Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

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Inventors

Kaushal Rege
Russell Urie
Inam (Maryam) Ridha
Pelagia Kouloumberis
Shelley Noland

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Smart Materials for Repairing Injured Nerves

Peripheral nerve injuries can affect sensation, movement and motor functions, significantly impacting a patient's quality of life. Surgical interventions, such as approximation or attachment, are often required to treat such injuries. However, tissue adhesives and sealants do not provide adequate mechanical support and suffer from low adhesion and elasticity, and suturing can put undue stress on the nerve and hinder axon sprouting and regeneration. Despite a long history, peripheral nerve repair still remains challenging and innovations to mitigate attachment related complications could go a long way in improving surgical success.

Researchers at Arizona State University have developed smart sealant materials and methods for peripheral nerve anastomosis and repair. These materials enable end-to-end attachment of severed peripheral nerves and result in accelerated repair. The materials are activated to fuse with the neural tissue leading to rapid sealing and strong adhesion. Growth factors and other bioactivate molecules can be incorporated into the materials to facilitate and improve growth and healing. Because these materials integrate with neural tissue they provide sufficient mechanical strength for the injury.

These tissue-integrating materials can mitigate many challenges associated with conventional sealing and provide a novel solution for rapid and effective nerve repair, healing and growth.

Potential Applications

- Peripheral nerve anastomosis and repair from:
  - Injuries/traumatic events
  - Diseases
  - Surgical procedures

Benefits and Advantages

- Needle and suture-free

- Faster approximation and repair & less invasive compared to suturing
- Strong fusion/adhesion
- The materials can be doped with growth factors or other biomolecules to increase healing, nerve tissue regeneration and growth
- Likely will not hinder axon sprouting
- The materials can be biodegradable
- Results in greater functional recovery
- Reduces fibrotic scarring associated with nerve repair and regeneration

For more information about the inventor(s) and their research, please see

Dr. Rege's laboratory webpage

Dr. Rege's departmental webpage