Biology Of Extracellular Matrix

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As far today, an always increasing amount of speculative, experimental and clinical data suggest “extracellular structures” seem to play a very important role in the genesis and maintenance of several diseases, mainly sub-acute and chronic ones. Unfortunately, we do not have the same “amount” of knowledge of such type of structures as well as for the cellular components, and the majority of evidence come out from controlled clinical trials, many still ongoing, in several disease. Molecular Biology clearly indicated and continues to highlights the importance of Extracellular Matrix (E.M) in allowing cells and tissues to function, but in clinical practice there is a still severe difficulty in “understanding the reasons why it happens”. Surely cell do not exist alone or in isolation: they are continuously in touch with other or their environment, or both. Cells have an Extracellular Matrix which allows a constant inter-change of information and physiologic and pathologic activities. Typically, EM has a commonly defined structure like a “fibrous component (collagen) and a more amorphous, polymeric region (e.g proteoglycans”).E.M. has lots of function: it gives shape and form, protect from pathogens, physical damages and injuries. Collagens, the most abundant protein component, can fold and cross-link into fibrils and net-works and are expressed by 20 different genes over 7 human chromosomes expressing on their turn at least 10 different types of human collagen. Active collagen forms become physiologically operative (fibril formation) only after an E.M. re-assessment operated exclusively outside of paternal-cell by specific protheases (carboxy-terminal cleavage, cross-linking and fibril formation). The so called “ground substance” of E.M. (25 to 30% of E.M weight) is represented by proteoglycans (PG ‘s) and glucosaminglycanes (GAG ‘s - 95% carbohydrate with protein backbone, hyaluronic acid core) acting as a sieve and may link several channel growth factors to their cellular receptors. In addition, lots of others components operate many other functions still today not completely understood. Among these, fibronectin, syndecans, perlecans (the latest linking to actin filaments inside the cell), laminin, and many others components still under investigation in clinical practice. This “scenario” is probably addressed to change within short timings due to the increasing interest in such type of speculative, experimental and clinical evidences. One of the most attractive field of research is the so-called “vascular ageing”, meaning both “macrovascular and microvascular ageing” due to the different hydro-dynamic patterns of the different districts, and the concept of “physiologic” or “pathologic” ageing: some preliminary experimental data seem to suggest that there is a different involvement of E.M. in “physiologic “ ageing compared to the “pathologic”-ones. Even if further experimental and clinical data are obviously requested and fundamental to better understand these aspects, available evidences suggest that E.M. seems to play a “vital” role in genesis and maintenance of several sub-acute and chronic diseases, and that we always have to take into acc both cellular and extracellular aspect of the “same” pathologic condition.