Role of the Exracellular Matrix Structures Fractones in Development, Cancer and Adult Neurogenesis

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We have found a common feature between development, cancer and adult neurogenesis (the production of new neurons in adulthood): the systematic presence of glycoproteic extracellular structures, which we named fractones. Fractones are not present in tissues that are not engaged in an active process of construction. Construction involves cell Proliferation, Differentiation, Migration and Apoptosis (PDMA). In the neurogenic zone of the adult mammalian brain, we have demonstrated that the binding of growth factors to the glycosylated motives of fractones is required for the activation of growth factors at the surface of stem cells and for the consequent production of new neurons. We anticipate that cancer-fractones work similarly to stimulate the production of new cancer cells and the migration of the newborn cancer cells to develop the disease outside of the original tumoral mass. We also find a faultless correlation between the distribution of fractones and the morphogenic process throughout the development of embryos. Therefore, we further anticipate that fractones might be responsible for the production and guidage of new cells to ultimately construct the embryo. In an attempt to determine whether fractones are present in all animals including the most primitive ones, we characterized fractones fractones in cyanobacteria, sponges, and diverse arthropods (insects and copepods). Together, these results strongly suggest that fractones are structures that control cell PDMA throughout life, and that for more than three billion years. Therefore, it is worth to further investigate the function of fractones, and characterize fractone inhibitors and stimulators. Beyond the basic knowledge of mechanisms that control the emergence of life and its maintenance throughout adulthood, this will provide insights into potential innovative treatments against cancer, developmental disorders, and neurodegenerative diseases.