Keith T. Gagnon, Ph.D.

Associate Professor
Biochemistry
Wake Forest University School of Medicine
Winston-Salem, NC 27101
(336) 713-1367 / ktgagnon@wakehealth.edu
www.labgagnon.com

EDUCATION

2000 - 2003	B.S., Biochemistry, North Carolina State University
2003 - 2007	Ph.D., Molecular & Structural Biochemistry, North Carolina State University Thesis Advisor: Dr. E. Stuart Maxwell "Assembly, Structure, and Function of Archaeal Box C/D sRNPs"

POSTDOCTORAL TRAINING

2008 - 2014	UT Southwestern Medical Center Departments of Pharmacology and Biochemistry Postdoctoral Advisor: Dr. David R. Corey

POSITIONS

2014 - 2020	Assistant Professor, Southern Illinois University Biochemistry & Molecular Biology (51%), School of Medicine Chemistry and Biochemistry (49%), College of Science
2019 - present	Scientific Co-founder, Iris Medicine
2020 - 2023	Associate Professor, Southern Illinois University Biochemistry & Molecular Biology (51%), School of Medicine Chemistry and Biochemistry (49%), College of Ag., Life, & Phys. Sciences
2023 - present	Associate Professor, Wake Forest University School of Medicine, Biochemistry

HONORS and AWARDS

Sigma Xi Kaplan Research Award (2021)
Oligonucleotide Therapeutics Society (OTS) Outstanding Young Investigator Award (2017)
Outstanding Young Alumni Award, College of Agriculture & Life Sciences, NC State Univ. (2016)
UT Southwestern Postdoctoral Association Travel Award (2013)
UT Southwestern Haberecht Wildhare-Idea Research Award (2013)
NIH (F32) Ruth L. Kirschstein Postdoctoral Fellowship, NICHD (2009-2012)
A.R. Main-Becton Dickinson Award for Outstanding Graduate Research (2007)
A. Tab Williams Endowment Scholarship, Undergraduate (2002-2003)
Col. Henry E. Kendall Scholarship, Undergraduate (2000-2003)

TEACHING

Southern Illinois University – CHEM 350, Biochemistry (2015-present)
Southern Illinois University – CHEM 595B, Biochemistry Seminar (2015-present)
SIU School of Medicine – Neuromuscular and Behavioral (NMB) Unit Tutor (2015-present)
SIU School of Medicine – CRR and ERG Medical School Unit Lectures (2017-present)

SIU School of Medicine – MBMB 597, Graduate Program Seminar, Coordinator (2015 - 2019)

PROFESSIONAL ACTIVITIES

Board of Directors: Oligonucleotide Therapeutics Society (2019-2021)
Scientific Advisory Board: Oligonucleotide Therapeutics Society (2014-2016, 2021-present), Iris Medicine (2019-present)
Society Membership: RNA Society (2006-present), Oligonucleotide Therapeutics Society (2010-present)
DoD Grant Reviewer: Congressionally Directed Medical Research Program (CDMRP) (2018-2021)
NIH Grant Reviewer: Therapeutic Approaches to Genetic Diseases (TAG) study section (2017, 2023); Neurological Sciences and Disorders B (NSD-B) study section (2020, 2021); Genomes, Computational Biology and Technologies (GCAT) study section (2021); Special Emphasis Panel (SEP), ZRG1 MGG-G (IND-enabling Studies of Somatic Genome Editing Therapeutic Leads, U19) (2022)
NSF Grant Reviewer: 2015, 2016
Journal Reviewer: *Nucleic Acids Research, Journal of Biological Methods, Gene, Molecular Therapy, Molecular Therapy – Nucleic Acids, ACS Synthetic Biology, ACS Chemical Biology, Human Molecular Genetics, Molecular Biotechnology, Acta Neuropathologica Communications, Chemical Science, Proceedings of the National Academy of Sciences (USA), The FEBS Journal, RNA Biology, RNA, Advanced Drug Delivery Reviews, Bioorganic and Medicinal Chemistry Letters, Journal of Neurochemistry, Nucleic Acid Therapeutics, Cell Reports, Biochemistry, Nature Cell Biology*
Journal Editorial Board: *Nucleic Acid Therapeutics* (2019-present), *Journal of Biological Methods* (2019-present)
International Conference Organization: Co-Organizer of the 18th Annual Meeting of the Oligonucleotide Therapeutics Society, Phoenix, AZ, October 2-5, 2022.

PUBLICATIONS

In Review / In Revision / Preprints

50. Parasrampuria, M., White, A.A., Chilamkurthy, R., El-Azzouzi, F., Pater, A.A., Ovington, K.N., Barton, M., Mukhopadhyay, Forrest, G., S., Jensik, P.J., and Gagnon, K.T. (2023) Allele-Selective Inhibition of Mutant Huntingtin with Genetically Encoded Repeat-Targeted Small RNAs. *In review*.
49. Adil, O., Eddington, S.B., Gagnon, K.T., Shamsi, M.H. (2023) Microprobes for Label-Free Detection of Neurodegenerative Genetic Repeats. *In review*.
48. Pater, A.A., Bosmeny, M.S., Barkau, C.L., Ovington, K.N., Chilamkurthy, R., Parasrampuria, M., Eddington, S.B., Yinusa, A.O., White, A.A., Metz, P.E., Sylvain, R.J., Hebert, M.M., Benzinger, S.W., Sinha, K., and Gagnon, K.T. (2021) Emergence and Evolution of a Prevalent New SARS-CoV-2 Variant in the United States. *BioRxiv*. Preprint, https://doi.org/10.1101/2021.01.11.426287.

Published

47. Bosmeny, M.S., White, A.A., Pater, A.A., Crew, J.R., Geltz, J., and Gagnon, K.T. (2023) Global Mpox Lineage Discovery and Rapid Outbreak Tracking with Nanopore Sequencing. *Virology J.*, 20:90. doi: 10.1186/s12985-023-02059-2.
46. Sudhakar, S., Barkau, C.L., Chilamkurthy, R., Barber, H.M., Pater, A.A., Moran, S.D., Damha, M.J., Pradeepkumar, P.I., and Gagnon K.T. (2023) Binding to the Conserved and Stably Folded Guide RNA Pseudoknot Induces Cas12a Conformational Changes During Ribonucleoprotein Assembly. *J. Biol. Chem.*, 104700. doi: 10.1016/j.jbc.2023.104700.
45. Chilamkurthy, R., White, A.A., Pater, A.A., Jensik, P.J., and Gagnon, K.T. (2022) Efficient Cloning and Sequence Validation of Repetitive and High GC-Content shRNAs. *Hum. Gene Therapy*, 33:829-839.
44. Pater, A.A, Bosmeny, M.S., White, A.A., Sylvain, R.J., Eddington, S.B., Parasrampuria, M., Ovington, K.N., Metz, P.E., Yinusa, A.O., Barkau, C.L., Chilamkurthy, R., Benzinger, S.W., Hebert, M.M., and Gagnon, K.T. (2021) High Throughput Nanopore Sequencing of SARS-CoV-2 Viral Genomes from Patient Samples. *J. Biol. Meth.*, 8:e155.

