## Αγγλική Περίληψη

The aim of this work is the comparative study of the immunocompatibility-hemocompatibility of different materials such as carbon based thin films [amorphous hydrogenated diamond-like carbon [a-C: H]], Titanium Nitride [TiN] thin film, Titanium [Ti] thin film and medical devices such as a silicon coated Latex irrigation catheter, endoprosthesis such as vascular grafts [Dacron, PTFE] and stent grafts [Nitinol stent graft, Cobalt Chromium stent graft], by means of complement C5 convertase [C5c] activation in human serum. The complement C5 convertase [C5c] catalyzes the splitting of C5 into two fragments, C5a and the C5b. The smallest fragment C5a is an anaphylatoxin involved in attracting phagocytes at the site of infection. The larger C5b fragment binds to the already bound to the cell surface, C3b fragment, and allows the initiation of restraint of the MAC (mebrane attact complex) from C6, C7, C8, C9 components. The composition of the MAC complex leads to the formation of channels and pores on the cell surface, which eventually leads to their lysis. The three types of nanocoatings used in this work were developed onto a silicon substrate by Magnetron Sputtering and Plasma-Enhanced Chemical Vapor Deposition (PECVD), respectively. Bare silicon substrate and human serum are used as "negative" control and the Latex [elastomer-elastic hydrocarbon polymer] as a "positive" control. Complement C5 convertase [C5c] activation was assessed using sandwich enzyme immunoassay-sandwich ELISA for the in vitro quantitative measurement of human C5c in human serum in order to evaluate C5c activation for the specific time periods [0min,15 min,30 min and 60 min] of a candidate biomaterial incubation. The morphological characterization of the above mentioned materials is conducted by Scanning Electron Microscopy (SEM). The study of thin films topography was conducted by Atomic Force Microscopy (AFM) and their surface wettability properties by Contact Angle measurements. In this way, by comparing various parameters measured by different methods, we obtained a complete picture of the properties of the samples used in this thesis and thereby confirmed the experimental results. The information we have analyzed, helped to understand some of the properties of materials used in the experiment and potentials for a possible changes and interventions for safer and better to apply materials. One of the goals of Nanomedicine is the possible application of Nanomaterials in medicine and effective monitoring of biological reactions. The results show that both groups of materials might be excellent candidates for medical application since they are not likely to cause any immunological adverse reaction.