Silver-enzyme hybrids for the treatment bacterial and fungal biofilms in chronic wounds, burns and surgical wounds (Ramot)

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Technology

The silver-enzyme hybrid cream is a formulation consisting of soluble, single glucose oxidase molecules coated with thin (~1.5nm) metallic silver coating. This formulation will penetrate into mixed microbial biofilms and affect their eradication by an enzymatically attenuated "triple action" mechanism: (1) glucose depletion; (2) hydrogen peroxide production; and (3) on-site silver ions release. The efficacy of this solution was demonstrated in vitro on E. coli biofilms. This cream can be used for the prevention and treatment of infected wounds.

The Need

Persistent infections present a major hurdle in the treatment of chronic wounds, surgical wounds and burns. As most of these infections are comprised of mixed cultures, wide-spectrum antimicrobial agents are required for their eradication. These include oxidizing agents, cationic polymers and silver. Silver, either in ionic or metallic form, is considered to be the safest, with rarely observed adverse effects.

Silver exhibits antibacterial activity (ionic or metallic) by two different mechanisms. Silver ions penetrating the bacterial cell interact with the respiratory chain and with cellular DNA. Metallic silver affects primarily cell membrane by physically 'puncturing' it or by slow release of silver ions resulting from oxidative environment. Metallic silver-impregnated wound dressings suffer from poor silver ion migration from the supplied 'reservoir' to and into their targeted microbial biofilm. Ionic silver has poor migration due to interaction with chloride and other anions, resulting in insoluble salt precipitation.

Stage of Development

Controlled Metallization of Glucose Oxidase: molecular silver-glucose oxidase hybrids retained their solubility and biological activities (SOPs)

in vitro efficacy: The feasibility of using these hybrids for therapeutic and preventive applications was demonstrated on E. coli (MIC, ZOI, glucose dose response)

Patent Status:

WO 2006/080017: Granted (France, Germany UK); US (pending)

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