

## Curriculum Vitae

### NAME IN FULL:

Elena V. Batrakova



### CAMPUS ADDRESS:

UNC Eshelman School of Pharmacy,  
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University of North Carolina at Chapel Hill,  
Chapel Hill, NC 27599-7362  
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### 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

### ACADEMIC APPOINTMENTS:

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

### 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	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

**CITIZENSHIP:** United States

**RESEARCH INTERESTS:**

- Development of cell-mediated drug delivery systems to attenuate neuroinflammation and produce neuroprotection in patients with PD
- Development of polymer-based drug delivery systems for the chemotherapy and central nervous system (CNS) disorders
- Functional studies of the blood-brain barrier and CNS drug transport
- Inhibition of drug efflux transporters, including p-glycoprotein (P-gp), multidrug resistance-associated protein (MRP), and breast cancer resistant protein (BCRP)
- Development of exosome-based drug delivery systems

**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)

**TEACHING ACTIVITIES:**

**a. Lectures in Team-taught Courses:**

1. PHSC 851 “Innovative Drug Delivery” Department of Pharmaceutical Sciences, UNMC, 2005, 2007, 2009 (Spring), 2011 (Fall).
2. PHAR 930/PAT922 “Polymer Nanoparticles” in “Neuroimmunology” Department of Pharmacology and Experimental Neuroscience, UNMC, 2009, 2011, 2012 (Spring).
3. PHSC 960 “Current Topics in the Pharmaceutical Sciences”, Department of Pharmaceutical Sciences, UNMC, 2003, 2007, 2009 (Fall, Spring).
4. Department of Pharmaceutical Sciences Seminar Series coordinator, UNMC, 2009, 2010, 2011 (Fall, Spring).
5. PHSC 691 “Pharmaceutical Sciences Application in Pharmacy”, UNMC, 2011 (Fall).
6. MOPH 738 “Nanomedicine”, UNC Eshelman School of Pharmacy, 2012 (Fall).
7. MOPH 864 “Advances in Drug Delivery”, UNC Eshelman School of Pharmacy, 2013 (Fall).
8. PHCY 410 Basic Pharmaceutics I, UNC Eshelman School of Pharmacy, 2013, 2014 (Fall).
9. MOPH 864 “Advances in Drug Delivery”, UNC Eshelman School of Pharmacy, 2014 (Fall).
10. MOPH 738 “Nanomedicine”, UNC Eshelman School of Pharmacy, 2014 (Fall).
11. PHRS 899 Seminar, UNC Eshelman School of Pharmacy, Course Director, 2015 (Spring).
12. MOPH 864 “Advances in Drug Delivery”, UNC Eshelman School of Pharmacy, 2015 (Fall).
13. MOPH 862 “Advanced Physical Pharmacy”, UNC Eshelman School of Pharmacy, 2016 (Spring).
14. MOPH 864 “Advances in Drug Delivery and Nanomedicine”, UNC Eshelman School of Pharmacy, 2016 (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-present
Jiang, Yuhang	2014-present
Seo, Youn Gee	2014-present
Rahhal, Tojan Bassam	2014-present
Wan, Xiaomeng	2015-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-present
Joseph Zhao	2015-present

### 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*
*jointly with Dr. A.V. Kabanov	
Myung Soo Kim	2013-present

### 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

### Postdoctoral/Visiting Scientists:

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

### Research Technologists:

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

### **c. Administrative service:**

1. Chair, Pharmaceutical Sciences Graduate Program (PSGP) Committee, 2011-2012.
2. Member of UNMC Graduate Council, 2011-2012.
3. Member of UNC Eshelman School of Pharmacy Technology and Pedagogy (TAP) sub-committee, 2012.
4. Committee member of the Honors Program, UNC, School of Pharmacy, 2013 (Fall).
5. Chair of search committee for recruiting a Research Assistant Professor, 2013 (Fall).
6. MOPH Prospective Graduate Student Interviews, January 2014
7. BBSP Prospective Graduate Student Interviews, February 2014
8. Committee member of the Honors Program, UNC, School of Pharmacy, 2014 (Spring, Fall).
9. Judge of Catalent Institute-AAPS Academic Competition, April 2014.
10. Member of the Committee to Review the Governance Document of the Graduate Program, September 2014.
11. MOPH Prospective Graduate Student Interviews, January 2015
12. Member of a search committee for Research Associate position, February 2015.
13. BBSP Prospective Graduate Student Interviews, February 2015
14. Member of a search committee for a Research Associate position, Spring 2015.
15. Member of a search committee for a Research Specialist at the UNC Center for Nanotechnology in Drug Delivery (CNDD), Fall 2015.

### **PATENTS:**

#### US Patents:

1. "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
2. "Copolymer compositions for oral delivery" Kabanov, A.V.; Alakhov, V.Yu.; Batrakova, E.V. US Patent # 6277410 A 2001/08-21
3. "Copolymer compositions for oral delivery" Kabanov, A.V.; Alakhov, V.Y.; Batrakova, E.V. US Patent # 6387406 A 2002/05-14

4. "Amphiphilic Polymer-Protein Conjugates and Methods of Use Thereof" Batrakova, E.V.; Vinogradov, S.V.; Kabanov A.V. US Patent #63203 A 2004.
5. "Treatment of Neurodegenerative Disorders", Batrakova E.V., Kabanov A.V., Gendelman, HE., US Patent #07006 A 2007.
6. "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.
7. "Amphiphilic Polymer-Protein Conjugates and Methods Thereof", Batrakova, E.V., Vinogradov, S.V., Kabanov A.V. US Patent #8017151 A 2011.
8. "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.
9. "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.
10. "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.
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.

PCT and Foreign patents:

12. "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
13. "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
14. "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

**PUBLICATIONS:**

*Original Articles with 8,478 unique citations with h-index 45, and i10-index 66*

<http://scholar.google.com/citations?hl=en&user=Lw0vpA8AAAAJ>

1. Egorov V.V., Batrakova E.V., Titkova L.V., Demin V.V., Zubov V.P., and Barnakov A.N. (1982) Characteristics of the behavior of N-cetyl-N,N-diallyl-(dodecyloxycarbonylmethyl)-ammonium bromide in water. Vysokomol. Soedin. [in Russian] Ser. B 24(5), 370-371
2. Batrakova E.V., Orlov Yu.N., Egorov V.V., Zubov V.P., Titkova L.V., Shapiro Yu.E., and Kabanov V.A. (1985) Colloid-chemical properties of cationic surfactant vinyl monomers in water. Kolloidn. Zh. [in Russian] 47(1), 130-134
3. Batrakova E.V., Orlov Yu.N., Egorov V.V., Zubov V.P., and Kabanov V.A. (1985) Effect of structurization on the kinetics of radical polymerization of cationic surface-active vinyl monomers in aqueous dispersions. Vysokomol. Soedin. [in Russian] Ser. B 27(2), 87-93.
4. Egorov V.V., Ksenofontova O.B., Batrakova E.V., and Zubov V.P. (1988) Influence of counterion nature on colloidal and chemical properties of surfactant monomers. Kolloidn. Zh. [in Russian] 50(4), 821-825.
5. Egorov V.V., Batrakova E.V., Ksenofontova O.B., and Zubov V.P. (1988) Radical polymerization in aqueous dispersions of ionic surface-active monomers with different counterions. Vysokomol. Soedin. [in Russian] Ser. A 30(9), 1854-1858.
6. Egorov V.V., Batrakova E.V., and Zubov V.P. (1988) Effect of initiator nature on the kinetics of radical polymerization of N,N-dimethyl-N-(acetodecyl) [(methacryloyloxy)ethyl] ammonium bromide in water. Vysokomol. Soedin. [in Russian] Ser. A 30(9), 1859-1861.
7. Egorov V.V., Ksenofontova O.B., Batrakova E.V., and Permin A.M. (1989) Effect of ethanol on the structure formation and kinetics of radical polymerization of cationic surface-active monomers in water. Vestn. Mosk. Univ. [in Russian] Ser. 2: Khim. 30(5), 517-522.
8. Egorov V.V., Batrakova E.V., and Zubov V.P. (1990) Radical polymerization in spherical micelles of unsaturated alkylammonium halides in water. Vysokomol. Soedin. [in Russian] Ser. A 32(5), 927-932.
9. Egorov V.V., and Batrakova E.V. (1990) Radical polymerization kinetics of unsaturated alkylammonium halides in ethanol. Vestn. Mosk. Univ. [in Russian] Ser. 2: Khim. 31(2), 199-202

10. Egorov V.V., Ksenofontova O.B., and Batrkova E.V. (1991) Specific features of the colloid-chemical behavior of surfactant monomers based on dimethylaminoethyl methacrylate in water in the presence of water-soluble polymers. *Colloid journal of the USSR [in Russian]* 53(2), 351-356.
11. Egorov V.V., Ksenofontova O.B., and Batrkova E.V. (1991) Colloid-chemical behavior of surfactant monomers based on dimethylaminoethylmethacrylate in water in the presence of water-soluble polymers. *Colloid journal of the USSR [in Russian]* 53(2), 305-309.
12. Kabanov A.V., Chekhonin V.P., Alakhov V.Yu., Batrkova E.V., Lebedev A.S., Melik-Nubarov N.S., Arzhakov S.A., Levashov A.V., Morozov G.V., Severin E.S., and Kabanov V.A. (1989) The neuroleptic activity of haloperidol increases after its solubilization in surfactant micelles. Micelles as microcontainers for drug targeting. *FEBS Lett* 258, 343-345. PMID: 2599097
13. Alakhov V.Yu., Kabanov A.V., Batrkova E.V., Koromyslova I.A., Levashov A.V., and Severin E.S. (1990) Increasing cytostatic effects of ricin A chain and Staphylococcus aureus enterotoxin A through in vitro hydrophobization with fatty acid residues. *Biotech Appl Biochem* 12, 94-98. PMID: 2310510
14. Kabanov A.V., Batrkova E.V., Melik-Nubarov N.S., Fedoseev N.A., Dorodnich T.Yu., Alakhov V.Yu., Chekhonin V.P., Nazarova I.R., and Kabanov V.A. (1992) A new class of drug carriers: micelles of poly(oxyethylene)-poly(oxypropylene) block copolymers as microcontainers for drug targeting from blood in brain. *J Contr Release* 22, 141-158.
15. Slepnev V.I., Kuznetsova L.E., Gubin A.N., Batrkova E.V., Alakhov V.Yu., and Kabanov A.V. (1992) Micelles of poly(oxyethylene)-poly(oxypropylene) block copolymer (pluronic) as a tool for low-molecular compound delivery into a cell. Phosphorylation of intracellular proteins with micelle incorporated [<sup>32</sup>P]ATP. *Biochem Internat* 26, 587-595. PMID: 1610369
16. Kabanov A.V., Slepnev V.I., Kuznetsova L.E., Batrkova E.V., Alakhov V.Yu., Melik-Nubarov N.S., Sveshnikov P.G., and Kabanov V.A. (1992) Pluronic micelles as a tool for low-molecular compound vector delivery into a cell: effect of Staphylococcus aureus enterotoxin B on cell loading with micelle incorporated fluorescent dye. *Biochem Internat* 26, 1035-1042. PMID: 1632800
17. Kabanov A.V., Nazarova I.R., Astafieva I.V., Batrkova E.V., Alakhov V.Yu., Yaroslavov A.A. and Kabanov V.A. (1995) Micelle formation and solubilization of fluorescent probes in poly(oxyethylene-b-oxypropylene-b-oxyethylene) solutions. *Macromolecules* 28, 2303-2314.
18. Kabanov, A.V., Nazarova, I.R., Astafieva, I.V., Batrkova, E.V., Alakhov, V.Yu., Yaroslavov, A.A., and Kabanov, V.A. (1996) Micelle formation and solubilization of fluorescent probes in poly-(oxyethylene-b-oxypropylene-b-oxyethylene). *Macromolecules*, 29(27), 8999.
19. Alakhov V.Yu., Moskaleva E.Yu., Batrkova E.V., and Kabanov A.V. (1996) Hypersensitization of multidrug resistant human ovarian carcinoma cells by Pluronic P85 block copolymer. *Bioconjugate Chemistry* 7, 209-216. PMID: 8983343
20. Alakhov V., Batrkova E., Li S., Venne A., and Kabanov A. (1996) Block copolymer drug carriers: 1. Hypersensitization of MDR cancers and in vivo activity. *Pharm Res* 13, S-214.
21. Batrkova E.V., Dorodnych T.Yu., Klinskii E.Yu., Kliushnenkova E.N., Shemchukova O.B., Arjakov S.A., Alakhov V.Yu., and Kabanov A.V. (1996) Anthracycline antibiotics non-covalently incorporated into micelles of Pluronic block copolymers: activity against drug sensitive and resistant tumors, *Br J Cancer* 74, 1545-1552. PMID: 8932333
22. Miller D.W., Batrkova E.V., Waltner T.O., Alakhov V.Yu., and Kabanov A.V. (1997) Interactions of Pluronic block copolymers with brain microvessel endothelial cells: evidence for multiple absorption pathways. *Bioconjugate Chemistry* 8, 649-657. PMID: 9327127
23. Batrkova E.V., Han H.-Y., Alakhov V.Y., Miller D.W. and Kabanov A.V. (1998) Effects of Pluronic block copolymers on drug absorption in Caco-2 cell monolayers. *Pharm Res* 15, 850-855. PMID: 9647349
24. Batrkova E.V., Han H.-Y., Miller D.W., and Kabanov A.V. (1998) Effects of Pluronic P85 unimers and micelles on drug permeability in polarized BBMEC and Caco-2 cells. *Pharm Res* 15, 1525-1532. PMID: 9794493
25. Melik-Nubarov N.S., Dorodnykh T.Y., Batrkova E.V., Kozlov M.Y., Suzdaltseva Y.G., Kabanov A.V., Alakhov V.Yu., Arzhakov S.A. (1999) Synthesis and Chemical Transformations-Synthesis and Biological Activity of the Functional Block Copolymers Based on Pluronic P85-Doxorubicin Conjugates. *Polymer Science-Series A* 41 (5), 494-499.

