

# Customizable Skull Prosthesis for Protection Following Craniectomy

## Lead Inventor:

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## Background & Unmet Need

- A decompressive craniectomy is a surgery in which a bone flap of the skull is removed to relieve intracranial pressure on the brain
- Every year, >100 K people in the United States have decompressive craniectomies, primarily as a result of stroke, infection, or traumatic brain injury
- The procedure to replace the bone flap (cranioplasty) may not occur for several months, leaving the brain unprotected and vulnerable to outside forces
- To protect the brain from further injury, patients usually wear a helmet, which is heavy and uncomfortable
- **Unmet Need:** A low-cost skull protective device that provides personalized protection, comfort, and cosmetic appeal is needed

## Technology Overview

- **The Technology:** An external skull prosthesis that offers localized protection of the brain at the surgical site after cranial bone removal
- The prosthesis is designed to curve around the skull, providing a cranial protection at a specific surgical site
- This skull protective prosthesis has a precise joint system for size adjustment, and incorporates holes for breathability and future attachment capability
- **PoC Data:** A prototype of the device was successfully produced using 3D printing and incorporated into multiple cranial attachment systems, including a head wrap, wig, and skull cap
- Compared to bulky protective devices such as helmets, this technology offers targeted protection that reduces weight, improves patient comfort, and is more aesthetically pleasing

## Inventors:

Susan C. Pannullo  
Karli Dale Thornton  
Stacey Kim  
Shwetha Sairam  
Tyler Nicole Webb  
Joseph Miller  
John Cheeseborough

## Patents:

PCT Application Filed

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## Cornell Reference:

D-9891



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## Technology Applications

- External skull prosthesis to provide brain protection in individuals following craniectomy
- Prosthesis for other conditions in which a portion of the skull is weakened or missing

## Technology Advantages

- Simple to customize to meet the needs of each patient
- Aesthetically appealing with various attachment options
- Excellent breathability and comfort

## Supporting Data / Figures



**Figure 1:** Prototype of the customizable skull prosthesis, demonstrating the interlocking sections and utilizing a wig as an exemplary attachment device.

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