THE ORGANIZATION OF EXTRACELLULAR PROTEINS ON THE CONNECTIVE TISSUE CELL SURFACE. P. Bornstein, J.F. Ash and D. Duksin (Seattle, Washington, USA)

Collagen and/or procollagen was demonstrated on the surface of monolayers of fibroblasts from normal rat kidney by indirect immunofluorescence with affinity-purified antibodies to collagen. The protein was arrayed in a reticular fashion on the cell surface and, in cells attached to a substratum, was severely restricted in its ability to undergo antibody-induced translational movement in the plane of the membrane. A similar pattern was observed for fibronectin (LETS protein, cell surface protein). These macromolecules were lost when fibroblasts were dissociated and examined in suspension cultures and were not regained until after the cells were replated. On the basis of the morphological findings, and in view of the likelihood of an interaction between fibronectin and collagen, we propose that these proteins form a meshwork on the cell surface. This meshwork is thought to interact directly or indirectly with the internal cytoskeleton and may mediate a number of cellular properties including adhesion, shape and motility.

To probe the role of carbohydrate side chains in this protein meshwork, normal and virally transformed mouse cells were treated with tunicamycin, an inhibitor of lipid-carrier-dependent glycosylation of proteins. Incubation of SV40- and polyoma-transformed 3T3 cells with tunicamycin caused detachment and death within 24 h; these effects were not seen with non-transformed cell lines. However, the proliferation of 3T3 cells was inhibited by tunicamycin and, after a few days, a distinct change from an epithelioid to an abnormally elongated shape was observed. Analyses of cell culture medium and of cell surface proteins indicated a marked reduction in fibronectin. These results suggest that tunicamycin interferes with the insertion or function of cell surface glycoproteins, some of which may participate in the formation of the external protein meshwork.