

IRINA V. SMIRNOVA, M.S. (Hon.), Ph.D.

Office Department of Physical Therapy and Rehabilitation Science
University of Kansas Medical Center
MS 2002, 3901 Rainbow Blvd.
Kansas City, Kansas 66106
Phone (913) 588-0248
Fax (913) 588-4568
E-mail ismirnova@kumc.edu

Education

- | | |
|---------|---|
| 1981-86 | M.S. student, Department of Biochemistry, Faculty of Biology, Lvov State University, Lvov, Ukraine |
| 1986 | M.S. Degree with Honors in Biochemistry; thesis on "Effect of partial reduction of disulfide bonds on structure and function of human thrombin" |
| 1986-89 | Ph.D. student, Department of Protein Chemistry, Institute of Bioorganic Chemistry, Academy of Science of Ukraine, Kiev, Ukraine |
| 1990 | Ph.D. Degree in Protein Chemistry; dissertation on "Specificity of proteolytic action of thrombin on high molecular weight substrates" |

Brief Chronology of Academic Appointments

- | | |
|------------|---|
| 1990-92 | Research Scientist, Department of Protein Chemistry, Institute of Bioorganic Chemistry, Academy of Science of Ukraine, Kyiv, Ukraine |
| 1992-95 | Postdoctoral Research Fellow, Neurobiology Research Laboratory, Kansas City VA Medical Center, Kansas City, MO |
| 1995-96 | Research Associate, Neurobiology Research Laboratory, Kansas City VA Medical Center, Kansas City, MO |
| 1996-97 | Associate Investigator, Neurobiology Research Laboratory, Kansas City VA Medical Center, Kansas City, MO |
| 1997-00 | Research Associate, Department of Biochemistry and Molecular Biology, University of Kansas Medical Center, Kansas City, KS |
| 2000-04 | Research Assistant Professor, Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS |
| 2004-09 | Assistant Professor, Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS |
| 2009-pres. | Associate Professor, Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS |

2006-pres. Director, PhD in Rehabilitation Science Program, Department of Physical Therapy and Rehabilitation Science, University of Kansas Medical Center, Kansas City, KS

Invited Speaker

“Calcium mobilization and receptor cleavage after thrombin stimulation in motor neurons” (FASEB Summer Research Conference “Thrombin and Vascular Medicine”, August 9-14, 1997, Saxton’s River, VT)

“Molecular mechanisms underlying the arrest of diabetic cardiomyopathy -Studies in rat models of type 1 diabetes” (Scientific Forum XV- International Congress of Cardiovascular Sciences, December 8-10, 2005, Rio de Janeiro, Brazil)

“Metabolic Syndrome: Evidence, Education and Effective Intervention Strategies” by Patricia Kluding, Yvonne Searls, Irina V. Smirnova, and Lisa Stehno-Bittel, opening multisection presentation (Combined Sections Meeting of the American Physical Therapy Association, February 1-5, 2006, San Diego, CA)

“Metabolic Syndrome and Type 2 Diabetes Mellitus” by Patricia Kluding, Yvonne Searls, Irina V. Smirnova, and Lisa Stehno-Bittel (Kansas Physical Therapy Association Fall Conference, October 6-8, 2006, Topeka, KS)

“Recruitment and Retention of International PhD Students” by Lisa Stehno-Bittel and Irina V. Smirnova (Annual North American Consortium of Nursing and Allied Health [NACNAH] Conference: Strategic Summit on Academic Internationalization for the Health Professions, November 9-10, 2006, Kansas City, KS)

Awards and Honors

- May 2002 University of Kansas Medical Center Faculty Travel Award to attend the American Diabetes Association 62nd Annual Meeting, June 14-18, 2002, San Francisco, CA
- Jul 2002 American Heart Association New Investigator Award to travel and present a poster at the Scientific Conference on Advances in the Molecular and Cellular Mechanisms of Heart Failure, Snowbird Conference Center, August 21-25, 2002, Snowbird, UT
- May 2003 Regents’ Faculty Award
- May 2004 University of Kansas Medical Center Faculty Travel Award to attend and present a poster at the XVIII World Congress of the International Society for Heart Research, August 7–11, 2004, Brisbane, Australia
- Mar 2005 University of Kansas Medical Center Diversity Initiative Certificate of Appreciation
- Mar 2007 Kansas IDeA Network of Biomedical Research Excellence (K-INBRE) Faculty Scholar award
- May 2007 University of Kansas Medical Center Faculty Travel Award to attend and present a poster at the 7th European Symposium of The Protein

