

Characterizing the antibacterial properties of bioactive materials for wound repair.

Yaroslav Rynza, Sarah Fakher, David Westenberg

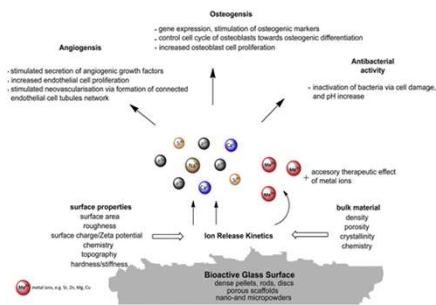
Abstract

Prevention of infection is a major concern after medical procedures or when dealing with open wounds from injury or as complications from various health conditions. Bioactive materials paved the way for more potent methods in dealing with nosocomial infections. In particular, borate bioactive glasses are attractive because of their high degradation rate. Incorporating various ions and metals into the borate bioactive glass enhances antibacterial activity of it. In this study we are using various methods to compare the antibacterial properties of several biomaterials.

Background

Borate bioactive glasses are useful as a biomaterial for wound healing and prevention of infection. Nano size fibers made from bioactive borate glass that react with the body fluids have been developed to be placed on the wound to stimulate the body to grow new blood vessels. Advantages of bioactive glass for wound healing include:

- Antimicrobial—Angiogenic— Non toxic
- Hemostatic—rapid reaction-response
- Stimulates body to start healing process
- Biodegradable
- Minimum scarring
- Light weight, long shelf life, usable over wide temperature range
- Easily handled—adaptable to a wound of any shape or size
- Inexpensive



Experimental Procedures

Bacteria used

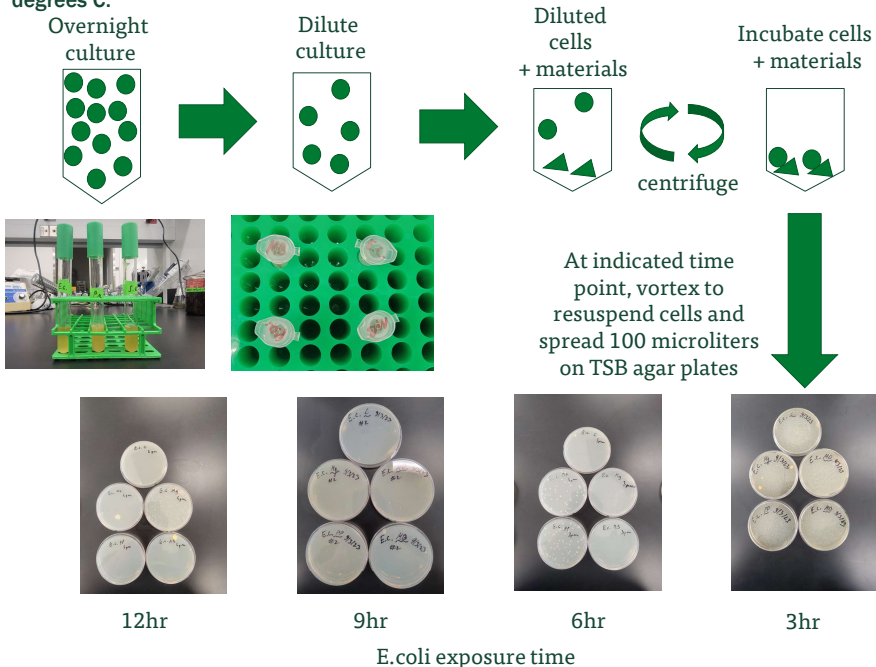
Staphylococcus epidermidis- Gram positive, skin bacteria, causes wound infections
Escherichia coli - Gram negative, infects small intestine
Pseudomonas aeruginosa- Gram negative, soil bacteria, causes wound infections

Materials tested

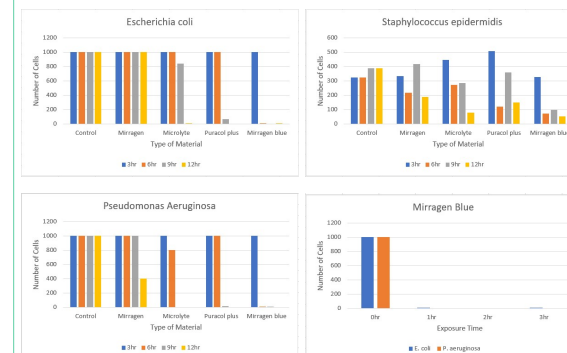


Testing procedure

Concentrated cultures are made by inoculating Trypticase Soy Broth and incubating overnight at 37 degrees C.



Results



Conclusion

- Bacteria need to be in close contact with the material for antibacterial activity.
- E. coli is least sensitive to the materials tested but still killed within 9 hours
- S. epidermidis is most sensitive to the materials
- Mirragen Blue is the most effective material, killing E. coli and P. aeruginosa within 3 hours and 99% of S. epidermidis.

Acknowledgements

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