

CURRICULUM VITAE

Michelle L Hastings, PhD

Center for Genetic Disease
Department of Cell Biology and Anatomy
Chicago Medical School
Rosalind Franklin University of Medicine and Science
3333 Green Bay Rd, North Chicago, IL 60064
Tel: (847)-578-8517 / Fax: 847-578-3253;
michelle.hastings@rosalindfranklin.edu
Website: <http://hastingslab.com>
Twitter: @HastingsLab
Linkedin: <https://www.linkedin.com/in/michelle-hastings-3a316434/>

EDUCATION AND TRAINING

1988-1992	B.A. Biology, St. Olaf College, Northfield, MN
1992-1998	Ph.D. Biology, Marquette University, Milwaukee, WI
1998-2006	Postdoctoral Fellow, Cold Spring Harbor Laboratory
2006-2007	Senior Fellow, Cold Spring Harbor Laboratory

ACADEMIC APPOINTMENTS

2007-2013	Assistant Professor of Cell Biology and Anatomy, Chicago Medical School (CMS), School of Graduate and Postdoctoral Studies, Rosalind Franklin University of Medicine and Science (RFUMS)
2013-2014	Associate Professor, RFUMS
2014-2020	Associate Professor with tenure, RFUMS
2017-present	Graduate Faculty Scholar, Northern Illinois University
2018-present	Director, Center for Genetic Disease, CMS
2019-present	Vice-Chair, Cell Biology and Anatomy, CMS
2020-present	Professor with tenure, RFUMS/CMS

HONORS AND AWARDS

Robert and Sophia Whiteside Academic Scholarship (1988-1992)
Marquette University Research Fellowship (1995-1996, 1997-1998)
Arthur J. Schmitt Fellowship (1996-1997)
Denis J. O'Brien Research Fellowship (1997)

Department of Defense Breast Cancer Research Fellowship (1999-2000)
NRSA National Institute of Health Post-Doctoral Fellowship, *declined* (2000)
American Cancer Society Post-Doctoral Fellowship (2000-2002)
Board of Trustees Award for Research Excellence (2010)
Illinois Science and Technology Coalition (ISTC) 2019 *Researcher to Know*

FUNDING

Current

- 04/18-03/23 NIH/NIA: 1R01AG060195
Prevention of complement and immune-mediated Lewy body dementia
Role: PI (multiple-PI with Isacson, Hastings, Hallett)
- 05/19-04/21 Cystic Fibrosis Foundation Research Grant
Antisense Oligonucleotides for the Treatment of Cystic Fibrosis
Role: PI
- 2019-2021 Forebatten Research Foundation
Antisense Oligonucleotides for the Treatment of CLN3 Batten Disease
Role: PI
- 2020-2021 Exicure, Inc.
Exicure Project: Cystic Fibrosis
Role: PI
- 2020-2021 Sebastian Velona Foundation
Antisense Oligonucleotides for the Treatment of CLN8 Batten Disease:
Evaluating CLN8 mRNA Processing in Healthy and Disease Cells
Role: PI
- 2020-2024 NIH/NINDS: R01NS113233
Reading Frame Correction for the Treatment of Batten Disease
Role: PI (multiple-PI with Jill Weimer)

Completed

- 2015-2019 Charlotte and Gwyneth Gray Foundation
Searching for an Effective Treatment for a CLN6 Batten Disease
Role: PI
- 2019 Cystic Fibrosis Foundation- Student Traineeship Award
Antisense Oligonucleotides for the Treatment of Cystic Fibrosis
Role: Mentor

- 2016-2018 Michael J. Fox Foundation
Novel, Stable LRRK2-Directed Antisense Oligonucleotides as a Therapy for Parkinson's Disease
Role: Co-Investigator (PI: Ole Isacson, Harvard University)
- 2013-2018 NIH/NIDCD: 1R01DC012596
Correction of Hearing and Vestibular Defects in a Mouse Model of Deafness
Role: PI
- 2015-2017 Ionis Pharmaceuticals
Antisense Oligonucleotide Development
Role: PI
- 2013-2016 Foundation Fighting Blindness
An Antisense Oligonucleotide Treatment for Retinitis Pigmentosa in Usher Syndrome
Role: Co-PI (with Jennifer Lentz, Louisiana State University)
- 2015-2016 Batten Research Alliance
Nonsense Suppression for the Treatment of Infantile and Late-Infantile Neuronal Ceroid Liposuscinosis
Role: PI
- 2015-2016 Batten Disease Support and Research Alliance
Antisense Oligonucleotides for the Treatment of Juvenile Neuronal Ceroid Lipofuscinosis
Role: PI
- 2015-2016 Batten Disease Support and Research Alliance
Stop Codon Readthrough and Nonsense Suppression for the Treatment of Infantile and Late-Infantile Neuronal Ceroid Lipofuscinosis
Role: PI
- 2015-2016 Northern Illinois University-RFUMS Pilot Research Project Award
Vestibular Function in Usher Syndrome
Role: co-PI with Doug Wallace, NIU
- 2010-2015 NIH/NINDS: 1R01NS069759
Targeting SMN2 Alternative Splicing for the Treatment of Spinal Muscular Atrophy
Role: PI
- 2014-2015 The Gerber Foundation
Comparison of Nutrient and Cellular Composition of Donor and Mother's Milk Pre- and Post-Fortification
Role: Co-Investigator w/ David Everly, (PI, Ramona Donovan, Lutheran General Hospital)
- 2013 RFUMS exploratory grant
Exploration of Antisense Oligonucleotides for Disease Therapy
Role: PI