- Society, "From Proteins to Proteome", May 12-16, 2007, Stockholm-Uppsala, Sweden.
- Nov 2007 Faculty Investigator Research Award
- Nov 2010 University of Kansas Medical Center Faculty Travel Award to attend and present a poster at the American Heart Association Scientific Sessions, November 13-17, 2010, Chicago, IL

Professional Education

Completed workshop "Recombinant DNA Techniques" (presented by Gibco BRL/Life Technologies, Inc. Training Center, August 3-7, 1998).

Scientific Society Membership

- 1986-92 Ukrainian Biochemical Society
- 2001-present American Heart Association, Council on Basic Cardiovascular Sciences
- 2003-present American Diabetes Association
- 2006-present mentor in the International Mentoring Program of the American Heart Association
- 2008 US Human Proteome Organization (HUPO)

Committee Service

University of Kansas

- 7/1/06-6/30/07 Graduate School Standing Committee on New Degrees and Degree Program Changes, member

University of Kansas Medical Center

- 7/1/02-6/30/05 Faculty Assembly Library Committee, member
- 5/1/03-present Laboratory Safety Committee, member
- 7/1/06-present Graduate Council, Faculty Graduate Representative
- 7/1/06-6/30/09 Faculty Assembly Elections Committee, member
- 7/1/08-6/30/09 Faculty Assembly Elections Committee, Chair
- 7/1/08-6/30/09 Faculty Assembly Steering Committee, member
- 5/1/07-6/30/09 International Affairs Committee, member

School of Medicine

- 5/3/04-present Advisory Committee for the Molecular Resource Facility, member

School of Allied Health

- 1/24/03-6/30/07 Diversity Committee, member
- 7/1/03-6/30/05 Diversity Committee, secretary
- 7/1/05-6/30/06 Diversity Committee, Chair
- 7/1/05-6/30/06 Steering Committee, member
- 3/14/08-12/31/08 Ad Hoc Committee to discuss PhD and Clinical Doctorates within the SAH
- 7/1/07-6/30/10 Elections Committee, member
- 7/1/08-6/30/09 Election Committee, Chair

7/1/08-6/30/09 Steering Committee, member
7/1/08-present Research Committee, member
7/31/08-present P.R. and Marketing Committee, member
7/1/09-present Appointment, Promotion and Tenure Committee, member

Department of Physical Therapy and Rehabilitation Science

7/1/01-6/30/03 Research Committee, member
7/1/01-6/30/03 PhD in Rehabilitation Science Program Committee, member
7/1/03-6/30/04 Publicity and Public Relations Committee, Chair
7/1/03-6/30/07 Faculty Retreat Committee, Chair
4/1/04-9/30/04 Ad Hoc PT&RS 60th Anniversary Celebration Committee, Chair
7/1/04-6/30/07 Outreach, Chair
3/1/05-9/30/08 Penny Cohn Golf Tournament Committee, Director of Logistics
7/1/04-6/30/06 PhD in Rehabilitation Science Program Committee, Admissions, member
1/15/06-6/30/06 PhD in Rehabilitation Science Program, Admissions Director
7/1/06-present PhD in Rehabilitation Science Program, Director

Faculty Search Committees

SAH Physical Therapy and Rehabilitation Science Department
Committee member

- May-November, 2006 - search for faculty candidate with a neuroscience background

Committee chair

- September 2007- May 2008 - search for faculty candidate with an orthopedic background

SAH Clinical Laboratory Sciences Department
Committee member

- February-April 2005 – search for faculty candidate, a molecular biologist for the new Masters in Molecular Biotechnology program
- September 2007-June 2008 – search for faculty candidate, a molecular biologist for the new Masters in Molecular Biotechnology program

