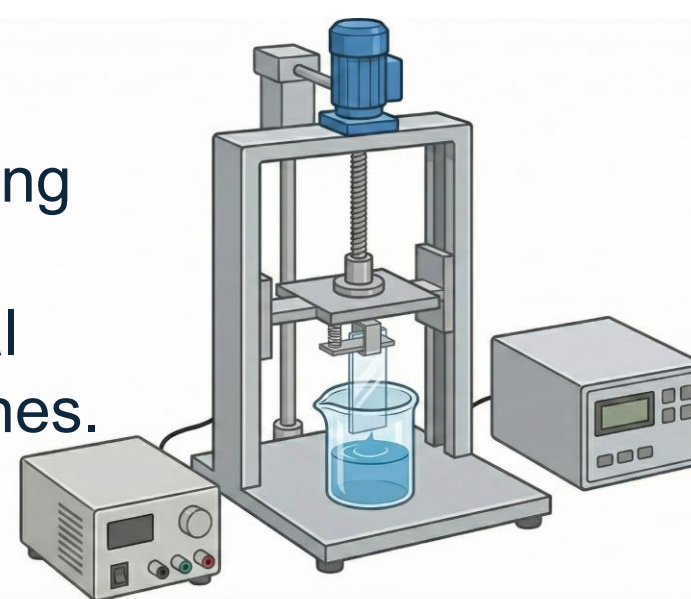
2. Polymer Synthesis

Converting these sustainable building blocks into a processable, liquid polymer.



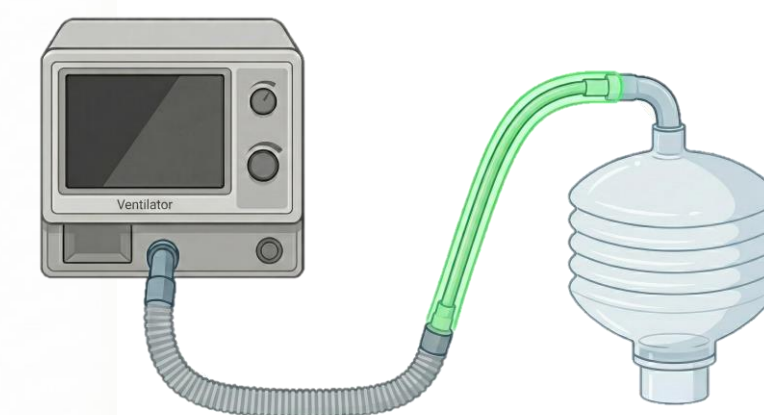
3. Dip Coating

Automated dip-coating process compatible with existing medical device production lines.



4. Medical Device Biofilm Testing

Real-World Validation: Prototype of 'biofilm-resistant' endotracheal tubes undergoing testing in a simulated neonatal ventilator loop.



4. PROOF OF CONCEPT & MANUFACTURING BREAKTHROUGH

Green Synthesis:

>95% monomer yield (low-energy, enzymatic catalysis)

Breakthrough:

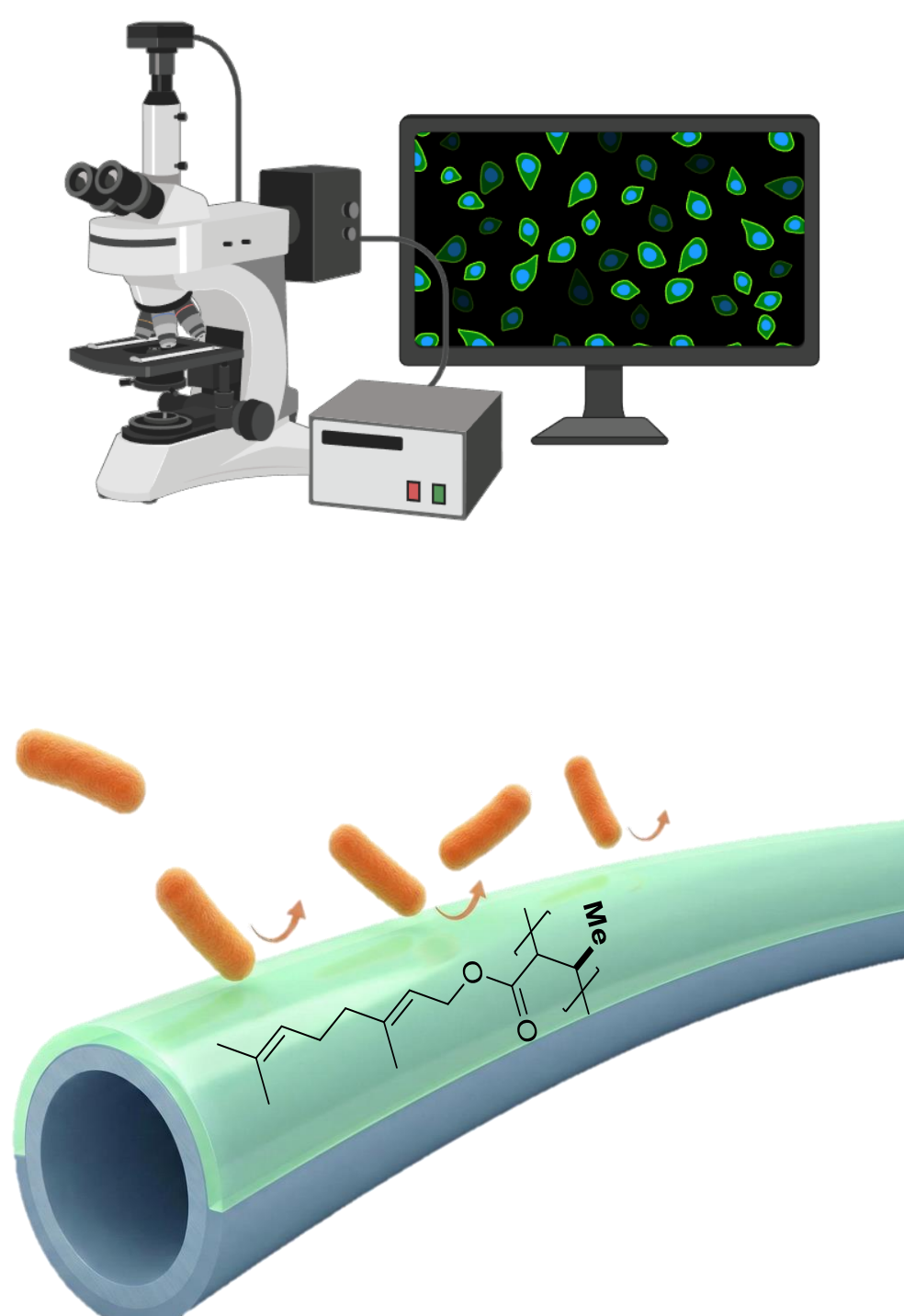
Isolated soluble polymer

Validation:

~60% biofilm reduction

Mechanism:

Correlating surface chemistry with bacterial rejection.*



*Adlington et al., Biomacromolecules 2015.

5 – IMPACT



Saving Lives:

Protects vulnerable newborn babies from avoidable deaths by reducing HAIs.



Economic Benefit:

Saves the NHS millions annually in treatment costs by preventing just 10% of HAIs.



NHS Sustainability:

Drives "Net Zero" targets by replacing fossil-fuel plastics with bio-based alternatives.



Commercialisation:

Rapidly translating technology to real medical devices alongside partner Angel Guard Ltd.