Development of new polymer-based hydrogels with inherent antimicrobial properties

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The antimicrobial activity represents a cornerstone in the development of biomaterials: it is a leading request in many areas, including biology, medicine, environmental sciences and industry [1-3]. Over the years, different polymeric scaffolds have been proposed as possible solutions, based on the encapsulation of metal ions/particles, antibacterial agents or antibiotics [4-5]. In this work, we developed a physico-chemical transition mediated synthesis of a new versatile hydrogel, using branched polyacrylic acid (carbomer 974P) and an aliphatic polyetherdiamine. This system is able to counteract the microbial growth thanks to the inherent properties of the polymers used, that are not subjected to further chemical modifications [6]. In particular, the anti-microbial activity is clearly demonstrated against *Staphylococcus aureus* and *Candida albicans*, two well-known opportunistic pathogens. Finally, a translation from bulk hydrogels synthesis to nanoparticles formulations with the same materials has been applied, with the aim of developing a novel type of drug carrier, designing a unique device able to combine inherent antibacterial/antimicrobial properties to a controlled drug delivery, as a promising tool for a wide range of biomedical applications.

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