



Emerging Techniques in Bioengineering

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In this special issue titled “Emerging techniques in Bioengineering”, four papers were published. The first paper described a study that examined the potential use of K350, a recently developed 2-aminobenzamide type HDAC (histone deacetylase) inhibitor, in promoting neurite outgrowth. Therapeutic use of HDAC inhibitors has been most extensively studied in the field of cancer. In the last decade, several papers have been published which examined the use of different HDAC inhibitors in the treatment of neurological dysfunctions including epilepsy and Huntington’s disease. In the present study, Marouka et al. reported that treatment of K350 can induce the expression of *nur77*, an early gene responsible for neuronal differentiation, and promote neurite extension in PC12 cells. Based on these findings, the authors proposed that K350 may be a novel therapeutic agent in the treatment of traumatic brain injury.

In the second paper, Smeal et al. reported a novel technique for capturing dynamics of signal propagation over a large neural network with a high temporal resolution. Specifically, the authors demonstrated the use of targeted path scanning (TPS) for characterizing rapid calcium transients in astrocytes using an ex vivo model. With this technique, the

authors were able to show suppression of traveling waves in a model system mimicking epilepsy. This study opens up a possibility of future diagnostic use of TPS for neural and glial pathologies.

In the third paper, Hurley et al. described a novel tissue engineering approach for extracellular matrix remodeling in the context of diabetic cardiomyopathy. Diabetic heart is often associated with increased collagen accumulation (leading to increased stiffness and cardiac dysfunction) and this is thought to be due to attenuated MMP2 expression/activity. In this study, the authors demonstrate that self-assembling peptide nanofiber (NF)-based scaffold provides a superior extracellular environment for MMP2 delivery and matrix remodeling by cardiac fibroblasts isolated from diabetic heart when compared to control matrigel-based ECM substrate. Therefore, peptide NF may have a promising application in cardiac regenerative medicine.

Finally, in the last paper, Brafman provides a comprehensive review of various high throughput screening platforms that are currently being used to study modulation of stem cell behavior by biochemical and biophysical cues from the microenvironment.

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