Teaching

Graduate Courses:

PTRS 712 - Pathophysiology & the PT Diagnosis
Course Co-Director and Instructor 2004-2006
Course Director and Instructor 2007
PTRS 712pp - Pathophysiology & the PT Diagnosis
Course Director and Instructor 2005-present
PTRS 882 - Pathophysiology and Clinical Screening of General Medical
Conditions
Course Co-Director and Instructor 2010-present
REHS 862 - Pathobiology of Human Function I

Course Instructor	2002-2003
Course Director and Instructor	2003-present

Textbook chapter revision for the next edition

Chapter 12 “The Cardiovascular System” by Catherine C. Goodman and Irina V. Smirnova, “Pathology: Implications for the Physical Therapist” by Catherine Cavallaro Goodman, and Kenda S. Fuller, 2009, 3rd Edition, Saunders Elsevier.

Review of a book proposal

“Application of Genomics to PT Practice” for F.A. Davis Company (2008)

Professional and Scientific Presentations

“The benefits of exercise for diabetic heart and how to fit in proteomics”, Kansas City Area Life Sciences Institute meeting on Proteomics in Diabetes, Midwest Research Institute, Kansas City, KS, March 13, 2003

“Diabetic cardiomyopathy and effects of exercise”, Kansas City Diabetes Research Interest Group meeting, KUMC, November 19, 2003

“The Benefits of Exercise for Diabetic Heart”, presentation for the research practicum for the 1st year physical therapy students, February 1, 2005

“Role of posttranslational protein modifications in diabetic cardiomyopathy”, KU NIH Center of Biomedical Research Excellence (COBRE) in Protein Structure and Function and KU Center for Bioinformatics meeting, KU Lawrence, December 16, 2005

“Diabetic cardiomyopathy: mechanisms, benefits of exercise, and beyond”, KU NIH Center of Biomedical Research Excellence (COBRE) in Protein Structure and Function meeting, KU Lawrence, February 8, 2006

“Role of posttranslational protein modifications in diabetic cardiomyopathy”, KU NIH Center of Biomedical Research Excellence (COBRE) in Protein Structure and Function – External Advisory Board meeting, KU Lawrence, March 2, 2006

“Diabetic cardiomyopathy: mechanisms and benefits of exercise”, KU Biomedical Engineering Society, KU Lawrence, March 6, 2006

“Unraveling the molecular mechanisms of exercise benefits in the diabetic heart”, KUMC Department of Molecular and Integrative Physiology weekly seminar, May 1, 2006

“Posttranslational protein modifications in diabetic heart”, KU NIH Center of Biomedical Research Excellence (COBRE) in Protein Structure and Function meeting, KU Lawrence, February 1, 2007

“Diabetic heart: molecular mechanisms and interventions”, SAH Faculty Investigator Research Awardee presentation, KUMC Annual Faculty Research Day, November 8, 2007

Continuing Education Workshops Conducted

“Emerging trends in diabetic care” by Smirnova IV and Stehno-Bittel L, University of Kansas Medical Center, October 16, 2002 (75 participants attended).

“Metabolic Syndrome: Evidence, Education and Effective Intervention Strategies” by Kluding P, Searls Y, Smirnova IV, and Stehno-Bittel L, three hour presentation for local physical therapists and PT students, January 19, 2006 (30 participants attended).

