GIOVANNI A. CAROSSO, PhD

bioengineer / founding scientist

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SUMMARY

Biomolecular engineer and biotech operator building programmable biological modalities and drug discovery platforms. As Founding Head of Research at General Control, set R&D strategy and advanced a multi-program, platform-engineered pipeline of epigenetic editors from concept to *in vivo* validation inside 18 months, supporting seed financing and a Novo Nordisk partnership. Previously a founding scientist at Epicrispr, co-developing the GEMS modality behind clinical-stage EPI-321 and durable-activation EPI-331. Skilled in architecting biological design-test-build loops for protein and mRNA therapeutics, quantitative experimentation, and agentic LLM frameworks for decision-grade reasoning. Expertise in technical tooling, scalable platform design, epigenetics, protein LMs and engineering, translational biology, and preclinical strategy/diligence (cardiometabolic, muscular).

TECHNICAL & OPERATING SKILLS

Discovery platforms: high-throughput synthetic biology; perturbation screening (CRISPRa/i); functional genomics; proteomics; scalable vector design; mRNA-LNP; NGS; Python (NumPy, pandas, Biopython); R (tidyverse, ggplot2).

ML-guided protein engineering: sequence–function modeling (ESM-2 embeddings, XGBoost); evolutionary optimization (EMCS); generative design (BoltzGen); structure evaluation (Boltz-2).

LLM tooling: multi-model agentic architectures (Conclave); evaluations & benchmarking; clinical landscaping (SAROS).

SELECTED OPEN-SOURCE CONTRIBUTIONS

Conclave—Multi-model LLM orchestrator (Claude, Codex, Gemini, Grok) for agentic routing, review, provenance.

SAROS—Clinical readout ledger (FY26–28) with sponsor info from public filings; compares programs, not molecules.

EXPERIENCE

Capable Oct 2026 – Present

MTS, Therapeutic Development

General Control Jul 2024 – Jul 2026

Founding Head of Research

- Owned scientific prioritization across a multi-program epi-editor engineering pipeline: translated ambiguous biology into *in vitro* engineering and *in vivo* milestones, coordinated internal scientists, computational biologists, and CROs to connect platform proof-points to financing and pharma-partner objectives.
- Delivered concept-to-validation of preclinical platform for 6-of-7 programs in 18 months by designing and deploying rapid engineering and translational campaigns of novel epi-editors against industry benchmarks; established single-dose, multiplexed targeting as a modality differentiator, delivering 90% knockdown of three targets in parallel.
- Accelerated preclinical hit-translation cycles from 16 to 3 weeks by devising an IVT-compatible expression vector for high-throughput screening elements to proceed directly into the mRNA synthesis pipeline for animal dosing.
- Optimized editor potency and novelty profiles with a model-guided search strategy over peptide sequence space that generates diverse candidates, ranks by predicted function and structural confidence, and concentrates experimental resources on high-probability sequences. 155 novel editors outperformed benchmarks across diverse genetic targets.
- Shaped scientific IP and FTO strategy as lead inventor with counsel through PCT filings and evaluation of competitive patent landscapes.

Epicrispr Biotechnologies Jan 2021 – Jul 2024

Senior Scientist, Technology Development (previously Scientist II, Scientist)

- Co-developed GEMS modality platform by introducing a compact Cas chassis and engineering proprietary epi-editor domains behind EPI-321, now in first-in-human FSHD trial (NCT06907875), and EPI-331 for durable activation.
- Led discovery and engineering of hypercompact activator that sustained five-week *LDLR* activation via single-dose mRNA-LNP *in vivo*; first author on external preprint.
- Increased pooled-screen editor hit rates from 1% to 8%; generated sequence-function data and training set for collaborative ML-guided protein engineering. *NeurIPS* (2023).

University of California, San Francisco (UCSF) Jan 2020 – Dec 2020

Postdoctoral Scholar, Neurological Surgery; Lab of Daniel Lim, MD, PhD

- Integrated multi-omics data into a machine-learning classifier over genome-scale dual CRISPRi screens spanning 18,905 coding and 10,678 lncRNA loci, with the Weissman and Lim Labs. *Cell Genomics* (2022).

EDUCATION

Johns Hopkins University School of Medicine 2019

***PhD**, Human Genetics (Lab of Hans T. Bjornsson, MD, PhD)*

- Discovered molecular drivers in pediatric disorders of chromatin machinery, novel roles for KMT2D in oxygen sensing during neurodevelopment. Dissertation, *JCI Insight* (2019).
- Secured NASA award for astronaut epigenetics in the ISS Twins Study Consortium (Feinberg Lab); co-developed first protocols for in-flight epigenomic sampling aboard ISS and experiments for astronauts Scott and Mark Kelly.

University of California, Santa Barbara 2010

***BS**, Biopsychology*

- Discovery of *POLR3A* mutations causing pediatric leukodystrophy. *AJHG* (2011).
- Elucidated mechanisms of medial prefrontal cortex dysfunction in cocaine abuse. *Addiction Biology* (2012).