- 2011-2014 1F31NS076237
The Identification and Manipulation of RNA Splicing Factor Regulators of Spinal Muscular Atrophy Gene, SMN2.
Role: Mentor (Mallory Havens, awardee)
- 2012-2013 National Organization for Hearing Research
Treatment of Deafness Using Antisense Oligonucleotides
Role: PI
- 2012 Capita Foundation, Development of Antisense Oligonucleotides as a Cure for Usher Syndrome
Role: PI
- 2012 Fight for Sight Summer Fellowship
Treatment of Blindness in a Mouse Model of Usher Syndrome Using Antisense Oligonucleotides
Role: Mentor (Jenna Erickson, awardee)
- 2011-2012 Midwest Eye-Banks
Therapeutic Approaches to Blindness Using Antisense Oligonucleotides
Role: PI
- 2009-2012 Deafness Research Foundation (Hearing Health Foundation)
Therapeutic Correction of Ush1c Splicing in a Mouse Model of Usher Syndrome
Role: PI
- 2009-2011 1U01NS061801
Tetracycline derivatives as *SMN2* mRNA splicing modifiers for treatment of SMA
Role: Co-Investigator (PI: Paul Higgins, Paratek Pharmaceuticals)
- 2011 AOA Carolyn L. Kuckein Research Fellowship
Identification of Novel Regulators of *SMN2* exon 7 splicing in SMA
Role: Mentor (Claribel Wee, awardee)
- 2010 SMA Europe, Higgins (PI)
Tetracycline Compounds as *SMN2* Splicing Modifiers for the Treatment of SMA
Role: Co-Investigator
- 2006-2009 Families of SMA
Characterization and optimization of small-molecule modulators of *SMN2* exon 7 splicing
Role: PI

INTELLECTUAL PROPERTY

Issued Patents

1. US8648053- Antisense Oligonucleotides That Target A Cryptic Splice Site In

- Ush1c As A Therapeutic For Usher Syndrome.
2. US9353371- Antisense Compounds Targeting Genes Associated with Usher Syndrome.
 3. US9556434- Antisense Oligonucleotides That Target A Cryptic Splice Site In Ush1c As A Therapeutic For Usher Syndrome.
 4. US9840709- Antisense Compounds Targeting Genes Associated with CFTR.
 5. US984710- Antisense Compounds Targeting Leucine-Rich Repeat Kinase 2 (LRRK2) for the Treatment of Parkinsons Disease.
 6. US10370667- Antisense Compounds Targeting Leucine-Rich Repeat Kinase 2 (LRRK2) for the Treatment of Parkinsons Disease.
 7. US10472634- Antisense Compounds Targeting Apolipoprotein E Receptor 2.
 8. US10525076- Antisense Compounds Targeting Genes Associated with Cystic Fibrosis.
 9. US10544417- Antisense Compounds Targeting Genes Associated with Cystic Fibrosis.

Patent Applications (patent pending)

1. 15/039188- Antisense Compounds Targeted to CLN3 and Uses Thereof (Batten Disease)
2. 19/020246- Compounds and Methods for the Modulation of Amyloid- β Precursor Protein.

PUBLICATIONS

1. **Hastings, M.L.**, Milcarek, C., Martincic, K., Peterson, M.L., Munroe, S.H. (1997). Expression of the thyroid hormone receptor gene, *erbA α* , in B lymphocytes: alternative mRNA processing is independent of differentiation but correlates with antisense RNA levels. *Nucleic Acids Res.* **25**: 4296-4300. PMID: 9336460.
2. **Hastings, M.L.**, Ingle, H.A., Lazar, M.A., Munroe, S.H. (2000). Post-transcriptional regulation of thyroid hormone receptor expression by cis-acting sequences and a naturally occurring antisense RNA. *J. Biol. Chem.* **275**:11507-11513. PMID: 10753970.
3. **Hastings, M.L.**, Wilson, C.M., Munroe, S.H. (2001). A purine-rich intronic element enhances alternative splicing of thyroid hormone receptor mRNA. *RNA* **7**:859-874. PMID: 11421362.
4. **Hastings, M.L.**, Krainer, A.R. (2001). Functions of SR proteins in the U12-dependent AT-AC pre-mRNA splicing pathway. *RNA* **7**: 471-482. PMID: 11333026.
5. **Hastings, M.L.**, Resta, N., Traum, D., Stella, A., Guanti, G., Krainer, A.R. (2005). An LKB1 AT-AC intron causes Peutz-Jeghers syndrome via splicing at non-canonical cryptic splice sites. *Nature Struct. Mol. Biol.* **12**: 54-59. PMID: 15608654.
6. Cartegni, L.*, **Hastings, M.L.***, Calarco, J.A., de Stanchina, E., Krainer, A.R. (2006) Determinants of exon 7 identity in the spinal muscular atrophy genes, *SMN1* and *SMN2*. *Am. J. Hum. Genet.* **78**: 63-77. PMID: 16385450. *equal contributors

7. Sheth, N., Roca, X., **Hastings, M.L.**, Roeder, T., Krainer, A.R., Sachidanandam, R. (2006) Comprehensive splice-site analysis using comparative genomics. *Nucleic Acids Res.* **34**: 3955-3967. PMID: 16914448. *over 100 citations
8. Allemand, E., **Hastings, M.L.**, Murray, M.V., Myers, M.P., Krainer, A.R. (2007) Alternative splicing regulation by interaction of phosphatase PP2C γ and nucleic acid-binding protein YB-1. *Nature Struct. Mol. Biol.* **14**: 630-638. PMID: 17572683.
9. **Hastings, M.L.**, Allemand, E., Duelli, D.M., Myers, M.P., Krainer, A.R. (2007) Control of pre-mRNA splicing by the general splicing factors PUF60 and U2AF65. *PLoS ONE* **2**: e538. PMID: 17579712.
10. Zhang, C., **Hastings, M.L.**, Krainer, A.R., Zhang, M.Q. (2007) Dual-specificity splice sites are used as both 5' and 3' splice sites. *Proc. Natl. Acad. Sci. USA* **104**: 15028-15033. PMID: 17848517.
11. Martins de Araujo, M., Bonnal, S., **Hastings, M.L.**, Krainer, A.R., Valcarcel, J. (2009) Differential 3' splice site recognition of SMN1 and SMN2 transcripts by U2AF and U2 snRNP. *RNA* **15**: 515-523. PMID: 19244360.
12. **Hastings, M.L.**, Berniac, J., Liu, Y.H., Abato, P., Jodelka, F.M., Barthel, L., Kumar, S., Dudley, C., Larson, K., Edmonds, J., Bowser, T., Draper, M., Higgins, P., Krainer, A.R. (2009) Tetracyclines that promote SMN2 exon 7 splicing as therapeutics for spinal muscular atrophy. *Sci. Transl. Med.* **1**: 5ra12. PMID: 20161659.
13. Salato, V.K., Rediske, N.W., Zhang, C., **Hastings, M.L.**, Munroe, S. H. (2010) An exonic splicing enhancer within a bidirectional coding sequence regulates splicing of thyroid hormone receptor mRNA. *RNA Biology*, **7**: 179-90. PMID: 20200494.
14. Pigati, L., Yaddanapudi, S., Iyengar, R., Kim, D.J., Hearn, S., Danforth, D., **Hastings M.L.**, Duelli, D.M. (2010) Selective Release of MicroRNA Species from Normal and Malignant Mammary Epithelial Cells. *PLoS One*. <http://dx.plos.org/10.1371/journal.pone.0013515>. PMID: 20976003. *over 200 citations.
15. Jodelka, F.M., Ebert, A.D., Duelli, D.M., **Hastings, M.L.** (2010) A feedback loop regulates splicing of the spinal muscular atrophy-modifying gene, SMN2. *Hum. Mol. Genet.* **19**:4906-17. PMID: 20884664.
16. Vorlova, S., Rocco, G., LeFave, C.V., Jodelka, F.M., **Hastings, M.L.**, Henke, E., Cartegni, L. (2011) Induction of antagonistic soluble decoy receptor tyrosine kinases by intronic polyA activation. *Mol. Cell*, **43**: 927-939. PMID: 21925381.
17. Bruno, A., Huang, J, Bennett, D.A., Marr, R., **Hastings, M.L.**, Stutzmann, G.E. (2012) Altered ryanodine receptor expression in mild cognitive impairment and Alzheimer's disease. *Neurobiol. Aging*, **33**: 1001.e1-6. PMID: 21531043.
18. Kim, D.J., Linnstaedt, S., Palma, J., Park, J.C., Ntrivalas, E., Kwak-Kim, J.Y.H., Gilman-Sachs, A., Beaman, K., **Hastings, M.L.**, Martin, J.N., Duelli, D.M. (2012) Plasma components affect accuracy of circulating cancer-related microRNA quantitation. *J. Mol. Diagn.* **14**: 71-80. PMID: 22154918. *Faculty of 1000 article.

