**Nurit Kalderon Abstract Friday Session**

## DEVELOPING A UNIFIED STRATEGY FOR CURING SCI: TARGETING THE DAMAGED NEURO-VASCULAR BARRIER

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Failure of wound repair and chronic tissue decay accompanied by enlarging cavitation at the damage site, comprise the characteristic pathology of spinal cord injury (SCI). Vascular injury plays a critical role in the irreversible pathophysiologic consequences of SCI. The CNS is immune privileged due to the endothelial barrier, e.g., leukocytes cannot penetrate the CNS parenchyma. Upon injury/disease the privilege is lost, leukocytes manage to invade (transmigrate) into the parenchyma leading to the chronic inflammation/decay.

The presentation will focus on the critical role of the compromised neuro-vascular barrier in the onset of the devastating pathology following SCI. Data will be presented in support of the concept that a unified and effective strategy for curing SCI can be developed by targeting the damaged neuro-vascular barrier. It will incorporate data published by various laboratories with data of my laboratory.

For instance, recent studies suggest that the abnormal/defective vessel repair (e.g., hypervacularization) and the related compromised blood-spinal cord barrier lead to the onset of chronic inflammation and the everlasting tissue degeneration, e.g., treatment to enhance angiogenesis with VEGF (vascular endothelial growth factor) rather than improving exacerbated the pathology.

Accordingly, the strategy for the effective therapy includes utilizing a battery of established procedures for suppressing/preventing the abnormal hypervascularization. Indeed, successful wound repair and prevention of the chronic tissue decay following SCI was achieved by this laboratory by targeted cell elimination, utilizing radiotherapy as used to eliminate highly dividing tumor cells, presumably preventing abnormal angiogenesis. Other potential candidates can be using drug therapies, Avastin and Lucentis which successfully prevent unwanted angiogenesis in tumor and macular degeneration therapies.

**Nurit Kalderon Abstract Saturday Session**

## THE ESSENTIAL INGREDIENTS OF SCI THERAPY: WOUND REPAIR/REGENERATION AND MOTOR TRAINING

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Spinal cord injury results structurally, in permanent damage and chronic tissue decay at the fracture/crush site and in destruction of the brain-spinal cord fiber connectivity, and functionally, in paralysis below the lesion site. The severed supraspinal fibers fail to cross the widening wound gap and brain motor control distal to the lesion site is permanently impaired.

Therapy for SCI is equated with the ultimate goal: restoring motor function with voluntary motor control. To achieve this goal, research efforts have been divided into two major disciplines: 1. finding the means necessary to enable regrowth of the supraspinal fibers back into regions below the lesion site, namely, re-establish/ restore some brain-spinal cord connectivity distal to the lesion, mostly in pre-clinical setting; and 2. neuro-rehabilitation by training/manipulating the local spinal circuitry below the lesion site to regain some control on motor function below the lesion. Neuro-rehabilitation, in clinical setting, gained in recent years much success in manipulating the existing local spinal circuitry and enabling, albeit limited, recovery of some motor function.

Here, the critical role neuro-rehabilitation will have in restoring voluntary motor function when structural repair is obtained, will be demonstrated. Data obtained in the pre-clinical setting, in severe contusion injury, will be presented in support of the argument/concept that a true effective therapy has to include at least two essential ingredients: structural repair and motor training. Furthermore, that a mere prevention of the pathology with re-establishment of supraspinal connectivity distal to the lesion site is ‘useless’ unless we add a training paradigm which manipulates the circuitry into a meaningful motor function.