

## Jennifer Franzen Kugel, Ph.D.

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### Educational Background and Academic Positions

- Aug. 1992 – May 1996 Bachelor of Arts, Summa Cum Laude  
St. Olaf College, Northfield, MN  
Major: Chemistry  
Concentration: Molecular Biology
- Aug. 1996 – Jan. 2001 Ph.D. Chemistry  
Department of Chemistry and Biochemistry  
University of Colorado, Boulder, CO
- June – Aug. 1998 Summer Intern  
Sangamo BioSciences, Boulder, CO  
Part of the Graduate Interdisciplinary Biotechnology Program
- Feb. 2001 – Dec. 2003 Research Associate  
Department of Chemistry and Biochemistry  
University of Colorado, Boulder, CO
- Jan. 2004 – April 2006 Senior Research Associate  
Department of Chemistry and Biochemistry  
University of Colorado, Boulder, CO
- May 2006 – June 2012 Assistant Research Professor  
Department of Chemistry and Biochemistry  
University of Colorado, Boulder, CO
- July 2012 – present Associate Research Professor  
Department of Biochemistry  
University of Colorado, Boulder, CO
- June 2020 – present Research Professor  
Department of Biochemistry  
University of Colorado, Boulder, CO

### Publications (chronological order, the underlined DOI will link to the article)

1. Nemecek Marshall, M., MacDonald, M., **Franzen, J.J.**, Wojciechowski, C.L., and Fall, R. (1995) Methanol emission from leaves. *Plant Phys.* 108:1359-1368.
2. Chakravarti, D., Mailander, P., **Franzen, J.**, Higginbotham, S., Cavalieri, E.L., and Rogan, E.G. (1998) Detection of dibenzo[*a,l*]pyrene-induced H-ras codon 61 mutant genes in preneoplasitic SENCAR mouse skin using a new PCR-RFLP method. *Oncogene* 16:3203-3210.
3. **Kugel, J.F.** and Goodrich, J.A. (1998) Promoter escape limits the rate of transcription from the adenovirus major late promoter on negatively supercoiled templates. *Proc. Natl. Acad. Sci. USA.* 95:9232-9237. [pnas.95.16.9232](https://doi.org/10.1073/pnas.95.16.9232)

4. **Kugel, J.F.** and Goodrich, J.A. (2000) A kinetic model for the early steps of RNA synthesis by human RNA polymerase II. *J. Biol. Chem.* 275:40483-40491. [10.1074/jbc.M006401200](https://doi.org/10.1074/jbc.M006401200) (Highlighted in: Valda, V. (2000) First Step to Commitment. *Science*. 289:2243.)
5. Ferguson, H.A., **Kugel, J.F.**, and Goodrich, J.A. (2001) Kinetic and mechanistic analysis of the RNA polymerase II transcription reaction at the human interleukin-2 promoter. *J. Mol. Biol.* 314:993-1006. [10.1006/jmbi.2000.5215](https://doi.org/10.1006/jmbi.2000.5215)
6. **Kugel, J.F.** and Goodrich, J.A. (2002) Translocation after synthesis of a four nucleotide RNA commits RNA polymerase II to promoter escape. *Mol. Cell. Biol.* 22:762-773. [10.1128/MCB.22.3.762-773.2002](https://doi.org/10.1128/MCB.22.3.762-773.2002)
7. **Kugel, J.F.** and Goodrich, J.A. (2003) In vitro studies of the early steps of RNA synthesis by human RNA polymerase II. *Meth. Enzymol.* 370:687-701. [10.1016.S0076-6879](https://doi.org/10.1016.S0076-6879)
8. Allen, T.A., Von Kaenel, S., Goodrich, J.A., and **Kugel, J.F.** (2004) The SINE encoded mouse B2 RNA represses mRNA transcription in response to heat shock. *Nat. Struct. Mol. Biol.* 11: 816-821. [10.1038/nsmb813](https://doi.org/10.1038/nsmb813)
9. Espinoza, C.A., Allen, T.A., Hieb, A. R., **Kugel, J.F.**, and Goodrich, J.A. (2004) B2 RNA binds directly to RNA polymerase II to repress transcript synthesis. *Nat. Struct. Mol. Biol.* 11: 822-829. [10.1038/nsmb812](https://doi.org/10.1038/nsmb812)  
(References 8 and 9, which were published back-to-back were: Cover articles; Highlighted in News and Views: Wassarman, KM (2004) RNA regulators of transcription. *Nat. Struct. Mol. Biol.* 11:803-804.; and Highlighted in: Heinrichs, A. (2004) A non-starter. *Nat. Rev. Mol. Cell Biol.* 5:682.)
10. Weaver, J.R., **Kugel, J.F.**, Goodrich, J.A. (2005) The sequence at specific positions in the early transcribed region sets the rate of transcript synthesis by RNA polymerase II in vitro. *J. Biol. Chem.* 280: 39860-39869. [10.1074/jbc.M509376200](https://doi.org/10.1074/jbc.M509376200)
11. Hieb, A.R., Baran, S., Goodrich, J.A., and **Kugel, J.F.** (2006) An 8 nt RNA triggers a rate-limiting shift of RNA polymerase II complexes into elongation. *EMBO J.* 25: 3100-3109. [10.1038/sj.emboj.7601197](https://doi.org/10.1038/sj.emboj.7601197)
12. **Kugel, J.F.** and Goodrich, J.A. (2006) Beating the heat: A translation factor and an RNA mobilize the heat shock transcription factor HSF1. *Mol. Cell* 22:153-154. [10.1016/j.molcel.2006.04.003](https://doi.org/10.1016/j.molcel.2006.04.003)
13. Goodrich, J.A. and **Kugel, J.F.** (2006) Non-coding RNA regulators of RNA polymerase II transcription. *Nat. Rev. Mol. Cell Biol.* 87: 612-616. [10.1038/nrm1946](https://doi.org/10.1038/nrm1946)
14. Goodrich, J.A. and **Kugel, J.F.** (2007) Binding and Kinetics for Molecular Biologists. Cold Spring Harbor Laboratory Press. Cold Spring Harbor, NY. 182 pages.
15. **Kugel, J.F.** and Goodrich, J.A. (2007) An RNA transcriptional regulator templates its own regulatory RNA. *Nat. Chem. Biol.* 3: 89-90. [10.1038/nchembio0207-89](https://doi.org/10.1038/nchembio0207-89)
16. Espinoza, C.A., Goodrich, J.A., and **Kugel, J.F.** (2007) Characterization of the structure, function and mechanism of B2 RNA, an ncRNA repressor of RNA polymerase II transcription. *RNA* 13: 783-596. [10.1261/rna.310307](https://doi.org/10.1261/rna.310307)
17. Weaver, J.R., Good, K., Walters, R.D., **Kugel, J.F.**, and Goodrich, J.A. (2007) Characterization of the sequence and architectural constraints of the regulatory and core regions of the human interleukin-2 promoter. *Mol. Immunol.* 44: 2813-2819. [10.1016/j.molimm.2007.01.027](https://doi.org/10.1016/j.molimm.2007.01.027)

18. Hieb, A.R., Halsey, W.A., Betterton, M., Perkins, T., **Kugel, J.F.**, and Goodrich, J.A. (2007) TFIIA changes the conformation of the DNA in TBP/TATA complexes and increases their kinetic stability. *J. Mol. Biol.* 372: 619-632. [10.1016/j.jmb.2007.06.061](https://doi.org/10.1016/j.jmb.2007.06.061)
19. Wager, S.D., **Kugel, J.F.**, and Goodrich, J.A. (2008) The role of non-coding RNAs in controlling mammalian RNA polymerase II transcription. Chapter 9 in *RNA and the Regulation of Gene Expression*, Editor K. Morris, Horizon Scientific Press, Norwich, UK.
20. Mariner, P.D., Walters, R.D., Espinoza, C.A., Drullinger, L.F., Wagner, S.D., **Kugel, J.F.**, and Goodrich, J.A. (2008) Human Alu RNA is a modular transacting repressor of mRNA transcription during heat shock. *Mol. Cell* 29: 499-509. [10.1016/j.molcel.2007.12.013](https://doi.org/10.1016/j.molcel.2007.12.013) (Highlighted in: Shamovsky, I and Nudler, E. (2008) Modular RNA heats up. *Mol. Cell* 29:415-417.)
21. **Kugel, J.F.** (2008) Using FRET to measure the angle at which a protein bends DNA. *Biochem. Mol. Biol. Educ.* 36: 341-346. [10.1002/bmb.20202](https://doi.org/10.1002/bmb.20202)
22. Goodrich, J.A. and **Kugel, J.F.** (2009) From bacteria to humans, chromatin to elongation, and activation to repression: the expanding roles of noncoding RNAs in regulating transcription. *Crit. Rev. Biochem. Mol. Biol.* 44: 3-15. [10.1080/10409230802593995](https://doi.org/10.1080/10409230802593995)
23. Gilman, B., Drullinger, L.F., **Kugel, J.F.**, and Goodrich, J.A. (2009) TATA-binding protein and transcription factor IIB induce transcript slipping during early transcription by RNA polymerase II. *J. Biol. Chem.* 284: 9093-9098. [10.1074/jbc.M900019200](https://doi.org/10.1074/jbc.M900019200)
24. Yakovchuk, P., Goodrich, J.A., and **Kugel, J.F.** (2009) B2 RNA and Alu RNA repress transcription by disrupting contacts between RNA polymerase II and promoter DNA within assembled complexes. *Proc. Natl. Acad. Sci. USA.* 106: 5569-5574. [10.1073/pnas.0810738106](https://doi.org/10.1073/pnas.0810738106)
25. **Kugel, J.F.** and Goodrich, J.A. (2009) In new company: U1 snRNA associates with TAF15. *EMBO rep.* 10: 454-456. [10.1038/embor.2009.65](https://doi.org/10.1038/embor.2009.65)
26. Walters, R.D., **Kugel, J.F.**, and Goodrich, J.A. (2009) InvAluable junk: the cellular impact and function of Alu and B2 RNAs. *IUBMB Life.* 61: 831-837. [10.1002/iub.227](https://doi.org/10.1002/iub.227)
27. Wagner, S.D., **Kugel, J.F.**, and Goodrich, J.A. (2010) TFIIF facilitates dissociation of RNA polymerase II from non-coding RNAs that lack a repression domain. *Mol. Cell. Biol.* 30: 91-97. [10.1128/MCB.01115-09](https://doi.org/10.1128/MCB.01115-09)
28. Yakovchuk, P., Gilman, B., Goodrich, J.A., and **Kugel, J.F.** (2010) RNA polymerase II and TAFs undergo a slow isomerization after the polymerase is recruited to promoter-bound TFIID. *J. Mol. Biol.* 397: 57-68. [10.1016/j.jmb.2010.01.025](https://doi.org/10.1016/j.jmb.2010.01.025)
29. Ponicsan, S.L., **Kugel, J.F.**, and Goodrich, J.A. (2010) Genomic gems: SINE RNAs regulate mRNA production. *Curr. Opin. Gen. Dev.* 20: 149-155. [10.1016/j.gde.2010.01.004](https://doi.org/10.1016/j.gde.2010.01.004)
30. Goodrich, J.A. and **Kugel, J.F.** (2010) Dampening DNA binding: A common mechanism of transcriptional repression for both ncRNAs and protein domains. *RNA Biol.* 7:305-309. [10.4161/rna.7.3.11910](https://doi.org/10.4161/rna.7.3.11910)
31. Goodrich, J.A. and **Kugel, J.F.** (2010) Genome-wide insights into eukaryotic transcriptional control. *Genome Biol.* 11:305. [10.1186/gb-2010-11-6-305](https://doi.org/10.1186/gb-2010-11-6-305)

