

Medical devices decorated with stimuli-responsive polymers for contact-killing surfaces and antimicrobial competitive release

Carmen Álvarez-Lorenzo*

Departamento de Farmacología, Farmacia y Tecnología Farmacéutica, R+DPharma Group (GI-1645), Facultad de Farmacia and Health Research Institute of Santiago de Compostela (IDIS), Universidade de Santiago de Compostela, 15782 Santiago de Compostela, Spain

* Corresponding author: email: carmen.alvarez.lorenzo@usc.es

The use of medical devices is associated to an inherent risk of infection. Prosthetic heart valves, catheters, hip prosthesis, vascular grafts, sutures, and contact lenses, among many other common implantable or insertable devices, are particularly prone to adhesion of certain host proteins soon after implantation, which in turn favors the subsequent bacteria adhesion and proliferation until biofilm formation by single or mixed species. These medical devices are indeed considered as a heaven for opportunistic bacteria and are responsible of almost 50% of nosocomial infections, which in turn have an impact on patients morbidity and mortality. Decoration of medical devices with polymers that modify their features as a function of the level and nature of the surrounding microorganisms can endow medical devices with improved performance against biofilms. Strong efforts are being made to design stimuli-responsive polymers that expose contact-killing groups when microorganisms try to adhere, and bioinspired nanostructures that recognize microorganisms for triggered (competitive/affinity-driven) drug release [1]. Relevant examples of both approaches will be presented. Prophylaxis and treatment of infections may benefit from polymers that are responsive to the unique changes that microbial growth causes in the surrounding environment or that even recognize the microorganism itself or its *Quorum Sensing* signals may offer novel tools prophylaxis and treatment of health-care related infections.

References

- [1] C. Alvarez-Lorenzo, C.A. Garcia-Gonzalez, E. Bucio, A. Concheiro. Stimuli-responsive polymers for antimicrobial therapy: drug targeting, contact-killing surfaces and competitive release. *Expert Opinion on Drug Delivery* 13, 1109-1119 (2016).