Using Wheat Germ Agglutinin Stain for Visualizing Biofilm in a Porcine Wound Model

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One of the most challenging aspects of wound care is overcoming recalcitrant infections, namely in the form of biofilms. Biofilms are a product of bacteria that can have negative effects on the healing of wounds due to their ability to reduce immune response and the efficacy of antibiotics, as well as the difficulty of identifying biofilm presence in a wound. Biofilms are characterized as aggregations of bacterial cells with various extracellular polymeric substances. There is a risk of biofilm formation in chronic wounds, implanted devices, and catheters, and they continue to be difficult to identify with readily available clinical markers. An estimated 60% of chronic wounds are infected with biofilms. Methodological studies are necessary to quickly address potential biofilm infections . A wheat germ agglutinin (WGA) staining method was used to visualize biofilm presence *in vitro*. WGA binds to polysaccharide elements in biofilms, and further fluorescent staining allows for visualization. A porcine wound model involved full-thickness dorsal burn wounds which were inoculated with bacteria; 6-8mm punch biopsies of these wounds were taken 7, 14, and 35 days post-inoculation and sectioned. To measure the success of the WGA stain, two strains of *S aureus*, a common biofilm forming bacteria, were used: *sarA* (hypo-biofilm forming) and *RexB* (hyper-biofilm forming). Quantitative measurements were taken to compare the levels of biofilm in visualizations of biopsies infected with each strain. The hypothesis was that biopsies infected with *sarA* would show less biofilm presence than those infected with *RexB*. The staining optimization is ongoing, with results expected in time for presentation. Concurrently, scanning electron microscopy (SEM) analysis from the same samples are complete and available. If successful, having a stain that can provide quantitively measure biofilm presence in clinical wound samples is an important step to producing a method for identifying biofilm infection in clinical settings.

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