32. Nguyen, T.N., Kim, L.J., Walters, R.D., Drullinger, L.F., Lively, T.N., **Kugel, J.F.**, and Goodrich, J.A. (2010) The C-terminal region of human NFATc2 binds cJun to synergistically activate interleukin-2 transcription. *Mol Immunol.* 47: 2314-2322. [10.1016/j.molimm.2010.05.287](https://doi.org/10.1016/j.molimm.2010.05.287)
33. Yakovchuk, P., Goodrich J.A., and **Kugel, J.F.** (2011) B2 RNA represses TFIID phosphorylation of RNA polymerase II. *Transcription.* 2:45-49. [10.4161/trns.2.1.14306](https://doi.org/10.4161/trns.2.1.14306)
34. Titov, D.V., Gilman, B., He, Q.-L., Bhat, S., Low, W.-K., Dang, Y., Smeaton, M., Demain, A.J., Miller, P.S., **Kugel, J.F.**, Goodrich, J.A., Liu, J.O. (2011). XPB, a subunit of TFIID, is a target of the natural product triptolide. *Nat. Chem. Biol.* 7:182-188. [10.1038/nchembio.522](https://doi.org/10.1038/nchembio.522)
35. Kaneko, H., Dridi, S., Tarallo, V., Fowler, B.J., Gelfand, B.D., Cho, W.G., Kleinman, M.E., Ponicsan, S.L., Hauswirth, W.H., Chiodo, V.A., Karikó, K., Yoo, J.W., Lee, D.-K., Hadziahmetovic, M., Song, Y., Chaudhuri, G., Buaas, F.W., Braun, R.E., Hinton, D.R., Zhang, Q., Grossniklaus, H.E., Provis, J.M., Madigan, M.C., Milam, A.H., Justice, N.L., Albuquerque, R.J.C., Blandford, A.D., Bogdanovich, S., Hirano, Y., Witta, J., Fuchs, E., Littman, D.R., Ambati, B.K., Rudin, C.M., Chong, M.M.W., Provost, P., **Kugel, J.F.**, Goodrich, J.A., Dunaief, J.L., Baffi, J.Z., Ambati, J. (2011). DICER1 dysregulation induces cytotoxic *Alu* RNA accumulation in age-related macular degeneration. *Nature.* 471:325-330. [10.1038/nature09830](https://doi.org/10.1038/nature09830)
36. **Kugel, J.F.** and Goodrich, J.A. (2012) Non-coding RNAs: key regulators of mammalian transcription. *Trends in Biochem. Sci.* 37:144-151. [10.1016/j.tibs.2011.12.003](https://doi.org/10.1016/j.tibs.2011.12.003)
37. Tarallo, V., Hirano, Y., Gelfand, B.D., Dridi, S., Kerur, N., Kim, Y., Cho, W.G., Kaneko, H., Fowler, B.J., Bogdanovich, S., Albuquerque, R.J.C., Hauswirth, W.W., Chiodo, V.A., **Kugel, J.F.**, Goodrich, J.A., Ponicsan, S.L., Chaudhuri, G., Murphy, M.P., Dunaief, J., Ambati, B.K., Ogura, Y., Yoo, J.W., Lee, D.K., Provost, P., Hinton, D.R., Núñez, G., Baffi, J., Kleinman, M.E., and Ambati, J. (2012) DICER1 loss and *Alu* RNA induce age-related macular degeneration via the NLRP3 inflammasome and MyD88. *Cell* 149:847-859. [10.1016/j.cell.2012.03.036](https://doi.org/10.1016/j.cell.2012.03.036)
38. Dridi, S., Hirano, Y., Tarallo, V., Kim, Y., Fowler, B.J., Ambati, B.K., Bogdanovich, S., Chiodo, V.A., Hauswirth, W.W., **Kugel, J.F.**, Goodrich, J.A., Ponicsan, S.L., Hinton, D.R., Kleinman, M.E., Baffi, J., Gelfand, B.D., and Ambati, J. (2012) ERK1/2 activation is a therapeutic target in age-related macular degeneration. *Proc. Natl. Acad. Sci. USA.* 109:13781-13786. [10.1073/pnas.1206494109](https://doi.org/10.1073/pnas.1206494109)
39. Blair, R.H., Goodrich, J.A., and **Kugel, J.F.** (2012) Single-molecule fluorescence resonance energy transfer shows uniformity in TATA binding protein-induced DNA bending and heterogeneity in bending kinetics. *Biochemistry* 51:7444-7455. [10.1021/bi300491j](https://doi.org/10.1021/bi300491j)
40. Heffler M.A., Walters, R.D., and **Kugel, J.F.** (2012) Using electrophoretic mobility shift assays to measure equilibrium dissociation constants: GAL4-p53 binding DNA as a model system. *Biochem. Mol. Biol. Educ.* 40:383-387. [10.1002/bmb.20649](https://doi.org/10.1002/bmb.20649)
41. **Kugel, J.F.** and Goodrich J.A. (2013). The regulation of mammalian mRNA transcription by long non-coding RNAs: Recent discoveries and current concepts. *Epigenomics.* 5:95-102. [10.2217/epi.12.69](https://doi.org/10.2217/epi.12.69)
42. Blair, R.H., Goodrich, J.A., and **Kugel, J.F.** (2013) Using FRET to monitor protein-induced DNA bending: the TBP-TATA complex as a model system. *Meth. Mol. Biol.* 977:203-215. [10.1021/bi300491j](https://doi.org/10.1021/bi300491j)

