QUEST INTERNATIONAL UNIVERSITY

MTE 2023 Malaysia Technology Expo™
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Advanced Healthcare and Life Sciences International Innovation Awards and Expo

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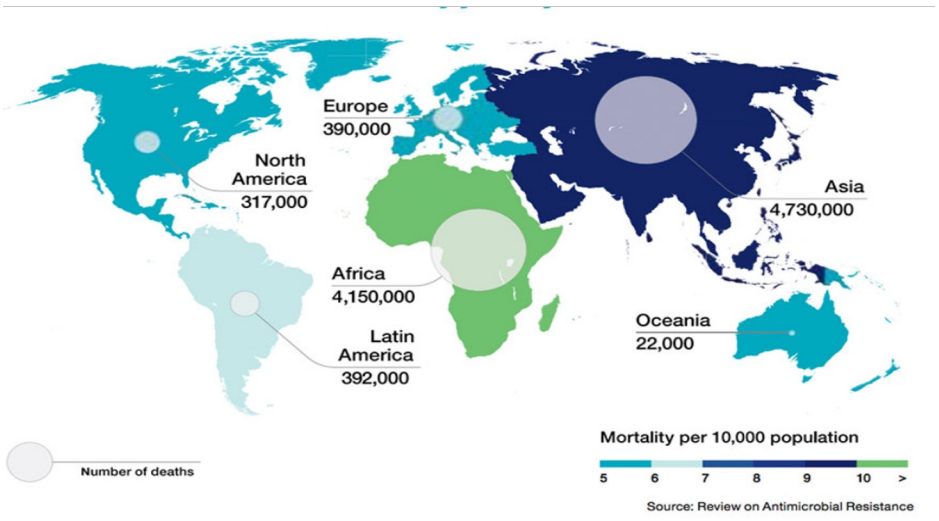
AgBiotics Mighty Hydrogel Patch: The Germ-Buster

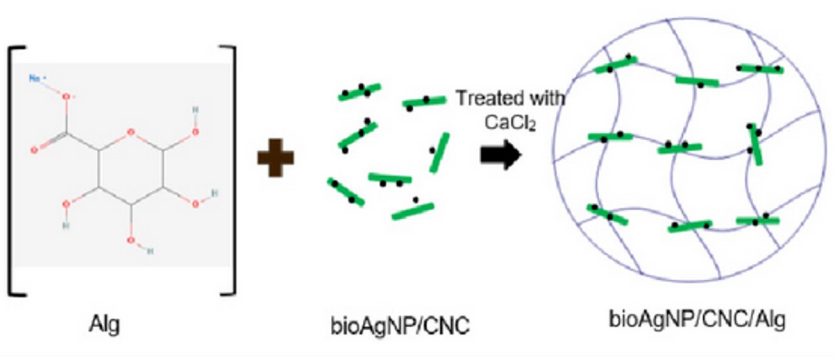
Introduction

The World Health Organization (WHO) has predicted that by 2050, the global burden of antimicrobial-resistant bacteria will cause 350 billion deaths. In the search for solutions, researchers have discovered that silver nanoparticles are an effective bactericidal agent. However, the direct application of silver nanoparticles on the wound site to prevent the growth of antibiotic-resistant bacteria is impossible. This innovation marks the first study to explore hydrogel biofilm formation using silver nanoparticles (AgNPs), cellulose nanocrystals (CNC), and alginate (Alg) as wound-dressing bandages to prevent the growth of antibiotic-resistant bacteria. In addition to preventing the growth of bacteria in the wound site, it is also capable of providing an allergen-free conducive environment for the wound-healing process.

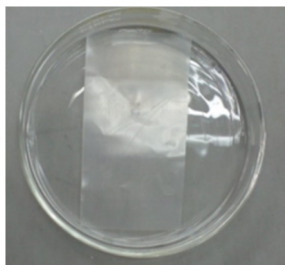


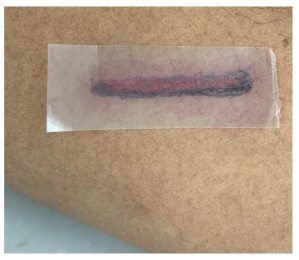
Deaths attributable to antibiotic-resistant bacteria every year by 2050 (Public health post, 2017)

Development of AgBiotics Mighty Hydrogel Patch

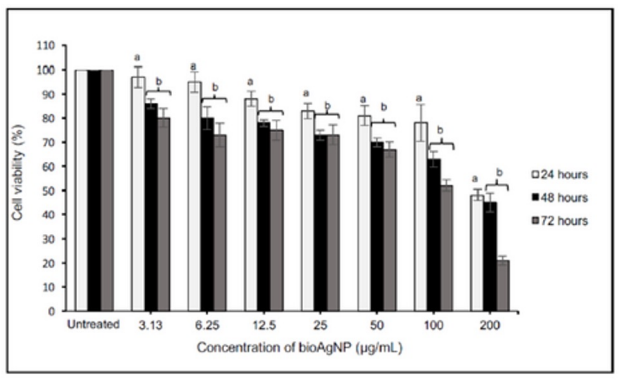



AgBiotics patch in the making


Final product of the AgBiotics patch


Application of AgBiotics patch to the wound

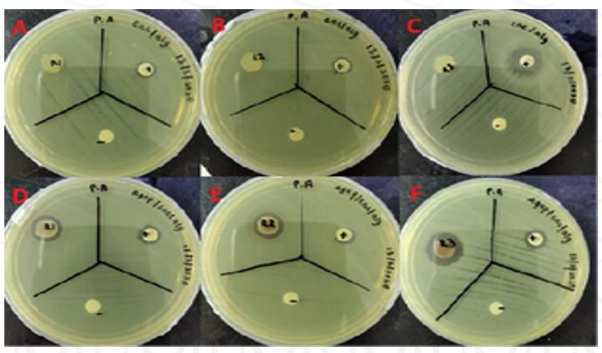
Effectiveness of AgBiotics Mighty Hydrogel Patch



AgBiotics patch shows a decrease in the superbug's viability

Significance of AgBiotics Mighty Hydrogel Patch

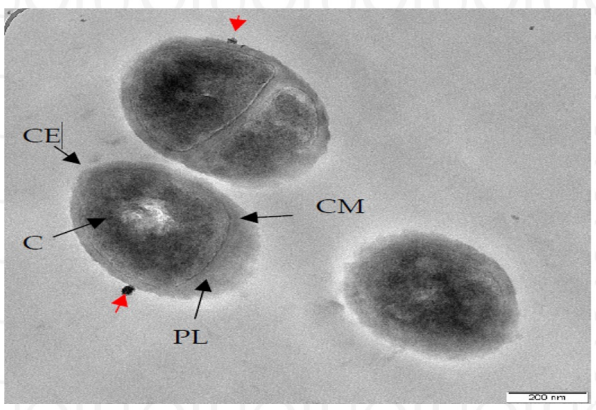
- Cost of antibiotic production reduces significantly
- Environmentally-friendly product since the cellulose nanocrystals are obtained from a vascular bundle of the oil palm trunk.
- This product will be applied on the wound site and no oral consumption is needed.
- Suitable for kids and senior citizens.
- Duration of treatment is shorter as AgBiotics are effective against a broad range of pathogens
- Reduces the wound care effort as no frequent dressing is needed.
- **To date there are no therapeutic patches that have been developed using alginate, CNC, and AgNPs that are commercially available in the market.**



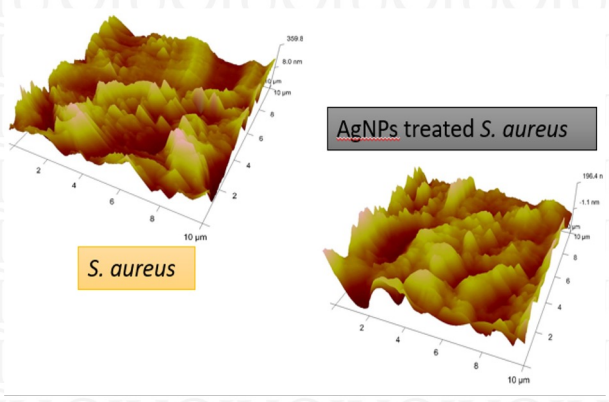
AgBiotics inhibition against the growth of superbugs

Publications

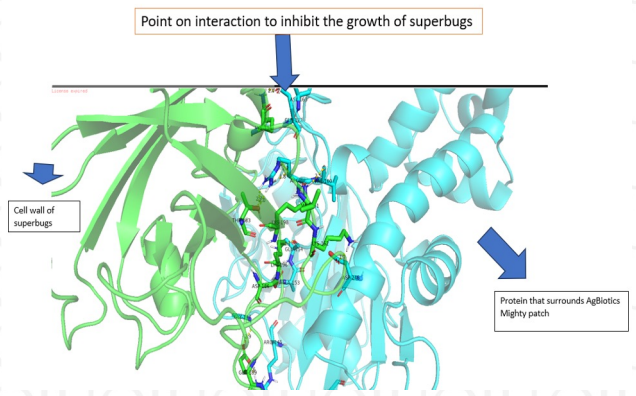
1. **Hemalatha.M**, Teh, C.L., Yahya, A.R.M., Noh, N.A.M., Kernain, D., Hashim, R., Bustami, Y. (2021) Study of antibacterial and anticancer properties of BioAgNPs synthesized using *Streptomyces* sp. PBD311B and the application of bioAgNPs-CNC/Alg as an antibacterial hydrogel film against *P.aueruginosa* and USMAR2 and MRSA, Molecules, 26, 6414
2. **Hemalatha.Murugaiah**, Yazmin Bustami. In vitro and in silico investigation of antimicrobial activity of silver nanoparticles synthesized using Streptomyces PBD311B. 6th International conference on Molecular Biology and Biotechnology 2023.
3. **Hemalatha.Murugaiah**, Yazmin Bustami. Green Synthesis of Silver Nanoparticles using *Streptomyces* sp. PBD311B and The development of Antibacterial Hydrogel film. 5th International conference on Molecular Biology and Biotechnology 2022.



Interaction of AgBiotics patch with a superbug (*S.aureus*) under TEM



Changes in the surface roughness of a superbug upon treatment with AgBiotics patch



In silico interaction of AgBiotics with the outer membrane of a superbug