Evidence for a Biofilm Based Treatment Strategy in the Management of Chronic Hidradenitis Suppurativa

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Hidradenitis suppurativa (HS) is a chronic, inflammatory, debilitating skin disease of the hair follicle defined by recurrent, painful, deep-seated and inflamed lesions 1. Although many aspects of the clinical presentation of HS is suggestive of infection, the role of the microbiology is still the subject of much debate. Polymicrobial positive cultures of skin bacteria are common but many cases are culture negative. Empirical antibiotic treatment returns mixed results in terms of resolving the disease. Interestingly, there are many similarities with otitis media with effusion (OME) in which there were conflicting data and opinions as to the role of bacteria in the chronic recurrent inflammation and whether the underlying cause was infection or a dysfunctional immune response 2. The bacterial biofilm paradigm of chronic disease may resolve some of these contradictions. Biofilms are aggregates of bacteria living within a protective extracellular polymeric slime (EPS) matrix that adhere to indwelling devices and host tissue. When bacteria are in the biofilm phenotype they become highly tolerant of antibiotics and host immunity and elicit a chronic inflammatory response that causes damage to host tissue but fails to clear the infection. Chronic inflammation associated with bacterial biofilms is seen in diseases such as OME, the infected cystic fibrosis lung and periprosthetic joint infections (PJI) 3. Since biofilm bacteria are notoriously difficult to culture and since there are no biofilm specific biomarkers, direct microscopic observation of biofilms is the best way to determine their presence with Confocal Laser Scanning Microscopy (CLSM) being the preferred method. Previously it was reported that bacterial biofilms were present in a HS patient case study 4 and this might provide a missing-link between microbiology and chronic inflammation. In the present issue of the BJD, Ring et al. 5 use Peptide Nucleic Acid (PNA) - Fluorescence *in situ* Hybridization (FISH) PNA-FISH and CLSM to demonstrate and map the presence of biofilms in chronic lesions of 42 HS patients. Biofilms were seen in 67% of chronic lesions and 75% of the perilesional samples. The biofilms were heterogeneously distributed in discrete bacterial aggregates ranging from 5 µm diameter up to more continuous patches >50µm, similar to those seen in OME and PJI specimens 2,3. Importantly, the majority of the sinus tract samples (73%) contained active bacterial cells, which were associated with inflammation, thus suggesting the histology of HS may provide ideal settings for biofilm growth. This important study makes a clear link between a biofilm involvement and chronic inflammation in the late stages of the disease. However, other biofilm studies looking at clinically unaffected HS skin and samples from acute HS found little or no evidence of biofilms 6,7 thus suggesting that biofilm formation is involved in exacerbating or possibly progressing the disease to later stages (Figure 1). The mounting evidence that biofilms have an involvement in HS warrants consideration of a biofilm-based treatment strategy such as is employed in other chronic wound biofilm infections8 in which a combination of high doses of locally administered antibiotics and aggressive early surgical excision or de-roofing may reflect the most optimal treatment strategy for these patients.

Figure 1. Emerging picture of the role of bacterial biofilm in chronic hidradenitis suppurativa. Bacterial biofilms attached to the walls of the sinuses, hair fragments, keratinous plug material and corneocytes elicit a massive infiltration of inflammatory cells, including neutrophils and macrophages, which cannot clear the protected biofilm but damage the surrounding tissue, exacerbating the disease. Note that although the fluid in the sinuses and dilated follicle may contain many inflammatory cells it may be relatively devoid of planktonic bacteria, thus the full extent of the bacterial involvement in the progression to chronic stages of the disease may not be readily declared.

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Conflicts of Interest. Dr Stoodley consults for Smith and Nephew and Biocomposites Ltd.

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