ADVISORY, PUBLIC ENGAGEMENT

STEM diplomacy: Led a U.S. Department of Defense-funded neuroscience workshop with *Clubes de Ciencia Bolivia*; taught in Spanish and published on science diplomacy.

Mindfire Global: Neurobiology consultancy; advised on neurodevelopment and human-centric AI collaboration.

Languages: Italian, French, Spanish, English.

PATENTS

PCT/US26/24051	— Systems and Methods for Upregulation of Exerkines. Filed 2026.
PCT/US26/24038	— Compositions and Methods for Epigenome Editing. Filed 2026.
WO 2024/238661 A2	— Systems and methods for regulating target genes. App. PCT/US2024/029475; pub. 2024.
US 2026/0085300 A1	— Systems and compositions for fusion polypeptides and methods of use thereof. App. 19/123,019; pub. 2026.
US 2025/0388634 A1	— Engineered gene effectors, compositions, and methods of use thereof. App. 18/842,718; pub. 2025.
WO 2023/172995 A1	— Systems and methods for genetic modulation to treat ocular diseases. App. PCT/US2023/064004; pub. 2023.
US 2024/0254659 A1	— Systems and methods for regulating target genes. App. 18/417,827; pub. 2024.
US 2024/0216482 A1	— Systems and methods for regulating aberrant gene expressions. App. 18/542,396; pub. 2024.

PUBLICATIONS

1. **Carosso GA,** Yeo RW, Gainous TB, Jawaid MZ, Yang X, Kim JYS, … Qi LS, Collin de l'Hortet A, Daley TP, Hart DO. (2024). Discovery of hypercompact epigenetic modulators for persistent CRISPR-mediated gene activation. *bioRxiv*.
2. Wu D, Poddar A, Ninou E, Hwang E, Cole MA, Liu SJ, Horlbeck MA, Chen J, Replogle JM, **Carosso GA,** … Shen Y, Weissman JS, Lim DA. (2022). Dual genome-wide coding and lncRNA screens in neural induction of induced pluripotent stem cells. *Cell Genomics*, 2(11), 100177.
3. Zheng SC, Stein-O'Brien G, Augustin JJ, Slosberg J, **Carosso GA,** Winer B, Shin G, Bjornsson HT, Goff LA, Hansen KD. (2022). Universal prediction of cell-cycle position using transfer learning. *Genome Biology*, 23(1), 41.
4. Breevoort A, **Carosso GA,** Mostajo-Radji MA. (2020). High-altitude populations need special considerations for COVID-19. *Nature Communications*, 11, 3280.
5. **Carosso GA,** Boukas L, Augustin JJ, Nguyen HN, Winer BL, Cannon GH, Robertson JD, Zhang L, Hansen KD, Goff LA, Bjornsson HT. (2019). Precocious neuronal differentiation and disrupted oxygen responses in Kabuki syndrome. *JCI Insight*, 4(20), e129375.
6. **Carosso GA,** Ferreira LMR, Mostajo-Radji MA. (2019). Scientists as non-state actors of public diplomacy. *Nature Human Behaviour*, 3(11), 1129–1130.
7. **Carosso GA,** Ferreira LMR, Mostajo-Radji MA. (2019). Developing brains, developing nations: can scientists be effective non-state diplomats? *Frontiers in Education*, 4, 95.
8. Ferreira LMR, **Carosso GA,** … Gandarilla O, Mostajo-Radji MA. (2019). Effective participatory science education in a diverse Latin American population. *Palgrave Communications*, 5(1), 11.
9. Benjamin JS, Pilarowski GO, **Carosso GA,** Zhang L, Huso DL, Goff LA, Vernon HJ, Hansen KD, Bjornsson HT. (2016). A ketogenic diet rescues hippocampal memory defects in a mouse model of Kabuki syndrome. *PNAS*, 114(1), 125–130.
10. Vanderver A, Tonduti D, Bernard G, Lai J, Rossi C, **Carosso G,** Quezado M, Wong K, Schiffmann R. (2013). More than hypomyelination in Pol-III disorder. *Journal of Neuropathology & Experimental Neurology*, 72(1), 67–75.
11. Ben-Shahar OM, Szumlinski KK, … **Carosso GA,** Woodward N. (2012). Extended access to cocaine self-administration results in reduced glutamate function within the medial prefrontal cortex. *Addiction Biology*, 17(4), 746–757.
12. Bernard G, Chouery E, Putorti ML, Tétreault M, Takanohashi A, **Carosso G,** … Schiffmann R, Vanderver A, Brais B. (2011). Mutations of POLR3A encoding a catalytic subunit of RNA polymerase Pol III cause a recessive hypomyelinating leukodystrophy. *American Journal of Human Genetics*, 89(3), 415–423.