Eamon F. X. Byrne, DPhil.

eamonbyrne.github.io

WORK EXPERIENCE

Senior Scientist

GigaMune, Inc. — *San Francisco, CA*

Sept. 2023 – Present

Biotech company developing in vivo cell therapies (e.g., CAR-T) for cancer and inherited blood disorders, with a focus on gene therapy via cell-type-specific lentiviral delivery. Joined as the core protein specialist, spearheading both computational modeling and experimental validation pipelines across key projects.

Key Responsibilities:

- Led cross-functional protein engineering initiatives, driving strategy from early-stage ideation through experimental execution and data interpretation.
- Oversaw project planning, resource allocation, and milestone management to align with company goals.
- Developed and maintained SOPs to standardize lab workflows and ensure quality and compliance.
- Mentored junior scientists, providing technical guidance in both experimental and computational domains.
- Troubleshot complex *in vitro* and *in vivo* experimental systems, promoting scientific rigor and innovation.

Selected Achievements:

- Critically evaluated mouse model literature to guide experimental strategy, directly contributing to the company's first successful *in vivo* results.
- Designed and implemented a high-throughput screening platform for lentiviral envelope proteins, enabled by a CRISPR-engineered packaging cell line for single-pot library generation (10^3–10^4 variants).
- Led feasibility studies on cell-specific targeting, combining structure-guided envelope protein engineering with variant screening in cell lines and primary PBMCs via flow cytometry and DNA-based readouts.
- Optimized lentiviral production and concentration protocols for *in vivo* use, improving yield and consistency.
- Established lentiviral delivery of CRISPR-Cas nucleases into target cells, enabling functional genome editing.
- Co-authored a preprint detailing screening of viral pseudotypes and successful *in vivo* tumor control.
  M.J. Spindler, A. Amezquita, E.F.X. Byrne, *et al.* Discovery and Validation of Alternatives to VSV-G for Pseudotyping of Lentiviral Vectors for In Vivo Delivery of Anti-Tumor Transgenes. *bioRxiv* 2025.03.03.641199; doi: https://doi.org/10.1101/2025.03.03.641199

Postdoctoral Research Scholar

Stanford University – Department of Bioengineering — *Stanford, CA*

Aug. 2018 – July 2023

Developed novel optogenetic tools in the Deisseroth Lab, with a focus on translating protein engineering advances into functional platforms for in vivo neuroscience applications.

Key Responsibilities:

- Led protein engineering efforts to design and optimize light-gated ion channels for precision neuromodulation in living systems.
- Applied structure-guided design, computational modeling, and electrophysiological assays (patch-clamp) to assess and refine tool performance.
- Collaborated on cryo-EM structure determination to inform rational engineering strategies and on *in vivo* validation pipelines to assess functional performance of candidate tools in animal models.

Selected Achievements:

- Engineered a long-acting neuronal silencer capable of sustained activity suppression from a single 10 ms light pulse—enabling new experimental paradigms for systems neuroscience.

- Spearheaded the optimization of kinetic and biophysical properties for potassium-selective channelrhodopsins, enhancing their suitability for *in vivo* use.
- Enabled functional deployment of novel opsins in animal models through iterative design-build-test cycles, bridging basic research and translational application.

PROJECTS

CAFA5 - Protein Function Prediction (Kaggle competition)
Erdős Institute, Machine Learning Summer Bootcamp (Online)
May – June 2023

- Collaborated on a fully remote team of five people, contributing code to GitHub and Kaggle.
- Used masked language model embeddings and high-dimensional multilabel classification to predict functional labels for thousands of proteins using Gene Ontology data.
- Project was ranked a "Top 5 Project" out of 40 by industry experts across computer science disciplines.

EDUCATION

DPhil., Clinical Medicine
University of Oxford, Oxford, United Kingdom
2013 – 2018

BSc.(Hons)/BA., Medical Biology
University of Melbourne, Melbourne, Australia
2007 – 2012

TECHNICAL SKILLS & EXPERTISE

Protein & Cell Engineering
Protein engineering · Lentiviral vector engineering · Mammalian cell engineering · CRISPR-Cas systems · CAR-T cell therapy · High-throughput scFv screening · GPCRs & membrane proteins · Protein & lentivirus production

Molecular & Structural Biology
Plasmid design & cloning · Protein expression & purification (preparative-scale for crystallography & cryo-EM) · SDS-PAGE & Western blotting · Chromatography (affinity, ion exchange, SEC) · HPLC (AKTA, Shimadzu) · Tangential flow filtration (TFF) · Ultracentrifugation · Structural analysis (cryo-EM, X-ray crystallography, TEM, SAXS) · Protein-protein interaction assays (BLI, SPR)

Cell & *In Vivo* Techniques
Mammalian tissue culture (cell lines & primary cells) · Lentiviral packaging (adherent & suspension), concentration, and transduction · Flow cytometry & cell sorting (Miltenyi, ThermoFisher, Sony) · Cell engineering (via lentivirus or CRISPR) · Mouse studies · *In vivo* gene therapy · Patch-clamp electrophysiology (cell lines & primary neurons)

Computational Biology & Data Analysis
Python (Jupyter, NumPy, Pandas, Matplotlib, Git) · Machine learning (PyTorch, Scikit-learn) · Analysis of biological datasets (protein sequences, promoter elements, expression data, GO terms) · Protein ML tools (RosettaFold, AlphaFold, Enformer, ESMFold) · Cloud computing (Google Colab, Google Cloud)

Leadership, Communication & Project Management
Project planning & team coordination (Benchling, Notion, Slack) · Experimental design & troubleshooting · Scientific mentorship & lab training · SOP development & protocol optimization · Literature surveillance (preprints, publications, seminars) · Grant writing & review (SBIR, ARPA-H, NIH, NHMRC) · Scientific communication (PowerPoint, Illustrator, BioRender, PyMOL, Excel, GraphPad Prism, Inkscape) · Database design

Scientific Domains & Interests
In vivo gene therapy · Cancer biology · Structural biology · Immunology · Neuroscience