Community Presentations

“The benefits of exercise for diabetic heart disease”, University of Kansas Medical Center Cray Diabetes Management Center, October 30, 2002

“Research update in diabetes: Human islet isolation in Kansas City” (presented research on how exercise improves diabetic heart muscle structure), the Saint Joseph Community Center for Health and Education, Saint Joseph Hospital, Kansas City, MO, July 10, 2003

Current Funded Research Grants

Stimulating insulin secretion from large islets with HTS: new drugs for diabetes
(**Smirnova** – PI, Chaguturu – Co-Investigator, Stehno-Bittel - Co-Investigator)

Pilot Grant

K-INBRE

1/1/11-12/31/11

\$50,000 direct cost

\$75,000 total cost

HTS to improve pancreatic islet function and viability (**Smirnova** – PI, Chaguturu – Co-Investigator, Stehno-Bittel - Co-Investigator)

Research Grant

KU Diabetes Institute

1/1/11-12/31/11

\$10,000 direct cost

\$10,000 total cost

Kansas University Training Program in Neurological and Rehabilitation Science
(Nudo – Principal Investigator; **Smirnova** - Graduate Student Mentor)

1 T32 HD057850-01

National Institutes of Health

04/01/09-03/31/14
\$1,203,745 direct cost
\$1,275,710 total cost

Completed Funded Research Grants

Exercise delays diabetic heart disease by reducing adipose related inflammation
(VanHoose – Principal Investigator; **Smirnova** – Sponsor)

1 F31 HL095273-01 Kirschstein NRSA for Individual Predoctoral Fellowship
National Institutes of Health
02/04/09-02/03/11
\$55,677 direct cost

Can a drug replace exercise to improve the diabetic heart? (**Smirnova** - Principal Investigator)

#0430236N Scientist Development Grant
American Heart Association, National
01/01/04-12/31/07 (in extension until 12/31/08)
\$236,364 direct cost
\$260,000 total cost

Age-dependent changes in the cardiac plasma membrane Ca²⁺-ATPase (Zaidi – Principal Investigator; **Smirnova** – Co- Investigator)

KCALSI-07-02-General Research Development Grant
Kansas City Area Life Sciences Institute
01/01/07 - 12/31/07 (in extension until 12/31/08)
\$22,727 direct cost
\$25,000 total cost

Kansas IDeA Network of Biomedical Research Excellence (K-INBRE) Faculty
Scholar award to **Smirnova** (Hunt - Principal Investigator)

K-INBRE NIH # P20 RR016475
05/01/07-04/30/08
\$20,000 direct cost
\$20,000 total cost

Exercise Induced Benefits on Cardiac Performance and Protein Kinase C beta II in
Type 1 Diabetes (Loganathan - Principal Investigator; **Smirnova** - Sponsor)

#0610002Z, Predoctoral Fellowship
American Heart Association, Heartland Affiliate
01/01/06-12/31/07
\$50,000 direct cost
\$50,000 total cost

Proteomic approach to study diabetic heart protein posttranslational modification
(**Smirnova** - Principal Investigator of Pilot Project Grant)

Subaward #FY2005-096, Pilot Project Grant
NIH COBRE in Protein Structure and Function
NCRR #P20 RR-17708 (Hanzlik - Principal Investigator)
05/01/05-06/30/07
\$101,650 direct cost
\$148,674 total cost

2007 Shared Equipment Award to purchase *Vita/View* Data Acquisition System
Series 4000 on Research Animals (Zhu - Principal Investigator; **Smirnova** – Co-
Investigator)

KUMC Research Institute
12/01/06-06/30/07
\$19,400 direct cost
\$19,400 total cost

ICAM-1 Targeted Nanoparticles for In Vivo, VEGF-Induced Angiogenesis (Berkland
- Principal Investigator; **Smirnova** - Co-Investigator)

#5-2005-1286 Research Grant
Juvenile Diabetes Research Foundation
01/01/06-12/31/06
\$100,000 direct cost
\$110,000 total cost

#4036-04-5330 SABIT training grant (**Smirnova** - Principal Investigator)
US Department of Commerce
09/01/04-08/31/05
\$13,700 direct cost
\$13,700 total cost

Can drugs replace exercise? (**Smirnova** - Principal Investigator)
Pilot grant #G1807780
Lied Endowed Basic Science Research Fund
03/01/03-08/31/04
\$35,000 direct cost
\$35,000 total cost

2004 Shared Research Equipment Award to purchase small animal calorimeter
Eco-Oxymax (**Smirnova** - Principal Investigator)

KUMC Research Institute
12/01/03-06/30/04
\$15,000 direct cost
\$15,000 total cost

