Why chronic wounds will not heal: a novel hypothesis

The present paper presents a hypothesis aimed at explaining why venous leg ulcers, pressure ulcers, and diabetic foot ulcers develop into a chronic state. We propose that the lack of proper wound healing is at least in part caused by inefficient eradication of infecting, opportunistic pathogens, a situation reminiscent of chronic Pseudomonas aeruginosa infections found in patients suffering from cystic fibrosis (CF). We have analyzed sections from chronic wounds by fluorescence in situ hybridization and found distinct microcolonies—the basal structures of bacterial biofilms. Several researchers have previously reported that another important hallmark of biofilm formation is the development of increased tolerance to various antimicrobial measures and treatments. Furthermore, the immune response to infecting bacteria in the cystic fibrosis lung is dominated by polymorphonuclear neutrophils (PMNs), and we have recently shown that in vitro biofilms of P. aeruginosa produce a shielding mechanism that offers protection from the phagocytic activity of PMNs. (1,2) We hypothesize that the presence of P. aeruginosa in biofilms, and the lack of concomitant elimination by attended PMNs, are the main causes of inefficient eradication by antibiotic treatment and antimicrobial activity of the innate immune system, respectively.