



Editorial



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See the article “Therapeutic Approaches Targeting Vascular Repair After Experimental Spinal Cord Injury: A Systematic Review of the Literature” via <https://doi.org/10.14245/ns.2244624.312>.



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The Importance of Vascular Repair as the First Step in Spinal Cord Injury Treatment: Commentary on “Therapeutic Approaches Targeting Vascular Repair After Experimental Spinal Cord Injury: A Systematic Review of the Literature”

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The first goal of treatment after spinal cord injury (SCI) is to minimize secondary injury and promote neuronal regeneration, which has been the topic of many studies. In secondary injuries, hemodynamic management is clinically known as a significant treatment.¹ The American Association of Neurological Surgeons/Congress of Neurological Surgeons 2013 SCI guideline recommends maintaining the mean arterial pressure at least between 85 and 90 mmHg for the first 7 days following an acute SCI.² In addition, many studies have actively investigated various neuroprotective substances and stem cell treatments after the acute phase. However, there is an overlooked aspect of these treatments—namely, the importance of vascular repair, which could enable proper perfusion pressure, flow, and drug/cell delivery. In order to maintain proper perfusion pressure in the injured spinal cord tissue, the blood vessels must be distributed appropriately. Furthermore, in order for a substance (e.g., an administered drug or cells) to reach the damaged area, it must be distributed through a blood vessel. In particular, the relationship between vascular repair after SCI and axonal regeneration underscores the importance of vascular repair.^{3,4} Therefore, vascular repair is one of the most important issues in the treatment of SCI, and this review paper is very important in this regard.

This review paper is broadly divided into a section on the pathophysiology that occurs within spinal cord tissue after damage and a section discussing studies on treatments for vascular regeneration in the spinal cord.⁵ In particular, 5 categories of treatments are described: (1) delivery of organic factors, (2) genetic engineering, (3) physical stimulation, (4) cell transplantation, and (5) the delivery of biomaterials carrying various factors.⁶ Each category is well represented with appropriate pictures and tables that present the material in an easy-to-understand manner. Angiogenic factors have shown clinically significant results, focusing on substances validated in other tissues, such as vascular endothelial growth factor

and fibroblast growth factor-2. Genetic engineering is relatively understudied compared to other treatments, but has high potential in terms of vascular regeneration. Physical stimulation techniques can be a good treatment alternative for acute treatment, and there have also been many recent clinical attempts to treat chronic SCI using electric stimulation. Cell transplantation and the delivery of biomaterials carrying various factors are the most popular approaches in recent research on regenerative medicine. In particular, the development of drug/cell delivery systems provides an environment where we can deliver certain cells in a precise and safe manner. In particular, several cell therapy techniques that can help regenerate nerves and surrounding cells are leading SCI treatment in a different direction than previous treatment methods. Proper biomaterials and cell combinations are likely to exert very high synergy. In particular, advances in biomaterials that can deliver and maintain various cell treatments, thereby creating a favorable environment for spinal cord regeneration, constitute a new paradigm for SCI treatment.

The treatment of SCI can never be fully addressed by a single therapeutic approach. This is because recovery after SCI is not just a matter of neuronal regeneration; instead, recovery is only possible when the organic network of spinal cord tissues that surround and support neurons is regenerated and restored. In the future, combined approaches (such as implanted biomateri-

als with the ability to release angiogenic factors or therapeutic cells) will be the most powerful treatments for SCI.

Conflict of Interest: The author has nothing to disclose.

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Title: Guernica
Year: 1937
Artist: Pablo Picasso
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