2004 Shared Research Equipment Award to purchase equipment for Magnetic
Resonance Imaging of research animals (Bilgen - Principal Investigator; **Smirnova** -
Co-Investigator)

KUMC Research Institute
12/01/03-06/30/04
\$25,000 direct cost
\$25,000 total cost

Mechanisms of fibrosis in diabetic heart and influence of exercise (**Smirnova** -
Principal Investigator)
Pilot grant #RI-80525
Lied Endowed Basic Science Research Fund
02/01/02-07/31/03
\$35,000 direct cost
\$35,000 total cost

Evaluation of the effects of long-acting anesthetics on wound healing (Reddy -
Principal Investigator; **Smirnova** - Co-investigator)
Research grant
Pharmaceutical Company
12/19/01-12/18/02
\$29,366 direct cost
\$44,049 total cost

#4036-00-0556 SABIT training grant (Stehno-Bittel - Principal Investigator;
Smirnova - Co-investigator)
US Department of Commerce, SABIT
05/01/01-04/30/02
\$9,545 direct cost
\$9,545 total cost

Publications (in peer-reviewed journals)

1. Sereyskaya AA, Osadchuk TV, Korneliuk AI, **Smirnova** (Pekhnik) **IV**, Serebrianyi SB: Enzymatic properties of the isolated B-chain of human thrombin. *Biochemistry (in Russian)*, 1989; **54**(4): 542-548.
2. Sereyskaya AA, **Smirnova** (Pekhnik) **IV**, Osadchuk TV: The effect of various forms of thrombin on nonspecific high molecular weight substrates. *Biochemistry (in Russian)*, 1990; **55**(4): 645-652.
3. **Smirnova** (Pekhnik) **IV**, Selishcheva MY, Sereyskaya AA: Influence of ionic strength on the enzymatic activity of thrombin. *Biopolymers and Cell (in Russian)*, 1990; **6**(3): 59-65.
4. **Smirnova** (Pekhnik) **IV**, Kheilomsky AB, Chikurova EV: Isolation and identification of N-terminal fragments of the A α -chain of bovine fibrinogen. *Ukrainian Biochem. J. (in Russian)*, 1991; **63**(2): 3-8.
5. Sereyskaya AA, Karabut LV, **Smirnova** **IV**: On the interaction of anion-binding exosite of thrombin with the complementary site of fibrinogen. *Ann. Acad.Sci. of Ukr.SSR (in Russian)*, 1991; **11**: 140-143.