43. Wagner, S.D., Yakovchuk, P., Gilman, B., Ponicsan, S.L., Drullinger, L.F., **Kugel, J.F.**, and Goodrich, J.A. (2013) Mammalian RNA polymerase II acts as an RNA-dependent RNA polymerase to extend and destabilize a non-coding RNA. *EMBO J.* 32:781-90. [10.1038/emboj.2013.18](https://doi.org/10.1038/emboj.2013.18)
44. Ponicsan, S.L., Houel, S., Old, W.M., Ahn, N.G., Goodrich, J.A., **Kugel, J.F.** (2013) The non-coding B2 RNA binds to the DNA cleft and active site region of RNA polymerase II. *J. Mol. Biol.* 425:3625-3638. [10.1016/j.jmb.2013.01.035](https://doi.org/10.1016/j.jmb.2013.01.035)
45. Walters, R.D., Drullinger, L.F., **Kugel, J.F.**, and Goodrich J.A. (2013) NFATc2 recruits cJun homodimers to an NFAT site to synergistically activate interleukin-2 transcription. *Mol. Immunol.* 46:48-56. [10.1016/j.molimm.2013.03.022](https://doi.org/10.1016/j.molimm.2013.03.022)
46. Horn, A.E., Goodrich, J.A., and **Kugel, J.F.** (2014) Single molecule studies of RNA polymerase II transcription in vitro. *Transcription.* 5:e27608. [10.4161/trns.27608](https://doi.org/10.4161/trns.27608)
47. Walters, R.D., McSwiggen, D.T, Goodrich, J.A., and **Kugel, J.F.** (2014) Selection and characterization of a DNA aptamer that can discriminate between cJun/cJun and cJun/cFos. *PLOS ONE.* 9:e101015. [10.1371/journal.pone.0101015](https://doi.org/10.1371/journal.pone.0101015)
48. Cardiello, J.F., **Kugel, J.F.**, and Goodrich, J.A. (2014) A new twist on cell growth control. *Cell Cycle.* 13:3474-3475. [10.4161/15384101.2014.980702](https://doi.org/10.4161/15384101.2014.980702)
49. Goodrich, J.A., and **Kugel, J.F.** (2015) Studying the affinity, kinetic stability, and specificity of RNA/protein interactions: SINE ncRNA/Pol II complexes as a model system. *Meth. Mol. Biol.* 1206:165-178. [10.1007/978-1-4939-1369-5\\_15](https://doi.org/10.1007/978-1-4939-1369-5_15)
50. Ponicsan, S.L., **Kugel, J.F.**, and Goodrich, J.A. (2015) Repression of RNA Polymerase II Transcription by B2 RNA Depends on a Specific Pattern of Structural Regions in the RNA. *Non-coding RNA.* 1:4-16. [10.3390/ncrna1010004](https://doi.org/10.3390/ncrna1010004)
51. Pazhani, Y., Horn, A.E., Grado, L., and **Kugel, J.F.** (2016) Evaluating the relationship between FRET changes and distance changes using DNA length and restriction enzyme specificity. *J. Chem. Edu.* 93:383-386. [10.1021/acs.jchemed.5b00440](https://doi.org/10.1021/acs.jchemed.5b00440)
52. Abrisch, R.G., Eidem, T.M., Yakovchuk, P., **Kugel, J.F.**, and Goodrich, J.A. (2016) Infection by Herpes Simplex Virus Type-I causes near-complete loss of RNA polymerase II occupancy on the host cell genome. *J. Virol.* 90:2503-2513. [10.1128/JVI.02665-15](https://doi.org/10.1128/JVI.02665-15)
53. Eidem, T.M., **Kugel, J.F.**, and Goodrich, J.A. (2016) Noncoding RNAs: Regulators of the mammalian transcription machinery. *J. Mol. Biol.* 428:2652-2659. [10.1016/j.jmb.2016.02.019](https://doi.org/10.1016/j.jmb.2016.02.019)
54. Horn, A.E., **Kugel, J.F.**, Goodrich, J.A. (2016) Single molecule microscopy reveals mechanistic insight into RNA polymerase II preinitiation complex assembly and transcriptional activity. *Nucl. Acids Res.* 44:7132-43. [10.1093/nar/gkw321](https://doi.org/10.1093/nar/gkw321)
55. Blair, R.H., Horn, A.E., Pazhani, Y., Grado, L., Goodrich, J.A., and **Kugel, J.F.** (2016) The HMGB1 C-Terminal Tail Regulates DNA Bending. *J. Mol. Biol.* 428:4060-4072. [10.1016/j.jmb.2016.08.018](https://doi.org/10.1016/j.jmb.2016.08.018)
56. **Kugel, J.F.** and Goodrich, J.A. (2017) Finding the start site: redefining the human initiator element. *Genes Dev.* 31:1-2. [10.1101/gad.295980.117](https://doi.org/10.1101/gad.295980.117)
57. Cardiello, J.F., Goodrich, J.A., and **Kugel, J.F.** (2018) Heat shock causes a reversible increase in RNA polymerase II occupancy downstream of mRNA genes, consistent with a global loss in transcriptional termination. *Mol. Cell. Biol.* 38:e00181-18. [10.1128/MCB](https://doi.org/10.1128/MCB)

