Biosensor application that can detect the presence of Gram-positive *Staphylococcus aureus* bacteria in intensive care units

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Abstract

Statement of the Problem: *Staphylococcus aureus* bacteria is the cause of many infections and deaths worldwide, especially in the USA, but also causes high financial losses. Staphylococcus aureus, which is frequently encountered in hospitals and dairy production sites, is becoming an increasing threat globally due to its antibiotic-resistant subspecies. Our main goal in this project is to detect Staphylococcus aureus bacteria in high-risk areas and ventilation systems, especially in intensive care units of hospitals, and to prevent possible contamination with our biosensor that we will develop.

Methodology & Theoretical Orientation: This system has been developed based on determining the controlled growth of Staphylococcus aureus bacteria in a nutrient medium (the agar to be used is the Baird Parker medium), by using the working principles of optical sensors and periodically inspecting it with the software we will develop.

Findings: *Staphylococcus aureus* bacteria has enterotoxigenic properties. It is a gram (+) non-motile, catalase-positive, round-shaped bacterium, and is seen in the form of grapes in microbiological examinations made from liquid media. Coagulase is an important pathogenicity factor for (+) staphylococci. *Staphylococci,* one of the leading life-threatening nosocomial infections, have become a major health problem both in hospitals and community-acquired infections due to their increasing resistance to antibiotics. It spreads especially by direct and indirect contact and is transmitted less frequently by airway and contact with contaminated items. They can settle in abscesses, acne and infected wounds that they cause in humans and animals and can contaminate foodstuffs from these places.

Conclusion & Significance: Biosensor system, closes legal gaps by minimizing the problems that may occur due to supervisory failures in air conditioning and air filtration systems. With the detection of *S. aureus* bactericide, it is foreseen to prevent both material and life losses that are experienced globally every year. This situation supports conscious drug consumption by reducing the use of indirectly consumed antibiotics and medicines used for treatment.

Image

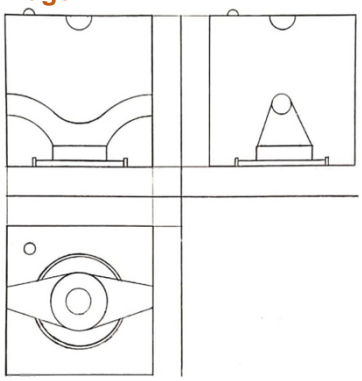


Figure 1. Perspective technical drawings of the biosensor

Recent Publications

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3) Noskin Gary, A.; Rubin Robert, J.; Schentag Jerome, J.; Kluytmans, J.; Hedblom Edwin, C.; Jacobson, C.; Smulders, M.; Gemmen, E.; Bharmal, M., Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2007, 45 (9), 1132 40.

4) Klevens, R. M.; Morrison Melissa, A.; Nadle, J.; Petit, S.; Gershman, K.; Ray, S.; Harrison Lee, H.; Lynfield, R.; Dumyati, G.; Townes John, M.; Craig Allen, S.; Zell Elizabeth, R.; Fosheim Gregory, E.; McDougal Linda, K.; Carey Roberta, B.; Fridkin Scott, K., JAMA: the journal of the American Medical Association 2007, 298 (15), 1763-71.

5) Microbiology and Immunology On-Line, University of South Carolina, School of Medicine, Richard Hunt

6) Schneider CA, Rasband WS, Eliceiri KW (2012). "NIH Image to ImageJ: 25 years of image analysis". Nat Methods. 9 (7): 671–675. doi:10.1038/nmeth.2089. PMC 5554542. PMID 22930834.

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Biography

Aleyna YILDIZ was born on May 17, 1998, in Kocaeli. He completed his high school education at Kultur High School. She is a senior year student at Dokuz Eylul University, Metallurgical and Materials Engineering. She took part in the rocket team at Dokuz Eylul University, Unmanned Aerial Vehicles Society (DEHA). Aleyna YILDIZ, who started her entrepreneurial adventure in 2019 in the BAMBU program, a branch of Dokuz Eylul University Technology Development Inc. Based on microbiology and engineering in general, she aimed to develop a worldwide constituent factor into a successful project. For this purpose, the AGON enterprise has been carrying out its activities for 2.5 years. Aleyna YILDIZ and AGON team, who completed the program with a rank, continue to gain success in various competitions and platforms.

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Notes/Comments: