HEPARAN SULFATE: FUNCTIONAL ROLE AT THE CELLULAR LEVEL

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Various types of cultured cells show extreme differences in production of matrix materials and other tissue-specific cell products. However, they apparently all produce small amounts of heparan sulfate. In many if not all cases, some of the heparan sulfate can be isolated under conditions that suggest it is present on the cell surface as a proteoglycan with multiple sugar chains. This cell surface heparan sulfate has metabolic characteristics that are independent of other cell surface materials, both in terms of turnover and in terms of metabolic fate. The ubiquity, localization and distinctive metabolism of heparan sulfate have aroused interest in the possibility that this substance may have functions that are required for life at the cellular level. Such a conjecture does not preclude, of course, that N-sulfated glycosaminoglycans probably also have other functions in cells, tissues and animals. Within this context, the CHO cell line (an established, tumorigenic Chinese hamster cell line that readily grows in suspension or monolayer culture) appears to be a complex model of essential and non-essential cellular functions. Metabolism of cell surface heparan sulfate appears similar to many other cells in that it shows cell cycle dependent release into the medium. In addition, CHO cells show a distinctive accumulation of heparan sulfate sugar chain fragments in the cytosol. These fragments lack peptide or linkage sugars, are much richer in N-sulfated glucosamine residues and much lower specific activity (than the surface material) when cells are labeled with ^{3}H-glucosamine for one generation. These features suggest that CHO cells may also serve as a convenient model for questions relating to degradation and/or reincorporation of surface or matrix species.

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