19. Havens, M.A., Reich, A.A., Duelli, D.M., **Hastings, M.L.** (2012) Biogenesis of mammalian microRNAs by a non-canonical processing pathway. *Nucleic Acids Res*, **40**: 4626-4640. PMID: 22270084. *Featured article.
20. Palma, J., Yaddanapudi, S.C., Pigati, L., Havens, M.A., Jeong, S., Weimer, K., Stern, B., **Hastings, M.L.**, Duelli, D.M. (2012) MicroRNAs are exported from malignant cells in customized particles. *Nucleic Acids Res*, **40**: 9125-9138. PMID: 22772984.
21. **Hastings, M.L.**, Palma, J., Duelli, D.M. (2012) Sensitive PCR-based quantitation of circulating cell-free microRNAs. *Methods* **58**: 144-150. PMID: 22884953. IF: 3.503
22. Quarles, K.A., Sahu, D., Havens, M.A., Forsyth, E.R., Wostenberg, C., **Hastings, M.L.**, Showalter, S.A. (2013) Ensemble analysis of primary miRNA structure reveals an extensive capacity to deform near the Drosha cleavage site. *Biochemistry*, **52**: 795-807. PMID: 23305493.
23. Duelli, D.M., Palma, J., Beaman, K., **Hastings, M.L.**, Kwak-Kim, J. Linnstaedt, S., Park, J.C., Kim, D.J. (2013) Author's reply: MicroRNA detection in plasma samples: How to treat heparinized plasma. *J. Mol. Diagn.* **15**: 138-139. PMID: 23390637.
24. Lentz, J.J., Jodelka, F.M., Hinrich, A.J., McCaffrey, K.E., Farris, H.E., Spalitta, M.J., Bazan, N.G., Duelli, D.M., Rigo, F., **Hastings, M.L.** (2013) Correction of hearing and vestibular dysfunction in a mouse model of deafness. *Nature Med*, **19**: 345-350. PMID: 23380860.
 - *Research Highlight: "Deafness diverted" *Nature* (2013) **494**, 150.
 - *Commentary: Kole, R. (2013) Splicing: Hear and Now! *Mol Ther* **21**: 920-21.
 - *Clinical Implications of Basic Research: Avraham, K.B. (2013) Rescue of Hearing Loss in Usher's Syndrome, *N Engl J Med* **369**:18-19.
 - **Selection of news stories:
 BBC: "Genetic patch stops deafness"
 Associated Press: "Partial fix found in mice for genetic disease"
 WBEZ Chicago radio: "Scientists develop treatment to prevent some deafness in mice"
25. Dauber, A., Golzio C., Guenot, C., Jodelka, F.M., Kibaek, M., Kjaergaard, S., Leheup, B., Martinet, D., Nowaczyk, M., Rosenfeld, J.A., Zeeman, S., Zurich, J., Beckmann, J.S., Hirschhorn, J.N., **Hastings, M.L.***, Jacquemont, S. *, Katsanis, N.* (2013) *SCRIB* and *PUF60* are primary drivers of the multisystemic phenotypes of the 8q23.4 copy number variant. *Am. J. Hum. Genet.* **93**: 798-811. PMID: 24140112. *co-senior authors.
26. Havens, M.A., Reich, A.A., **Hastings, M.L.** (2014) Drosha promotes splicing of a pre-microRNA-like alternative exon. *PLoS Genetics*, **10**: e1004312. PMID: 24786770.
27. Wee, C.D., Havens, M.A., Jodelka, F.M., **Hastings, M.L.** (2014) Targeting SR proteins improves SMN expression in Spinal Muscular Atrophy cells. *PLoS ONE*, **9**: e115205. PMID: 25506695.
28. Hinrich, A.J., Jodelka, F.M., Chang, J.L., Brutman, D., Bruno, A.M., Briggs, C.A., James, B.D., Stutzmann, G.E., Bennett, D.A., Miller, S.A., Rigo, F., Marr, R.A., **Hastings, M.L.** (2016) Therapeutic correction of ApoER2 splicing in Alzheimer's

- disease mice using antisense oligonucleotides. *EMBO Mol. Med.* **8**: 328-345. PMID: 26902204).
- *News and Views: Wasser, C.R. & Herz J. (2016) Splicing therapeutics for Alzheimer's disease. *EMBO Mol. Med.* **8**: 308-310 (PMID: 26902203).
29. Depreux, F.F, Wang L., Jiang, H., Jodelka, F.M., Rosencrans R.F., Rigo, F., Lentz, J.J., Brigande, J.V., **Hastings, M.L.** (2016) Antisense oligonucleotides delivered to the amniotic cavity *in utero* modulate gene expression in the postnatal mouse. *Nucleic Acids Res.* **44**: 9519-9529. PMID: 27683224.
- *Selected Breakthrough article
*Featured on WBEZ Chicago radio: "Chicago Researchers Make Significant Finding in Treating Genetic Defects In Utero."
30. Donovan, R., Kelly, S., Prazad, P., Talaty, P.N., Lefaiver, C., **Hastings, M.L.**, Everly, D.N. (2016) The Effects of Human Milk Fortification on Nutrients and Milk Properties. *J. Perinatol.*, **37**: 42-48. PMID: 27711042.
31. Pan, B., Askew, C., Galvin, A., Heman-Ackah, S., Asai, Y., Indzhykulian, A.A., Jodelka, F.M., **Hastings, M.L.**, Lentz, J.J., Vandenberghe, L.H., Holt, J.R., Geleoc, G.G.S. (2017) Gene therapy restores auditory and vestibular function in a mouse model of Usher syndrome, type IC. *Nature Biotech.* **35**: 264-272. PMID: 28165476.
32. Vijayakumar, S., Depreux, F., Jodelka, F.M., Lentz, J.J., Rigo, F., Jones, T.A., **Hastings, M.L.** (2017) Rescue of peripheral vestibular function in Usher syndrome mice using a splice-switching antisense oligonucleotide. *Hum. Mol. Genet.* **26**: 3482-3494. PMID: 28633508.
33. Ponnath, A., Depreux, F.F., Jodelka, F.M., Rigo, F., Farris, H., **Hastings, M.L.***, Lentz, J.J.* (2018) Rescue of outer hair cells with antisense oligonucleotides in Usher mice is dependent on age of treatment. *J. Assoc. Res. Otolaryngol.* **19**: 1-16. *corresponding authors. PMID: 29027038.
34. Donaldson, T.N., Jennings, K.T., Cherep, L.A., McNeela, A.M., Depreux, F.F., Jodelka, F.M., **Hastings, M.L.**, Wallace, D.G. (2018) Antisense oligonucleotide therapy rescues disruptions in organization of exploratory movements associated with Usher syndrome type 1C in mice. *Behav. Brain Res.* **338**: 76-87. PMID: 29037661.
35. Chang, J.L., Hinrich, A.J., Roman, B., Norrbom, M., Rigo, F., Marr, R.A., Norstrom, E., **Hastings, M.L.** (2018) Targeting amyloid precursor protein, APP, splicing with antisense oligonucleotides reduces amyloid- β production. *Mol. Ther.* **26**: 1539-1551. PMID: 29628304.
- *Alzforum article: Antisense Oligonucleotides Turn Down the A β Spigot. 08 Jun 2018, Marina Chicurel (<https://www.alzforum.org/news/research-news/antisense-oligonucleotides-turn-down-av-spigot>)
36. Parnell, S.C., Magenheimer, B.S., Maser, R.L., Pavlov, T.S., Havens, M.A., **Hastings, M.L.**, Peterson, K.R., Staruschenko, A., and Calvet, J.P. (2018) A Mutation Affecting Polycystin-1 Mediated Heterotrimeric G-Protein Signaling Causes ADPKD. *Hum. Mol. Genet.* **27**: 3313-3324. PMID: 29931260.

37. Timm, D., Gereats, R.D., White, K., Koh, S.Y., Kielian, T., Pearce, D.A., **Hastings, M.L.**, Weimer, J.M. (2018) Searching for novel biomarkers using a mouse model of CLN3 Batten disease. *PloS One*, **13**: e0201470. PMID: 30086172.
38. Korecka, J.A., Talbot, S., Osborn, T., de Leeuw, S.M., Levy, S., Ferrari, E.J., Moskites, A., Atkinson, E., Jodelka, F.M., Hinrich, A.J., **Hastings, M.L.**, Woolf, C.J., Hallett, P.J., Isacson, O. (2019) ER calcium dependent neurite collapse and alterations in ER calcium control in human iPSC-derived neurons carrying the *LRRK2* G2019S mutation. *Stem Cell Reports*, **12**: 29-41. PMID: 30595548.
39. Korecka, J.A., Thomas, R., Christensen, D.P., Hinrich, A.J., Ferrari, E.J., Levy, S.A., **Hastings, M.L.**, Hallett, P.J., Isacson, O. (2019) Decreased mitochondrial clearance in *LRRK2* G2019S familial Parkinson's disease patient fibroblasts is due to a reduction in mature autophagosome levels. *Hum. Mol. Genet.* **28**: 3232-3243. PMID: 31261377.
40. Wang, L., Kempton, J.B., Jiang, H., Jodelka, F.M., Brigande, A.M., Dumont, R.A., Rigo, F., Lentz, J.J., **Hastings, M.L.**, Brigande, J.V. (2020) Fetal antisense therapy for congenital deafness and balance dysfunction. *Nucleic Acids Res.* *Doi:10.1093/nar/gkaa194*. PMID: 32249312.
41. Centa, J.L., Jodelka, F.M., Hinrich, A.J., Johnson, T.B., Ochaba, J., Norrbom, M., Weimer, J.M., Rigo, F., Duelli, D.M., **Hastings, M.L.** (2020) Therapeutic efficacy of antisense oligonucleotides in mouse models of CLN3 Batten disease. *Nature Med.* *Doi: 10.1038/s14591-020-0986-1*. PMID: 32719489.
42. Michaels, W.E., Bridges, R.J., **Hastings, M.L.** (2020) Antisense oligonucleotide-mediated correction of CFTR 3849+10kbC>T splicing improves chloride secretion in cystic fibrosis patient-derived bronchial epithelial cells. *Nucleic Acids Res.* **48**: 7454-7467. *PMID: 32520327*.
43. Korecka J.A., Thomas, R., Hinrich, A.J., Moskites, A.M., Macbain, Z.K., Hallett, P.J., Isacson, O., **Hastings, M.L.** (2020) Splice-switching antisense oligonucleotides reduce *LRRK2* kinase activity in human *LRRK2* transgenic mice. *Mol Ther- Nucl. Acids*, **21**: 623-635. PMID 32736291.
44. Lentz, J.J., Pan, B., Ponnath, A., Tran, C.M., Nist-Lund, C., Galvin, A., Goldberg, H., Robillard, K.N., Jodelka, F.M., Farris, H.E., Huang, J., Zhu, H., Zhou, W., Rigo, F., **Hastings, M.L.**, Geleoc, G.S.G. (2020) Direct delivery of antisense oligonucleotides to the middle and inner ear improves hearing and balance in Usher mice. *Mol Ther*, S1525-0016 (20)30412-3 PMID: 32818431.
45. Moissoglu, K., Stueland, M., Gasparski, A.N., Wang, T., Jenkins, L.M., **Hastings, M.L.**, and Mili, S. (2020) Local translation of RAB13 controls cell migration and GTPase function. *EMBO J*, **39**: e104958. PMID: 32946136.
46. Carmack, S.A., Vendruscolo, J.C.M., McGinn, M.A., Miranda-Barriento, J., Hinrich, A.J., Bosse, G., Repunte-Canonigo, V., Jodelka, F.M., Rigo, F., Ling, K., Messing, R.O., Peterson, R., Edwards, S., Sanna, P.P., Morales, M., **Hastings, M.L.**, Koob, G.F., Vendruscolo, L.F. Corticosteroid-dependent sensitization to stress drives opioid addiction. *In revision*.