43. Ageely, E. A., Chilamkurthy, R., Jana, S., Abdullahu, L., O'Reilly, D., Jensik, P., Damha, M.J., and Gagnon, K.T. (2021) Gene Editing with CRISPR-Cas12a Guides Possessing Ribose-Modified Pseudoknot Handles. *Nature Commun.*, 12:6591.
42. Barkau, C.L., O'Reilly, D., Eddington, S., Damha, M.J., and Gagnon, KT. (2021) Small Nucleic Acids and the Path to the Clinic for Anti-CRISPR. *Biochem. Pharmacol.,* 189:114492.
41. Kartje, Z.J., Janis, H.I., Mukhopadhayay, S., and Gagnon, K.T. (2021) Revisiting T7 RNA Polymerase Transcription *In Vitro* with the Broccoli RNA Aptamer as a Simplified Real-Time Fluorescent Reporter. *J. Biol. Chem.,* 296:100175.
40. Asefifeyzabadi, N., Alkhaldi, R., Qamar, A.Z., Pater, A.A., Patwardhan, M., Gagnon, K.T., Talapatra, S., and Shamsi, M.H. (2020) Label-Free Electrochemical Detection of CGG Repeats on Inkjet Printable 2D Layers of MoS_2. *ACS Appl. Mater. Interfaces*, 12:52156-52165.
39. Price, D.A., Kartje, Z.J., Hughes, J.A., Hill, T.D., Loth, T.M., Watts, J.K., Gagnon, K.T., and Moran, S.D. (2020) Infrared Spectroscopy Reveals the Preferred Motif Size and Local Disorder in Parallel Stranded DNA G-quadruplexes. *Chembiochem*, 21:2792-2804.
38. Habibian, M., Harikrishna, S., Fakhoury, J., Barton, M., Ageely, E.A., Cencic, R., Takahashi, M., Rossi, J., Pelletier, J., Gagnon, K.T., Pradeepkumar, P.I., and Damha, M.J. (2020) Effect of 2'-5'/3'-5' Phosphodiester Linkage Heterogeneity on RNA Interference. *Nucleic Acids Res.,* 48:4643-4657.
37. Rohilla, K.J., Ovington, K.N., Pater, A.A., Barton, M., Henke, A.J., and Gagnon, K.T. (2020) Systematic Microsatellite Repeat Expansion Cloning and Validation. *Hum. Genet.,* 139:1233-1246.
36. Taki, M., Rohilla, K.J., Barton, M., Funneman, M., Benzabeh, N., Naphade, S., Ellerby, L.M., Gagnon, K.T., and Shamsi, M.H. (2019) Novel Probes for Label-Free Detection of Neurodegenerative GGGGCC Repeats Associated with Amyotrophic Lateral Sclerosis. *Anal. Bioanal. Chem.*, 411:6995-7003.
35. Barkau, C.L., O'Reilly, D., Rohilla, K.J., Damha, M.J., and Gagnon, K.T. (2019) Rationally Designed Anti-CRISPR Nucleic Acid Inhibitors of CRISPR-Cas9. *Nucl. Acid Therap.*, 29:136-147.
    - Commentary in *The New England Journal of Medicine* [Dowdy, S.F. (2019) Controlling CRISPR-Cas9 Gene Editing, *N. Engl. J. Med.*, 381:289-290].
    - Highlighted in a news article in *Nature*, https://www.nature.com/articles/d41586-020-00053-0
    - Cover Art of *Nucleic Acid Therapeutics*, volume 29, issue 3.
34. Gagnon, K.T., and Corey, D.R. (2019) Guidelines for Experiments Using Antisense Oligonucleotides and Double-Stranded RNAs. *Nucl. Acid Therap*., 29:116-122.
33. O'Reilly, D., Kartje, Z.J., Ageely, E.A., Malak-Adamian, E., Habibian, M., Schofield, A., DeRossett, L.B., Weigle, A.T., Damha, M.J., and Gagnon, K.T. (2019) Extensive CRISPR RNA Modification Reveals Chemical Compatibility and Structure-Activity Relationships for Cas9 Biochemical Activity. *Nucl. Acids Res.,* 47:546-558.
32. Kartje, Z.J., Barkau, C.L., Rohilla, K.J., Ageely, E.A., and Gagnon, K.T. (2018) Chimeric Guides Probe and Enhance Cas9 Biochemical Activity. *Biochemistry*, 57:3027-3031.
31. Rohilla, K.J., and Gagnon, K.T. (2017) RNA Biology of Disease-Associated Microsatellite Repeat Expansions. *Acta Neuropath. Comm.,* 5:63.
30. Ageely, E.A., Kartje, Z.J., Rohilla, K.J., Barkau, C.L., and Gagnon, K.T. (2016) Quadruplex-Flanking Stem Structures Modulate the Stability and Metal Ion Preferences of RNA Mimics of GFP. *ACS Chem. Biol.*, 11:2398-2406.
29. Dodd, D.W., Tomchick, D.R., Corey, D.R., and Gagnon, K.T. (2016) Pathogenic C9ORF72 Antisense Repeat RNA Forms a Double Helix with Tandem C:C Mismatches. *Biochemistry,* 55:1283-1286.
28. Kalantari, R., Hicks, J.A., Li, L., Gagnon, K.T., Sridhara, V., Lemoff, A., Mirzaei, H., and Corey, D.R. (2016) Stable Association of RNAi Machinery is Conserved Between the Cytoplasm and Nucleus of Human Cells. *RNA*, 22:1-14.
27. Gagnon, K.T. (2016) "Loading of Argonaute Protein with Small Duplex RNA in Cellular Extracts" in *Meth. Mol. Biol.*, Ren-Jang Lin editor, Humana Press, 1421:53-67.
26. Hu, J., Liu, J., Gagnon, K.T., and Corey, D.R. (2015) Engineering Duplex RNAs for Challenging Targets: Recognition of GGGGCC/CCCCGG Repeats at the ALS/FTD *C9ORF72* Locus. *Chem. Biol.*, 22:1505-1511.