58. Ly, E., Goodrich, J.A., and **Kugel, J.F.** (2019) Monitoring transcriptional activity by RNA polymerase II in vitro using single molecule co-localization. *Methods*. S1046-2023(18): 30302-5 [10.1016/j.ymeth.2019.03.006](https://doi.org/10.1016/j.ymeth.2019.03.006).
59. Greene, E., Flees, J., Dhamad, A., Alrubaye, A., Hennigan, S., Pleimann, J., Smeltzer, M., Murray, S., **Kugel, J.F.**, Goodrich, J., Robertson, A., Wideman, R., Rhoads, D., and Dridi, S. (2019) Double-stranded RNA is a novel molecular target in osteomyelitis pathogenesis. *Am. J. Pathol.* 189:2077-2089. [10.1016/j.ajpath.2019.06.013](https://doi.org/10.1016/j.ajpath.2019.06.013).
60. Ly, E., Powell, A.E., Goodrich, J.A., and **Kugel, J.F.** (2020) Release of human TFIIB from actively transcribing complexes is triggered upon synthesis of 7 nt and 9 nt RNAs. *J. Mol. Biol.* 432: 4049-4060. [10.1016/j.jmb.2020.05.005](https://doi.org/10.1016/j.jmb.2020.05.005)
61. Ly, E., **Kugel, J.F.**, and Goodrich, J.A. (2020) Single molecule studies reveal that p53 tetramers dynamically bind response elements containing one or two half sites. *Sci. Rep.* 10:16176. [10.1038/s41598-020-73234-6](https://doi.org/10.1038/s41598-020-73234-6)
62. Salant, G.M., Tat, K.L., Goodrich, J.A., and **Kugel, J.F.** (2020) miR-206 knockout shows it is critical for myogenesis and directly regulates newly identified target mRNAs. *RNA Biol.* [10.1080/15476286.2020.1737443](https://doi.org/10.1080/15476286.2020.1737443)