47. Broner, S., Holm, L.L., Larsen, M.R., Doktor, T.K., Andersen, H.S., **Hastings, M.L.**, Hua, Y., Krainer, A.R., Andresen, B.S. Identification of SRSF10 as a novel regulator of SMN ISS-N1. *Hum. Mutat.*, *under review*.
48. Amato, R.J., Rosencrans, R.F., Jodelka, F.M., Depreux, F.F., Bazan, N.G., Rigo, F., **Hastings, M.L.***, Lentz, J.J.* Long-term rescue of vision with antisense oligonucleotides in a mouse model of Usher syndrome. *corresponding authors. *In revision*.

INVITED REVIEWS/BOOK CHAPTERS

49. **Hastings, M.L.**, Krainer, A.R. (2001). Pre-mRNA splicing in the new millennium. *Curr. Opin. Cell Biol.* **13**: 302-309. PMID: 11343900. *over 100 citations.
50. **Hastings, M.L.**, Sachidanandam, R. (2008) Evolutionary conservation of splice sites. In: Encyclopedia of Life Sciences (ELS). John Wiley & Sons, Ltd: Chichester. DOI: 10.1002/9780470015902.a0020782.
51. Havens, M.A., Duelli, D.M., **Hastings, M.L.** (2013) Targeting RNA splicing for disease therapy. *Wiley Interdiscip Rev RNA*, **4**: 247-266. PMID: 23512601.
52. Allemand, E., **Hastings, M.L.** (2014) Expression and Purification of Splicing Proteins. *Methods Mol. Biol.* **1126**: 205-216. PMID: 24549667.
53. Case, A.M., Sawyer, I.A., Dundr, M., **Hastings, M.L.** (2015) Pre-mRNA splicing: function and dysfunction. Encyclopedia of Cell Biology, Volume 1: Molecular Cell Biology edited by Ralph A Bradshaw and Philip D Stahl, 01/2016: chapter Pre-mRNA Splicing: Function and Dysfunction: pages 503-511; Elsevier, ISBN: 978-0-12-394796-3.
54. **Hastings, M.L.** (2015) A big score for RNA. *RNA*. **21**: 634-635. PMID: 25780170.
55. Havens, M.A., **Hastings, M.L.** (2016) Splice-switching antisense oligonucleotides as therapeutic drugs. *Nucleic Acids Res.* **44**: 5549-5563. PMID: 27288447.
56. Geraets, R.D., Koh, S.Y., **Hastings, M.L.**, Kielian, T., Pearce, D.A., Weimer, J.M. (2016) Moving Towards effective therapeutic strategies for neuronal ceroid lipofuscinosis. *Orphanet J Rare Dis.* **11**, 40-53. PMID: 27083890.
57. **Hastings, M.L.**, Jones, T.A. (2019) Antisense Oligonucleotides for the Treatment of Inner Ear Dysfunction. *Neurotherapeutics*, **16**: 348-359. PMID:30972560.
58. **Hastings, M.L.**, Brigande, J.B. (2020) Fetal gene therapy and pharmacotherapy to treat congenital hearing loss and vestibular dysfunction. *Hearing Res.* *Doi:10.1016/j.heares.2020.107931*. PMID: 32173115.
59. **Hastings, M.L.**, Centa, J.L. (2021) Targeting alternative splicing for therapeutic interventions. *In: Alternative Splicing, Methods Mol. Biol.*, *In preparation*.