25. Gagnon, K.T., and Corey, D.R. (2015) Stepping Toward Therapeutic CRISPR. *Proc. Natl. Acad. Sci., USA*, 112:15535-15537.
24. Gagnon, K.T., and Maxwell, E.S. (2015) Assessing Intermolecular RNA:RNA Interactions Within a Ribonucleoprotein Complex Using Heavy Metal Cleavage Mapping. *Meth. Mol. Biol.*, 1240:125-134.
23. Gagnon, K.T., Li, L., Janowski, B.A., and Corey, D.R. (2014) Analysis of Nuclear RNA Interference in Human Cells by Subcellular Fractionation and Argonaute Loading. *Nat. Protoc.*, 9:2045-2060.
22. Gagnon, K.T., Li, L., Chu, Y., Janowski, B.A., and Corey, D.R. (2014) RNAi Factors Are Present and Active in Human Cell Nuclei. *Cell Reports*, 6:211-221.
21. Gagnon, K.T., and Watts, J.K. (2014) 10th Annual Meeting of the Oligonucleotide Therapeutics Society. *Nucl. Acid Therap.*, 24:428-434.
20. Matsui, M., Zhang, H., Chu, J., Gagnon, K.T., Shaikh, S., Kuchimanchi, S., Manoharan, M., Corey, D.R., and Janowski, B.A. (2013) Promoter RNA Links Transcriptional Regulation of Inflammatory Pathway Genes. *Nucl. Acids Res.*, 41:10086-10109.
19. Dodd, D.W., Gagnon, K.T., and Corey, D.R. (2013) Digital Quantitation of Potential Therapeutic Target RNAs. *Nucl. Acid Therap.*, 23:188-194.
18. Gagnon, K.T., and Corey, D.R. (2012) Argonaute and the Nuclear RNAs: New Pathways for Controlling Gene Expression. *Nucl. Acid Therap.*, 1:3-16.
17. Gagnon, K.T., Biswas, S., Zhang, X., Brown, B.A. II, Wollenzien, P., Mattos, C., and Maxwell, E.S. (2012) Structurally Conserved Nop56/58 N-Terminal Domain Facilitates Efficient Box C/D Ribonucleoprotein-Guided Methyltransferase Activity. *J. Biol. Chem.*, 287:19418-19428.
16. Gagnon, K.T., Watts, J.K., Pendergraff, H.M., Potier, P., Thai, D., Montaillier, C., and Corey, D.R. (2011) Antisense and Antigene Inhibition of Gene Expression by Cell-Permeable Oligonucleotide-Oligospermine Conjugates. *J. Am. Chem. Soc.*, 133:8404-8407.
15. Hu, J., Gagnon, K.T., Lui, J., Watts, J.K., Syeda-Newaz, J., Bennett, C.F., Swayze, E.E., Randolph, J., Chattopadhyaya, J. and Corey, D.R. (2011) Allele-Selective Inhibition of Ataxin-3 (ATX3) Expression by Antisense Oligomers and Duplex RNAs. *Biol. Chem.*, 392:315-325.
14. Biswas, S., Buhrman, G., Gagnon, K.T., Mattos, C., Brown II, B.A., and Maxwell, E.S. (2011) Comparative Analysis of the 15.5kD Box C/D snoRNP Core Protein in the Primitive Eukaryote *Giardia lamblia* Reveals Unique Structural and Functional Features. *Biochemistry*, 50:2907-2918.
13. Gagnon, K.T., and Maxwell, E.S. (2011) "Electrophoretic Mobility Shift Assay for Characterizing RNA-Protein Interaction." in *Meth. Mol. Biol.*, Henrik Nielsen editor, Humana Press, 703:275-291.
12. Gagnon, K.T., Pendergraff, H.M., Deleavey, G.F., Swayze, E.E., Potier, P., Randolph, J., Roesch, E.B., Chattopadhyaya, J., Damha, M.J., Bennett, C.F., Montaillier, C., Lemaitre, M., and Corey, D.R. (2010) Allele-Selective Inhibition of Mutant Huntingtin Expression with Antisense Oligonucleotides Targeting the Expanded CAG Repeat. *Biochemistry*, 49:10166-10178.
11. Yue, X., Schwartz, J. C., Chu, Y., Younger, S. T., Gagnon, K.T., Elbashir, S., Janowski, B. A., and Corey, D. R. (2010) Transcriptional Regulation by Small RNAs at Sequences Downstream from 3' Gene Termini. *Nat. Chem. Biol.*, 6:621-629.
10. Gagnon, K.T., Zhang, X., Qu, G., Biswas, S., Suryadi, J., Brown II, B.A., and Maxwell, E.S. (2010) Signature Amino Acids Enable the Archaeal L7Ae Box C/D RNP Core Protein to Recognize and Bind the K-loop RNA Motif. *RNA*, 16:79-90.
9. Gagnon, K.T. (2010) HD Therapeutics – CHDI 5th Annual Conference. *IDrugs*, 13:219-223.
8. Franzen, S., and Gagnon, K.T. (2010) Advertising Science for High Impact Publication. *The Open Ethics J.*, 4:1-9.
7. Hu, J., Matsui, M., Gagnon, K.T., Schwartz, J.C., Gabillet, S., Arar, K., Wu, J., Bezprozvanny, I., and Corey, D.R. (2009) Allele-Specific Silencing of Mutant Huntingtin and Ataxin-3 Genes by Targeting Expanded CAG Repeats in mRNAs. *Nat. Biotechnol.*, 27:478-484.
6. Bleichert, F., Gagnon, K.T., Brown II, B.A., Maxwell, E.S., Leschziner, A.E., Unger, V.M., and Baserga, S.J. (2009) A Dimeric Structure for Archaeal Box C/D Small Ribonucleoproteins. *Science*, 325:1384-1387.
5. Gagnon, K.T., Ju, S.Y., Goshe, M.B., Maxwell, E.S., and Franzen, S. (2009) A Role for Hydrophobicity in a Diels-Alder Reaction Catalyzed by Pyridyl-Modified RNA. *Nucl. Acids Res.*, 37:3074-3082.

