

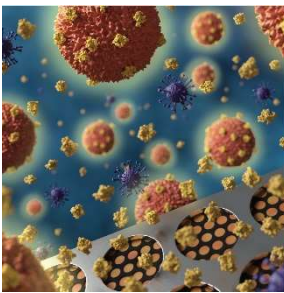


**Alessandro Grattoni, Ph.D.** *Frank J. and Jean Raymond Centennial Chair, Chairman and Professor, Department of Nanomedicine, Houston Methodist Research Institute, Professor, Departments of Surgery & Radiation Oncology Houston Methodist Academic Institute, Houston Methodist Hospital.*

Dr. Grattoni's research is focused on the development and translation of implantable technology platforms for controlled long-acting drug delivery and cell transplantation. **We are looking for MD/PhD or PhD students, and early stage Postdoctoral Fellows to join the research projects below. These projects are supported by new NIH funding.**

**Preferred background: transplant biology / immunology (NICHE project), Pharmaceuticals and formulation chemistry (HIV PrEP project), Cancer immunology and biology (NanoLymph project).**

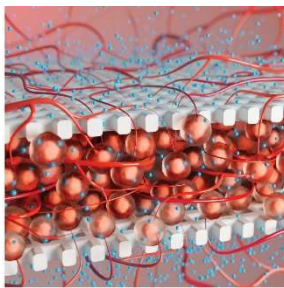
If interested, please contact: [grattonilab@houstonmethodist.org](mailto:grattonilab@houstonmethodist.org)



### **Long-Acting Nanofluidic implants for the prevention of HIV.**

The nanochannel drug delivery system (nDS) is a long-acting platform for continuous and sustained release of therapeutics to treat, manage or prevent chronic diseases. At the core of the nDS technology is an implantable silicon nanofluidic membrane for controlled drug delivery, where drug- and tissue- agnosticity affords a broad variety of therapeutic indications. Nanochannels are akin to the neck of an hourglass, where their size and numbers can be tuned to achieve the desired release rate of therapeutics of any molecular size. Our current therapeutic focus includes HIV pre-

exposure prophylaxis (PrEP), where clinical translation of the nDS could realize the potential global health impact of preventive adherence. **Reference:** Pons-Faudoa, F. P. *et al. Advanced Therapeutics* 2020. <https://onlinelibrary.wiley.com/doi/full/10.1002/adtp.202000163>



### **3D printed cell encapsulation device for endocrine cell transplantation (NICHE).**

The Neovascularized Implantable Cell Homing and Encapsulation (NICHE) platform is an implant for endocrine cell transplantation. The key innovation of the NICHE lies in the integration of a fully vascularized transplant microenvironment and local delivery of immunosuppressant drugs within the same implant. Immunosuppressants are released from the drug reservoir across a nanoporous membrane directly into the vascularized transplant reservoir. This unique design limits immunosuppressant delivery to the transplant site to prevent immune rejection of transplanted cells, while the vascularized microenvironment supports long-term engraftment. As such, transplant recipients are spared from the toxic side effects of whole-body immunosuppression. Our therapeutic focus includes Type 1 Diabetes management using pancreatic beta islets. **Reference:** Paez-Mayorga, J. *et al. Biomaterials* 2020.

**Reference:** Paez-Mayorga, J. *et al. Biomaterials* 2020. <https://www.sciencedirect.com/science/article/pii/S0142961220304786>



### **In situ immunomodulation for vaccinations (NanoLymph).**

The NanoLymph is a 3D printed vaccine platform that acts as an immunostimulatory niche to generate antigen-specific immune responses through the continuous release of immunomodulatory agents. Continuous drug release stimulates dendritic cells (DC) recruitment and immune activation against relevant antigens with the goal of achieving durable memory responses. Current studies focus on prophylactic and therapeutic cancer vaccination in murine cancer models. Due to flexibility in immunomodulatory agents and antigens, the NanoLymph can be used for other

clinical indications including allergy immunomodulation. **Reference:** Viswanath, D. I. *et al. Biomaterials* 2022. <https://www.sciencedirect.com/science/article/abs/pii/S0142961222000138>.