## Research Presentations

- April 1998 Invited Talk. "Promoter escape is the rate limiting step for RNA polymerase II transcription." Rocky Mountain Transcription Meeting. Denver, CO.
- Sept. 1999 Poster. "RNA polymerase II preinitiation complexes undergo a rapid transition prior to the rate limiting step of promoter escape." Mechanisms of Eukaryotic Transcription Meeting. Cold Spring Harbor, NY.
- May 2001 Invited Talk. "Mechanism of transcription by human RNA polymerase II." Harold M. Weintraub Graduate Student Award Symposium. Seattle, WA.
- April 2006 Selected Talk. "An 8 nucleotide RNA triggers a rate-limiting shift of RNA polymerase II complexes into elongation." Regulation of Eukaryotic Transcription: From Chromatin to mRNA. Taos, NM.
- Feb. 2008 Poster. "A novel zinc-mediated interaction between NFAT1 and cJun results in transcriptional synergy: Identification of a peptide that blocks inducible transcription in T cells." Regulatory Mechanisms in Eukaryotic Transcription. Keystone, CO.
- Jan. 2009 Invited Talk. "Non-coding RNA regulators of mammalian RNA polymerase II." EMBO Workshop - New Functions of Regulatory RNAs in Pro- and Eucaryotes. Vienna, Austria.
- April 2009 Invited Talk. "Non-coding RNA regulators of mammalian RNA polymerase II." American Association for Cancer Research Annual Meeting. Denver, CO.
- April 2010 Invited Talk. "Regulation of Early Steps of Transcription by Small ncRNAs" Dynamics of Eukaryotic Transcription During Development. Big Sky, MT.
- Oct. 2010 Invited Talk. "Non-coding RNA regulators of mammalian RNA polymerase II." EMBO|EMBL Symposium: Non-Coding Genome. Heidelberg, Germany.

- Aug. 2011 Poster. "Understanding and controlling AP-1 driven transcription in breast cancer cells using peptide and non-coding RNA inhibitors." Era of Hope Breast Cancer Research Program Meeting. Orlando, FL.
- July 2014 Invited Lecture/Seminar. "Mechanisms of General Transcription." Eukaryotic Gene Expression Course. Cold Spring Harbor Laboratories. Cold Spring Harbor, NY.
- Sept. 2014 Invited Talk. "Regulation of RNA polymerase II by SINE encoded ncRNAs" Total Transcription Meeting. Cambridge, England.
- March 2015 Invited Talk. "Regulation of RNA polymerase II by SINE encoded ncRNAs" Long Noncoding RNAs: From Evolution to Function. Keystone, CO.
- June 2018 Invited Keynote Speaker. "Regulation of RNA polymerase II by SINE encoded ncRNAs" RiboWest 2018 Conference. Lethbridge, Alberta, Canada.
- Jan. 2020 Selected Talk. "Single-molecule studies resolve heterogeneity in the activity of transcribing complexes to reveal steps in transcription that dictate the activity of Pol II." Gene Regulation: From Mechanism to Disease. Keystone, CO.
- Sept. 2021 Invited Talk. "Genome-wide studies of transcriptional regulation by RNA polymerase II in response to environmental stimuli." RiboClub 2021. Magog, Quebec, Canada.

