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The DNABII family of proteins: Diagnostic markers and therapeutic targets of bacterial biofilms

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Abstract

Biofilms are organized bacterial communities adhered to a surface. These communities are embedded in an extracellular matrix also known as extracellular polymeric substances (EPS), the bulk of which is often comprised of abundant extracellular DNA (eDNA). Although biofilms are pervasive in the environment, they present specialized problems when they reside within the human body, contributing significantly to the pathogenesis, chronicity and recurrence of many infectious diseases. The EPS is so recalcitrant to the actions of the host's immune system that biofilms act as impenetrable reservoirs of bacteria that occasionally slough off, thereby eliciting further acute infections and inducing additional remote sequelae. Even more problematic, as the host immune system mounts an attack on the biofilm, are the bystander effects to surrounding healthy tissue. We have identified that the DNABII family of proteins commonly expressed by virtually all eubacteria is essential for EPS integrity. These proteins appear to function through the stabilization of eDNA at unusual structural motifs which have properties shared with DNA repair intermediates. Furthermore, treatment with antisera directed against members of the DNABII family is highly effective in debulking all biofilms tested *in vitro* to date. Data will be provided to show the mechanism of action of this protein and the failure of the immune system to mount a sufficient neutralizing response under normal disease conditions. Finally, various insights will be described to show the utility of using this family of proteins as a diagnostic marker for biofilm infections.

Biography

Steven Goodman completed his Ph.D in Biochemistry at the Johns Hopkins Bloomberg School of Public Health in 1988 and his postdoctoral studies at the National Institutes of Health in 1993. He was faculty at the University of Southern California from 1993 to 2012 where he served as Chair of the Division of Biomedical Sciences at the Herman Ostrow School of Dentistry and Director of the Microbial Systems Institute. He has published more than 45 papers in peer review journals.