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Biology of Physicochemical Interactions at the Cell Surface

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P 122 INDUCTION OF CELL DIFFERENTIATION BY EXTRACELLULAR MATRIX: MECHANICAL VS. CHEMICAL SIGNALLING, H.P. Hohn, R. Grümmer, M. Hook, and H.-W. Denker, Institute for Anatomy, University Hospital, D-45122 Essen, Germany

Human choriocarcinoma cells express trophoblast-specific differentiation markers and are, therefore, a useful model to study the differentiation potential of tumor cells and its relevance for malignancy. When BeWo choriocarcinoma cells were maintained on different forms of extracellular matrix, expression of the differentiation marker chorionic gonadotropin (hCG) was stimulated much more (up to 5-fold) when cells were grown on flexible matrix gels as compared to cells grown on rigid/non-flexible substrates of the same chemical composition (coated plastic). This difference was accompanied by a change in morphology from cell monolayers on rigid substrates to cell spheroid-like aggregates of more rounded cells on matrix gels. A similar correlation was observed during experimental modulation of culture morphology of cells grown on plastic: In response to reduction of substrate adhesiveness (plastic coated with different concentrations of poly-HEMA) the cells assumed a more rounded shape and formed aggregates attached to the support. Concomitantly the secretion of hCG was increased up to the levels obtained on matrix gels. Piling up of cells did not seem to be the cause for this difference: Expression of connexins and of E-cadherin was not correlated with hCG production in attached cell spheroids as compared with spheroids in suspension culture and with cell monolayers. Conclusions: A rounded morphology combined with polar attachment to a substrate facilitate cell differentiation. Both are supported optimally only by flexible matrix substrates. These provide molecules for attachment and proper physical characteristics so that cells can assume a cell architecture favorable for differentiation.

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