

Faculty of Engineering

ASPIRE Summer Research Program 2026-2027

Project Title: Injectable peptide hydrogel for the treatment of stroke

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Objective

To evaluate the controlled local delivery and therapeutic efficacy of amnion-derived neuroprotective and anti-inflammatory factors encapsulated within an injectable, nanostructured self-assembling peptide hydrogel to attenuate ischemic stroke-induced damage *in vitro*.

Project Details

Over 16 million people suffer from stroke annually, with current pharmacological interventions offering limited neuroprotection. While therapeutic factors derived from amnion cells (e.g., secretome, cytokines, growth factors) show high potential to reduce brain inflammation, direct intravenous or local injection leads to rapid protein degradation, systemic dilution, and poor retention at the infarct site.

To overcome these limitations, this project utilizes an injectable self-assembling peptide hydrogel as a localized depot for sustained factor release within the damaged brain microenvironment [1,2].

Experimental Focus:

1. **Hydrogel Formulation & Release:** Encapsulate bioactive factors within the peptide hydrogel network and characterize controlled release kinetics.
2. **In Vitro Ischemia Model:** Establish an oxygen-glucose deprivation (OGD) cell culture model to simulate stroke-like ischemic conditions.
3. **Functional Assessment:** Quantify the ability of the released factors to attenuate neuroinflammation, promote neuronal survival, and accelerate recovery mechanisms in dish-based assays.

Project Timeline

[illegible]

Final Report & Manuscript Writing										
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Prerequisites

Undertaking a degree in MSE/Chem Eng/Biomed Eng

Student Placement Agreement

A student placement agreement must be signed by the project supervisor and the student prior to commencement of the ASPIRE program.

[LV0554-72741 ASPIRE Program Co-Curricular-Student-Placement-Agreement-Short-term.docx](#)

Additional Information

Applicants will be required to undertake an interview

Submit as a word document - no more than one page long.