6. Sereyskaya AA, **Smirnova IV**, Karabut LV, Chetyrkina SN: Critical role of interaction of thrombin anion binding exosite with complementary recognition site of fibrinogen A α -chain for high specificity of the enzyme. *Biochemistry (in Russian)*, 1994; **59**(3): 255-260.
7. Festoff BW, Reddy RB, VanBecelaere M, **Smirnova I**, Chao J: Activation of serpins and their cognate proteases in muscle after crush injury. *J. Cel. Physiol.* , 1994; **159**: 11-18.
8. Ho GJ, Gregory EJ, **Smirnova IV**, Zoubine MN, Festoff BW: Cross-linking of beta-amyloid precursor protein catalyzed by tissue transglutaminase. *FEBS Lett.*, 1994; **349**: 151-154.
9. **Smirnova IV**, Festoff BW: Alterations in serum thrombospondin in patients with Amyotrophic Lateral Sclerosis. *J. Neurolog. Sci.*, 1994; **127**: 207-213.
10. **Smirnova IV**, Ma JY, Citron BA, Ratzlaff KT, Gregory EJ, Akaaboune M, Festoff BW: Neural thrombin and protease nexin I kinetics after murine peripheral nerve injury. *J. Neurochem.*, 1996; **67**(5): 2188-2199.
11. Citron BA, Ratzlaff KT, **Smirnova IV**, Festoff BW: Protease nexin I in mouse brain is expressed from the same gene that is expressed in seminal vesicle. *J. Mol. Neurosci.*, 1996; **7**(3): 183-191.
12. Zoubine MN, Ma JY, **Smirnova IV**, Citron BA, Festoff BW: A molecular mechanism for synapse elimination: Novel inhibition of locally-generated thrombin delays synapse loss in neonatal mouse muscle. *Dev. Biology*, 1996; **179**: 447-457.
13. Citron BA, **Smirnova IV**, Zoubine MN, Festoff BW: Quantitative PCR analysis reveals novel expression of prothrombin mRNA and regulation of its levels in developing mouse muscle. *Thrombos. Res.*, 1997; **87**: 303-313.
14. Citron BA, Zhang SX, **Smirnova IV**, Festoff BW: Apoptosis, injury-induced cell death in cultured murine motor neurons. *Neurosci. Lett.*, 1997; **239**: 25-28.
15. **Smirnova IV**, Salazar A, Arnold PM, Glatt S, Handler M, Festoff BW: Thrombin and its precursor in human cerebrospinal fluid. *Thrombos. Hemostas.*, 1997 , **78**: 1473-1479.
16. **Smirnova IV**, Citron BA, Arnold PM, Zhang SX, Festoff BW: Characterization of apoptosis in a motor neuron. *Spine*, 1998; **23**:151-158.
17. **Smirnova IV**, Vamos S, Wiegmann T, Citron BA, Arnold PM, Festoff BW: Calcium mobilization and protease-activated receptor cleavage after thrombin stimulation in motor neurons. *J. Mol. Neurosci.*, 1998; **10**: 31-44.
18. **Smirnova IV**, Zhang SX, Citron BA, Arnold PM, Festoff BW: Thrombin is an extracellular signal that activates intracellular death protease pathways inducing apoptosis in a model motor neurons. *J. Neurobiol.* 1998; **36**: 64-80.
19. Akaaboune M, Hantai D, **Smirnova I**, Lachkar S, Kapsimali M, Verdiere-Sahuque, M, Festoff BW: Developmental regulation of the serpin, protease nexin I, localization during activity-dependent polyneuronal synapse elimination in mouse skeletal muscle. *J. Comp. Neurol.* 1998; **397**: 572-579.
20. Citron BA, **Smirnova IV**, Arnold PM, Festoff BW: Upregulation of neurotoxic serine proteases, prothrombin, and protease-activated receptor 1 early after spinal cord injury. *J. Neurotrauma.* 2000; **17**: 1191-1203.