CONFERENCE TALKS, INVITED SEMINARS AND WORKSHOPS

1. Seminar, Department of Biochemistry, School of Medicine, University of Utah, April 2022

2. Innovative Approaches for Identification of Antiviral Agents Summer School, Sardinia, Italy, June. 2021
3. RNA Therapeutics Institutes 2021 Annual Symposium, RNA Therapeutics: from Concept to Clinic. University of Massachusetts Medical School, Worcester, MA June 2021.
4. Neurodegenerative Drug Development Summit. New Targets and Approaches to Targeting Monogenic Neurodegenerative Diseases. Feb. 24, 2021.
5. Seminar, HOPE Center Lysosomal Group, Washington University. Feb. 18, 2021.
6. Eli Lilly RNA Club, Dec. 2020.
7. Seminar, Division of Neuroscience and Behavior, National Institute of Drug Abuse, NIH. Nov. 20, 2020.
8. RNA Innovation Seminars, Center for RNA Biomedicine, University of Michigan, Nov. 16, 2020.
9. 2020 Ross Prize Symposium for Dr. Adrian Krainer, New York Academy of Sciences, NY, NY, October 2020, virtual presentation.
10. Brain Science Institute virtual conference, Investing in Brain Disease Research, Sept. 17, 2020.
11. Batten Disease Support and Research Association Annual Family Conference, July 2020, virtual presentation.
12. Annual Meeting of the Chicago Chapter of the Society for Neuroscience, Therapeutic Discovery afternoon symposium, March, 2020, Chicago, IL.[CANCELLED due to COVID-19]
13. Seminar, Department of Pharmacology, Southern Illinois University, School of Medicine, Springfield, IL March 2020.
14. 17th National NCL Congress of the NCL Foundation, Hamburg, Germany, Dec. 2019.
15. Translational Research Conference for the Management of NCLs, Lombard, IL, Nov. 2019.
16. Bellucci Symposium on Hearing Research, Creighton University, May 2019
17. American Society of Gene and Cell Therapy Annual Meeting, Washington, DC, May 1st 2019 (Centa)
18. Abbvie Pharmaceuticals, Grand Rounds, Antisense Technology for the Treatment of Disease. April 2019
19. Chicago Brain Bee speaker, Lake Forest College, Feb. 2019
20. Molecular and Cellular Sciences (MCS) seminar series speaker, RFUMS, North Chicago, IL, Jan. 2019
21. University of Minnesota, Biochemistry, Molecular Biology and Biophysics seminar program, Minneapolis, MN, Oct. 2018.
22. Innovative Approaches for Identification of Antiviral Agents Summer School, Sardinia, Italy, Sept. 2018
23. RNA 2018, 20th Annual Meeting of the RNA Society, Berkeley, CA, May 2018 (Centa)
24. Swiss National Center of Competence in Research RNA & Disease Seminar series, ETH Zurich, Switzerland, May 2018
25. Swiss National Center of Competence in Research RNA & Disease Seminar series, University of Bern, Switzerland, May 2018

26. Molecular Biology of Hearing and Deafness Conference 2018, Gottingen, Germany, May 2018
27. Southern Illinois University, seminar series, School of Medicine, Microbiology, Molecular Biology and Biochemistry, Carbondale, IL, Feb. 2018.
28. Batten Disease: 2017 Update of Translational Research for Management of INCL/LINCL, Washington, DC, December 2017
29. National Institute of Deafness and Other Communication Disorders, Seminar series, NIH/NIDCD, Bethesda, MD November 2017
30. CNS Diseases Summit, Boston MA, Sept. 2017
31. USH Connections Conference, Chicago, IL, July 2017
32. National Cancer Institute, RNA Biology Seminar Series, NCI, Bethesda, Frederick, MD, May 2017
33. Neuroscience Seminar Series, McLean Hospital/Harvard Medical School, Boston, MA, May 2017
34. Hearing Loss Symposium, University of Pennsylvania, Philadelphia, PA, April 2017
35. RNA and Oligonucleotide Therapeutics Meeting, Cold Spring Harbor Laboratory, March 2017
36. John D. Wiley Seminar Series, Waisman Center, University of Wisconsin, Madison, WI, Dec. 2016
37. Seminar Series, Department of Developmental and Stem Cell Biology, Pasteur Institute, Paris, Nov. 2016
38. Decibel Therapeutics, Oct. 2016
39. Knowles Symposium on Hearing Restoration, Northwestern University, Evanston, IL, Oct. 2016
40. The 15th International Conference on Neuronal Ceroid Lipofuscinosis (Batten Disease), Boston, MA Oct. 2016
41. Hope for Vision Research Meeting, Miami, FL, Sept. 2016
42. Gray Foundation Research Meeting, Los Angeles, CA, Aug. 2016
43. Molecular Biology of Hearing and Deafness Conference, Wellcome Genome Campus, Hinxton, UK, May 2016
44. Kings College London, Department of Basic and Clinical Neuroscience, May 2016
45. Update of Translational Research for Management of Infantile (CLN1) and Late Infantile (CLN2) Forms of Batten Disease, Bethesda, MD, March 2016
46. The 20th Annual Meeting of the RNA Society, Madison, WI, Jun. 2015 (Hinrich)
47. University of Southern Denmark, Department of Biochemistry and Molecular Biology, April 2015
48. The 14th International Conference on Neuronal Ceroid Lipofuscinosis, Cordoba, Argentina, Oct. 2014
49. University of Helsinki, Institute of Biotechnology, Helsinki, Finland, Oct. 2014
50. Jackson Laboratory, Bar Harbor, ME, Sept. 2014
51. Hope for Vision Research Meeting, Miami, FL, Sept. 2014
52. University of Illinois, Dept. Cell Biology and Anatomy, Jun. 2014
53. The 19th Annual Meeting of the RNA Society, Quebec City, Quebec, CA, Jun. 2014 (Havens)
54. Update of Translational Research for Management of Infantile (CLN1) and Late Infantile (CLN2) Forms of Batten Disease, Bethesda, MD, March 2014

55. Sanford Children's Health Research Center, Sioux Falls, SD, Dec 2013
56. RFUMS, Neuroscience and Neuropharmacology Retreat, Dec. 2013
57. Oligonucleotide Therapeutics Society, Naples, Italy, October 2013
58. Indiana University School of Medicine, Indianapolis, IN, May 2013
59. RNA and Oligonucleotide Therapeutics, Cold Spring Harbor Lab, April 2013
60. Hope for Vision Research Meeting, Miami, FL, March 2013
61. Captain James A. Lovell Federal Health Care Center, Research Day, Jan. 2013
62. 17th Annual Meeting of the RNA Society, June 2012 (Jodelka)
63. Purdue University, Dept. Biological Sciences, Aug. 2012
64. Rosalind Franklin University of Medicine and Science Board Meeting, Nov. 2011
65. 4th International Congress of Myology, Lille, France, 2011
66. RFUMS, Neuroscience and Neuropharmacology Retreat, December, 2010
67. Nationwide Children's Hospital, The Research Institute, Columbus, OH, 2010
68. Wright State University, Dept. of Biological Sci. Dayton, OH, 2010
69. Rosalind Franklin University, Microbiology and Immunology, Chicago, IL, 2009
70. Chicagoland RNA Club, University of Chicago, 2009
71. Chicagoland RNA Club, University of Chicago, 2007
72. Marquette University, Dept. Biological Sciences, Milwaukee, WI, 2007
73. Brain Symposium. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 2007
74. Louisiana State University Health Sciences Center, New Orleans, LA, 2007
75. Chicago Medical School. Rosalind Franklin University, Chicago, IL, 2007
76. Eukaryotic mRNA Processing Meeting, Cold Spring Harbor Laboratory, 2007
77. 11th Annual International Spinal Muscular Atrophy Meeting, Schaumburg, IL, 2007
78. 12th Annual Meeting of the RNA Society, Madison, WI, 2007
79. University of Minnesota, College of Pharmacy, Duluth, MN, 2006
80. University of Connecticut Health Center, Farmington, CT, 2006
81. University of Toledo, Dept. of Biology, Toledo, OH, 2005
82. Cold Spring Harbor Lab In-House Seminar Series, Cold Spring Harbor, NY, 2004
83. Annual International Spinal Muscular Atrophy Meeting. Schaumburg, IL, 2004
84. 9th Annual Meeting of the RNA Society, Madison, WI, 2004
85. 4th Annual Meeting of the RNA Society, Edinburgh, Scotland, 1999
86. 3rd Annual Meeting of the RNA Society, Madison, WI, 1998

