Blood Purification by Immunoadsorption

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The minireviews by Stegmayr and Matic and coworkers, explore the relatively new blood-cleansing domain of immunoadsorption. This technology is a logical outgrowth of past technology for nonspecifically removing unwanted disease-causing proteins from the blood such as endotoxin, and the antibodies directed against glomerular basement membrane, and circulating immune complexes. In the beginning there was plasmapheresis, which separated cells from plasma protein in order to permit exchanging the pathological proteins with 'normal' substitutes such as albumin or physiologic saline. As noted in the reviews, biomedical engineering has enhanced both the specificity of this technology as well as the ease of the methods by which it is applied. The latter was accomplished by utilizing the uniqueness of the interaction between a pathological antibody and its corresponding antigen linked to beads in a column or tethered to the walls of a hollow fiber device. While this is a magnificent step forward and will likely enhance the success of life-saving therapies such as xenotransplantation by selectively removing anti-Gal alpha 1-3 Gal antibody (the cause of xenograft hyperacute rejection), there remains a lingering concern about other applications that are less well controlled temporally than placing a xenograft.

The problem with septicemia as discussed by Stegmayr below exemplifies this concern. In this clinical setting, by the time clinical awareness of the need for endotoxin removal is manifest and endotoxin appears in significant concentrations in the blood, the triggering of inflammatory mediators is well underway and the specific removal of endotoxin as treatment is 'too little too late'. By then, one is obliged to consider removing an entire spectrum of reaction products, a considerably more daunting task. The nonmedical analogy of the formula for making perfect toast comes to mind; namely, removal of the toast from the toaster 25 seconds before you see smoke.

As is usual with novel medical technology, the capability to accomplish a biomedical task runs well in advance of our understanding of how best to utilize it. And also, as is usual, the new technology provides an elegant study tool to explore the pathophysiology of the offending condition for which it was designed. This field of selective toxin removal is currently under lively investigation and should be watched for contributions to our basic understanding of the major clinical abnormalities begetting kidney failure.