4. Gagnon, K.T., Qu, G., and Maxwell, E.S. (2009) “Multicomponent 2’-O Ribose Methylation Machines: Evolving Box C/D RNP Structure and Function.” in *DNA and RNA Modification Enzymes: Structure, Function, Mechanism and Evolution*, H. Grosjean editor, LANDES BioScience, p.436-449.
3. Gagnon, K.T., Zhang, X., and Maxwell, E.S. (2008) “The Box C/D RNPs: Evolutionarily Ancient Nucleotide Modification Complexes.” in *RNA and DNA Editing: Molecular Mechanisms and their Integration into Biological Systems*, H. Smith editor, John Wiley and Sons, Inc., p.313-339.
2. Gagnon, K.T., Zhang, X., and Maxwell E.S. (2007) *In Vitro* Reconstitution and Affinity Purification of Catalytically Active Archaeal Box C/D sRNP Complexes. *Meth. Enzym.*, 425:263-282.
1. Gagnon, K.T., Zhang, X., Agris, P.F., and Maxwell, E.S. (2006) Assembly of the Archaeal Box C/D sRNP Can Occur Via Alternative Pathways and Requires Temperature-Facilitated sRNA Remodeling. *J. Mol. Biol.*, 362:1025-1042.

PATENTS

5. Gagnon, K.T., Eddington, S., Barkau, C. “Cis-Acting Switchable Small Nucleic Acid-Based Regulators of CRISPR-Cas9.” Provisional filed on 09/30/2022.
4. Gagnon, K.T., Jensik, P.J., Blewett, M. “Compositions and Methods for Treating CAG Repeat Diseases.” Provisional filed on 10/04/2021.
3. Gagnon, K.T., Damha, M.J. "Anti-CRISPR Nucleic Acid Inhibitors of CRISPR-Cas Effector Enzymes.” International PCT Filed on 09/30/2019.
2. Gagnon, K.T., Damha, M.J. "Tuning CRISPR/Cas9 Activity with Chemically Modified Nucleotide Substitutions." International PCT Filed on 09/23/2017.
1. Corey, D. R., Gagnon, K.T., Swayze, E., Bennett, F. “Selective inhibition of polyglutamine protein expression by oligonucleotides.” Patent application 61/302450. Filed 02/08/10. Canadian Patent Allowed, 11-02-2016, 2,732,343. Licensed to Ionis Pharmaceuticals, 07/2011.