PROFESSIONAL SERVICE

Editorial Boards/Service

Journal of Neurochemistry, Handling Editor (2019-present)

Nucleic Acids Research (2015-present)

PLoS Genetics, guest editor (2014,2018)

Scientific Advisory Board

QurAlis, (2020-present)

Consulting

Clarion Healthcare LLC, 2017-present
Guidepoint Global Advisors, 2018-present
Gerson Lehrman Group (GLG), 2018-present
Morgan, Lewis & Bockius LLP, 2019-present

Peer Review

Grants/Study Section Review

- *Member, Communication Disorders Review Committee (CDRC) of NIH/NIDCD (2017-2021)*
- *American Society of Gene and Cell Therapy Career Development Grants (2019)*
- *National Institutes of Health, ad hoc, CDIN study section, 04/12, 04/13*
- *National Institute of Health, ad hoc, ZRG1 ETTN-M (08), ZRG MDCN-P(03)*
- *National Science Foundation, ad hoc, Gene Expression 2; Molecular and Cellular Biosciences, 10/12, 04/13, 02/14, 03/15*
- *Department of Defense*
- *Alzheimer's Association*
- *French National Research Agency*
- *Italian Telethon Foundation*
- *Medical Research Council (MRC) UK*
- *United States- Israel Binational Science Foundation*
- *Action on Hearing Loss International Project Grants*
- *Batten Disease Support and Research Association*

Manuscript Review

Nature Medicine, Science Translational Medicine, Cell, Molecular Cell, Genes & Development, Molecular and Cellular Biology, RNA, Nucleic Acids Research, Proceedings of the National Academy of Sciences, U.S.A., Journal of Cell Science, Journal of Biological Chemistry, Lab Investigation, Gene Therapy, Molecular Biology and Evolution, Human Genetics, Journal of Translational Medicine, RNA Biology, PLoS ONE, BMC Molecular Biology, PLoS Genetics, Human Molecular Genetics

Meeting Organization/Session Chair

Co-Chair, RNA-based therapeutics and small molecule-interactions with RNPs, 2021 RNA Society meeting, June 2021.

Moderator, Translational Research Conference for the Management of NCLs, Emerging Genetic Approaches session, Lombard, IL, Nov. 2019.

Co-Chair, Oligonucleotide and RNAi Therapeutics symposium, Annual Meeting of the American Society of Gene and Cell Therapy May, 2019.

Co-Chair, Gender Bias Under the Microscope, Inaugural Women and Medicine and Science Symposium Sept. 2016,

Organizing Committee - Annual Meeting of the Chicago Chapter of the Society for Neuroscience (2014-2016)

Session Chair- Rustbelt RNA Meeting- Regulation of RNA Processing session, Oct. 2009.

Memberships

RNA Society (1996-present)
Association for Research in Otolaryngology (2011-present)
Society for Neuroscience (2011-present)
American Society of Gene & Cell Therapy (2018-present)
Oligonucleotides Therapeutics Society (2019-present)
Women in Bio (2019-present)
American Society of Human Genetics (2006-2013)

Membership Activities

Member, Oligonucleotide and RNAi Committee, American Society of Gene and Cell Therapy (2018-present)
Member, Meetings Committee, RNA Society (2014-2018)
Chair, Nominating Committee, RNA Society (2014)
Executive Secretary, Chicago Society for Neuroscience (2013-2016)
Councilor, Chicago Society for Neuroscience (2012-present)

Professional Development

Leadership Academy, RFUMS (2019)
AAMC Mid-Career Women Faculty Profession Development, Austin, TX (2013)

External Scholarship

Scholarship Oversight Committee; Advocate Lutheran General Hospital- Dept. of Pediatrics (2013-present)

University Service

University Credentials and Tenure Committee (2019-present)
Committee to Examine Policies and Procedures for Research Misconduct and Data Integrity (2019)
Search Committee for Director, Center for Cancer Cell Biology, Immunology and Infection (2018)
Biological Research Facility Space Utilization Advisory Committee (2018-present)
Liaison Committee on Medical Education (LCME) Self Study Task Force (2018-2020)
Faculty Executive Committee (2018-present)
Principal Senator (2017-2018)
President's Cabinet (2017-2018)

Partnership Advisory Team (2017-present)
Strategic Enrollment Management Steering Committee (2017-2019)
Curriculum Standard 8 Committee (2017-2019)
Research Park Space Committee (2016-2020)
Sabbatical Leave Committee (2016-present)
Year 3,4 Curriculum Committee (2015-2020)
Deputy Principal Senator (2015-2017)
Senate Executive Council (2015-2018)
Faculty Women's Advisory Council, founding member (2014-2017)
Education Affairs/Curriculum Committee (2011-2015)
Research Review Panel (2011-present)
Radiation Safety Committee (2009-present)
University Senate, Cell Biology and Anatomy Senator (2008-2011, 2013-present)
Faculty Awards committee (2008-2011)
Chicago Medical School, Admissions interviewer (2008-2016)
All School Research Consortium poster competition, Judge (2009-2011)
IGPBS selection committee (2011)
School of Pharmacy Faculty Search Committee (2011-2012)

Department/Discipline/Center Service

Vice-Chair, Cell Biology and Anatomy Discipline (2019-present)
Graduate Studies Oversight Committee (2008-present)
Departmental Faculty Search Committee (2008, 2012)
Subcommittee for Chair Performance Assessment (2008, 2009, 2011)
Departmental Seminar Series, Organizer (2008-2015)
CBA graduate student recruitment event, Co-organizer (2007-2010)

TEACHING AND MENTORING

Chicago Medical School

Clinical Anatomy (2009-2020)

