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Intracellular biofilms

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We recently have found biofilms in an intracellular position in Alzheimer's disease (AD), molluscum contagiosum (MC), and psoriasis. We have noted them also in leprosy. With AD, the biofilms are made primarily by dental and Lyme spirochetes; with MC, it is the molluscum virus that "hijacks" the cell DNA and makes them; and with psoriasis, it is streptococci, primarily in the pharynx that make them. In leprosy, we have observed them inside the "globi" that are prominent in lepromatous leprosy, and they are made by *Mycobacterium leprae*. Thus, spirochetes, DNA viruses, gram positive bacteria, and mycobacteria can be added to the list of microbes that make intracellular biofilms. Intracellular biofilms add another layer of protection to the slime coating already in place. We have found these biofilms with routine histopathologic staining with PAS and Congo red (CR) stains. The PAS stains the extracellular polysaccharides (EPS) that are an essential ingredient in biofilms. The CR stains the amyloid that forms the infrastructure of biofilms and is another essential element. These intracellular biofilms have both been clearly shown in these diseases and exist alongside the extracellular biomasses that have previously been found. Limits to the evaluation of these findings involve the resolution power of light microscopy, selection of the tissue involved (in psoriasis, it is the tonsils, not the skin, where the biofilms are found), and the lack of a test, such as culture, to confirm the findings. The size of the organisms is important to make a biofilm, the microbes must have 10 organisms in any direction to begin the process. The resulting aggregate must then fit within the cell cytoplasm. The size ranges from 3 nM in MC to 25μM in Borrelia. These clearly are spatially able to fit within the cells. These findings are novel as to finding biofilms intracellularly in the skin and are the second time in history that a virus has been shown to make biofilms.

Biography

Herbert B Allen specialties include dermatology and dermatopathology, skin pathology and fungal infections. He is a graduate of Johns Hopkins University School of Medicine. He has served on the boards of the American Society of Dermatology and the American College of Physicians and has published over 30 scientific articles in the fields of dermatology and dermatopathology. He is the author of 'Keywords' in Dermatology, a book on the language of dermatology. He's board-certified with the American Board of Dermatology and the American Board of Pathology. He is currently an Emeritus Professor in the department of Dermatology where he served as chair of the department for 14 years.

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