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Nervous tissue restoration following traumatic brain injury by coral skeleton based implants

Weiss Orly Eva
Ariel University, Israel

Traumatic brain injury (TBI) is a major cause of mortality and disability in the world, and has no cure. Thus, identifying means that could regenerate new tissue in brain wounds and recover functionality is a major challenge. We found that implantation of scaffolds made of aragonite crystalline skeleton of corals into cortical TBI wounds induced in mice, caused histological and functional recoveries. The TBI injury was produced by a novel procedure that provides a control over the wound dimensions. This control is achieved by removing cortical tissue of precise volume (2 mm3, in this case). The implant was composed of coral skeleton grains (0.1-1 mm length) wrapped in a collagen gel. Two weeks to one month following implantation, wounds were loaded with cells in their open void volume, as well as around and within the implants. Implanted wounds, by contrast to non-implanted, contained astrocytes (expressing glial fibrillary acidic protein), neuronal processes (mainly neurofilament M expressing axons) and neuronal precursors (nestin positive). Functional open field tests showed that implanted TBI mice performed more than two folds better than non-implanted TBI mice, in terms of walking velocity and time in center of the field. These results suggest that the implant caused a reduction in TBI-generated anxiety. Thus, the results demonstrate that using coral skeleton-based scaffolds to repair TBI injuries in the nervous system is an approach of great therapeutic potential. It is logical to assume that this scaffold can be applicable to other types of brain damages, such as those caused by neurodegenerative diseases.

Biography

Weiss Orly Eva is a PhD student at the Department of Molecular Biology. The topic of her thesis is "Repair of traumatic brain injuries using coralline based scaffolds". She has presented five posters at distinct conferences, signed on two patents with her name and has three papers in preparation.

orly1990@hotmail.com

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