ORAL PRESENTATIONS and INVITED SEMINARS

48. TIDES USA, San Diego, California, May 10, 2023. Invited lecture: “Toward Breaking the 2'-Hydroxyl Barrier for Complete CRISPR RNA Ribose Modification.”
47. Oligo 2023, Oxford, United Kingdom, March 27, 2023. Invited lecture: “Understanding the 2'-Hydroxyl Barrier to CRISPR RNA Ribose Modification.”
46. University of Illinois at Urbana-Champaign, February 9, 2023. Invited seminar: “Making RNA-Guided Genomic Medicines Better with Biochemistry.”
45. Purdue University, November 8, 2022. Invited seminar: “Guiding CRISPR with Chemical Biology.”
44. Wake Forest University Medical School, November 3, 2022. Invited lecture: “Guiding CRISPR with Chemical Biology.”
43. Rush University Medical Center, October 19, 2022. Invited lecture: “CRISPR Chemical Biology for Therapeutics.”
42. Midwest Symposium on Oligonucleotide Therapeutics, August 7-8, 2022. Invited keynote lecture: “Structural Insight into Mechanistic Effects of Cas9 Guide RNA Chemical Modification.”
41. University of North Carolina, Chapel Hill, North Carolina, March 7, 2022. Invited lecture: “CRISPR & ALS: RNA as a Tool and Target for Therapeutic Discovery and Development.”
40. Saint Louis University, St. Louis, Missouri, February 15, 2022. Invited lecture, Virtual: “CRISPR-Cas Biochemistry & Therapeutic Translation with Chemical Biology.”
39. 17th Annual Meeting of the Oligonucleotide Therapeutics Society, Virtual, September 26-29, 2021. NextGen Session Keynote Lecture, Invited lecture, Virtual: “Chemical Biology, CRISPR, RNA Therapeutics, and More - Just Love What You Do!”
38. Illinois SARS-CoV-2 Sequencing Work Group, Virtual, August 17, 2021. Invited lecture, Virtual: “SARS-CoV-2 Sequencing and Variant Surveillance in Illinois.”
37. Pfizer, Virtual, June 18, 2021. Invited lecture, Virtual: “Cellular and In Vitro Models for RNA-Centric Disease Mechanism and Therapeutic Discovery in C9FTD/ALS.”

36. Sigma Xi Kaplan Research Award, Carbondale, Illinois, April 29, 2021. Invited Keynote lecture, Virtual: “RNA at the Center of ALS, CRISPR, and COVID-19.”
35. Saluki Teen Science Café, Virtual, May 13, 2021. Invited lecture, Virtual: “Emergence of New SARS-COV-2 Variants and What They Mean for the COVID-19 Pandemic
34. Cold Spring Harbor Laboratory (CSHL) Meeting on Nucleic Acid Therapies, Virtual, March 24-26, 2021. Selected abstract: “Gene Editing with Ribose-Modified CRISPR-Cas12a 5' Pseudoknots.”
33. Registered Student Organization (RSO) Research Connection, Virtual, March 2, 2021. Invited lecture: “SARS-CoV-2 Genome Sequencing in Illinois.”
32. Chicago CAN Cohort Collaborative, Virtual, February 25, 2021. Invited lecture: “SARS-CoV-2 Sequencing of Patient Samples: Genomic Surveillance in Chicagoland and Illinois.”
31. 16th Annual Meeting of the Oligonucleotide Therapeutics Society, Virtual, September 27-30, 2020. Selected abstract: “Gene Editing and Differential Cis-Trans Activity with Chemically Modified Cas12a (Cpf1) Pseudoknots.”
30. Chemistry and Biochemistry Department, Southern Illinois University, Carbondale, Illinois, October 16, 2020. Invited lecture: “CRISPR, Chemical Biology, and the Future of Genetic Medicine.”
29. Emory University, Atlanta, Georgia, March 12, 2020. Invited lecture: “CRISPR and anti-CRISPR with Nucleic Acid Analogues.”
28. RNA Society Salon: Art of RNA Workshop Series, Southern Illinois University, Carbondale, Illinois, March 3, 2020. Invited lecture: “RNA-Protein Interaction and Affinity by EMSA and Dot-Blot.”
27. ACS Kentucky Lakes Section, Murray State University, Paducah, Kentucky, February 27, 2020. Invited lecture: “Controlling CRISPR-Cas Enzymes with Chemically Modified Nucleic Acids.”
26. Intellia Therapeutics, Cambridge, Massachusetts, February 13, 2020. Invited lecture: “CRISPR and anti-CRISPR with Modified Guides and Small Nucleic Acids.”
25. SIU Technology Innovation Expo, Chicago, Illinois, October 17, 2019. Invited lecture: “Controlling CRISPR for Therapeutics.”
24. Southern Illinois University, Microbiology, Biochemistry and Molecular Biology (MBMB) Seminar Series, Carbondale, Illinois, August 30, 2019. Invited lecture: “Noncoding RNA in Disease Biology and Therapeutics.”
23. American Chemical Society (ACS) National Meeting, Orlando, Florida, March 31-April 4, 2019. Invited lecture: “Rationally Designed Anti-CRISPR Nucleic Acid Inhibitors of CRISPR-Cas9.”
22. Cold Spring Harbor Meeting on RNA and Oligonucleotide Therapeutics, Cold Spring Harbor, New York, March 27-30, 2019. Invited lecture: “Rationally Designed Anti-CRISPR Nucleic Acid Inhibitors of CRISPR-Cas9.”
21. Oligonucleotide Therapeutics Society Webinar Series, March 21, 2019. Invited lecture: “An Overview of Chemical Modifications to CRISPR RNA.”
20. Mathematics Department Colloquium, Southern Illinois University, Carbondale, Illinois, February 25, 2019. Invited lecture: "Understanding and Engineering the Human Genome."
19. Alnylam Pharmaceuticals, Cambridge, Massachusetts, January 18, 2019. Invited lecture: “Mechanisms and Mysteries of Argonaute in the Nucleus (with a dash of CRISPR).”
18. Science Café, the Science Center, University Mall, Carbondale, Illinois, November 15, 2018. Invited lecture: "Back to the Future: From Understanding to Engineering the Human Genome."
17. Center for NeuroGenetics, University of Florida, Gainesville, Florida, November 7, 2018.Invited lecture: “RNA-Centric Mechanisms, Models, and Modifications for Therapeutic Discovery.”
16. Neurology Grand Rounds, Southern Illinois University School of Medicine, Springfield, Illinois, September 12, 2018. Invited lecture: "Amyotrophic Lateral Sclerosis Therapeutics on the Horizon.”
15. 13th Annual Meeting of the Oligonucleotide Therapeutics Society, September 24-27, 2017, Bordeaux, France. Invited lecture: "A 'Guided' Tour of an Early Career in RNA and Nucleic Acid Therapeutics."
14. Department of Chemistry, St. Louis University, St. Louis, Missouri, February, 2017. Invited lecture: "Broccoli, CRISPR, and What's Cooking in the RNA Kitchen."
13. 12th Annual Meeting of the Oligonucleotide Therapeutics Society, September 25-28, 2016, Montreal, Quebec, Canada. Selected abstract: "Nucleotide Substitutions Tune CRISPR/Cas9 Cleavage Activity."

