The Adhesion Modulating Properties of Tenascin-W

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Abstract:

Tenascins are extracellular matrix glycoproteins associated with cell motility, proliferation and differentiation. Tenascin-C inhibits cell spreading by binding to fibronectin; tenascin-R and tenascin-X also have anti-adhesive properties in vitro. Here we have studied the adhesion modulating properties of the most recently characterized tenascin, tenascin-W. C2C12 cells, a murine myoblast cell line, will form broad lamellipodia with stress fibers and focal adhesion complexes after culture on fibronectin. In contrast, C2C12 cells cultured on tenascin-W fail to spread and form stress fibers or focal adhesion complexes, and instead acquire a multipolar shape with short, actin-tipped pseudopodia. The same stellate morphology is observed when C2C12 cells are cultured on a mixture of fibronectin and tenascin-W, or on fibronectin in the presence of soluble tenascin-W. Tenascin-W combined with fibronectin also inhibits the spreading of mouse embryo fibroblasts when compared with cells cultured on fibronectin alone. The similarity between the adhesion modulating effects of tenascin-W and tenascin-C in vitro led us to study the possibility of tenascin-W compensating for tenascin-C knockout mice, especially during epidermal wound healing. Dermal fibroblasts harvested from a tenascin-C knockout mouse express tenascin-W, but dermal fibroblasts taken from a wild type mouse do not. However, there is no upregulation of tenascin-W in the dermis of tenascin-C knockout mice, or in the granulation tissue of skin wounds in tenascin-C knockout animals. Similarly, tenascin-X is not upregulated in early wound granulation tissue in the tenascin-C knockout mice. Thus, tenascin-W is able to inhibit cell spreading in vitro and it is upregulated in dermal fibroblasts taken from the tenascin-C knockout mouse, but neither it nor tenascin-X are likely to compensate for missing tenascin-C during wound healing.

Key Word:
tenasin, extracellular matrix, fibronectin, wound healing, C2C12.