

BIOGRAPHICAL SKETCH

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NAME Natalia Shirokova	POSITION TITLE Assistant Professor		
eRA COMMONS USER NAME nshirokova			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
MPhTI, Moscow, USSR	MS	1987	Molecular/Chem. Phys.
Bogomoletz Institute of Physiology, Kiev, Ukraine	PhD	1991	Physiology&Biophysics
Rush University Medical School, Chicago, USA	Post-Doc	1991-1996	Physiology

A. Positions and Honors.

POSITIONS HELD

- 1987-1990: Aspirant MPhTI in the Bogomoletz Institute of Physiology, Kiev, Ukraine (Advisors: Drs. I. Magura and P.Kostyuk).
- 1990-1997: Research Associate of the Department of General Physiology of the Nervous System, Bogomoletz Institute of Physiology, Kiev, Ukraine.
- 1991-1996: Research Associate in the Department Molecular Biophysics and Physiology, Rush University, Chicago, IL, USA.
- 1996-2000: Assistant Professor (non-tenure) in the Department Molecular Biophysics and Physiology, Rush University, Chicago, IL, USA.
- 2000-date: Assistant Professor in the Department of Pharmacology and Physiology, UMDNJ-New Jersey Medical School, Newark, NJ, USA.

HONORS

- 1985 MS with Honor, MPhTI.
- 1997-1998 Fellowship under the NIH Training Program

PROFESSIONAL MEMBERSHIPS

- 1991-date Biophysical Society.
- 1994-date Society of General Physiologists

REFERRAL WORK

American Journal of Physiology (Cell Physiol.), Biophysical Journal, Journal of Physiology (London), Journal of General Physiology, Cell Calcium, Journal of Biological Chemistry, European Heart Journal

B. Selected Peer-Reviewed Publications.

N. Shirokova and E. Niggli. Studies of RyR functions in situ. (2008). *Methods*, 46: 183-193.

W.J. Durham, P. Aracena-Parks, C. Long, A.E. Rossi, S.A. Goonasekera, S. Boncompagni, D.L. Galvan, C.P. Gilman, M. Baker, **N. Shirokova**, F. Protasi, R. Dirksen and S.L. Hamilton. (2008). RyR1 S-Nitrosylation underlies environmental heat stroke and sudden death in Y522S RyR1 knock-in mice. *Cell*, 133: 53-65.

C. Jung, A.S. Martins, E. Niggli and **N. Shirokova**. Dystrophic cardiomyopathy: amplification of cellular damage by Ca²⁺ signalling and reactive oxygen species-generating pathways (2008). *Cardiovascular Research*, 77: 766-773.