12. 47th American Chemical Society (ACS) Central Regional Meeting (CERM), May 18-21, 2016, Covington, KY. Invited lecture: "Tuning Cas9 Activity with CRISPR RNA Modification."
11. CRISPR & Genome Engineering Conference, May 26-27, 2016, Boston, MA. Invited lecture: "Tuning Cas9 Activity with CRISPR RNA Modification."
10. Physiology Department, Southern Illinois University, Carbondale, Illinois, October, 2015. Invited lecture: "Adventures in Noncoding RNA Biochemistry: A Collection of Short Stories."
9. South Dakota State University, Brookings, South Dakota, March 2014. Invited lecture: "Seeing Biochemistry and Disease Through RNA Lenses."
8. Chemistry and Biochemistry Department, Southern Illinois University, Carbondale, Illinois, February 2014. Invited lecture: "Seeing Biochemistry and Disease Through RNA Lenses."
7. Anatomy and Cell Biology Department, Rosalind Franklin Medical University, North Chicago, Illinois, January 2014. Invited lecture: "Viewing Biology and Disease Through RNA Lenses."
6. Chemistry and Biochemistry Department, Baylor University, Waco, Texas, December 2013. Invited lecture: "Viewing Biochemistry and Disease Through RNA Lenses."
5. 16th Annual Meeting of the American Society for Gene and Cell Therapy, May 15-18, 2013, Salt Lake City, Utah. Invited lecture: "Noncoding RNAs Link Transcriptional Regulation of Inflammatory Pathway Genes."
4. Keystone Symposia on RNA Silencing, March 19-24, 2013, Whistler Conference Centre, Whistler, British Columbia, Canada. Selected Abstract: "Argonaute and RNAi in the Mammalian Cell Nucleus."
3. Department of Biological Sciences, University of South Carolina, Columbia, South Carolina, February 2013. Invited lecture: "Noncoding RNA and Repeat Expansion RNA in Human Biology and Disease."
2. 17th Annual Meeting of the RNA Society, May 29-June 3, 2012, University of Michigan, Ann Arbor, Michigan. Selected abstract: "Argonaute and RISC in the Mammalian Cell Nucleus."
1. 6th Annual Meeting of the Oligonucleotide Therapeutics Society, October 20-23, 2010, Dana Point, California. Selected abstract: "Allele-Selective Inhibition of Mutant Huntingtin Expression with Antisense Oligonucleotides Targeting the Expanded CAG Repeat."

RESEARCH SUPPORT

Current Support

NIH R61/R33 (NIAID)

1R61AI169661-01 Gagnon (PI) $3,222,289 04/01/22-03/31/27
"Coupling Epitranscriptomics to Molecular Disease Mechanisms and Nucleic Acid Therapeutics in Persistent Residual HIV Infection."

