Antimicrobial and Antibiofilm Urinary Catheters

Preamble:

Catheter-associated urinary tract infections (CAUTI) and their control is a worldwide challenge. This project entitled, '**Development of Novel Urinary Catheter that Prevents Colonization, Biofilm Formation and Encrustation by Bacterial Pathogens'** funded by Rajiv Gandhi Science and Technology Commission, Mumbai, provides insight into the most effective methods for controlling these infections, as well as promising prospects for developing a urinary catheter that is wholly resistant to microbial adhesion, colonization, and biofilm formation. In this project, we have developed novel urinary catheters that successfully prevented colonization and biofilm formation by bacterial pathogens. The encrustation of the catheter was also prevented.

Salient features:

- **Antimicrobial urinary catheters**
- **Prevents bacterial and fungal attachment**
- **Prevents biofilm formation**
- **Lasts for 30 days after insertion**
- **No blockage of the catheter**
- **Prevents catheter associated urinary tract infections**
- **Shelf life of more than 6 months**
- **Reduces treatment cost**
- **Reduce generation of solid hospital waste**

Product developed:

- **Novel urinary catheters** that were developed in this project prevented contamination by bacteria for **30 or more days** as compared to a normal catheter that gets contaminated in only 3 days. Moreover, these novel catheters have a **shelf life of more than 6 months** based on *In-vitro* study.

- 'in-lab' validation has been already completed by performing the experimental bladder model that mimics the urinary bladder with continuous flow of bacterial contaminated urine through the developed catheter. This was also supported by SEM analysis.

- The novel urinary catheter showed antimicrobial activity against potent uropathogens like *Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumonia, Enterococcus faecalis, Acinetobacter baumannii, Granulicatella elegans, Stenotrophomonas maltophilia, Staphylococcus pseudintermedius, Candida albicans, etc.*

- Market cost of existing Foley catheter is Rs. 180/- and as per our study it lasts for 3 days. Thus if a patient need catheterization for 30 days, he will need 10 catheters, which approximates the total of Rs.1800/-. Approximate costing of our novel catheter was estimated to be Rs. 300 and it can last for 30 days thus requiring only

one catheter for 30 days.

- Means the cost saving will be Rs. 1500 by use of the novel catheter. There is a significant reduction in cost by use of novel catheter, as these prevent bacterial contamination for much longer time.

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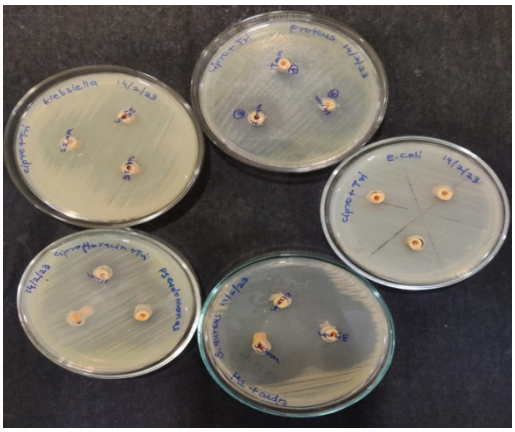

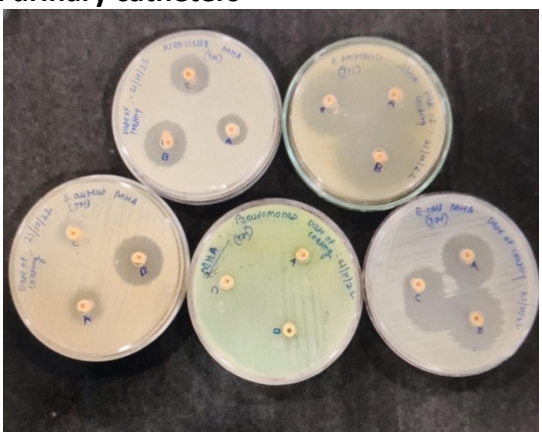

Antimicrobial activity shown by novel urinary catheters pieces against various uropathogens