Spinal Cord Regeneration

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Abstract:
Among the vertebrate, urodele amphibians and teleost fish have ability to regenerate their spinal cord after injury. In mammals following spinal cord injury (SCI) there are overwhelming inflammatory responses which trigger several other secondary tissue damage, neuronal and glial loss, progressive cavitation and glial scarring. These processes lead to functional decline and paralysis. Zebrafish is a powerful vertebrate model organism to elucidate gene function during regeneration, since they have extraordinary ability to regenerate their fins, heart muscle and central nervous system (CNS) after injury. Adult zebrafish, in contrast to mammals, can re-grow axons readily after SCI and re-establish appropriate connections to recover significant functions. In order to understand the mechanisms of inducing CNS regeneration in mammals, studies involving regeneration competent model organism is a prerequisite. Regeneration of spinal cord has been studied by various groups using expression analysis of candidate genes or by generating transgenic zebrafish. However, parallel analysis of gene expression during different phases of regenerative events in spinal cord using high-density dedicated zebrafish arrays has not been attempted. In Medaka, another teleost fish, a small-scale cDNA microarray screen during fin regeneration was reported using 2,900 expressed sequence tags (ESTs), which shared no homology to known genes. Attempts have been made to employ Affymetrix arrays containing 14,900 transcripts representing 10,000 genes to study regeneration of fin, heart and retina in zebrafish. High density arrays have been used to profile the transcriptome dynamics during embryogenesis but such high-density microarray for genome-wide gene expression analysis has not previously been attempted for studying regeneration in adult zebrafish.

Biography:

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Recent Publications:

1. Development of a parallelized dynamo solver in spherical shells.
2. Spinal Cord Injury Scarring and Inflammation: Therapies Targeting Glial and Inflammatory Responses. 2018 Jul; 15(3): 541–553. Published online 2018 May 1.
3. Induced Pluripotent Stem Cell Therapies for Cervical Spinal Cord Injury Int J Mol Sci. 2016 Apr; 17(4): 530. Published online 2016 Apr 9.

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