- Clinical Correlation: The Eye (2011-2018)
- Orbit and Contents (2011-2020)
- The Ear (2011-2020)

Clinical Molecular and Cellular Biology (2018-present)

Clinical Molecular and Cellular Biology (MBCH)

- Actin microfilaments and cell motility (2018-present)

Friday Case Studies- Preceptor (2018)

Clinical Skills- Preceptor (2014, 2020)

Neurobehavioral Health (2019-present)

- Eye Anatomy and Embryology
- Disorders of the Eye
- Ear Anatomy and Embryology

College of Pharmacy

Pharmacogenomics (2013-2018)

YPHS 609 Introduction to Pharmacogenomics and Molecular Biology

- RNA Transcription and Splicing (2013-2018)
- Control of Gene Expression (2013-2018)
- DNA Structure and Function (2014)
- DNA Replication, Mutation and Repair (2014)
- Techniques in Molecular Biology and Genomics (2014)

Interdisciplinary Graduate Program in Biomedical Sciences

Course Director

GCBA 600 Advanced Cell Biology (2009-present)

Faculty

GIGP 505 Cellular and Molecular Developmental Biology (2008-present)

- RNA Processing and Regulation in Development

GCBA 604 Techniques in Cell Biology (2009-present)

- RNA Processing and Manipulation

GIGP 508 Ethics and Regulatory Issues in Biomedical Research (2009)

- Faculty contributor

Community Education

- Open Doors- Job shadowing experience for Lake Forest High School students- 2019
- INSPIRE (Influence Student Potential and Increase Representation in Education) Program 2015-present
- Lake Bluff Middle School Career Expo 2017
- Lake Bluff Middle School and Lake Bluff Elementary School Science Night – 2013, 2014
- Lake Bluff Montessori School Science Club Field Trip- 2014
- Bring Your Sons and Daughters to Work Day Laboratory- 2010

Mentoring

Post-doctoral Fellows

2019- Rusudan Kotaria, Ph.D.
 2014-2016 Frederic Depreux, PhD; currently Senior Research Associate,
 Northwestern University
 2013-2014 Mallory Havens, PhD; currently Associate Professor, Lewis University
 2013-2014 Helan Xiao, PhD
 2011-2013 Alicia Case, PhD; currently Senior Scientist Abbott Molecular

Ph.D. Students

2020- Matthew Stratton
 2016- Jessica Centa
 2016- Wren Michaels
 2013-2018 Jennifer Chang (currently post-doctoral fellow, Northwestern University)
 2008-2013 Mallory Havens (currently Associate professor, Lewis University)

MD Students

2020 Roni Klein, MD
 2020 Olivia Gignilliat, MD
 2011-2013 Claribel Wee, MD with Distinction in Research
 2010 Jenna Erickson, MD
 2009-2010 Jennifer Akamine, MD

Pharmacy Students

2015-2017 Tiffany Chairudan, RFUMS College of Pharmacy

Undergraduate Students

2019 Estella Tcaturian, Lake Forest College
 2018 Sam Curry, Lake Forest College
 2017 Grant Brady, Lake Forest College
 2016 Viktoriya Georgieva, Lake Forest College
 2015 Mallory Birney, Lake Forest College
 2015 Paul John, DePaul University
 2014 Brittney Swanson, DePaul University
 2014 Cecilia Reyes, Lake Forest College
 2013-2014 Maria Ruiz, Lake Forest College
 2013 Rida Khan, Lake Forest College
 2010-2013 Ashley Reich, Lake Forest College
 2012 Anjeanette Mendez, DePaul University
 2011 Alejandra Luna, DePaul University
 2010-2011 Kate McCaffrey, DePaul University
 2010-2011 Daniella Brutmann, Lake Forest College
 2009-2010 Paige Keasler, Lake Forest College

High School/Middle School Students

2019 Aileen Sanroman, Round Lake High School, Round Lake, IL
 2018 Jocelyn Torres, North Chicago Community High School, N. Chicago, IL
 2015-2017 Reyna Ayala, Waukegan High School, Waukegan, IL

2014-2019 Fiona Nugent, Lake Bluff Middle School, Lake Bluff, IL
2013 Varun Medhal, Stephenson High School, Lincolnshire, IL
2013 Liam Hermann, Lake Forest High School, Lake Forest, IL

Visiting Ph.D. Students

2016 Sabrina Bröner, Syddansk University, Denmark (Andresen Lab)
2012 Kaycee Quarles, Pennsylvania State University (Showalter Lab)

Student Committees

Surech Kandel (RFUMS, SGPBS), Ashley Blackwell (NIU; MS; 2020), Tia Donaldson (Northern Illinois University; MS, 2018), Matt Andreoli (CMS; MDDR, 2016), Xin Liu (IGPBS/RFUMS; PhD 2015), Ashley Reich (LFC, 2013), Daniel Hafez (CMS/RFUMS; Ph.D. 2012), Jeffrey Huang (IGPBS/RFUMS; Ph.D. 2012), Daniella Brutmann (LFC, 2011), Paige Keasler (LFC, 2010), Trish Kaiser (M.S. 2009), Sree Ganapathiraju (M.S. 2010), Ryan Metzler (RFUMS), Justin Wikle (CMS)

Graduate student rotations

Gerald Sakamaki (2020), Matthew Stratton (2019), Rachel Chudoba (2018), Maxine Loh (2015), Jessica Centa (2015), Jennifer Chang (2013), Sahithi Pamarthy (2012), Kalpit Shah (2011), Chirosree Bandyohay (2010), Eric Cavanaugh (2010), Jeffrey Frenkel (2009), Sayan Chakraborty (2009), Angela Bruno (2009), Mallory Havens (2008), Jacob Tatay (2008)

Management/Mentorship

Research Lab staff

Francine Jodelka- Lab Manager (2008-present)
Anthony Hinrich- Research Associate (2010-present)
Victor Barragan- Lab Technician (2019)
Jaime Palma- Research Assistant (2013)
Lea Barthel- Research Assistant (2007-2008)

Administrative staff

Amarillis Hernandez- Center Administrator (2019-present)
Rosa (Abi) Cabral-Rains- Center Administrator (2018-2019)
Nichole Uhlibarri- Center Administrator (2018-2019)
Christine Swanson- Center Administrator (2018)