Treatment of Staphylococcus epidermidis Utilizing Iontophoresis of Quorum Factor-Targeted siRNA through Catfish Skin

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The researcher aimed to test effects of transdermal iontophoresis treatment consisting of quorum-sensing-targeted siRNA on growth of Staphylococcus epidermidis. Small Interfering RNA(siRNA), is involved in RNAi naturally within cells and synthetically to inhibit expression of genes. This experiment explored using siRNA to inhibit expression of the AgrB gene, part of the accessory-regulator-system controlling quorum-sensing within Staphylococcus epidermidis. The researcher hypothesized treating Staphylococcus epidermidis with siRNA transdermally through iontophoresis would inhibit growth of bacteria. Iontophoresis is used to apply medication transdermally using an electric field to repel the medication through the skin into affected areas. Ictalurus punctatus (catfish) skin was used as a substitute for human skin because of prior use as skin grafts on burn victims. Trials were performed using both iontophoresis treatment with 20nM siRNA concentration as well as simply testing inhibition of growth by applying siRNA to Staphylococcus epidermidis in liquid media, at concentrations 20nM and 50nM. The researcher also performed trials using ampicillin to compare to the inhibition of growth from siRNA. Iontophoresis was found to be unreliable for treatment to subdermal infections. However, the researcher’s data collected from administering siRNA to bacteria in liquid media demonstrated that quorum-sensing-targeted siRNA shows promise for inhibiting the growth of Staphylococcus epidermidis 19-24 hours after treatment. While the inhibition of growth resulting from the treatment of siRNA was less than the inhibition of growth resulting from a treatment of Ampicillin, the researcher concludes siRNA shows promise for treatment for antibiotic-resistant subdermal bacterial infections.

Awards Won: