

## CURRICULUM VITAE

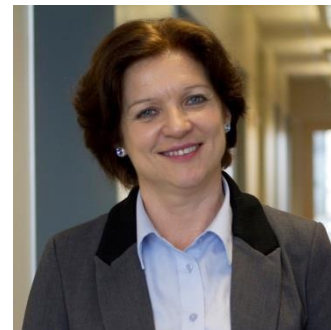
### A. PERSONAL:

#### NAME IN FULL:

Elena V. Batrakova

#### CAMPUS ADDRESS:

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Pharmacy, MARSICO HALL,  
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### B. EDUCATION AND DEGREES:

August 1978 to July 1983

Student, Faculty of Chemistry, MV Lomonosov Moscow State University (MSU), Moscow, Russia

Obtained M.Sc. in chemistry with distinction

November 1983 to May 1987

Ph.D. student, Department of Polymers, MV Lomonosov MSU, Moscow, Russia

Obtained Ph.D. in chemistry of polymers, advisor: D.Sc. Viktor Kabanov

### C. PROFESSIONAL EXPERIENCE:

July 2013 to present

Member of UNC Center for Nanotechnology in Drug Delivery, Chapel Hill, NC

July 2012 to present

Associate Professor, UNC Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, NC

July 2010 to June 2012

Research Associate Professor (promoted through P&T process), Department of Pharmaceutical Sciences, College of Pharmacy (COP), University of Nebraska Medical Center (UNMC), Omaha, NE

July 2007 to June 2012

Director, CNS Drug Delivery Program, Center for Drug Delivery and Nanomedicine (CDDN), UNMC, Omaha, NE

July 2003 to June 2010

Research Assistant Professor, Department of Pharmaceutical Sciences, COP, UNMC, Omaha, NE

September 1995 to July 2003

Research Associate, Department of Pharmaceutical Sciences, COP, UNMC, Omaha, NE

September 1994 to August 1995

Senior Research Fellow at the Laboratory of Drug Delivery, Department of Polymers, MV Lomonosov MSU, Moscow, Russia

May 1994 to August 1995

Director of Research (half time), Moscow Institute of Biotechnology, Moscow, Russia

December 1987 to April 1994

Research Fellow and Senior Research Fellow at All-Russian Research Center of Molecular Diagnostics and Therapy, Moscow, Russia

November 1983 to May 1987

Post-Graduate Researcher and Ph.D. Student at the Laboratory of Polymerization Processes, Department of Polymers, MV Lomonosov MSU, Moscow, Russia

### D. HONORS:

2009

UNMC New Investigator Award

2010

Oldfield/Reagan Alzheimer's Research Award

2010	Top cited article in 2008-2010 Award in Journal of Controlled Release
2011	UNMC Innovation, Development and Engagement Award (IDEA)
2012/2013	UNC Academic Excellence Award in Research
2014	Editorial Board, Nanomedicine: Nanotechnology, Biology and Medicine (Elsevier)
2014	Highly cited of total 10 scientists at UNC 2014
2014	A Thomson Reuters Highly Cited Researcher
2014-2017	Editorial Board, Journal of Drug Delivery
2014	Top 1% highly cited researcher in Pharmaceutics and Toxicology; <a href="http://highlycited.com/">http://highlycited.com/</a>
2013/2014	UNC Academic Excellence Award in Research
2014	Research Innovation Award, UNMC
2015	The most downloaded article in Journal of Controlled Release corresponding author
2015	Scientific Advisory Board for the neurosensory and Neuroregenerative Research Foundation
2015	Editorial board, International Journal of Pharmaceutical Sciences Research
2015	Editorial board, Journal of Bioanalytical Techniques
2016	Editorial board, Mathews Journal of Cancer Science
2016	Editorial board, Journal of Clinical Pharmacology (JCP)
2016	Award for outstanding contributions to the PharmD Program UNC, Chapel Hill, NC
2016	UNC Academic Excellence Award in Research
2016	Leader for Scientific Advisory Board for the Neurosensory and Neuroregenerative Research Foundation (NNRF)
2016	Author of the Top Ten WNAN Article accessed in 2016
2017	Editorial Board, Alzheimer's and Parkinsonism: Research Therapy
2017	Editorial board, International Journal of Neurodegenerative Disorders
2017	Author of the Top 25% most cited PlosOne articles
2020	Editorial Board, Pharmaceutics
2021	Editorial Board, Pharmaceutics

## E. BIBLIOGRAPHY:

*Original Articles with 16,700 unique citations with h-index 62, and i10-index 87*

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2. Klyachko N.L., Haney M.J., Batrakova E.V., and Kabanov A.V. (2021) Cationized-modified Exosomes for Gene Delivery. *Nanomedicine*. Under review.
3. Haney M.J., Zhao Y., Fallon John, Gololobova O.A., Wang Y., Li S.M., Erie D., Smith C. P., and Batrakova E.V. (2021) Extracellular Vesicles as Drug Delivery System for Treatment of Neurodegenerative Disorders: Optimization the Cell Source. *Advanced Health Materials*. *Advanced healthcare materials*. Under review.
4. Hayes S., Liu Q., Selvakumar S., M.J. Haney M.J., Batrakova E.V., Allman B.A., Walton P., Kiser P. and Whitehead S.N. (2021) Brain targeting and toxicological assessment of the exosome-packaged antioxidant Catalase-SKL following intranasal administration in mice. *Neurotoxicology Research*. Under review.
5. Rodriguez M., Soler Y., Muthu Karuppan M.K., Zhao Y., Batrakova E.V., El-Hage N. (2021) Targeting Beclin1 as an Adjunctive Therapy against HIV Using Mannosylated Polyethylenimine Nanoparticles. *Pharmaceutics*. Feb 6;13(2):223. doi: 10.3390/pharmaceutics13020223. PMID: 33561939.
6. Lopukhov A.V., Yang Z., Haney M.J., Bronich T.K., Sokolsky-Papkov M., Batrakova E.V., Klyachko, N.L., and Kabanov A.V. (2021) Mannosylated Cationic Copolymers for Gene Delivery to Macrophages, *Macromolecular Bioscience*. 22 February 2021, <https://doi.org/10.1002/mabi.202000371>
7. Klyachko N.L., Arzt C.J., Li S.M., Gololobova O.A., and Batrakova E.V. (2020) Extracellular vesicle-

- based Therapeutics: Pre-clinical and Clinical Investigations. *Pharmaceutics*. Dec 1;12(12):E1171. doi: 10.3390/pharmaceutics12121171. *Pharmaceutics*. 2020. PMID: 33271883. **Senior/Corresponding author.**
8. Cartaya A., Batrakova E., Bahnson E.M. (2020) Immune Cell mediated Delivery of Cinnamic Aldehyde for Therapeutic Vascular Applications. *Free Radical Biology and Medicine*, 159, S88.
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  10. Kumar S., El-Hage N., and Batrakova E.V. (2020) Extracellular Vesicles in HIV, Drug abuse, and Drug delivery. *J Neuroimmune Pharmacol*. Jul 22. doi: 10.1007/s11481-020-09946-3. PMID: 32696265
  11. Haney M.J., Zhao Y., J. Fay, H. Duhyeong, M. Wang, H. Wang, Z. Li, Y.Z. Lee, Muthu Karuppan M.K., El-Hage N., and Batrakova E.V. (2020) Genetically modified macrophages accomplish targeted gene delivery to the inflamed brain in transgenic Parkin Q311X(A) mice: importance of administration routes. *Sci Rep*. 2020 Jul 16;10(1):11818. doi: 10.1038/s41598-020-68874-7. PMID: 32678262. **Senior/Corresponding author.**
  12. Haney M.J., Zhao Y., Jin Y.S., and Batrakova E.V. (2020) Extracellular Vesicles as Drug Carriers for Enzyme Replacement Therapy to Treat Batten Disease: Optimization of Drug Administration Routes. *Cells*. May 20;9(5):E1273. doi:10.3390/cells9051273. PMID: 32443895. **Senior/Corresponding author**
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  17. Haney M.J., Klyachko N.L., Harrison E.B. Zhao Y., Kabanov A.V., and Batrakova E.V. (2019) TPP1 Delivery to Lysosomes with Extracellular Vesicles and their Enhanced Brain Distribution in the Animal Model of Batten Disease. *Adv. Health Mater*. Apr 18:e1801271. doi: 10.1002/adhm.201801271. [Epub ahead of print] PMID: 0997751. NIHMS1026691, **Senior/Corresponding author**
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37. Rosenbaugh, E.G., Manickam D.S., Batrakova E.V., Kabanov A.V., Zimmerman M.C. (2012) Neuronal uptake and subcellular localization of functional nanoformulated copper/zinc superoxide dismutase (SOD nano), *FASEB Journal*, 26, April.
38. Zhang G., Kiyota T., Batrakova E.V., and Gendelman H.E. (2012) Inhibitory Effect of Nanozymes on Amyloid Beta Aggregation and Oxidative Stress: A New Therapeutic Implication for Alzheimer's Disease. *Journal of Neuroimmune Pharmacology*, 7, S61.
39. Zhao Y., Haney M., Klyachko N.L., Manickam D.S., Li S., Booth S.L., Zimmerman M.C., Mosley R.L., Kabanov A.V., Gendelman H.E., Batrakova E.V. (2011) Polyelectrolyte complex optimization for macrophage delivery of redox enzyme nanoparticles. *Nanomedicine (Lond)*. Jan; 6(1):25-42, PMID: 21182416; NIHMSID #262189. **Senior/Corresponding author.**
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#### BOOKS AND BOOK CHAPTERS:

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#### SELECTED ABSTRACTS:

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5. Batrakova E.V., Haney M.J., Klyachko N.L., Zhao Y., and Kabanov A.V. “Extracellular vesicles as Drug Delivery Vehicles for Lysosomal Enzyme TPP1 to Treat Batten Disease” (2020) WORLD *Symposium*, Orlando, FL, February 10-13.
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  23. Batrakova E.V., Kim M.S., Haney M.J., Zhao Y., Mahajan V., Deygen I., Klyachko N.L., Inskoe E., Piroyan A., Sokolsky M., and Kabanov A.V., (2017) “Engineering Exosomes for Targeted Paclitaxel Delivery to Pulmonary Metastases”, Gordon’s Research Conference, Cancer Nanotechnology, West Dover, VT, June.
  24. Batrakova E.V., Kim M.S., Haney M.J., Zhao Y., Mahajan V., Deygen I., Klyachko N.L., and Kabanov A.V. (2017) “Exosome-mediated drug delivery for treatment of pulmonary metastases” 11th World Drug Delivery Summit, Baltimore, Maryland, USA, October 16-18.
  25. Batrakova E.V., Kim M.S., Haney M.J., Zhao Y., Deygen I., Klyachko N.L., and Kabanov A.V. (2017) “Using Exosomes for Drug Delivery”, In vitro Biology Meeting, Raleigh, NC, June.
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  30. Batrakova E.V., Kim M.S., Haney M.J., Zhao Y., and Kabanov A.V. (2016) “Autologous Macrophages as Active Biocompatible Drug Delivery vehicles for the Treatment of Neurodegenerative Disorders”, 3rd Annual Personalized Nanomedicine Symposium Miami, FL, May
  31. Batrakova E.V., Kim M.S., Haney M.J., Zhao Y., Gupta R., Mahajan V., Inskoe E., Piroyan A., Sokolsky M., Okolie O., Hingtgen S.D., Kabanov A.V., and (2016) “Development of exosome-encapsulated paclitaxel to overcome MDR in cancer cells”. American Society of Exosomes and Microvesicles (ASEMV) Annual Meeting, Pacific Beach, CA, October 20-24.
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  33. Batrakova E.V., Haney M.J., Klyachko N.L., Zhao Y., Gupta R., Plotnikova E.G., He Z., Patel T., Piroyan A., Sokolsky M., and Kabanov A.V., (2015) “Exosomes as Drug Delivery Vehicles for Parkinson’s Disease Therapy”, Annual Meeting American Society of Exosomes and Microvesicles (ISEV), Washington D.C., April 23-26.
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  54. Batrakova E.V., Haney M.J., Zhao Y., Klyachko N.L., Mosley R.L., Kabanov A.V., and Gendelman H.E. (2011) "Using Exosomes for Drug Transport in Macrophage-mediated Drug Delivery", *Conference for Exosomes and Microvesicles*, Orlando, FL, October 15-17.
  55. Batrakova E.V., Brynskikh A.M., Li S., Zhao Y., Mosley R.L., Kabanov A.V., and Gendelman H.E. (2010) "Polymer therapeutics for delivery of antioxidants in Parkinson's disease" *Symposium on Biomedical Polymers for Drug Delivery*, Salt Lake City, Utah, March 26-28.
  56. Batrakova E.V., Brynskikh A.M., Zhao Y., Li S., Mosley R.L., Boska M.D., Klyachko N.L., Kabanov A.V., and Gendelman H.E. (2010) "Cell-mediated Delivery of Catalase Nanoparticles to Treat Parkinson's Disease" *First World Conference on nanomedicine and Drug Delivery (WCN-2010)*, Kottayam, Kerala, India, April 16-18.
  57. Batrakova E.V., Brynskikh A.M., Li S., Mosley R. L., Kabanov A.V., and Gendelman H.E. (2010) "CNS Delivery of Antioxidants in Monocytes for Parkinson's Disease" 8<sup>th</sup> International; *Symposium on Polymer Therapeutics: From Laboratory to Clinical Practice*, Valencia, Spain, May 24-26.
  58. Luxenhofer R., Schulz A., Roques C., Li S., Bronich T.K., Batrakova E.V., Jordan R., Kabanov A.V. (2010) "Doubly-Amphiphilic poly(2-Oxazoline)s with Unusual Microenvironment as High-capacity Drug Delivery Systems" 8<sup>th</sup> International; *Symposium on Polymer Therapeutics: From Laboratory to Clinical Practice*, Valencia, Spain, May 24-26.
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  61. Batrakova E.V., Brynskikh A.M., Zhao Y., Haney M., Mosley R.L., Li S., Boska M.D., Klyachko N.L., Kabanov A.V., and Gendelman H.E. (2010) "Macrophages as Drug carriers for Antioxidant Enzymes in Parkinson's Disease" *Drug carriers in Medicine and Biology*, Gordon Research Conference, Waterville Valley, NH, August 15-20.
  62. E.V. Batrakova, A.M. Brynskikh, Y. Zhao, M. Haney, R.L. Mosley, S. Li, Boska M.D., Klyachko N.L., Kabanov A.V., and Gendelman H.E., (2010) "Cell-mediated drug delivery for Parkinson's disease therapy" 8<sup>th</sup> International Nanomedicine and Drug Delivery Symposium (NanoDDS), Omaha, NE, October 3-5.
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- Disease: Therapeutic Effect in vivo” NIH IDEa Central Region Conference, Oklahoma City, OK, May 28-29.
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  68. Manickam D.S., Klyachko N.L., Batrakova E.V., Bronich T.K. and Kabanov A.V. (2009) “Polyelectrolyte complexes of redox enzymes and block copolymers – physicochemical characterization and cellular uptake mechanisms” 7<sup>th</sup> International Nanomedicine and Drug Delivery Symposium (NanoDDS), Indianapolis, IN, October 4-5.
  69. Brynskikh A.M., Batrakova E.V., Gendelman H.E., Kabanov A.V. (2009) “Development of Antioxidant Nanozymes for Parkinson’s disease Therapy” 7<sup>th</sup> International Nanomedicine and Drug Delivery Symposium (NanoDDS), Indianapolis, IN, October 4-5.
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  71. Brynskikh A., Kabanov A.V., Howard E. Gendelman H.E., Batrakova E.V. (2008) Development of Antioxidant Nanozymes for Parkinson’s Disease Therapy, 6<sup>th</sup> International Nanomedicine and Drug Delivery Symposium (NanoDDS), Toronto, Canada.
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  73. Batrakova E.V., Brynskikh A.M., Li S., Reynolds A.D., Mosley R.L., Kabanov A.V., and Howard E. Gendelman H.E. (2008) “Building a Trojan Horse for Delivery of Therapeutic Peptides to the Brain” 5<sup>th</sup> Barriers on the CNS Gordon Research Conference, Tilton, NH.
  74. Erickson M.A., Batrakova E.V., Kabanov A.V., Vinogradov S., and Banks W.A (2008) “Transport of Superoxide Dismutase-nanozyme across the Blood-brain Barrier” 5<sup>th</sup> Barriers on the CNS Gordon Research Conference, Tilton, NH.
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  79. Batrakova E., Li S., Shlyakhtenko L., Reynolds A., Thomas M., Gendelman H.E., and Kabanov A. (2007) “Cell-mediated delivery of therapeutic polypeptides in nanoparticles across the BBB” International Symposium on Polymer Therapeutics, FU, Berlin.
  80. Batrakova E., Li S., Sharma A.K., Li Y., Boska M., Valery Yu. Alakhov V.Yu., and Kabanov A. (2007) “Mechanism of Pluronic P85 sensitization effects in MDR tumors in vivo” 6<sup>th</sup> International Symposium on Polymer Therapeutics, FU, Berlin.
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84. Zhang X., Batrkova E.V., and Kabanov A.V. (2007) "Effect of Pluronic P85 on Organic Anion Transport across the Blood Brain Barrier", 5<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Boston, MA.
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  115. Prabha S., Batrakova E., and Vinogradov S. (2000) Study of intracellular uptake of Pluronic P85 in drug resistant MCF7/ADR cell line. 32<sup>nd</sup> Annual Scientific Research meeting, June, Columbus, OH.
  116. Batrakova E., Li S., Alakhov V., Elmquist W., Miller D., and Kabanov A. (2000) Pluronic block copolymers for drug delivery to the brain. In Proceedings of 4<sup>th</sup> International Symposium on Polymer Therapeutics, London, England.
  117. Batrakova E.V., Li S., Alakhov V.Yu., and Kabanov A.V. (2000) Selective energy depletion and sensitization of multiple drug resistant cells by Pluronic block copolymers. Polym Prepr 41(2), 1639-1640.
  118. Vinogradov S., Batrakova E., and Kabanov A. (2000) Novel drug delivery systems: Nanogel networks.
  119. Kabanov A.V., Lemieux P., Vinogradov S.V., Nguyen H.-K., Batrakova E.V., Gebhardt, C.L., Ochietti B., Guerin N., and Alakhov V.Yu. (1999) Self-assembly and activity of polyplexes. In Structure

