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Neutrophils: No longer just simple suicidal killers associated with implanted biomaterial tissue regeneration templates

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Neutrophils, the innate immune response sentinels that predominate during the first hours of the inflammatory response associated with a biomaterial implant, are short-lived, suicidal killers that have minimal impact compared to subsequent, more widely studied cell types (i.e. macrophages). This perpetuated belief continues despite considerable recent progress in defining the neutrophil functions and behaviors in tissue repair. This presentation will provide an overview of the neutrophil's numerous, important roles in both inflammation and resolution, and subsequently, their potential critical role in biomaterial/ tissue regeneration template integration. As it stands, neutrophils function in three primary capacities: Generation of oxidative bursts, the release of granules, and formation of neutrophil extracellular traps (NETs). These highly orchestrating functions enable neutrophil involvement in inflammation, macrophage recruitment, and macrophage differentiation, resolution of inflammation, angiogenesis, pro- and anti-tumor roles, and immune system activation. Germane to this presentation is the fact that neutrophils exhibit great plasticity to adapt to their tissue microenvironments, thus allowing for the engineering of biomaterial composition and architecture to potentially influence neutrophil's overall role in the tissue integration of biomaterials, this presentation will serve to highlight the neutrophil's plasticity, reiterating that neutrophils are not just simple suicidal killers, but key players in inflammation, resolution, and tissue regeneration.

Biography

Gary L Bowlin is a Professor and Herbert Herff Chair of Excellence at The University of Memphis in the Department of Biomedical Engineering. He received his PhD in Biomedical Engineering from the University of Akron in 1996. His laboratory has published extensively in the area of electrospinning for tissue regeneration templates with over 125 peer-reviewed manuscripts. Google Scholar data shows his group's published works have been cited over 16,600 times, resulting in an H-index of 54. He has also been granted 12 US patents and over 35 foreign patents and is a Fellow of the National Academy of Inventors.

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