

Role of Functional Polymers in the development of Biomaterials for Application in the Biomedical Field

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The contribution of polymers to the development and application of biomaterials during the last 50 years has been well recognised and patented in very good products (prosthesis, devices, cements, bioadhesive membranes, drug delivery systems, etc.). In this presentation we will give information of the contributions of my research group and the most appreciate colaborations with very well recognised groups to the application of functional polymers to the development of advanced systems for the application of devices, drug delivery systems and “Polymer Drugs”.

The enormous possibilities offered by the macromolecular chemistry of polymer systems give opportunities for the development of very interesting formulations to buildup the necessary components to reorganice the human body as well as the development of targeting and drug delivery systems. Essentially there is a clear relationship in the design applied by the nature in the formation of all the components and elements of the human body and the fabrication of biomimetic macromolecular systems for applications in the body for restoration of functions and the logical and controlled way of the application of bioactive molecules or macromoleculaes, like most of the drug delivery systems, growth factor or enzymatic compounds.

Examples of diferent systems developped and applied in the clinical practice by the group will be presented of different polymer families.

The development of biodegradable systems and composites based on polysaccharides for drug delivery systems has been an important cooperation with the 3B' group directed by Rui Reis and others, fruit of cooperation with Jan Feijen, Pedro Guillen, Antonio Lopez Bravo, and J. Antonio de Pedro. Bassically we interpret how to offer biodegradable systems or partially biodegradable systems to guaranttee the biomechanical estabily in bone fractures. In this sense we developped partially acrylic – polylactide composites with a very good integration in the bone tissue without loss of the biomechanical estabily during the remodelation process of the fracture.

One of the main activities of the group has been the development of bioactive polymer systems “polymer Therapeutics”, based on self-assembling polymers in a biomimetic way. The design of copolymer systems with the adequated balance of hydrophilic and hydrophobic components has oppened excellent opportunities for the preparation of advanced bioactive systems with properties as antioxidant, antitumoral or antibacterial functions. Cooperative works with excellent groups directed by Sanjukta Deb, James Kirkpatrick, Andres García, Buddy Ratner, Claudio Migliaresi, Gino Ambrosio, Susi Borsachiello and many others has been well recognised.

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