NIH R01 (NIGMS)

1R01GM135646-01 Gagnon (PI) $1,090,755 01/03/20-12/31/23
"Nucleic Acid-Based Anti-CRISPR Inhibitors of Cas9."

NIH R21 (NIGMS)

1R21GM150088-01 Gagnon (PI) $423,796 04/01/23-03/31/25
"Toward Synthetic Chemically Defined mRNA for Human Therapeutics."

Pending Support

NIH R01 (NIGMS)

1R01GM153875-01 Gagnon (PI) $1,479,472 04/01/24-03/31/28
"Reinventing the Therapeutic Editing Toolbox by Resurrecting Extinct CRISPR-Cas Enzymes"

NIH R21/R33 (NIAID)

Grant number not yet assigned Gagnon (PI) $1,710,939 09/01/23-08/31/28
"Toward a Curative Treatment for HBV with cccDNA-Targeting Peptide Nucleic Acids"

Completed Support (as an independent investigator)

NIH R15 (NINDS)

1R15NS111374-01 (No-Cost Extension) Gagnon (PI) $442,500 05/15/19-05/14/23
"Nuclear Surveillance of Expanded Tandem Repeat RNA in C9FTD/ALS Disease."

Intellia Therapeutics
Sponsored Research Gagnon (PI) $25,702 12/01/22-3/31/23
"Characterizing RNP Assembly and Target DNA Binding Affinity of SpCas9 with Modified sgRNAs"

NIH R21 (NINDS)
1R21NS114499-01 (No-Cost Extension) Gagnon (PI) $381,875 01/13/20-01/12/23
"Inhibiting C9ORF72 Repeat RNA Transcription with a Common Class of Small Molecules."

Illinois Department of Public Health Gagnon (PI) $1,590,000 12/01/20-12/30/22
"SARS CoV-2 Viral Genome Sequencing and Analysis."

NIH R03 (NINDS)
1R03NS112972-01 Gagnon (PI) $161,625 07/01/19-06/30/22
"Discovery of Small Molecules that Block Supt4h1-Supt5h Dimerization for Potential C9FTD/ALS Therapeutics."

RNA Salons (Local Seminar Support)
The RNA Society Gagnon (PI) $2,000 10/01/18-09/30/21
"The Art of RNA Workshop Series."

Venrock/Iris Medicine
Sponsored Research Gagnon (PI) $501,557 11/15/19-03/31/22
"Evaluating Repeat-Targeted shRNAs as a Potential Therapeutic Strategy for Repeat Expansion Disorders."

Chicago CAN (Walder Foundation) Gagnon (Co-PI) $329,456 10/15/20-09/30/21
"Surveying SARS-CoV-2 Genomes and Public Data in Near Real-Time for Pandemic Response."

Locana Bio Gagnon (PI) $54,169 10/15/20-08/31/21
"Generation of Custom GGGGCC Repeat Expansion RNA Expression Vectors."

SIU Discretionary Seed Funding
SIU - School of Medicine/VCR Office Gagnon (PI) $30,000 05/15/20-05/14/21
"Sequencing SARS-CoV-2 Genomes from COVID-19 Patient Samples Across Illinois."

Synthetic Biology Grant Program
Integrated DNA Technologies, Inc. Gagnon (PI) $7,500 12/01/17-12/31/20
"Controlling CRISPR Outcomes - Cas9 Fusion to DNA Damage Repair Modules."

Amyotrophic Lateral Sclerosis Therapeutic Idea Award
DoD (W81XWH-16-1-0176) Gagnon (PI) $648,728 05/15/16-05/14/19
"Chemical Library Screening for Potential Therapeutics Using Novel Cell-Based Models of ALS."

Discovery Science Grant
SIU School of Medicine Gagnon (PI) $15,000 01/01/18-12/31/18
"Discovering Chromatin-Associated Long Noncoding RNAs Acting as Mitotic Bookmarks."

Judith and Jean Pape Adams ALS Grant
Judith & Jean Pape Adams Charity Gagnon (PI) $60,000 01/01/17-12/31/17
"C9ORF72 Transcription and Splicing as Therapeutic Targets for a Genetic Form of ALS."

ALS Association Starter Grant
ALS Association Gagnon (PI) $40,000 08/01/15-07/31/16
"Flexible and Accessible Cell-Based Models of c9FTD/ALS."

Team Development Grant
SIU School of Medicine Gagnon (PI) $15,000 01/01/15-12/31/16
"Demystifying Aggregation in c9FTD/ALS to Enable Therapeutic Development."