21. Festoff BW, D'Andrea MR, Citron BA, Salcedo RM, **Smirnova IV**, Andrade-Gordon P: Motor neuron cell death in *Wobbler* mutant mice follows overexpression of the G-protein-coupled protease activated receptor for thrombin. *Mol. Med.* 2000; **6**: 410-429.
22. **Smirnova IV**, Bittel DC, Ravindra R, Jiang H, Andrews GK: Zinc and cadmium can promote rapid nuclear translocation of MTF-1. *J. Biol. Chem.* 2000; **275**: 9377-9384.
23. Bittel DC, **Smirnova IV**, Andrews GK: Functional heterogeneity in the zinc fingers of the metalloreulatory transcription factor, MTF-1. *J. Biol. Chem.* 2000; **275**: 37194-37201.
24. **Smirnova IV**, Citron BA, Arnold PM, Festoff BW: Neuroprotective signal transduction in motor neurons exposed to thrombin: G-protein modulation effects on neurite outgrowth, Ca²⁺ mobilization and apoptosis. *J. Neurobiol.* 2001; **48**: 87-100.
25. Daniels PJ, Bittel D, **Smirnova IV**, Winge DR, Andrews GK: Mammalian metal response element-binding transcription factor-1 functions as a zinc sensor in yeast, but not as a sensor of cadmium or oxidative stress. *Nucleic Acids Res.* 2002, **30**: 3130-3140.
26. Chi L, Stehno-Bittel L, **Smirnova IV**, Stechschulte DJ, Dileepan KN: Signal transduction pathways in mast cell granule-mediated endothelial cell activation. *Mediators Inflamm.* 2003, **12**: 79-87.
27. Fedoryak OD, Searls Y, **Smirnova IV**, Burns D, Stehno-Bittel L: Spontaneous nuclear Ca²⁺ oscillations in subcellular compartments of vascular smooth muscle cells rely on different Ca²⁺ pools. *Cell Research*, 2004, **14**: 379-88.
28. Searls Y, **Smirnova IV**, Fegley BR, Stehno-Bittel L: Exercise attenuates diabetes-induced ultrastructural changes in rat cardiac tissue. *Med. Sci. Sports Exerc.*, 2004, **36**: 1863-1870.
29. Bilgen M, Al-Hafez B, Malone T, **Smirnova IV**: Ex vivo magnetic resonance imaging of rat spinal cord at 9.4 T. *Magn. Reson. Imaging*, 2005, **23**:601-605.
30. Loganathan R, Bilgen M, Al-Hafez B, **Smirnova IV**: Characterization of alterations in diabetic myocardial tissue using high resolution MRI. *Int. J. Cardiovasc. Imaging*, 2006, **22**: 81-90.
31. Loganathan R, Bilgen M, Al-Hafez B, Alenezy MD, **Smirnova IV**: Cardiac dysfunction in the diabetic rat: quantitative evaluation using high resolution magnetic resonance imaging. *Cardiovasc Diabetology*, 2006 **5**:7 (4 April 2006).
32. **Smirnova IV**, Kibiryeva N, Vidoni E, Buñag RD, Stehno-Bittel L: Abnormal EKG stress test in rats with type 1 diabetes is deterred with low-Intensity exercise programme. *Acta Diabetologica*, 2006 **43**(3): 66-74.
33. Loganathan R, Bilgen M, Al-Hafez B, Zhero, SV, Alenezy MD, **Smirnova IV**: Exercise training improves cardiac performance in diabetes: *in vivo* demonstration with quantitative cine-MRI analysis. *Journal of Applied Physiology*, 2007 **102**(2): 665-72.
34. Bilgen M, Al-Hafez B, Alrefae T, He Y-Y, **Smirnova IV**, Aldur M, Festoff BW: Longitudinal magnetic resonance imaging of spinal cord injury in mouse: changes

- in signal patterns associated with the inflammatory response *Magnetic Resonance Imaging*, 2007;25(5):657-64.
35. Al-Jarrah M, Pothakos K, Novikova L, **Smirnova IV**, Kurz MJ, Stehno-Bittel L, Lau Y-S: Endurance exercise promotes cardiorespiratory rehabilitation without neuronrestoration in the chronic mouse model of Parkinsonism with severe neurondegeneration, *Neuroscience*, 2007;149(1):28-37.
 36. Alrefae T, **Smirnova IV**, Cook LT, Bilgen M: A model-based time-reversal of left ventricular motion improves cardiac motion analysis using tagged MRI data, *BioMedical Engineering OnLine*, 2008; 7:15 (19 May 2008).
 37. Fischer KJ, Novak EA, **Smirnova IV**, Reddy GK, Stehno-Bittel L: Effects of diabetes and exercise on soft connective tissue properties at the knee in the rat, *Journal of Musculoskeletal Research*, 2009;12(2):95-104.
 38. Bweir S, Al-Jarrah M, Almalty A-M, Maayah M, **Smirnova IV**, Novikova L, Stehno-Bittel L: Resistance exercise training lowers HbA1c more than aerobic training in adults with type 2 diabetes, *Diabetology & Metabolic Syndrome*, 2009, 1:27.
 39. Searls YM, Loganathan R, **Smirnova IV**, Stehno-Bittel LA: Intracellular Ca²⁺ regulating proteins in vascular smooth muscle cells are altered with type 1 diabetes due to the direct effects of hyperglycemia, *Cardiovascular Diabetology* 2010, 9:8.
 40. Williams S, Huang H-H, Kover K, Moore W, Berkland C, Singh M, **Smirnova IV**, MacGregor R, Stehno-Bittel L: Reduction of diffusion barriers in isolated rat islets improves survival, but not insulin secretion or transplantation outcome, *Organogenesis*, 2010, 6:2, 115-124.
 41. VanHoose L, Sawers Y, Loganathan R, Vacek JL, Stehno-Bittel L, Novikova L, Al-Jarrah M, **Smirnova IV**: Electrocardiographic changes with the onset of diabetes and the impact of aerobic exercise training in the Zucker Diabetic Fatty (ZDF) rat, *Cardiovascular Diabetology*, 2010, 9:56.
 42. Al-Jarrah MD, Matalka I, Al Aseri H, Mohtaseb A, Stehno-Bittel L, **Smirnova IV**, Novikova L, Al-Khateeb A, Bweir S: Exercise training prevents endometrial hyperplasia and biomarkers for endometrial cancer in rat model of type 1 diabetes, *Journal of Clinical Medicine Research*, 2010, 2:5, 207-214.
 43. Huang H-H, Novikova L, Williams JS, **Smirnova IV**, Stehno-Bittel L: Low insulin content of large islet population is present in situ and in isolated islets, *Islets*, 2011, 3:1, 1-8.
 44. Farmer KL, Kuphal KE, **Smirnova IV**, Novikova L, Ryals JM, Wright DE: Voluntary exercise upregulates the analgesic neurotrophic factor GDNF and improves painful diabetic neuropathy in mice and rats, 2011, in revision.
 45. Farmer KL, Brown J, **Smirnova IV**, Smith P, Wright DE, Kuphal KE: Voluntary exercise reduces mechanical sensitivity in nerve-injured and diabetic rats, 2011, submitted.
 46. Shi JJ, Alenezzy M, **Smirnova IV**, Bilgen M: A two-parameter model for left ventricular wall motion, 2011, submitted.