26. Melik-Nubarov N.S., Dorodnykh T.Y., Batrakova E.V., Kozlov M.Y., Suzdaltseva Y.G., Kabanov A.V., Alakhov V.Yu., Arzhakov S.A. (1999) Synthesis and biological activity of the functional block-copolymers based on Pluronic P85-doxorubicin conjugates. *Vysokomol Soed (in Russian)* 41(5), 768-775.
27. Miller D.W., Batrakova E.V., and Kabanov A.V. (1999) Inhibition of multidrug resistance-associated protein (MRP) functional activity with Pluronic block copolymers. *Pharm Res* 16, 396-401. PMID: 10213370
28. Batrakova E.V., Li S., Miller D.W. and Kabanov A.V. (1999) Pluronic P85 increases permeability of broad spectrum of drugs in polarized BBMEC and Caco-2 cell monolayers. *Pharm Res* 16, 1368-1374. PMID: 10496651
29. Batrakova E., Lee S., Li S., Venne A., Alakhov V. and Kabanov A. (1999) Fundamental relationships between the composition of Pluronic block copolymers and their hypersensitization effect in MDR cancer cells. *Pharm Res* 16, 1375-1381. PMID: 10496652
30. Vinogradov S.V., Batrakova E.V., Li S., and Kabanov A.V. (1999) Polyion complex micelles with protein-modified corona for receptor-mediated delivery of oligonucleotides into cells. *Bioconjugate Chem.* 10, 851-860. PMID: 10502353
31. Alakhov V., Klinsky E., Li S., Pietrzynski G., Venne A., Batrakova E., Bronich T., Kabanov A. (1999) Block copolymer-based formulation of doxorubicin. From cell screen to clinical trials. *Colloids and Surfaces B: Biointerfaces* 16, 113-134.
32. Vinogradov S., Batrakova E., Kabanov A. (1999) Poly(ethylene glycol)-polyethyleneimine NanoGel™ particles: novel drug delivery systems for antisense oligonucleotides. *Colloids and Surfaces B: Biointerfaces* 16, 291-304.
33. Kozlov M.Yu., Melik-Nubarov N.S., Batrakova E.V., and Kabanov A.V. (2000) Relationship between Pluronic block copolymer structure, critical micellization concentration and partitioning coefficients of low molecular mass solutes, *Macromolecules* 33, 3305-3313.
34. Lemieux P., Vinogradov S.V., Gebhart, C.L., Guérin N., Paradis G., Nguyen H.-K., Ochiatti B., Suzdaltseva Y.G., Batrakova E.V., Bronich T.K., St-Pierre Y., Alakhov V.Yu., and Kabanov A.V. (2000) Block and graft copolymers and Nanogel™ copolymer networks for DNA delivery into cell. *J Drug Targeting*, 8(2), 91-105.
35. Vinogradov S., Batrakova E., Kabanov A. (2000) Novel drug delivery systems: Nanogel networks. *THE American Chemical Society*, 220, U284-U284.
36. Batrakova E.V., Miller D.W., Li S., Alakhov V.Yu., Kabanov A.V., and Elmquist W.F. (2001) Pluronic P85 enhances the delivery of digoxin to the brain: in vivo and in vitro studies. *JPET* 296, 556-562. PMID: 11160643
37. Batrakova E.V., Li S., Vinogradov S.V., Alakhov V.Yu., Miller D.W., and Kabanov A.V. (2001) Mechanism of Pluronic effect on P-glycoprotein efflux system in blood brain barrier: contribution of energy depletion and membrane fluidization. *JPET*, 299, 483-493. PMID: 11602658
38. Batrakova E.V., Li S., Elmquist W.F., Miller D.W., Alakhov V.Yu., and Kabanov A.V. (2001) Mechanism of sensitization of MDR cancer cells by Pluronic block copolymers: Selective energy depletion. *British J. Cancer*, 85, 1987-1997. PMID: 11747344
39. Kabanov A.V., Batrakova E.V., Li S., Alakhov V.Yu., (2001) 40th Microsymposium of the Prague Meetings on Macromolecules Prague, Czech Republic 2000-12 Selective Energy Depletion and Sensitization of Multiple Drug-Resistant Cancer Cells by Pluronic Block Copolymers. *Macromolecular Symposia* 172, 103-112.
40. Kabanov A.V., Batrakova E.V., and Alakhov V.Yu. (2002) Pluronic block copolymers as novel polymer therapeutics for drug and gene delivery. *J. Contrl. Rel.*, 82, 189-212. PMID: 12175737
41. Kabanov A.V., Batrakova E.V., and Alakhov V.Yu. (2002) Pluronic block copolymers for overcoming drug resistance in cancer. *Adv. Drug Deliv. Rev.*, 54, 759-779. PMID: 12204601
42. Batrakova E.V., Li S., Alakhov V.Yu., Miller D.W., and Kabanov A.V. (2003) Optimal structure requirements for Pluronic block copolymers in modifying drug efflux transporters activity in BBMEC monolayers. *JPET*, 304, 845-854. PMID: 12538842
43. Kabanov A.V., Batrakova E.V., and Miller D.W. (2003) Pluronic block copolymers as modulators of drug efflux transporter activity in the blood-brain barrier. *Adv. Drug Deliv. Rev.*, 55,151-164. PMID: 12535579

44. Kabanov A.V., Batrakova E.V., and Alakhov V.Yu. (2003) An essential relationship between ATP depletion and chemosensitizing activity of Pluronic block copolymers. *J. Contr. Release*, 91, 75-83. PMID: 12932639
45. Batrakova E.V., Li S., Elmquist W.F., Miller D.W., Alakhov V.Yu., and Kabanov A.V. (2003) Sensitization of cells overexpressing multidrug resistant protein by Pluronic P85. *Pharm. Res.*, 20, 1581-1590. PMID: 14620511
46. Vinogradov S.V., Batrakova E.V., Kabanov A.V. (2004) Nanogels for oligonucleotide delivery to the brain. *Bioconjugate Chem.* 15, 50-60. PMID: 14733583
47. Kabanov A.V., Batrakova E.V. (2004) New technologies for drug delivery across the blood brain barrier. *Current Pharm. Design*, 10, 1355-1363. PMID: 15134486
48. Batrakova E.V., Zhang Y., Li S., Li Y., Vinogradov S.V., Persidsky Y., Alakhov V.Yu., Miller D.W., and Kabanov A.V. (2004) Effects of Pluronic P85 on GLUT1 and MCT1 transporters in the blood brain barrier. *Pharm. Res.*, 21, 1993-2000.
49. Kabanov A.V., Batrakova E.V., and Alakhov V.Yu. (2004) Pluronic Block Copolymers as Novel Therapeutics in Drug Delivery, *J. Contr. Rel.*, 130-153
50. Batrakova E.V., Li S., Li Y., Alakhov V.Yu., and Kabanov A.V. (2004) Effect of Pluronic P85 on ATPase activity of drug efflux transporters., *Pharm. Res.*, 21, 2226-2233. PMID: 15648254
51. Kabanov A.V., Batrakova E.V., Sriadibhatla S., Yang Z, Kelly D.L., and Alakov V.Yu. (2004) Polymer genomics: shifting the drug delivery paradigm. *Polym. Prepr.* 45, 442-443.
52. Batrakova E.V., Li S., Li Y., Alakhov V.Yu., Elmquist W.F., and Kabanov A.V. (2004) Distribution kinetics of Pluronic P85, a micelle-forming block copolymer. *J. Contr. Release*, 100, 389-397. PMID: 15567504
53. Vinogradov S.V., Batrakova E.V., Li S., Kabanov A.V. (2004) Mixed polymer micelles of amphiphilic and cationic copolymers for delivery of antisense oligonucleotides. *J. Drug Target.*12, 517-526. PMID: 15621677
54. Yu Q., Batrakova E.V., Lori Jerome L., Kris Banerjee K., Shu Li S., Yuli Li Y., Viviane Page V., Alexander Kabanov A.V., Brian Leyland-Jones B. (2004) Reversal of multidrug resistance by Pluronic block copolymers correlates with inhibition of drug efflux transporters and depletion of intracellular ATP and GSH levels. *Cancer Res.*, 64 (7 Supplement), 492-492.
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  29. Batrkova E.V., Kabanov A.V., Li S., Li Y., Kelly D.L., and Alakhov V.Yu. (2004) Amphiphilic Block Copolymers Alter genetic Responses to a Drug. 7<sup>th</sup> Symposium on Biomaterials Science. New Brunswick, NJ.
  30. Batrkova E.V., Kabanov A.V., Li S., Li Y., Yang Zhihui, Kelly D.L., Sherman S. and Alakov V.Yu. (2005) Polymer Genomics: Effect of Amphiphilic Block Copolymers on Genetic Responses to a Drug in Cancer Cells. *Oncogenomics 2005: Dissecting Cancer through Genome Research*. San Diego, CA.
  31. Batrkova E.V., Kabanov A.V., Minko T., Li S., Li Y., Pakunlu R., and Alakhov V.Yu. (2005) Pluronic Block Copolymer Formulation with Doxorubicin Induces Apoptosis in Drug-Resistant Cancer Cells. 32<sup>nd</sup>

Annual Meeting & Exposition held by the CRS Conference, Miami, FL.

32. Vinogradov S.V., Kohli E., and Batrakova E.V. (2005) Cytotoxic Drug Formulations in Polymer Nanogels. The AAPS Journal Vol. 7, No. S2, Abstract M1186; 2005 AAPS Annual Meeting, Nashville, TN, Nov.5-10.
33. Batrakova E., Li S., Reynolds A., Thomas M., Gendelman H.E., and Kabanov A. (2006) Inflammatory Cells for Transport of Therapeutic Polypeptides across the BBB. 4<sup>th</sup> Barriers on the CNS Gordon Research Conference, Tilton, NH.
34. Batrakova E., Li S., Reynolds A., Thomas M., Gendelman H.E., and Kabanov A. (2006) Trojan Horses for CNS Drug Delivery. Drug Carriers in Medicine & Biology Gordon Research Conference. Big Sky, MT.
35. Zhang X., Batrakova E.V., Li S., Yang Z., Li Y., Zhang L., and Kabanov A.V. (2006) Effect of Pluronic P85 on Amino Acid Transporters in the Blood Brain Barrier. Pharm Res, Poster # W5113, AAPS Annual Meeting and Exposition, San Antonio, TX.
36. Sharma A.K., Zhang L., Li S., Alakhov V.Yu., Batrakova E.V., and Kabanov AV. (2006) Formulation of Doxorubicin with Pluronic P85 prevents development of Drug resistance *in vitro* and *in vivo*. Pharm Res, Poster # T2101, 2006 AAPS Annual Meeting and Exposition, San Antonio, TX.
37. Batrakova E., Li S., Reynolds A., Thomas M., Gendelman H.E., and Kabanov A. (2006) "Nanozymes" for cell-mediated delivery across the Blood-Brain Barrier. 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE.
38. Sahay G., Batrakova E., Zhang X., Sriadibhatala S., Li S., and Kabanov A. (2006) Pluronic P85 Modulated Endocytosis in Brain Endothelial Cells. 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE.
39. Zhang X., Batrakova E., Li S., Yang Z., and Kabanov A. (2006) Effect of Pluronic P85 on Amino Acid Transport across Blood Brain Barrier. 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE.
40. Sharma A.K., Zhang L., Li S., Alakhov V.Yu., Batrakova E.V., and Kabanov A.V. (2006) Formulation of Doxorubicin with Pluronic P85 prevents development of Drug resistance to Doxorubicin. 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE.
41. Sahay G, Batrakova E.V., Zhang X, Sriadibhatala S.S, Li S and Kabanov A.V. (2006) Pluronic P85 modulates endocytosis in Brain Endothelial Cells. Poster Presentation at Globalization of Pharmaceuticals and Education Network (GPEN), Lawrence, Kansas.
42. Sahay G, Batrakova E., Zhang X, Li S and Kabanov AV. (2006) Effect of Pluronic on fluid phase endocytosis in Blood Brain Barrier. Pharmaceutics Graduate Student Research Meeting (PGSRM) Minneapolis, Minnesota.
43. Batrakova E., Li S., Shlyakhtenko L., Reynolds A., Thomas M., Gendelman H.E., and Kabanov A. (2007) "Inflammatory response cells for protein delivery to the brain" Immunochemistry and Immunobiology Gordons Research Conference, Ventura, CA.
44. 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.
45. 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.
46. Batrakova E.V., Li S., Reynolds A.D., Mosley R.L., Bronich T.K, Kabanov A.V., and Gendelman H.E. (2007) "Cell-mediated Delivery of Nanozymes" 5<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Boston, MA.
47. Alakhova D.Yu., Rapoport N.Y., Batrakova E.V., Timoshin A.A., Li S., Alakhov V.Yu., and Kabanov A.V. (2007) "Targeting Metabolic Pathways by an Amphiphilic Block Copolymer to Sensitize Multidrug Resistant Cells", 5<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Boston, MA.
48. Yi X., Vinogradov S., Batrakova E.V., Kabanov A.V. (2007) "Modification of a Protein with Pluronic Block Copolymers for Cellular Delivery", 5<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Boston, MA.
49. Zhang X., Batrakova 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.

50. Sahay G., Batrkova E.V., and Kabanov A.V. (2007) "Nanomaterials influencing trafficking Mechanism", 5<sup>th</sup> International Nanomedicine and Drug Delivery Symposium (NanoDDS), Boston, MA.
51. Brynskikh A., Kabanov A.V., Howard E. Gendelman H.E., Batrkova, 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.
52. Batrkova E.V., Brynskikh A.M., Li S., Reynolds A.D., Mosley R.L., Kabanov A.V., and Howard E. Gendelman H.E. (2008) "Monocytes for Delivery of Antioxidants in Parkinson's Disease" 7<sup>th</sup> International Symposium on Polymer Therapeutics, Spain, Valencia.
53. Batrkova 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.
54. M.A. Erickson, E.V. Batrkova, A.V. Kabanov, S. Vinogradov, and W.A. Banks (2008) "Transport of Superoxide Dismutase-nanozyme across the Blood-brain Barrier" 5<sup>th</sup> Barriers on the CNS Gordon Research Conference, Tilton, NH.
55. E.V. Batrkova, D.Yu. Alakhova, G. Sahay, A.K. Sharma, S. Li, M. Boska, R.L. Mosley, H.E. Gendelman, V.Yu. Alakhov, A.V. Kabanov (2008) "Polymer Micelles from Bench to Bedside" NCI Translational Science Meeting, Washington DC.
56. N.L. Klyachko, E.V. Batrkova, L.S. Shlyakhtenko, V. Kurova, and A.V. Kabanov (2008) "SOD/catalase conjugated with block ionomer - antioxidant delivery system" Bioencapsulation, Dublin, Ireland, Sept. 3-7.
57. E.V. Batrkova, Anna M. Brynskikh, Shu Li, R. Lee Mosley, Alexander V. Kabanov, and Howard E. Gendelman (2009) "Therapeutic Proteins Delivered by Monocytes to the Brain in Parkinson's Disease" Protein & Peptide Conference-2009, Seoul, Korea, April 1-4.
58. E.V. Batrkova, A.M. Brynskikh, S. Li, R.L. Mosley, M. D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (2009) "A Macrophage-based Delivery System of Antioxidant Enzymes for Parkinson's Disease: Therapeutic Effect in vivo" NIH IDEa Central Region Conference, Oklahoma City, OK, May 28-29.
59. E.V. Batrkova, D.Yu. Alakhova, G. Sahay, A.K. Sharma, S. Li, M. Boska, R.L. Mosley, H.E. Gendelman, V.Yu. Alakhov, and A.V. Kabanov (2009) "A new polymer-based nanoformulation for overcoming multi-drug resistance in cancer" 2<sup>nd</sup> World Cancer Congress 2009, Beijing, China, June 22-25.
60. E.V. Batrkova, A.M. Brynskikh, D.S. Manickam, Y. Zhao, S. Li, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2009) "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, June 29 – July 4.
61. D.S. Manickam, N.L. Klyachko, E.V. Batrkova, T.K. Bronich and A.V. Kabanov (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.
62. A.M. Brynskikh, E.V. Batrkova, H.E. Gendelman, A.V. Kabanov (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.
63. E.V. Batrkova, A.M. Brynskikh, Y. Zhao, S. Li, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2009) "CNS delivery of therapeutic proteins in living cells" 3rd BBBB-Bosphorus International Conference on Pharmaceutical Sciences, Turkey, Antalya, October 26-28.
64. E.V. Batrkova, A.M. Brynskikh, S. Li, Y. Zhao, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (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.
65. E.V. Batrkova, A.M. Brynskikh, Y. Zhao, S. Li, R.L. Mosley, Michael D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (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.
66. E.V. Batrkova, A.M. Brynskikh, S. Li, R. L. Mosley, A.V. Kabanov, and H.E. Gendelman (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.
67. R. Luxenhofer, A. Schulz, C. Roques, Li S., T.K. Bronich, E.V. Batrkova, R. Jordan, A.V. Kabanov

- (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.
68. D.Yu. Alakhova, N.Y. Rapoport, E.V. Batrakova, A.A. Timoshin, S. Li, V.Yu. Alakhov, and A.V. Kabanov (2010) "Effect of Pluronic Amphiphilic Copolymers on Cancer Stem Cells in Multidrug Resistant Models" 8<sup>th</sup> International; Symposium on Polymer Therapeutics: From Laboratory to Clinical Practice, Valencia, Spain, May 24-26.
  69. E.V. Batrakova, A.M. Brynskikh, S.Li, R.L. Mosley, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (2010) "Development of Cell-mediated Drug Delivery of Antioxidants for Parkinson's Disease Therapy" First Annual World Congress of NeuroTalk-2010, Singapore, June 25-28.
  70. E.V. Batrakova, A.M. Brynskikh, Y.Zhao, M.Haney, R.L. Mosley, S. Li, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (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.
  71. E.V. Batrakova, A.M. Brynskikh, Y.Zhao, M.Haney, R.L. Mosley, S. Li, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman, (2010) "Cell-mediated drug delivery for Parkinson's disease therapy" 8th International Nanomedicine and Drug Delivery Symposium (NanoDDS), Omaha, NE, October 3-5.
  72. E.V. Batrakova, A.M. Brynskikh, Y. Zhao, S.Li, R.L. Mosley, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman, (2010) "Nanoformulated Catalase for Parkinson's Disease Therapy", 2nd International Nanotechnology Conference & Exhibition, Tel Aviv, Israel, November 8-9.
  73. E.V. Batrakova, A.M. Brynskikh, M.J. Haney, Y. Zhao, S. Li, R. L. Mosley, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (2011) "Living cells as drug delivery vehicles for Parkinson's Disease Therapy", International Conference on Biomaterials Science (ICBS), Tsukuba, Japan, March 15-18.
  74. E.V. Batrakova, M.J. Haney, Y. Zhao, P. Suresh, J.A. Vetro, N.L. Klyachko, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2011) "Living Cells as Drug Delivery Vehicles for Treatment of Neurodegenerative Disorders", Molecular Mechanisms of Neurodegeneration, Milano, Italy, May 13-15.
  75. E.V. Batrakova, A.M. Brynskikh, M.J. Haney, Y. Zhao, S. Li, R. L. Mosley, M.D. Boska, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (2011) "Living cells as drug delivery vehicles for Parkinson's Disease Therapy", IDeA Central Regional Meeting, Omaha, NE, May 23-25.
  76. E.V. Batrakova, M.J. Haney, Y. Zhao, P. Suresh, N.L. Klyachko, S. Li, J.A. Vetro, R. L. Mosley, A.V. Kabanov, and H.E. Gendelman (2011) "Using living cells for targeted drug transport across blood brain barrier", Pharmaceutics and Novel Drug delivery Systems, Las Vegas, June 6-8.
  77. E.V. Batrakova, M.J. Haney, Y. Zhao, P. Suresh, N.L. Klyachko, S. Li, J.A. Vetro, R. L. Mosley, A.V. Kabanov, and H.E. Gendelman (2011) "Development of nanoformulations of Therapeutic proteins for brain delivery in macrophages", First International Conference on Small Science, Sydney, Australia, August 15-18.
  78. E.V. Batrakova, M.J. Haney, Y. Zhao, P. Suresh, A.M. Brynskikh, R. L. Mosley, N.L. Klyachko, A.V. Kabanov, and H.E. Gendelman (2011) "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, September 19-24.
  79. E.V. Batrakova, M.J. Haney, Y. Zhao, N.L. Klyachko, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2011) "Using Exosomes for Drug Transport in Macrophage-mediated Drug Delivery", Conference for Exosomes and Microvesicles, Orlando, FL, October 15-17.
  80. E.V. Batrakova, M.J. Haney, Y. Zhao, A.M. Brynskikh, S. Li, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2012) "Living Cells as Drug Delivery Vehicles for Transport of Nanoformulated Antioxidants to the Brain", Zing Nanoscience Conference, Lanzarote, Spain, February 14-17.
  81. E.V. Batrakova, M.J. Haney, Y. Zhao, N.L. Klyachko, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2012) "Exosomes as drug carriers in Macrophage-mediated Drug Delivery", ISEV Annual Scientific Meeting, Gothenburg, Sweden, April 18-20.
  82. E.V. Batrakova, M. Haney, Y. Zhao, A.M. Brynskikh, S. Li, R.L. Mosley, A.V. Kabanov, and H.E. Gendelman (2012) "Living Cells as Drug Delivery Vehicles for Transport of Nanoformulated Antioxidants to the Brain", BU Symposium on "Therapeutic Innovation: The Next Generation of Discovery" , Boston, MA, April 30.
  83. E.V. Batrakova, M. Haney, Y. Zhao, S. Li, N.L. Klyachko, R.L. Mosley, A.V. Kabanov, and H.E.



- Gendelman (2012) "Living cells as drug delivery vehicles for CNS delivery", Southeastern Regional Meeting of the ACS (SERMACS), Raleigh, NC, November 14-17.
84. E.V. Batrakova, M.J. Haney, Y. Zhao, S. Li, N.L. Klyachko, R. L. Mosley, H.E. Gendelman, and A.V. Kabanov (2013) "Treatment of neurological disorders with nanoformulated antioxidants delivered to the brain in living cells", ICEAS, Tokyo, Japan, March 15-17.
  85. E.V. Batrakova, M.J. Haney, Y. Zhao, S. Li, N.L. Klyachko, R. L. Mosley, H.E. Gendelman, and A.V. Kabanov (2013) "Carriers that break barriers", Biocatalysis, Moscow, Russia, July 2-5.
  86. E.V. Batrakova, M.J. Haney, Y. Zhao, S. Li, N.L. Klyachko, R. L. Mosley, H.E. Gendelman, and A.V. Kabanov (2013) "Blood-Borne Macrophages Hitchhike Endosome Networks for Brain Delivery of Antioxidant, Catalase", American Society for Exosomes and Microvesicles, Orlando, Florida, USA, September 7-9.
  87. E.V. Batrakova, M.J. Haney, Y. Zhao, E.B. Harrison, V. Mahajan, S. Ahmed, Z. He, S.D. Hingtgen, N.L. Klyachko, R.L. Mosley, H.E. Gendelman, and A.V. Kabanov (2014) "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 23-26.
  88. E.V. Batrakova, M.J. Haney, Y. Zhao, E.B. Harrison, V. Mahajan, S. Ahmed, Z. He, S.D. Hingtgen, N.L. Klyachko, R.L. Mosley, H.E. Gendelman, and A.V. Kabanov (2014) "Carriers that Break Barriers" ASNM 4<sup>th</sup> Annual Meeting, Rockville, MD, March 28-30.
  89. E.V. Batrakova, M.J. Haney, Y. Zhao, N.L. Klyachko, V. Mahajan, S. Ahmed, Z. He, S.D. Hingtgen, N.L. Klyachko, R.L. Mosley, H.E. Gendelman, and A.V. Kabanov (2014) "Cell-mediated delivery of nanoformulated antioxidants for treatment of neurodegenerative disorders", 5<sup>th</sup> Annual Nanotechnology for Health Care Conference, Little Rock, Arkansas, April 2-4.
  90. E.V. Batrakova, M.J. Haney, Y. Zhao, N.L. Klyachko, V. Mahajan, S. Ahmed, Z. He, S.D. Hingtgen, N.L. Klyachko, R.L. Mosley, H.E. Gendelman, and A.V. Kabanov (2014) "Carriers that Break Barriers", International Congress on Natural Sciences and Engineering, Kyoto, Japan, May 7-9.
  91. D. Yuan, X. Yi, D. Alakhova, E.V. Batrakova, A.V. Kabanov (2014) "In vitro and in vivo characterization of Raw 264.7 macrophages-derived exosomes as brain delivery nanovectors" NanoDDS, Chapel Hill, NC, October 2-6.
  92. M.S. Kim, M. Haney, Y. Zhao, P. Phua, A.V. Kabanov, E.V. Batrakova (2014) Exosome-Encapsulated Water-Insoluble Small Molecule Chemotherapeutics for the Treatment of Pulmonary Metastases", NanoDDS, Chapel Hill, NC, October 2-6.
  93. E.V. Batrakova, M.J. Haney, N.L. Klyachko, Y. Zhao, R. Gupta, E.G. Plotnikova, Z. He, T. Patel, A. Piroyan, M. Sokolsky, A.V. Kabanov, and (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.
  94. M.S. Kim, M.J. Haney, Y. Zhao, R. Gupta, Z. He, P. Phua, A. Piroyan, M. Sokolsky, A.V. Kabanov, and E.V. Batrakova (2015) "Characterization of Exosome-Encapsulated Paclitaxel for the Treatment of Neoplasms", Annual Meeting American Society of Exosomes and Microvesicles (ISEV), Washington D.C., April 23-26.

#### GRANTS/APPLICATIONS:

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		
2R01 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		
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		
ACTIVE		
UNC TEG15-4849 (E. Batrakova)	09/01/15 – 06/30/16	
NC Biotechnology Center	\$50,000	
"Use of Autologous Macrophages for Sustained Delivery of GDNF as Treatment of Parkinson's Disease"		
Principal Investigator		
ACTIVE		
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		
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		
Oldfield Alzheimer's Research Fund Award	06/01/10 – 06/01/11	5% effort
UNMC (E. Batrakova)	\$20,000	
Principal 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		
1R01 NS094609 (E. Batrakova)	02/01/16 – 03/31/21	25% effort
NIH/NINDS	\$1,502,500	
"Exosome-based L-DOPA Delivery System for Parkinson's Disease Therapy"		
Principal Investigator		
PENDING		
1R41 NS095533-01 (A. Kabanov)	02/01/16 – 02/31/17	3% effort
NIH/NINDS	\$180,110	
"Novel Cell-mediated Delivery of Proteins for the Treatment of Parkinson's Disease"		
Co-Investigator		
PENDING		
1R21 (U. Roy)	02/01/16 – 02/31/18	5% effort
NIH/NIAID	\$608,000	
"Development of Nanomedicine based anti-HIV Drug Delivery Targeting to the Gut Associated Lymphoid Tissue (GALT)"		
Co-Investigator		
PENDING		

CCNE pilot program (E. Batrakova) 12/01/15 – 12/31/16 5% effort  
“Developing cell-based gene delivery system for cancer metastases therapy”  
Principal Investigator \$50,000  
PENDING

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

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

1. AAPS PharmSciTech
2. ACS Nano
3. Acta Biomaterialia
4. Acta Pharmaceutica Sinica
5. Advanced Drug Delivery
6. American Journal of Drug Delivery
7. Biochemistry
8. Biochemical Pharmacology
9. Biomacromolecules
10. Biomaterials
11. Brain, Behavior, and Immunity
12. Critical Reviews™ in Therapeutic Drug Carrier Systems
13. Current Pharmaceutical Design
14. Developmental neuroscience
15. Drug Targeting and Delivery
16. Drug Delivery
17. Exp. Biology and Medicine
18. Journal of Controlled Release
19. Journal of Drug Targeting
20. Journal of Neuroimmune Pharmacology
21. Journal of Pharmaceutical Science
22. Journal of Pharmacy & Pharmaceutical Sciences
23. Langmuir
24. Macromolecule Bioscience
25. Molecular Pharmaceutics
26. Molecular Therapy
27. Nanomedicine (London)
28. Neuroscience Letters
29. Peptides
30. Pharmaceutical Research
31. Plos ONE
32. Therapeutic delivery
33. Wiley Interdisciplinary Reviews: Nanomedicine

##### **Editorial Board member:**

34. Nanomedicine: Nanotechnology, Biology, and Medicine (Elsevier)
35. Journal of Bioanalytical Techniques

#### **GRANT REVIEW AND STUDY SECTIONS:**

1. Grant reviewer to NIH Challenge Grants in Health and Science Research, RFA-09-003, July 2009.
2. Grant reviewer to Italian Ministry of Health grants, August 2009.
3. Grant reviewer to Edna Ittner Pediatric Research Support Fund, June 2010.
4. Grant reviewer to American Institute of Biological Sciences, January 2011.
5. Committee Member, NIH Gene and Drug Delivery Study section, June 2011.
6. R13 Committee Member, NIH/NCI Study section, June 2011.

7. Grant reviewer to NIH Small Business: Biological Chemistry, Biophysics, and Drug Discovery (SBIR/STTR) Study section, October 2011.
8. Grant reviewer to NIH Small Business: Biological Chemistry, Biophysics, and Drug Discovery (SBIR/STTR) Study section, February 2012.
9. R13 Grant reviewer to NIH/NCI Study section, April 2012.
10. Vice-Chair of UNMC AY2012-13 Assistantship/Fellowship Competition, Bioinformatics Study Section, April 2012.
11. Grant reviewer to Technology Foundation STW (Innovation Research Incentives Scheme), Netherlands, January 2013.
12. R13/U13 Grant reviewer to Special Emphasis Panel/Scientific Review Group 2013/05 ZCA1 PCRB-G Study section, April 2013.
13. Grant reviewer to Biobehavioral Regulation, Learning and Ethology (BRLE) Study Section, June 2013.
14. Grant reviewer to P2RMIS Department of Defense program, August 2013.
15. Judge for the 3rd Annual Catalent Institute Academic Competition, April 2014.
16. Grant reviewer to UNC Nutrition Obesity Research Center, February 2014.
17. Grant reviewer to NIH Special ZRG1 F05-R (20) L Fellowship: Cell Biology, Developmental Biology, and Bioengineering Panel, July 2014.
18. Grant reviewer to NIH Neural Oxidative Metabolism, Mitochondria and cell Death (NOMD) Study section, October 2014.
19. Grant reviewer to NIH Center for Scientific Review Vascular Cell and Molecular Biology (VCMB) Study Section, October 2014.
20. Grant reviewer to NIH 2015/05 ZCA1 PCRB-G (M1) S - R13 study section, February 2015.
21. Grant reviewer to Special Emphasis Panel/Scientific Review Group 2015/10 ZRG1 OTC-B (11) B, July 2015.

#### **SYMPOSIUM PRESENTATIONS:**

1. "Effects of polyoxyethylated surfactants on drug transport in blood-brain barrier" on AAPS Annual Meeting in Boston, MA in 1997.
2. "Selective energy depletion and sensitization of multiple drug resistant cells by Pluronic block copolymers" on ACS meeting in Washington, DC in 2000.
3. "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 in 2002.
4. "Effects of Pluronic P85 on GLUT-1 and MTC1 Transporters in the Blood Brain Barrier" on Gordon Research Conferences, Tilton, NH in 2004.
5. "Pluronic Block Copolymers as a Novel Drug Delivery System for Overcoming Drug Resistance in Cance" on Gordon Research Conference "Drug Carriers in Medicine & Biology", Big Sky, MT in 2004.
6. "Nanozymes" for cell-mediated delivery across the Blood-Brain Barrier". 4<sup>th</sup> International Nanomedicine and Drug Delivery Symposium, Omaha, NE in 2006.
7. "Cell-mediated delivery of therapeutic polypeptides in nanoparticles across the BBB" International Symposium on Polymer Therapeutics, FU, Berlin in 2007.
8. "Overcoming MDR using Block Copolymers" AAPS Annual Meeting and Exposition, San Diego, CA in 2007.
9. "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 in 2008.
10. "Nanomedicine: from Bench to Bedside" 14<sup>th</sup> International Pharmaceutical Technology Symposium, Turkey, Antalya in 2008.
11. "Therapeutic Proteins Delivered by Monocytes to the Brain in Parkinson's Disease" Protein & Peptide Conference-2009, Seoul, Korea, in 2009.
12. "A new polymer-based nanoformulation for overcoming multi-drug resistance in cancer" 2<sup>nd</sup> World Cancer Congress, Beijing, China, in 2009.
13. "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 in 2009.
14. "A Macrophage-based Delivery System of Antioxidant Enzymes for Parkinson's disease: Therapeutic

- Effect in vivo” NIH IDeA Central Region Conference, Oklahoma City, OK, in 2009.
15. “A new polymer-based nanoformulation for overcoming multi-drug resistance in cancer” 2<sup>nd</sup> World Cancer Congress, Beijing, China in 2009.
  16. “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 in 2009.
  17. “CNS Delivery of Therapeutic Proteins in Living Cells” 3rd BBBB-Bosphorus International Conference on Pharmaceutical Sciences, Turkey, Antalya, in 2009.
  18. “Cell-mediated Delivery of Catalase Nanoparticles to Treat Parkinson's Disease” First World Conference on nanomedicine and Drug Delivery (WCN-2010), Kottayam, Kerala, India, in 2010.
  19. “Development of Cell-mediated Drug Delivery of Antioxidants for Parkinson's Disease Therapy” First Annual World Congress of NeuroTalk-2010, Singapore in 2010.
  20. “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 in 2010.
  21. “Using Living Cells for Targeted Drug Transport across Blood Brain Barrier”, Pharmaceutics and Novel Drug delivery Systems, Las Vegas in 2011.
  22. “Development of Nanoformulations of Therapeutic Proteins for Brain Delivery in Macrophages”, First International Conference on Small Science, Sydney, Australia in 2011.
  23. “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.
  24. “Using Exosomes for Drug Transport in Macrophage-mediated Drug Delivery”, Conference for Exosomes and Microvesicles, Orlando, FL in 2011.
  25. “Living Cells as Drug Delivery Vehicles for Transport of Nanoformulated Antioxidants to the Brain”, Conference for Nanoscience, Lanzarote, Spain in 2012.
  26. “Cells for Drug Delivery of Nanoformulated Antioxidants to the Brain”, BU Symposium on "Therapeutic Innovation: The Next Generation of Discovery", Boston, MA, in 2012.
  27. “Living cells as drug delivery vehicles for CNS delivery”, Southeastern Regional Meeting of the ACS (SERMACS), Raleigh, NC, in 2012.
  28. “Treatment of Neurological Disorders with Nanoformulated Antioxidants Delivered to the Brain in Living Cells”, ICEAS, Tokyo, Japan, in 2013.
  29. “Carriers that break barriers”, Biocatalysis, Moscow, Russia in 2013.
  30. “Blood-Borne Macrophages Hitchhike Endosome Networks for Brain Delivery of Antioxidant, Catalase”, ASEMV, Orlando, Florida, in 2013.
  31. “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, in March 2014.
  32. “Carriers that Break Barriers” ASNM 4<sup>th</sup> Annual Meeting, Rockville, MD, in March 2014.
  33. “Cell-mediated Delivery of Nanoformulated Antioxidants for Treatment of Neurodegenerative Disorders”, 5<sup>th</sup> Annual Nanotechnology for Health Care Conference, Little Rock, AR, in April 2014.
  34. “Carriers that Break Barriers”, International Congress on Natural Sciences and Engineering, Kyoto, Japan, in May 2014, a keynote speaker.
  35. “Exosomes as Drug Delivery Vehicles for Parkinson’s Disease Therapy”, Annual Meeting American Society of Exosomes and Microvesicles (ISEV), Washington D.C., in April 2015.

#### **RESEARCH SEMINARS:**

1. “Amphiphilic Block Copolymers in Drug Delivery”, College of Pharmacy, UNMC October 1998.
2. “Pluronic Interactions in MDR Cancer Cells and Blood Brain Barrier”, College of Pharmacy, UNMC, March, 2000.
3. “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.
4. “Kinetic Considerations of Pluronic Effects on Drug Efflux transporters”, College of Pharmacy, UNMC, May 2003.
5. “Polymer Genomics: Shifting Drug Delivery paradigm”, 37<sup>th</sup> Annual Higuchi Research Seminar, Dept.

- of Pharm. Chemistry, University of Kansas, May 2004.
6. "Nanozymes" for Cell-mediated Delivery across the Blood-brain Barrier", Department of Anatomy and Physiology, Kansas State University, Manhattan, KS, April 2007.
  7. "Cell-Mediated Transport of Nanozymes across the Blood-Brain Barrier", American Chemical Society Seminar, UNMC, Omaha, May 2008.
  8. "Living Cells as Delivery Vehicles Antioxidant Enzymes in Parkinson's Disease" Department of Pharmaceutical Sciences seminar, UNMC, Omaha, January 2010.
  9. "Cell-cell Interactions and Nanoparticles Transfer in Macrophage-mediated Drug Delivery. A love story", COP, UNMC, Omaha, October 2010.
  10. "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.
  11. "Trojan Horses of 21<sup>st</sup> Century: Delivery of Therapeutics in Macrophages", research seminar for UNMC Eppley Cancer Center, CGMR Program, March 2012.
  12. "Cell-mediated Drug Delivery", Surgery division research forum, UNMC, Omaha, April 2012.
  13. "New Developments in CNS Drug Delivery", Invited lectures, Moscow State University, Russia, November 2012.
  14. "Carriers that Break Barriers", MOPH division seminar program, February 2014.
  15. "Harnessing the Power of Exosomes for Drug Delivery", CNDD Colloquium, September 2015.

**OTHER:**

1. Pluronic formulations developed with my active participation have successfully completed the Phase II clinical trials.
2. Member of UNMC Translational Research Task Force group.
3. Volunteer for UNMC Skate-a-Thon for Parkinson's, January 2012.
4. Moderator/Session Chair, Eight Annual Chapel Hill Pharmaceutical Sciences Conference, May 28-29, 2014.
5. Volunteer for two lectures "Brain and Polymers" at Ephesus Elementary School, Chapel Hill, December 2014.
6. Recording lecture for Carolina Nanoformulation Workshop "Exosomes for Drug Delivery", July 2015.