

Ahmed, Z., B. D. Idowu, and R. A. Brown. 1999. Stabilization of fibronectin mats with micromolar concentrations of copper. *Biomaterials* 20:201-209.

**Abstract:** Fibronectin, a large extracellular matrix cell adhesion glycoprotein has diverse functions in wound repair including organization of matrix deposition and promotion of angiogenesis. We have previously shown that purified plasma fibronectin can be made into three-dimensional, fibrous materials, termed fibronectin mats (Fn-mat). The aim of this study was to examine means of increasing the stability of Fn-mats using a novel treatment with micromolar concentrations of copper ions which may be used to improve wound healing/nerve repair. Cytotoxicity of incorporated copper was determined using rat Schwann cells, rat tendon fibroblasts and human dermal fibroblasts. Dissolution of protein from the Fn-mat showed that treatment with the lowest concentration of copper used (1 microM) increased the stability of mats by 3-4 times at room temperature relative to control mats and twofold at 37 degrees C. Copper mediated increase in stability was dose dependent. Orientation of the Fn-fibres (within mats), monitored by scanning electron microscopy was retained with 1 microM copper but disappeared with higher concentrations. Schwann cells grew in culture with mats stabilized by 1 microM copper treatment without reduction in cell number but growth was inhibited at 10-200 microM Cu. All types of fibroblasts were unaffected by copper treatment upto 200 microM. Fn-mats can be successfully stabilized by this technique producing longer survival in vitro. The differential effects of copper on these cell types suggests that CuFn-mats may be used to select the type of cells which colonize these materials.