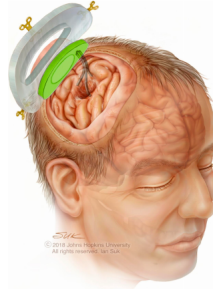


## MRI-Compatible Functional Skull-Embedded Implant for Chronic and Direct Medicine Delivery for Chronic Brain Diseases

- **Goal:** Develop the first implantable medicine delivery device to extend the lives of patients with brain cancer. The primary aim is to develop a skull-embedded and MRI-compatible, actively pumping therapeutic delivery device to target brain cancer resection site. The device is poised to treat and extend the lives of over 11 million patients that are affected annually with brain diseases (brain cancer, Alzheimer's, Parkinson's, etc).



Patent-pending: "Magnetic resonance imaging compatible, convection-enhanced delivery cranial implant devices and related methods" Gordon et al. 2019. Assigned to JHU.

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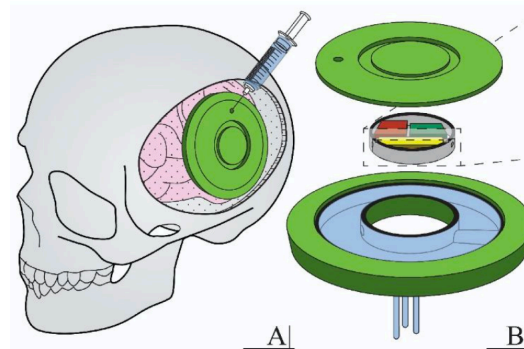
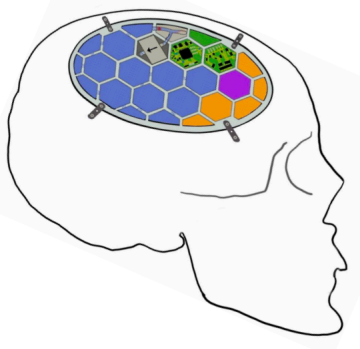


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## MRI-Compatible Functional Skull-Embedded Implant for Chronic and Direct Medicine Delivery for Chronic Brain Diseases

### The Technology

Refillable, modular, MRI-compatible, real-time Bluetooth connectivity



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## MRI-Compatible Functional Skull-Embedded Implant for Chronic and Direct Medicine Delivery for Chronic Brain Diseases

- **What Students Will Do:**

- Work with the Nordic nrf52 system-on-chip to develop a software platform for the device and apply a systems-level approach to integrate new sensors (such as pressure sensors) into the hardware and software of the device.
- Perform hardware prototyping, interact with hardware using C code, and implement a secure communication protocol.
- Invited to attend weekly Center for Neuroplastic Surgery lab meetings.

- **Deliverables:**

- **Minimum:** Design and develop a functional system that integrates the necessary sensors, software, and hardware to control the device.
- **Expected:** Integrate the functional system into the device and conduct benchtop testing.
- **Maximum:** Integrate the functional system into the device and test in an animal study.

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## MRI-Compatible Functional Skull-Embedded Implant for Chronic and Direct Medicine Delivery for Chronic Brain Diseases

- **Design Requirements:**

- Miniature and implantable (skull embedded)
- Wirelessly powered
- Bluetooth and continuously functioning
- Rechargeable
- MRI-safe

- **Group Size:** 2-3

- **Skills:** Knowledge of C code, systems-level integration of hardware and software, prototyping and testing, translation research, and an interest in medical devices

- **Mentors:**

- The Johns Hopkins Center for Neuroplastic Surgery Research
  - Dr. Chad Gordon ([cgordon@jhmi.edu](mailto:cgordon@jhmi.edu))
  - Dr. Avi Rubin ([avirubin@gmail.com](mailto:avirubin@gmail.com))
  - Dr. Nathan Scott ([nscott@jhu.edu](mailto:nscott@jhu.edu))
  - Dr. Mehran Armand ([mehran.armand@jhuapl.edu](mailto:mehran.armand@jhuapl.edu))
  - Support from the JHU School of Medicine Department and Johns Hopkins Technology Ventures

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