

# **An *in vitro* Model for Traumatic Brain Injury**

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Closed-head, mild traumatic brain injury (TBI) causes a variety of long term cognitive and psychological disabilities in those exposed to blast waves. In order to elucidate the cellular mechanisms of TBI, we have developed an *in vitro* model for blast injury. Vascular smooth muscle (VSM) cells seeded on micropatterned fibronectin lines and shielded with a damping polyacrylamide gel were impacted with a motor-driven piston. Immunofluorescence techniques were used to analyze intracellular structures and extracellular matrix (ECM) one hour after treatment. We compared actin coverage off the fibronectin lines, versus on, for blasted and control cells. We found increased relative colocalization of actin structures and fibronectin in cells subjected to blast injury, implying that mechanical insult induces lamellipodial retraction.

Our data suggest that blast waves initiate an intracellular signaling cascade that results in cerebral vasospasms and failure of the blood brain barrier. In conclusion, we found that the *in vitro* trauma model presented here could be used to test treatments for mild TBI.

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