and Design of Synthetic Gene Carriers, UCSF Molecular Design Institute, San Francisco, CA, USA.

120. Batrakova E., Lee S., Miller D., and Kabanov A. (1998) Effects of Pluronic P85 on drug transport across blood brain and intestinal barriers. *PharmSci Suppl 1*, S-380; S-446.
121. Kabanov A.V., Lemieux P., Vinogradov S.V., Nguyen H.-K., Batrakova E.V., Ochietti B., Guerin N., and Alakhov V.Yu. (1998) Taking polycation gene delivery systems from in vitro to in vivo. *PharmSci Suppl 1*, S-604-605.
122. Kabanov A., Batrakova E.V., Miller D., and Alakhov V. (1997) Amphiphilic block copolymers in drug delivery. In Abstracts of Papers 214th ACS National Meeting, Part 2, Las Vegas, NV, COLL 0157.
123. Vinogradov S., Bronich T., Batrakova E., Miller D., and Kabanov A. (1997) Cationic block copolymers for delivery of phosphorothioate oligonucleotides. *Pharm Res 14*, S-641.
124. Batrakova E., Miller D., Alakhov V., and Kabanov A. (1997) Effects of polyoxyethylated surfactants on drug transport in blood-brain barrier. *Pharm Res 14*, S-221.
125. Alakhov V.Yu., Batrakova E.V., Dorodnich T., Li S., Venne A., and Kabanov A.V. (1996). Block copolymeric drug carriers: 1. Delivery of antineoplastic drugs. In Proceedings of 1st International Symposium on Polymer Therapeutics, London, England.
126. Batrakova E., Fontane M., Alakhov V., Miller D., and Kabanov A. (1996) Block copolymer drug carriers: 2. Multiple mechanisms for drug transport in brain endothelial cells. *Pharm Res 13*, S-214.
127. Alakhov V.Yu., Batrakova E.V., Klinsky E.Yu., Moskaleva E.Yu., and Kabanov A.V. (1995) Poly(oxyethylene)-poly(oxypropylene) block copolymer micelles as a delivery vehicle for cytotoxic drugs. Reversion of multiple drug resistance to carcinoma cells. In Abstracts of Seventh International Symposium on Recent Advances in Drug Delivery Systems, Salt Lake City, UT.

#### **SYMPOSIUM PRESENTATIONS:**

1. “Extracellular vesicles as Drug Delivery Vehicles for Lysosomal Enzyme TPP1 to Treat Batten Disease”, Invited talk at *WORLD Symposium*, Orlando, FL, February 2020.
2. “Trojan Horses of the 21<sup>st</sup> century: Targeted Delivery of Therapeutics in Macrophages to the Brain” Invited talk at the Center for Targeted Therapeutics and translational Nanomedicine (CT3N) Symposium, Philadelphia, PA, USA, December 2019.
3. “Exosomes as Drug Delivery System for Transport of Therapeutic Proteins to the Brain” Invited talk at Joint Life Sciences Forum, Sochi, Russia, October 2019.
4. “Macrophage-derived Extracellular Vesicles Target Inflamed Brain and Deliver Therapeutic Proteins for Treatment of Neurodegenerative Disorders” Invited talk at 25<sup>th</sup> Scientific Conference of the Society on Neuroimmune Pharmacology (SNIP), Portland, OR, USA, April 2019.
5. “Macrophage-derived Extracellular Vesicles Facilitate Brain Transport of Therapeutic Enzymes to Treat Neurodegenerative Disorders” Invited talk at NY Academy of Sciences conference; New York, NY, USA, February 2019.
6. “Extracellular vesicles as drug delivery vehicles for Potent Redox Enzyme Catalase to treat Parkinson’s disease” SfrBM 25th Annual Meeting, Chicago, IL, USA, November 2018.
7. “Macrophage-derived Extracellular Vesicles Facilitate Brain Transport of Therapeutic Enzymes for Lysosomal Storage Disease Therapy”, NCL 2018 Annual meeting, London, Great Brittan, September 2018.
8. “Development of EV-based drug formulations for treatment of neurodegenerative disorders”, Gordon’s Research Conference, Extracellular Vesicles, Grand Summit Hotel at Sunday River, Newry, ME, USA, August 2018.
9. “Engineering Macrophage-derived Exosomes for Therapeutic Protein Delivery to the Brain”, Controlled Release Society Annual Meeting & Exposition, New York, NY, USA, July 2018.
10. “Macrophage-derived Exosomes for targeted drug delivery to the brain” PsychoNeuroImmunology Research Society (PNIRS) 25<sup>th</sup> Annual Scientific Meeting, Miami Beach, FL, USA, June 2018.
11. “Exosomes as drug delivery vehicles for therapeutic proteins to the brain”, International Society of Extracellular vesicles Meeting (ISEV2018), Barcelona, Spain, May 2018.
12. “Engineering Exosomes for Targeted Paclitaxel Delivery to Pulmonary Metastases”, Gordon’s Research Conference, Cancer Nanotechnology, USA, June 2017.
13. “Harnessing the Power of Extracellular Vesicles for Therapy of Brain Infectious Diseases”, Extracellular

Vesicles and Infections, Potomac, USA, June 2017.

