Development of a Novel Biohybrid Nanorobot for Detection and Treatment of Disease

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With enormous advancements in nanotechnology, it is becoming increasingly more applicable for the translation of this technology into medicine.Through bio-hybridization, it is possible to develop cell-like robot mimicking these cellular functions.The goal of this research was to develop a bio-hybridized Nano-robot(BHNs) capable of carrying out many cellular functions and detecting diseases. This experiment questioned Nano-robots ability to neutralize bacteria, stabilize toxins such as Alpha-toxins and acids, also its ability for ultrasonic propulsion.It was hypothesized that BHNs are capable of complete bacterial lysis, effective in balancing of toxins and small ultrasonic propelled movement(1μm/sec). The BHNs ability to absorb organic compounds present in diseases was then analyzed using a chemiresistive biosensor to question its capability for disease detection. The BHNs were synthesized through the centrifuging of erythrocytes and platelets with a copper-nanorod in the presence of PEG-1000.These nanorobots were then placed in a petri dish with E.coli and with a microscope, E.coli population changes were calculated. The BHNs were also placed in a test tube with blood and Alpha-toxin, a spectrometer was used to analyze the hemoglobin concentration change. A titration was performed to determine the BHNs behavior in an acidic solution. Finally, different organic compounds each which were related to a specific disease was then exposed to the BHNs and analyzed by the sensor. The hypothesizes were accurate, other than that the BHNs traveled faster through ultrasonic propulsion than hypothesized. A computer model was developed to identify diseases from compounds collected from BHNs through a biosensor and calculate hydraulic propulsion.

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