47. Loganathan R, Novikova L, Boulatnikov I, **Smirnova IV**: Exercise improves diabetic heart performance by reducing the levels of diacylglycerol, 2011, in revision.
48. Poyarkov AA, Poyarkova SA, **Smirnova IV**, Kukhar VP: Liporetro-D-peptides - a novel class of highly selective thrombin inhibitors, 2011, in revision.
49. Englert JM, Reiniger N, **Smirnova IV**, Kliment CR, Schmidt AM, Oury TD: Hyperglycemia mitigates the fibrotic response to asbestos independent of alterations in pulmonary RAGE expression, 2011, submitted.

Publications (not-peer reviewed)

1. VanHoose LD, Novikova L, Loganathan R, Sawers Y, Vacek J, Stehno-Bittel L, **Smirnova IV**: The impact of diabetes on cardiac lymphatics and the protective role of exercise training, *Lymph Link – National Lymphedema Network*, 2011, 23:3-4,14.

Invited reviews

1. **Smirnova IV**, Ho GJ, Fenton II JW, Festoff BW: Extravascular proteolysis and the nervous system: serine protease/serpin balance. *Sem. Thrombos. Hemostas.*, 1994; **20**(4): 426-432.
2. Ho GJ, **Smirnova IV**, Akaaboune M, Hantai D, Festoff BW: Serine proteases and their serpin inhibitors in Alzheimer's Disease. *Biomed. Pharmacother.*, 1994; **48**: 296-304.
3. Festoff BW, **Smirnova IV**, Ma JY, Citron BA: Thrombin, its receptor and protease nexin I, its potent serpin, in the nervous system. *Sem. Thrombos. Hemostas.*, 1996; **22**(3): 267-271.
4. Loganathan R, Searls Y, **Smirnova IV**, Stehno-Bittel L: Exercise-induced benefits in individuals with type 1 diabetes - review. *Physical Therapy Reviews*, 2006, **11**: 77-89.

Book chapter

Festoff BW, Citron BA, **Smirnova IV**: Shifts in the thrombin:protease nexin I balance in postnatal and degenerative synapse elimination. In: Synapse: In development, health, and disease (Festoff, B.W., Hantai, D., and Citron, B.A., co-eds). *Advances in organ biology* (Bittar, E.E., ed), 1997; JAI Press, Greenwich, CT), 351-375.