14. "Engineering Exosomes to Deliver a Potent Redox Enzyme Catalase to the Brain", Gordon Research Conference on Oxidative Stress & Disease (GRC), Lucca (Barga) Italy, March 2017.
15. "Exosomes as drug delivery vehicles", Moscow International Biotechnology Congress, Russia, February 2017.
16. "Development of exosome-encapsulated paclitaxel to overcome MDR in cancer cells". Annual Meeting American Society of Exosomes and Microvesicles (ASEMV) Pacific Beach, CA, USA, October 2016.
17. "Autologous Macrophages as Active Biocompatible Drug Delivery vehicles for the Treatment of Neurodegenerative Disorders", third Annual Personalized Nanomedicine Symposium Miami, FL, USA, May 2016.
18. "Cell-mediated Gene therapy for CNS Disorders", Batten Disease: 2016 Update of Translational Research for Management of INCL/LINCL, Bethesda, MD, USA, March 2016.
19. "Exosomes as Drug Delivery Vehicles for Parkinson's Disease Therapy", Annual Meeting International Society of Exosomes and Microvesicles (ISEV), Washington D.C., USA, April 2015.
20. "Cell-mediated Delivery of Redox Enzymes for Treatment of Neurodegenerative Disorders", 17<sup>th</sup> Biannual Meeting of Society for Free Radical Research International (FSRRI), Kyoto, Japan, March 2014.
21. "Carriers that Break Barriers" ASNM 4<sup>th</sup> Annual Meeting, Rockville, MD, USA, March 2014.
22. "Cell-mediated Delivery of Nanoformulated Antioxidants for Treatment of Neurodegenerative Disorders", 5<sup>th</sup> Annual Nanotechnology for Health Care Conference, Little Rock, AR, USA, April 2014.
23. "Carriers that Break Barriers", International Congress on Natural Sciences and Engineering, Kyoto, Japan, in May 2014, a keynote speaker.
24. "Treatment of Neurological Disorders with Nanoformulated Antioxidants Delivered to the Brain in Living Cells", ICEAS, Tokyo, Japan, 2013.
25. "Carriers that break barriers", Biocatalysis, Moscow, Russia, 2013.
26. "Blood-Borne Macrophages Hitchhike Endosome Networks for Brain Delivery of Antioxidant, Catalase", ASEMV, Orlando, Florida, USA, 2013.
27. "Living Cells as Drug Delivery Vehicles for Transport of Nanoformulated Antioxidants to the Brain", Conference for Nanoscience, Lanzarote, Spain, 2012.
28. "Cells for Drug Delivery of Nanoformulated Antioxidants to the Brain", BU Symposium on "Therapeutic Innovation: The Next Generation of Discovery", Boston, MA, USA, 2012.
29. "Living cells as drug delivery vehicles for CNS delivery", Southeastern Regional Meeting of the ACS (SERMACS), Raleigh, NC, USA, 2012.
30. "Using Living Cells for Targeted Drug Transport across Blood Brain Barrier", Pharmaceuticals and Novel Drug delivery Systems, Las Vegas, USA 2011.
31. "Development of Nanoformulations of Therapeutic Proteins for Brain Delivery in Macrophages", First International Conference on Small Science, Sydney, Australia, 2011.
32. "Macrophages as Trojan Horses for Brain Delivery of Redox Enzymes", 2<sup>nd</sup> International School on Nanomaterials and Nanotechnology in Living Systems, Safety and nanomedicine, Moscow, Russia in 2011.
33. "Using Exosomes for Drug Transport in Macrophage-mediated Drug Delivery", Conference for Exosomes and Microvesicles, Orlando, FL, USA 2011.
34. "Cell-mediated Delivery of Catalase Nanoparticles to Treat Parkinson's Disease" First World Conference on nanomedicine and Drug Delivery (WCN-2010), Kottayam, Kerala, India, 2010.
35. "Development of Cell-mediated Drug Delivery of Antioxidants for Parkinson's Disease Therapy" First Annual World Congress of NeuroTalk-2010, Singapore, 2010.
36. "CNS Delivery of Antioxidants in Monocytes for Parkinson's Disease" 8<sup>th</sup> International; Symposium on Polymer Therapeutics: From Laboratory to Clinical Practice, Valencia, Spain, 2010.
37. "Therapeutic Proteins Delivered by Monocytes to the Brain in Parkinson's Disease" Protein & Peptide Conference-2009, Seoul, Korea, 2009.
38. "A new polymer-based nanoformulation for overcoming multi-drug resistance in cancer" 2<sup>nd</sup> World Cancer Congress, Beijing, China, 2009.
39. "Living Cells as Drug Delivery Vehicles for Protein Transport to the Brain" 1st International Summer School on Nanomaterials and Nanotechnology in Living Systems, Moscow, Russia, 2009.

40. "A Macrophage-based Delivery System of Antioxidant Enzymes for Parkinson's disease: Therapeutic Effect in vivo" NIH IDeA Central Region Conference, Oklahoma City, OK, USA, 2009.
41. "A new polymer-based nanoformulation for overcoming multi-drug resistance in cancer" 2<sup>nd</sup> World Cancer Congress, Beijing, China, 2009.
42. "Living Cells as Drug Delivery Vehicles for Protein Transport to the Brain" 1st International Summer School on Nanomaterials and Nanotechnology in Living Systems, Moscow, Russia, 2009.
43. "CNS Delivery of Therapeutic Proteins in Living Cells" 3rd BBBB-Bosphorus International Conference on Pharmaceutical Sciences, Turkey, Antalya, 2009.
44. "Monocytes for Delivery of Antioxidants in Parkinson's Disease" International Symposium on Polymer Therapeutics, 7<sup>th</sup> International Symposium on Polymer Therapeutics, Spain, Valencia, 2008.
45. "Nanomedicine: from Bench to Bedside" 14<sup>th</sup> International Pharmaceutical Technology Symposium, Turkey, Antalya, 2008.
46. "Cell-mediated delivery of therapeutic polypeptides in nanoparticles across the BBB" International Symposium on Polymer Therapeutics, FU, Berlin, 2007.
47. "Overcoming MDR using Block Copolymers" AAPS Annual Meeting and Exposition, San Diego, CA, USA, 2007.
48. "Nanozymes" for cell-mediated delivery across the Blood-Brain Barrier". 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE, USA, 2006.
49. "Effects of Pluronic P85 on GLUT-1 and MTC1 Transporters in the Blood Brain Barrier" on Gordon Research Conferences, Tilton, NH, USA, 2004.
50. "Pluronic Block Copolymers as a Novel Drug Delivery System for Overcoming Drug Resistance in Cancer" on Gordon Research Conference "Drug Carriers in Medicine & Biology", Big Sky, MT, USA, 2004.
51. "Mechanism of Pluronic effect on P-glycoprotein efflux system in blood brain barrier" on 5<sup>th</sup> International Symposium on Polymer Therapeutics, The Welsh school of Pharmacy, Cardiff, UK, 2002.
52. "Selective energy depletion and sensitization of multiple drug resistant cells by Pluronic block copolymers" on ACS meeting in Washington, DC, USA, 2000.
53. "Effects of polyoxyethylated surfactants on drug transport in blood-brain barrier" on AAPS Annual Meeting in Boston, MA, USA, 1997.

#### **RESEARCH SEMINARS:**

1. "Cell-mediated and exosome-mediated drug delivery systems" Carolina Cancer Nanotechnology Training Program (CCNTP T32) Seminar Series, UNC at Chapel Hill, February 2021.
2. "Biocompatible Nanocarriers, Exosomes, for Drug Delivery to the Brain" Carolina Cancer Nanotechnology Training Program (CCNTP T32) Seminar Series, UNC at Chapel Hill, October 2020.
3. "Exosomes as Drug Delivery System" Catalyst Seminar series, UNC at Chapel Hill, June 2020.
4. "Back to Nature: Harnessing the Power of Exosomes for Anticancer Therapy" Marsico Lung Institute Seminar Series, College of Medicine, UNC at Chapel Hill, September 2019.
5. "Macrophage- and exosome-based drug delivery systems to the CNS" The Joint Seminar Series in Chemical Biology and Bioorganic Chemistry, Eshelman School of Pharmacy, UNC, August 2019.
6. "Engineering drug delivery systems by means of macrophages and macrophage-derived exosomes for treatment of neurodegenerative disorders" Seminar series at Johns Hopkins University, School of Medicine, Baltimore, MD, May 2019.
7. "Cell-mediated and Exosome-mediated Drug Delivery Systems" Invited lecture at Moscow M.V. Lomonosov State University, Moscow, Russia, March 2019.
8. "Autologous Macrophages as Active Biocompatible Drug Delivery Vehicles for the Treatment of Neurodegenerative Disorders" Seminar series at Rush University, Chicago, IL, November 2018.
9. "Proteins and Peptides Drug Delivery" Invited lecture at Moscow M.V. Lomonosov State University, Moscow, Russia, October 2018.
10. "Back to Nature: Extracellular Vesicles for Drug Delivery", Invited lecture at Anatomy & Cell Biology Seminar Series, Western University, London, Canada, September 2018.
11. "Cell-mediated and exosome-mediated drug delivery", Invited lecture at Moscow M.V. Lomonosov State University, Russia, March 2018.

12. "Translational Applications in Exosome Research: From Biomarker Discovery to Drug Delivery", Science Webinar Series, Science/AAAS Custom Publishing Office, April 2017.
11. "Cell-mediated Drug Delivery", Invited lecture at Moscow M.V. Lomonosov State University, Russia, April 2017.
12. "Exosome-mediated Delivery of Therapeutic Proteins to the Brain", Seminar series at George Mason University, VA, April 2017.
13. "Exosomes for Drug Delivery to the Brain", The Nanoscale Science Program at Seminar series at Chemistry Department, UNC-Charlotte, NC, February 2017.
14. "Harnessing the Power of Exosomes for Drug Delivery", CNDD Colloquium, September 2015.
15. "Carriers that Break Barriers", MOPH division seminar program, Omaha, NE, February 2014.
16. "Trojan Horses of 21<sup>st</sup> Century: Delivery of Therapeutics in Macrophages", research seminar for UNMC Eppley Cancer Center, CGMR Program, Omaha, NE, March 2012.
17. "Cell-mediated Drug Delivery", Surgery division research forum, UNMC, Omaha, April 2012.
18. "New Developments in CNS Drug Delivery", Invited lectures, Moscow State University, Russia, November 2012.
19. "Living Cells as Delivery Vehicles Antioxidant Enzymes in Parkinson's Disease" Department of Pharmaceutical Sciences seminar, UNMC, Omaha, NE, January 2010.
20. "Cell-cell Interactions and Nanoparticles Transfer in Macrophage-mediated Drug Delivery. A love story", COP, UNMC, Omaha, NE, October 2010.
21. "Cell-mediated Drug Delivery for Parkinson's Disease Therapy", research seminar for Department of Internal Medicine, division of Geriatrics and Gerontology, UNMC, Omaha, December 2010.
22. "Cell-Mediated Transport of Nanozymes across the Blood-Brain Barrier", American Chemical Society Seminar, UNMC, Omaha, May 2008.
23. "Nanozymes" for Cell-mediated Delivery across the Blood-brain Barrier", Department of Anatomy and Physiology, Kansas State University, Manhattan, KS, April 2007.
24. "Polymer Genomics: Shifting Drug Delivery paradigm", 37<sup>th</sup> Annual Higuchi Research Seminar, Dept. of Pharm. Chemistry, University of Kansas, May 2004.
25. "Kinetic Considerations of Pluronic Effects on Drug Efflux Transporters", 36<sup>th</sup> Annual Higuchi Research Seminar, Dept. of Pharmaceutical Chemistry, University of Kansas, May 2003.
26. "Kinetic Considerations of Pluronic Effects on Drug Efflux transporters", College of Pharmacy, UNMC, Omaha, NE, May 2003.
27. "Pluronic Interactions in MDR Cancer Cells and Blood Brain Barrier", College of Pharmacy, UNMC, Omaha, NE, March 2000.
28. "Amphiphilic Block Copolymers in Drug Delivery", College of Pharmacy, UNMC, Omaha, NE, October 1998.

## **PATENTS:**

### US Patents:

1. "BIOLOGICAL AGENT-EXOSOME COMPOSITIONS AND USES THEREOF" U.S. Batrakova E.V., Kabanov A.V., Haney M., M. Sokolsky. National Phase Patent Application No. US 2020/0297631 A1, September 2020.
2. "Cellular Backpacks for Drug Delivery Across the Blood-Brain Barrier", Batrakova E.V., Cohen R.E., Haney M.J., Klyachko N.L., Polak R., Rubner M.F., and Zhao Y. Patent M.I.T. Case # 18547J, February 2020.
3. "Synthetically functionalized living cells for targeted drug delivery", Polak R., Cohen R.E., Rubner M.F., Batrakova E.V., Haney M.J., Klyachko N.L., Zhao Y. US Patent application #15/458,925, MIT, December 2019.
4. "Delivery of therapeutic proteins to the brain by means of extracellular vesicles (EVs) and methods thereof", Batrakova E.V., Kabanov A.V., Haney M.J., Zhao Y. New Invention Notification (NIN) #19-0177, UNC, June 2019.
5. "BIOLOGICAL AGENT-EXOSOME COMPOSITIONS AND USES THEREOF" U.S. Batrakova E.V., Kabanov A.V., Haney M., M. Sokolsky. National Phase Patent Application No. 16/089,833, filed September

28, 2018.

6. "Compositions for protein delivery and methods of use thereof", Kabanov A.V. Bronich T.K., Batrakova E.V., Gendelman, H.E., US application #16/021,537, filed on June 28, 2018.
7. "Biological Agent-exosome Compositions and Uses thereof", Batrakova E.V., Kabanov A.V., Yuan, D., Haney M.J. U.S. PCT Application No. PCT/US2017/024931; filed March 30, 2017. International application was published by WIPO on October 5, 2017 under publication number WO 2017/173034.
8. "Nucleic acids (e.g. DNA) compositions of exosomes and methods thereof", Kabanov A.V., Batrakova E.V., and Haney M.J. NIN OTD: 16-0112, March 2016.
9. "Biological agent compositions of exosomes and methods thereof", Batrakova E.V., Kabanov A.V., Yuan, D., Haney M.J. U.S. Provisional Patent Application No. 62/315,389; filed March 30, 2016
10. "Synthetically Functionalized Living cells for targeted Drug delivery", Polak R., Cohn R., Rubner M., Batrakova E.V., Haney M., Klyachko N.L., Zhao Y. US patent application, Case No.: 18547, March 2016.
11. "Compositions and Methods for Gene Therapy", Kabanov A.V., Batrakova E.V., Mahijan V., Haney M. US patent extension, Docket #12084PCT, No. PCT/US13/040577, 2014.
12. "Compositions and Methods for Gene Therapy", Kabanov A.V., Batrakova E.V., Mahijan V., Haney M. US patent, Docket #12084PCT, No. PCT/US13/040577, 2013.
13. "Drug-loaded exosomes released from inflammatory cells for treatment of neurodegenerative disorders", Batrakova E.V., Kabanov A.V., Haney M.J., Zhao Y. Provisional patent filing, UNC, 2013.
14. "Using inflammatory cells for transfection of neurons, brain microvessel endothelial cells (BMVEC), and astrocytes for treatment of neurodegenerative disorders", Batrakova E.V., Kabanov A.V., New Invention Notification (NIN) #11088, UNMC, 2012.
15. "Amphiphilic Polymer-Protein Conjugates and Methods Thereof", Batrakova, E.V., Vinogradov, S.V., Kabanov A.V. US Patent #8017151 A 2011.
16. "Treatment of Neurodegenerative Disorders", Batrakova E.V., Kabanov A.V., Gendelman, HE., US Patent #07006 A 2007.
17. "Compositions for Protein Delivery and Methods of Use Thereof", Kabanov A.V. Bronich T.K., Batrakova E.V., Gendelman, H.E., US Patent #07015 A 2007.
18. "Amphiphilic Polymer-Protein Conjugates and Methods of Use Thereof" Batrakova, E.V.; Vinogradov, S.V.; Kabanov A.V. US Patent #63203 A 2004.
19. "Copolymer compositions for oral delivery" Kabanov, A.V.; Alakhov, V.Y.; Batrakova, E.V. US Patent #6387406 A 2002/05-14
20. "Copolymer compositions for oral delivery" Kabanov, A.V.; Alakhov, V.Yu.; Batrakova, E.V. US Patent #6277410 A 2001/08-21
21. "Compositions for targeting biological agents" Kabanov, A.V.; Alakhov, V.Yu; Chekhonin, V.P.; Batrakova, E.V.; Kabanov, V.A. US Patent # 6153193 A 2000/11-28

#### PCT and Foreign patents:

22. "Pharmaceutical compositions containing a biological agent and a poly (oxyethylene)-poly (oxypropylene) block copolymer" Kabanov, A.V.; Alakhov, V.Y.; Batrakova, E.V. WO 99-US2538 1999/0205
23. "Polyether block copolymer micellar compositions for targeting biological agents" Kabanov, A.V.; Alakhov, V.Yu.; Chekhonin, V.P.; Batrakova, E.V.; Kabanov, V.A. WO 96/40056 A1 1996/1219
24. "Preparation of aqueous dispersions of polymer vesicles from dialkylammonium halides" Zubov, V.P.; Egorov, V.V.; Batrakova, E.V.; Ksenofontova, O.B. SU Patent # 1523550 A1 1989/11-23

#### **F. TEACHING ACTIVITIES:**

##### **a. Lectures in Team-taught Courses for the past ten years:**

1. DPMP 738 "Nanomedicine", UNC, 2021 (Spring).
2. DPMP 738 "Nanomedicine", UNC, 2020 (Spring).
3. BME 590 "Special Topics in Biomedical Engineering: Advanced Drug Delivery", NC State University, 2020 (Spring).
4. BIOC/PHCO 745 "Intercellular Signaling in Development and Disease", UNC, 2020 (Spring).

5. RASP Honors, UNC, 2020 (Spring).
6. Honors Research Carolina, UNC, 2020 (Spring).
7. BIOL 395/495/395H, "Undergraduate Research in Biology", UNC, 2019 (Fall).
8. DPMP 738, "Nanomedicine", UNC, 2019 (Spring).
9. BIOL 395/495/395H, "Undergraduate Research in Biology", 2019 (Spring).
10. PHCY 726, "RASP III", 2019 (Spring).
11. BIOC/PHCO 745, "Intercellular Signaling in Development and disease", 2018 (Spring).
12. MOPH 862 "Advanced Physical Pharmacy", 2018 (Spring).
13. DPMP 868 "Advanced Physical Pharmacy", 2017 (Fall).
14. BIOC/PHCO 740-745 "Intercellular Signaling in Development and Disease", 2017 (Spring).
15. MOPH 862 "Advanced Physical Pharmacy", 2017 (Spring).
16. PHRS 899 Seminar, UNC Eshelman School of Pharmacy, 2016 (Fall).
17. MOPH 868 "Advances in Drug Delivery and Nanomedicine", UNC Eshelman School of Pharmacy, 2016 (Fall).
18. PHCY 512 "Pharmaceutics and Drug Delivery Systems", UNC Eshelman School of Pharmacy, 2016 (Spring)
19. MOPH 862 "Advanced Physical Pharmacy", UNC Eshelman School of Pharmacy, 2016 (Spring)
20. MOPH 864 "Advances in Drug Delivery", UNC Eshelman School of Pharmacy, 2015 (Fall).
21. PHRS 899 Seminar, UNC Eshelman School of Pharmacy, Course Director, 2015 (Spring).
22. MOPH 738 "Nanomedicine", UNC Eshelman School of Pharmacy, 2014 (Fall).
23. MOPH 864 "Advances in Drug Delivery", UNC Eshelman School of Pharmacy, 2014 (Fall).
24. PHCY 410 Basic Pharmaceutics I, UNC Eshelman School of Pharmacy, 2013, 2014 (Fall).
25. MOPH 864 "Advances in Drug Delivery", UNC Eshelman School of Pharmacy, 2013 (Fall).
26. MOPH 738 "Nanomedicine", UNC Eshelman School of Pharmacy, 2012 (Fall).

**b. Mentorship/Students Supervision:**

Graduate supervisory/advisory committees:

Amit Sharma	2004-2007
Zagit Gaymalov	2005-2010
Gaurav Sahay	2005-2010
Xiang Yi	2005-2010
Mark Ueda	2009-2011
Daria Alakhova	2004-2012
Anna Brynskikh	2007-2012
Yi Zhao	2008-2013
Erin G. Rosenbaugh	2009-2013
Poornima Suresh	2011-2013
Inmaculada Sánchez	2013 (member of
PhD thesis examination panel)	
James Huckle	2013-2014
Michaela L. Eggen	2011-2015
Gang Zhang	2011-2015
Zhijian He	2013-2015
Yuan, Dongfen	2014-2017
Jiang, Yuhang	2014-2016
Seo, Youn Gee	2014-2019
Rahhal, Tojan Bassam	2014-2016
Wan, Xiaomeng	2015-2018
Lei Miao	2015-2016
Srinivas, Nithya	2015-2018
Yeon Soo Jin	2017-2020
James Fay	2018-present
Ana Cartaya	2019-present

Undergraduate visiting/summer students/unpaid interns:

Song Mu	1997
Haiquin Dai	1999
Swayam Prabha	1999-2000
Jason Jokerst	2003-2004
Aaron Mayo	2003-2004
Daria Alakhova	2004-2005
Stephanie L. Booth	2009-2010
Kelvin Chin	2011
Muna Pokhrel	2011
Tatyana Kasperovich	2011
Eli Inscoe	2013-2014
Richa Gupta	2013-2014
Phi Phua	2014-2015
Corey Pahel-Short	2015
Joseph Zhao	2015
Lena Cohen	2016
Oyesola Popoola	2017
Halle Lutz	2017
Carolyn Reuland	2017-2018*
Yeon Soo Jin	2017-2020 (RASP student)
Karlie Tong	2019-2020
Sam Michael Li	2018-present
Cami Arzt	2019-present
*jointly with Dr. F. Church	

Graduate Students:

Jian Zhu	2004*
Amit Sharma	2004-2007*
Gaurav Sahay	2005-2010*
Xiang Yi	2005-2010*
Michelle Gasko	2007-2008*
Mark Ueda	2009-2011*
Daria Alakhova	2006-2011*
Anna Brynskikh	2007-2012*
Yi Zhao	2008-2013*
Poornima Suresh	2010-2013*
Myung Soo Kim	2013-2016
James Fay	2017-present*
*jointly with Dr. A.V. Kabanov	

Rotation Graduate Students:

Chaitali Passey	2008
Rajesh R. Wakaskar	2009
Hardeep S. Oberoi	2007
Emily B. Harrison	2011-2012
John P. Bohnsack	2012
Tojan Rahhal	2012-2013
Tejash Patel	2012-2013
Myung Soo Kim	2012-2013



Goodwin, Tyler Jay	2013-2014
Erin Wilson	2013
Olga Uvarov	2015
Yue Wang	2019

Postdoctoral/Visiting Scientists:

Li Zhang	2004-2005
Mirjam Clemens-Hemmelmann	2012
Fiona Cooke	2015
Natalia Klyachko	2012-2018
Roberta Polak	2015

Research Technologists:

Shu Li	1998-2011
Yulili Li	2002-2005
Yuling Zhao	2009-present
Matthew Haney	2010-present

**G. GRANTS:**

1R01NS102412-01A1 (E. Batrakova) 06/01/18 – 05/31/23 40% effort  
 NIH / NINDS \$1,950,000  
 “Cell-based Platform for Gene Delivery to the Brain”  
 Principal Investigator  
 ACTIVE

1R01NS112019-01A1 (E. Batrakova) 07/01/19 – 06/31/24 40% effort  
 NIH / NINDS \$1,979,628  
 “Extracellular Vesicles for CNS Delivery of Therapeutic Enzymes to Treat Lysosomal Storage Disorders”  
 Principal Investigator  
 ACTIVE

MJF 19-5960 (E. Batrakova) 01/01/20 – 05/31/2021 3% effort  
 M.J. Fox Foundation for Parkinson’s Research \$297,000  
 “Bio-inspired Nanoformulation of GDNF for Treatment of Parkinson's Disease (PD)”  
 Principal Investigator  
 ACTIVE

1R01 (U. Roy) 09/01/2020 – 08/31/2025 5% effort  
 NIH/NIDA \$416,594  
 “A targeted anti-HIV drug delivery to the GALT”  
 MPI  
 ACTIVE

University cancer Research Fund (UCRF) (E. Batrakova)  
 UNC Lineberger Comprehensive Cancer Center \$11,394 6% effort  
 Theme 3: “Development of new cancer treatments”  
 Co-Investigator  
 ACTIVE

1R21MH118985 (N. El-Hage) 03/01/19 – 04/30/21 3% effort

NIH / NIDA	\$39,000	
“Develop and evaluate efficacy of nanoformulated siBeclin1 delivered intranasally to eliminate HIV in brain”		
Co-Investigator		
ACTIVE		
20-0916 (E. Batrakova)	01/01/20 – 03/31/21	2% effort
Aruna Biomedical	\$28,378	
“Loading fluorescently labeled catalase into neural stem cell derived exosomes <i>via</i> saponin permeabilization and sonication and the characterization, quantification and neural protective effects of the catalase-loaded exosomes”		
Principal Investigator		
ACTIVE		
A20-0944 (E. Batrakova)	01/01/20 – 12/31/20	3%
BDSRA	\$40,000	
“Novel Nanoformulation of TPP1 for Treatment of LINCL Batten Disease”		
Principal Investigator		
ACTIVE		
550KR242035 (J. Taylor)	07/01/20 – 07/01/21	1%
NC TRaCS	\$50,000	
“Pre-clinical evaluation of a novel therapeutic target for Parkinson's disease”		
Co-Investigator		
ACTIVE		
UNC RX03812420 (A. Kabanov)	06/01/18 – 06/01/20	1% effort
Eshelman Institute for Innovation (EII)	\$200,000	
“Nanoparticle delivery of Cas9 and therapeutic gRNAs to the brain”		
Co-Investigator		
ACTIVE		
PA2019TierA-ID33 (Monash-UNC)	01/12/19-10/30/21	2% effort
PharmAlliance	\$63,720	
“Screening of EVs as natural nanocarriers using a B <sup>3</sup> -chip”		
Co-Investigator		
ACTIVE		
UNC 38-124 (E. Batrakova)	06/01/18 – 08/30/21	5% effort
Eshelman Institute for Innovation (EII)	\$50,000	
“Developing Exosome-based Delivery of TPP1 for Batten Disease Therapy”		
Principal Investigator		
ACTIVE		
RR172267 (S. Whitehead)	11/01/18-03/31/20	2% effort
Canada 2017: AD-Related Diseases program	\$300,000	
“Evaluating the neuroprotective potential of CAT-SKL in a pre-clinical model of AD”		
Collaborator		
COMPLETED		
RG-1607-25207 (G. Matsushima)	4/1/2017-3/31/2020	5% effort
NIH / NMSS	\$381,530	

“Function of microglia during remyelination”

Co-Investigator

COMPLETED

UNC RX03712415 (A. Kabanov) 06/01/17 – 01/01/20 1% effort

Eshelman Institute for Innovation (EII) \$375,000

“Systemic Targeting of Mononuclear Phagocytes for Parkinson’s Disease Gene Therapy” Co-Investigator

COMPLETED

EUP 17-4676 (E. Batrakova) 10/01/17 – 03/31/19 25% effort

Elsa U Pardee Foundation \$159,024

“Targeting the Triple Negative Breast Cancer with Paclitaxel-loaded Biomimetic Nanovesicles, Exosomes”

Principal Investigator

COMPLETED

1R01 NS057748-01A2 (E. Batrakova) 09/29/08 – 08/31/13 35% effort

NIH / NINDS \$1,250,000

“Inflammatory Cells for Transport of Therapeutic Polypeptides across the Blood Brain Barrier”

Principal Investigator

COMPLETED

UNC EII29-201 (E. Batrakova) 06/01/16 – 06/01/17 1% effort

Eshelman Institute for Innovation (EII) \$50,000

“Engineering 3D models of cancer metastasis with pro-inflammatory microenvironment for cancer immunotherapy”

Principal Investigator

COMPLETED

UNC TEG15-4849 (E. Batrakova) 09/01/15 – 06/30/17 5% effort

NC Biotechnology Center \$50,000

“Use of Autologous Macrophages for Sustained Delivery of GDNF as Treatment of Parkinson’s Disease”

Principal Investigator

COMPLETED

Oldfield Alzheimer’s Research Fund Award 06/01/10 – 06/01/11 5% effort

UNMC (E. Batrakova) \$20,000

Principal Investigator

COMPLETED

1P20 RR021937-01A2 (A. Kabanov) 09/26/08 – 06/30/13 25 % effort

NIH / NCRR \$1,473,976

COBRE: “Nebraska Center for Nanomedicine”

Project Leader

COMPLETED

2 R01 NS051334 (A. Kabanov) 01/01/10 – 03/31/16 5% effort

NIH / NINDS \$1,750,000

“Polypeptide modification for enhanced brain delivery”

Co-Investigator

COMPLETED

W81XWH11-1-0700 (A. Kabanov)	08/29/11 – 08/28/14	5% effort
DoD	\$190,794,000	
“Integrate Immune, Biomaterial & Stem Cell Platform for Neuroprotection in Battlefield Injuries”		
Co-Investigator		
COMPLETED		
2RO1 CA89225 (A. Kabanov)	02/01/08 – 01/31/12	5% effort
NIH / NCI	\$1,250,000	
"Interactions of Pluronic block copolymers in drug resistant cancer"		
Co-Investigator		
COMPLETED		
1R43GM062054-01 (F. Wang)	08/01/00 – 01/31/01	25% effort
NIH / NCI	\$99,961	
“Star polymer unimolecular micelles for drug delivery”		
Co-Investigator		
COMPLETED		
NCI SBIR Phase II CA-221487 (R. Gupta)	01/26/17 – 08/31/19	1% effort
NIH / NIDS	\$200,000	
“Exosomal Drug Delivery”		
Paid Consultant		
COMPLETED		
UNC RX03812408 (A. Kabanov)	06/01/18 – 05/31/19	1% effort
Eshelman Institute for Innovation (EII)	\$50,000	
Brain Drug Delivery: Optimizing miR-29 Nanoformulation for Neuroprotection”		
Co-Investigator		
COMPLETED		

#### **H. PROFESSIONAL SERVICE:**

1. BBSP candidates’ interviews, UNC at Chapel Hill, Eshelman School of Pharmacy, January 2020.
2. MD-PhD candidate interviews, UNC at Chapel Hill, School of Medicine, January 2020.
3. BBSP Preview Weekend Interviews, UNC at Chapel Hill, Eshelman School of Pharmacy, September 2019.
4. Seminar coordinator at the Center for Nanotechnology in Drug Delivery (CNDD) at North Carolina University (UNC) at Chapel Hill, Eshelman School of Pharmacy, 2019 (Spring, Fall).
5. Committee member of the Honors Program, UNC, School of Pharmacy, 2018 (Spring).
6. Seminar coordinator at the Center for Nanotechnology in Drug Delivery (CNDD) at North Carolina University (UNC) at Chapel Hill, Eshelman School of Pharmacy, 2018 (Spring, Fall).
7. Committee member of the Honors Program, UNC, School of Pharmacy, 2017 (Spring, Fall).
8. Committee member of the Honors Program, UNC, School of Pharmacy, 2016 (Spring, Fall).
9. MOPH Prospective Graduate Student Interviews, January 2015
10. Member of a search committee for Research Associate position, February 2015.
11. Committee member of the Honors Program, UNC, School of Pharmacy, 2015 (Spring, Fall).
12. BBSP Prospective Graduate Student Interviews, February 2015
13. Member of a search committee for a Research Associate position, Spring 2015.
14. Member of a search committee for a Research Specialist at the UNC Center for Nanotechnology in Drug Delivery (CNDD), Fall 2015.
15. MOPH Prospective Graduate Student Interviews, January 2014
16. BBSP Prospective Graduate Student Interviews, February 2014
17. Committee member of the Honors Program, UNC, School of Pharmacy, 2014 (Spring, Fall).

18. Judge of Catalent Institute-AAPS Academic Competition, April 2014.
19. Member of the Committee to Review the Governance Document of Graduate Program, September 2014.
20. Committee member of the Honors Program, UNC, School of Pharmacy, 2013 (Fall).
21. Chair of search committee for recruiting a Research Assistant Professor, 2013 (Fall).
22. Member of UNC Eshelman School of Pharmacy Technology and Pedagogy (TAP) sub-committee, 2012.
23. Chair, Pharmaceutical Sciences Graduate Program (PSGP) Committee, 2011-2012.
24. Member of UNMC Graduate Council, 2011-2012.

#### **EDITORIAL DUTIES AND REVIEW PANELS:**

##### **Ad Hoc Reviewer:**

1. AAPS PharmSciTech
2. ACCR Review Journal of Chemistry
3. ACS Nano
4. Acta Biomaterialia
5. Acta Pharmaceutica Sinica
6. Advanced Drug Delivery
7. Advances Sciences
8. American Journal of Drug Delivery
9. Bentham Science Publishers
10. Biochemistry
11. Biochemical Pharmacology
12. Biomacromolecules
13. Biomaterials
14. Brain, Behavior, and Immunity
15. Cancers
16. Critical Reviews™ in Therapeutic Drug Carrier Systems
17. Current Pharmaceutical Design
18. Developmental neuroscience
19. Drug Targeting and Delivery
20. Drug DeliveryExp. Biology and Medicine
21. Hundai Publishing Corporation
22. Journal of Controlled Release
23. Journal of Drug Targeting
24. Journal of Extracellular Vesicles
25. Journal of Neuroimmune Pharmacology
26. Journal of Pharmaceutical Science
27. Journal of Pharmacy & Pharmaceutical Sciences
28. Langmuir
29. Life Sciences
30. Macromolecule Bioscience
31. Molecular Pharmaceutics
32. Molecular Therapy
33. Movement Disorders
34. Nanomedicine (London)
35. Nature Communications
36. Neurotherapeutics
37. Neuroscience Letters

38. Peptides
39. Pharmaceuticals
40. Pharmaceutical Research
41. PlosONE
42. Scientific Reports
43. Therapeutic delivery
44. Wiley Interdisciplinary Reviews: Nanomedicine

**Editorial Board Member:**

45. Nanomedicine: Nanotechnology, Biology, and Medicine (Elsevier)
46. Journal of Bioanalytical Techniques
47. Mathews Journal of Cancer Science
48. Journal of Drug Delivery
49. Journal of Clinical Pharmacology (JCP)
50. Alzheimer's and Parkinsonism: Research Therapy
51. International Journal of Neurodegenerative Disorders
52. Pharmaceuticals

**GRANT REVIEW AND STUDY SECTIONS:**

1. Grant reviewer on Special Emphasis Panel/Scientific Review Group ZRG1 BST-R (10), "Small Business: Biomaterials, Delivery, and Nanotechnology" March 2021.
2. Grant reviewer on Special Emphasis Panel/Scientific Review Group 2020/01 ZRG1 F09B-M (20) L meeting "Oncology" November 2020.
3. Grant reviewer on Special Emphasis Panel/Scientific Review Group 2020/10 ZRG1 F09B-M (20) L meeting "Oncology" July 2020.
4. Grant reviewer Special Emphasis Panel/Scientific Review Group 2020/05 ZRG1 MDCN-M (91) S, "The Blood-Brain Barrier, Neurovascular System and CNS Therapeutics", March 2020.
5. Grant reviewer to 2020/05 Gene and Drug Delivery (GDD) Study Section Panel/Scientific Review Group, February 2020.
6. Grant reviewer to 2020/01 ZRG1 F09B-M (20) L Special Emphasis Oncological Sciences Fellowship Panel Panel/Scientific Review Group, November 2019.
4. Grant reviewer to 2019/10 ZAT1 SM(50) Special Emphasis Panel/Scientific Review Group "Early Phase Clinical Trials of Natural Products (R33 and R61/R33) and Natural Products Phase II Clinical Trial Cooperative Agreements (UO1) (NP)", July 2019.
5. Grant reviewer to ZRG1 VH-D(02)M Special Emphasis Panel/Scientific Review Group "Vascular Regulation and Hematology", June 2019.
6. Grant reviewer to ZRG1 IMST-H(55)R Special Emphasis Panel/Scientific Review Group "Innovative Research in Cancer Nanotechnology (IRCN)", March 2019.
7. Grant reviewer to 2019/05 ZRG1 CB-D (71) R review Group, "Advancing Extracellular RNA (exRNA) Communication Research: Towards Single Extracellular Vesicle (EV) Sorting, Isolation, and Analysis of Cargo", March 2019.
8. Grant reviewer to ZCA1 PCRB-G J1 S NCI R13/U13 conference grants review Group (PA-18-648), October 2018.
9. Grant reviewer to Transformational Research for the W. Garfield Weston Foundation: Canada 2018 program, August 2018.
10. Grant reviewer to 2018/10 ZRG1 F09B-M (20) L Special Emphasis Panel/Scientific Review Group, June

- 2018.
11. Grant reviewer to ZRG1 MDCN-T (50) Special Emphasis Panel/Scientific Review Group, May 2018.
  12. Grant reviewer to NIH Shared Instrumentation for Animal Research (SIFAR) Grant Program (Internal review), April 2018.
  13. Grant reviewer to Special Emphasis Oncological Sciences Fellowship Panel Panel/Scientific Review Group ZRG1 F09B-M 20 L, March 2018.
  14. Grant reviewer to Special Emphasis Oncological Sciences Fellowship Panel Panel/Scientific Review Group 2018/01 ZRG1 F09B-M (20) L, November 2017.
  15. Grant reviewer to Special Emphasis Panel/Scientific Review Group 2018/01 ZCA1 PCRB-G (J1) S, October 2017.
  16. Grant reviewer to 2017/ NIH/CSR F09B Fellowship Study Section on Cancer Biology, March 2017.
  17. Grant reviewer to 2017/05 ZCA1 TCRB-D (M2) S for NIH/UO1. Study section: Innovative Research in Cancer Nanotechnology (IRCNs) for NIH/NCI Study section, February 2017.
  18. Grant reviewer to NIH Review Study, November 2016.
  19. Grant reviewer to ZCA1 PCRB-G J1 S, for R13 Conference Grant Review, October 2016.
  20. Grant reviewer to ZCA1 TCRB-6 (O1) Study section: Innovative Research in Cancer Nanotechnology (IRCNs) for NIH/NCI Study section, July 2016.
  21. Grant reviewer to 2016 Peer Reviewed Breast Cancer Research Program (BCRP) for the Department of Defense Congressionally Directed Medical Research Programs (CDMRP) Nanotechnology (BCRP NT) study section, July 2016.
  22. Grant reviewer to 2016 Spring UNC Lineberger Cancer Center Developmental Grants program, June 2016.
  23. Grant reviewer to NIH 2015/05 ZCA1 PCRB-G (M1) S - R13 study section, February 2015.
  24. Grant reviewer to Special Emphasis Panel/Scientific Review Group 2015/10 ZRG1 OTC-B (11) B, July 2015.
  25. Judge for the 3<sup>rd</sup> Annual Catalent Institute Academic Competition, April 2014.
  26. Grant reviewer to UNC Nutrition Obesity Research Center, February 2014.
  27. Grant reviewer to NIH Special ZRG1 F05-R (20) L Fellowship: Cell Biology, Developmental Biology, and Bioengineering Panel, July 2014.
  28. Grant reviewer to NIH Neural Oxidative Metabolism, Mitochondria and cell Death (NOMD) Study section, October 2014.
  29. Grant reviewer to NIH Center for Scientific Review Vascular Cell and Molecular Biology (VCMB) Study Section, October 2014.
  30. Grant reviewer to Technology Foundation STW (Innovation Research Incentives Scheme), Netherlands, January 2013.
  31. R13/U13 Grant reviewer to Special Emphasis Panel/Scientific Review Group 2013/05 ZCA1 PCRB-G Study section, April 2013.
  32. Grant reviewer to Biobehavioral Regulation, Learning and Ethology (BRLE) Study Section, June 2013.
  33. Grant reviewer to P2RMIS Department of Defense program, August 2013.
  34. Grant reviewer to NIH Small Business: Biological Chemistry, Biophysics, and Drug Discovery (SBIR/STTR) Study section, February 2012.
  35. R13 Grant reviewer to NIH/NCI Study section, April 2012.
  36. Vice-Chair of UNMC AY2012-13 Assistantship/Fellowship Competition, Bioinformatics Study Section, April 2012.
  37. Grant reviewer to American Institute of Biological Sciences, January 2011.

38. Committee Member, NIH Gene and Drug Delivery Study section, June 2011.
39. R13 Committee Member, NIH/NCI Study section, June 2011.
40. Grant reviewer to NIH Small Business: Biological Chemistry, Biophysics, and Drug Discovery (SBIR/STTR) Study section, October 2011.
41. Grant reviewer to Edna Ittner Pediatric Research Support Fund, June 2010.
42. Grant reviewer to NIH Challenge Grants in Health and Science Research, RFA-09-003, July 2009.
43. Grant reviewer to Italian Ministry of Health Grants, August 2009.

#### **PROFESSIONAL SOCIETIES:**

Controlled Release Society (CRS)  
American Chemical Society (ACS)  
American Association of Pharmaceutical Scientists (AAPS)  
American Association of Cancer Research (AACR)  
International Society of Exosomes and Microvesicles (ISEV)  
American Society of Exosomes and Microvesicles (ASEMV)  
NY Academy of Sciences (NYAS)

#### **OTHER:**

1. Oral presentation at UNC Catalyst Seminar series, UNC at Chapel Hill, June 2020.
2. Poster presentation at UNC Catalyst for Rare Diseases Event, UNC at Chapel Hill, February 2020.
3. Moderator/Session Chair, International Society of Extracellular Vesicles Meeting (ISEV2019), Kyoto, Japan, April 25-28, 2019.
4. Speaker at National Center for Advancing translational Sciences (NCATS) event, February 2019.
5. Speaker at public event “Spotlight on Rare Disease”, April 25, 2018.
6. Participation in the hosting a delegation of pharmacy faculty from Moldova, April 2018.
7. Recording lecture for Carolina Nanoformulation Workshop “Exosome-mediated drug delivery”, March 2018.
8. Speaker of webinar panel of Science magazine “Translational applications in exosome research: From biomarker discovery to drug delivery”, April 19, 2017.
9. Recording lecture for Carolina Nanoformulation Workshop “Exosomes for Drug Delivery”, July 2015.
10. Volunteer for two lectures “Brain and Polymers” at Ephesus Elementary School, Chapel Hill, December 2014.
11. Moderator/Session Chair, Eight Annual Chapel Hill Pharmaceutical Sciences Conference, May 28-29, 2014.
12. Volunteer for UNMC Skate-a-Thon for Parkinson’s, January 2012.
13. Member of UNMC Translational Research Task Force group, 2012.
14. The first-in-man polymeric micelle drug SP1049C (now SKC1049) that was developed with my active participation received FDA’s SPA for Phase III and is in clinical development by SoftKemo.