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## Antimicrobial contact lenses: Crosslinked quaternary organosilane and gelatin films

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**Background:** Contact lenses are used by over 100 million people globally for various medical and non-medical applications. However, microbial contamination of contact lenses or cases predispose wearers to adverse ocular surface complications and can lead to vision loss or impairment. An example is microbial keratitis, affecting over 500,000 people yearly. With increasing usage of contact lenses, there is a pressing need for antimicrobial lenses without affecting their optical transparencies and ocular toxicity.

**Purpose:** To determine the antimicrobial properties and cytocompatibility of crosslinked gelatin-silane films against Gram-positive and Gram-negative bacterial strains.

**Methods:** Films were prepared by slow crosslinking of gelatin with silane containing quaternary ammonium groups. To augment the antimicrobial spectrum of the films, tobramycin was incorporated. Gelatin films were casted on petri dishes and allowed to air-dry, followed by exposure to ammonium carbonate for 48 hours to induce crosslinking. Antimicrobial assessment of the films was assessed via disc diffusion method. After exposing the films to human conjunctival epithelial cells (corneal fibroblasts) for 24 hours, cytocompatibility of the films with cells were tested by LDH and ATP assays after which optical microscopic images were taken to determine cell morphology changes. The presence of crosslinking and surface characterizations of films were performed via FT-IR and SEM, respectively. Strengthening of films and crosslinking were proven via tensile strength assessments.

**Results:** Crosslinked films and tobramycin incorporation did not affect optical transparency. Crosslinked films showed contact mediated inhibitory activity against bacterial strains. These properties were enhanced after incorporating tobramycin. However, no zone of inhibition was observed for MRSA strains. Furthermore, crosslinked films featured smooth and uniform surfaces, along with increased mechanical strength without inducing significant cytotoxicity.

**Conclusion:** Crosslinked gelatin-silane films with/without tobramycin display antimicrobial properties whilst preserving optical transparency. This potentially yields prospects in the design of antimicrobial contact lenses and even clean-room surface coverings.

### Biography

Edward is a 3<sup>rd</sup> year Medical Student from Singapore's Yong Loo Lin School of Medicine. An ex-national Sailor who won many awards, he is now pursuing his passion in Ophthalmology. He started with internships at well-established eye centers and is now working on contact lens-related research projects. As a newcomer, he has shown great potential in the field of research. Recently, he emerged 1st place in a local medical university symposium and also won People's Choice Award for his inspiring and engaging oral presentation. Aside from juggling clinical work and research commitments, he also explores the Bio-design industry. He recently completed a course from Singapore Stanford Biodesign and innovated to produce a device that allowed for earlier ICU mobilization to help patients enjoy shortened length of stays.

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