### **Classroom Teaching**

- Aug. 1993 – Dec. 1993 General Chemistry Class  
St. Olaf College  
Teaching Assistant
- Aug 1995 – Dec. 1995 Physical Chemistry Laboratory  
St. Olaf College  
Teaching Assistant
- Aug. 1996 – May 1997 Biochemistry Laboratory  
University of Colorado at Boulder  
Teaching Assistant
- August 1999 Eukaryotic Gene Expression Course  
Cold Spring Harbor Laboratories, NY  
Teaching Assistant
- October 2003 Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures
- February 2004 HHMI undergraduate journal club for minority students  
Presented lectures on scientific reading and writing
- October 2005 Guest lecture on Mechanisms of Transcriptional Regulation  
CHEM 4751, University of Colorado at Boulder
- March 2006 Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures

- AY 2006/2007  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Designed and taught a new experimental module  
Fall/Spring semesters, 4 lab sessions each
- February 2008  
Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures
- AY 2007/2008  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Designed and taught two new experimental modules  
Fall/Spring semesters, 4 lab sessions each
- AY 2008/2009  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Taught an experimental module  
Fall/Spring semesters, 2 lab sessions each
- AY 2009/2010  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Taught an experimental module  
Fall/Spring semesters, 2 lab sessions each
- February 2010  
Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures
- AY 2010/2011  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Taught an experimental module  
Fall/Spring semesters, 2 lab sessions each
- AY 2011/2012  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Taught an experimental module  
Fall/Spring semesters, 2 lab sessions each
- February 2012  
Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures
- February 2014  
Advanced Topics in Signal Transduction and Cell Cycle Regulation  
CHEM 5801, University of Colorado at Boulder  
2 lectures
- AY 2014/2015  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Fall semester I helped students conceive and implement independent study projects. Spring semester I taught a new experimental module that I designed
- AY 2015/2016  
Biochemistry Laboratory  
CHEM 4761, University of Colorado at Boulder  
Taught an experimental module



	Fall/Spring semesters, 2 lab sessions each
March 2016	Advanced Topics in Signal Transduction and Cell Cycle Regulation CHEM 5801, University of Colorado at Boulder 2 lectures
AY 2016/2017	Biochemistry Laboratory CHEM 4761, University of Colorado at Boulder Taught an experimental module Fall/Spring semesters, 2 lab sessions each
AY 2017/2018	Biochemistry Laboratory CHEM 4761, University of Colorado at Boulder Taught an experimental module Fall/Spring semesters, 2 lab sessions each
March 2018	Advanced Topics in Signal Transduction and Cell Cycle Regulation CHEM 5801, University of Colorado at Boulder 2 lectures
Fall 2018	Biochemistry Laboratory CHEM 4761, University of Colorado at Boulder Taught an experimental module Fall semester, 2 lab sessions each
October 2019	Scientific Conduct BCHM-MCDB 5776, University of Colorado at Boulder 1 lecture
March 2020	Advanced Topics in Signal Transduction and Cell Cycle Regulation CHEM 5801, University of Colorado at Boulder 2 lectures

### Select Professional Service

Ongoing	Reviewer for NSF and NIH grant applications
Ongoing	Reviewer for research manuscripts submitted to: Nature, Nature Structure and Molecular Biology, Nature Communications, EMBO Journal, eLife, RNA, PNAS, Review Commons, Journal of Molecular Biology, Nucleic Acids Research, EMBO reports, PLOS ONE, Gene, Genome Biology, Scientific Reports, Journal of Chemical Education, Methods, F1000 Biology Reports, Biochemistry, Integrative Biology, Biochimie, Technology in Cancer Research and Treatment, Mammalian Genome

### Select Outreach

Ongoing	Member of FabFems. An online resource for connecting girls with female mentors that work in STEM fields.
Ongoing	Participant in career days and mentoring for Middle School Students and High School Students interested in biomedical research.