Dear Faculty, IGERT Fellows, IGERT Associates and Students,

You are cordially invited to attend a Seminar presented by Anthony Bianchi. Please plan to attend.

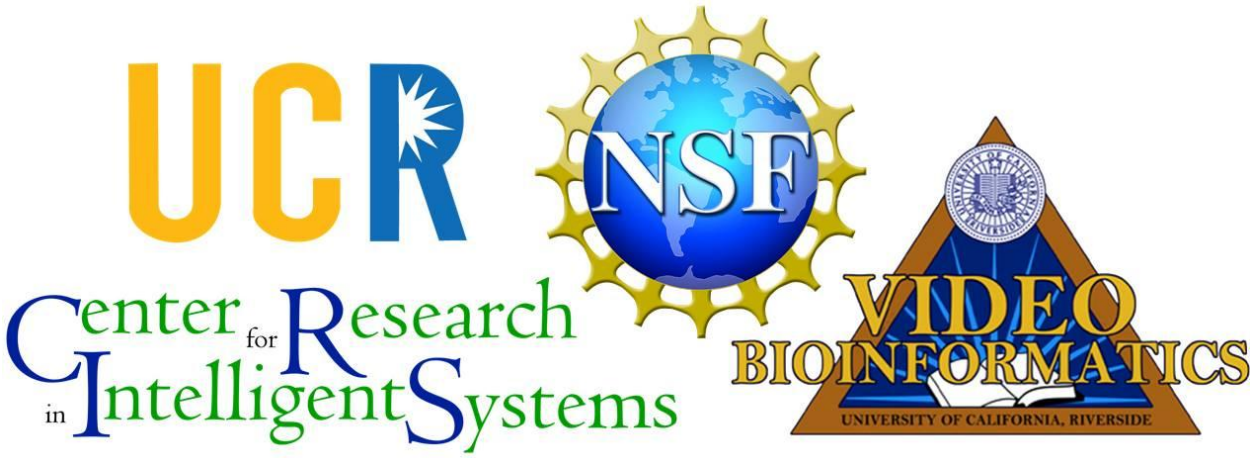
Virginia Donovan

IGERT Fellow
Cell, Molecular, and Developmental Biology, University of California, Riverside

Date: Monday, October 1, 2012
Location: Bourns A265
Time: 11:10am

Computational Analysis Reveals Increased Blood Deposition Following Repeated Mild Traumatic Brain Injury

Abstract:
Mild traumatic brain injury (mTBI) has become an increasing public health concern as subsequent injuries can exacerbate existing neuropathology and result in neurological deficits. This study investigated the temporal development of cortical lesions using magnetic resonance imaging (MRI) to assess two mTBIs delivered to opposite cortical hemispheres. The controlled cortical impact model was used to produce the initial mTBI on the right cortex followed by a second injury induced on the left cortex at 3 (rmTBI 3d) or 7 (rmTBI 7d) days later. Histogram examination was combined with a novel semi-automated computational analysis to perform a voxel-wise examination of extravascular blood and edema volumes within the lesion. Examination of lesion volume 1d post last injury revealed increased tissue abnormalities within rmTBI 7d animals compared to other groups, particularly at the site of the second impact. Histogram analysis of lesion T2 values suggested increased edematous tissue but blood deposition within rmTBI 3d and rmTBI 7d animals, respectively. Further quantification of lesion composition for blood and edema containing voxels supported our histogram findings, with increased edema at the site of second impact in rmTBI 3d animals and elevated blood deposition in the rmTBI 7d group at the site of the first injury. Histological measurements revealed spatial overlap of regions containing blood deposition and microglial activation within the cortices of all animals. In conclusion, our findings suggest that there is a window of tissue vulnerability where a second distant mTBI, induced 7d after an initial injury, exacerbates tissue abnormalities consistent with hemorrhagic progression.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