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Glyconectin proteoglycans: The self assembling molecular velcro mediating self non self recognition and adhesion implicated in evolution of multicellularity

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The goal of this presentation is to make a specific contribution about glyconectin proteoglycan as the selfassembling nano-molecularvelcro system mediating initial steps of self nonself recognition and cell adhesion in Porifera, the first descendants of the most simple primordial multicellular organisms. Two original findings will be described: i) Velcro like concept based on highly polyvalent and specific intermolecular glycan to glycan associations with extremely low affinity of the single binding site, and ii) novel structures of the large and newly emerging family of glyconectin like proteoglycan molecules. The emphasis will be put on the interdisciplinary approach for studying structure to function relationship at the different size scale levels by combining the knowledge and technologies (instrumentation and methods) of physics, chemistry, biology and mathematics. Applying such strategy which is crossing the boundaries of different science disciplines enabled us to develop a new Atomic Force Microscopy (AFM) based nanobiotechnology and perform the first quantitative measurements of intermolecular binding forces at the single molecular level under physiological conditions. We propose that nanovelcro systems of the glyconectin glycans, which are the constituents on the cell surface that are the most exposed to the environment, were responsible for the molecular self nonself recognition and adhesion processes that underpinned the emergence of multicellular life forms.