- A.S. Martins, V.M. Shkryl, M.C. Nowycky and **N. Shirokova**. Reactive oxygen species contribute to Ca^{2+} signals produced by osmotic stress in mouse skeletal muscle fibres (2008). *Journal of Physiology*, 586: 197-210.
- E. Niggli and **N. Shirokova**. (2007). A guide to sparkology: The taxonomy of elementary cellular Ca^{2+} signaling events. *Cell Calcium*, 42(4-5):379-387.
- E.V. Isaeva, V.M. Shkryl and **N. Shirokova**. (2006). Ca^{2+} sparks: SOS signals of struggling muscle. *Physiology News*, 62: 27-28.
- V.M. Shkryl and **N. Shirokova**. (2006). Transfer and tunneling of Ca^{2+} from sarcoplasmic reticulum to mitochondria in skeletal muscle. *Journal of Biological Chemistry*, 281(3): 1547-1554.
- E.V. Isaeva, V.M. Shkryl and **N. Shirokova**. (2005). Mitochondrial redox state and Ca^{2+} sparks in permeabilized mammalian skeletal muscle. *Journal of Physiology*, 565: 855-872.
- E.V. Isaeva and **N. Shirokova**. (2003). Metabolic regulation of Ca^{2+} release in permeabilized mammalian skeletal muscle fibres. *Journal of Physiology*, 547: 453-462.
- E. Ríos, **N. Shirokova**, W.G. Kirsch, G. Pizarro, M.D. Stern, H. Cheng and A. González (2001). A Preferred Amplitude of Calcium Sparks in Skeletal Muscle. *Biophysical Journal*, 80: 169-183.
- G.A. Brum, A. González, J. Rengifo, **N. Shirokova** and E. Ríos. (2000). Fast imaging in two dimensions resolves extensive sources of Ca^{2+} sparks in frog skeletal muscle. *Journal of Physiology*, 528: 419-433.
- A. González, W.G. Kirsch, **N. Shirokova**, G. Pizarro, G. Brum, I.N. Pessah, M.D. Stern, H. Cheng and E. Ríos. (2000). Involvement of multiple intracellular release channels in calcium sparks of muscle. *Proceedings of National Academy of Science*, 97: 4380-4385.
- A. González, W.G. Kirsch, **N. Shirokova**, G. Pizarro, M.D. Stern and E. Ríos.(2000). The spark and its ember. Separately gated local components of Ca^{2+} release in skeletal muscle. *Journal of General Physiology*, 115: 139-157.
- N. Shirokova**, R. Shirokov, D. Rossi, A. González, W.G.Kirsch, J. García, V. Sorrentino and E. Ríos. (1999). Spatially segregated control of Ca release in developing skeletal muscle. *Journal of Physiology*, 521: 483-495.
- E. Ríos, M.D. Stern, A. González, G. Pizarro and **N. Shirokova**. (1999). Release flux underlying Ca^{2+} sparks in frog skeletal muscle. *Journal of General Physiology* 114: 31-48.
- N. Shirokova**, A. González, W.G. Kirsch, E. Ríos, G. Pizarro, M.D. Stern and H. Cheng. (1999). Calcium sparks: release packets of uncertain origin and fundamental role. *Journal of General Physiology*, 113: 377-384.
- H. Cheng, L.S. Song, **N. Shirokova**, A. González, E.G. Lakatta, E. Ríos and M.D. Stern. (1999). Amplitude distribution of calcium sparks in confocal Images. Theory and studies with an automatic detection method. *Biophysical Journal*, 76: 606-17.
- N. Shirokova**, J. García and E. Ríos. (1998). Local calcium release in mammalian skeletal muscle. *Journal of Physiology*, 512: 377-384.
- N. Shirokova** and E. Ríos. (1997). Small event Ca^{2+} release. A probable precursor of Ca^{2+} sparks in frog skeletal muscle. *Journal of Physiology*, 501: 3-11.
- G. Pizarro, **N. Shirokova**, A. Tsugorka and E. Ríos. (1997). Quantal release of calcium in skeletal muscle. *Journal of Physiology*, 501: 289-303.
- N. Shirokova** and E. Ríos. (1996). Activation of Ca^{2+} release by caffeine and voltage in frog skeletal muscle.

Journal of Physiology, 493: 317-339.

N. Shirokova and E. Ríos. (1996). Caffeine enhances intramembranous charge movement in skeletal muscle by increasing cytoplasmic Ca^{2+} concentration. *Journal of Physiology*, 493: 341-356.

N. Shirokova, J. García, G. Pizarro and E. Ríos. (1996). Ca^{2+} release from the sarcoplasmic reticulum compared in amphibian and mammalian skeletal muscle. *Journal of General Physiology*, 107: 1-18.

N. Shirokova, A. González, J. Ma, R. Shirokov and E. Ríos. (1995). Properties and roles of an intramembrane charge mobilized at high voltages in skeletal muscle. *Journal of Physiology*, 486: 385-400.

N. Shirokova, G. Pizarro, and E. Ríos. (1994). A damped oscillation in the intramembrane charge movement and calcium release flux of frog skeletal muscle fibers. *Journal of General Physiology*, 104: 449-477.

R. Shirokov, R. Levis, **N. Shirokova** and E. Ríos. (1993). Calcium dependent inactivation of cardiac L-type calcium channels does not involve their voltage sensor. *Journal of General Physiology*, 102: 1005-1030.

R. Shirokov, R. Levis, **N. Shirokova** and E. Ríos. (1992). Two classes of gating current from L-type Ca channels in guinea pig ventricular myocyte. *Journal of General Physiology*, 99: 863-895.

C. Research Support

Ongoing Research Support

NIH AR053933 "Mitochondria and Calcium Signaling in Skeletal Muscle", PI, 09/19/08-08/31/13

American Heart Association "Cardiac dystrophy: cellular mechanisms", PI, 07/01/08-06/30/11

Muscular Dystrophy Association, "Calcium Signaling in Dystrophic heart", PI, 01/01/07 – 03/01/09

Swiss Muscle Foundation Research "Duchenne Muscular Dystrophy: Pathophysiological Implications of mitochondrial Calcium Signaling and ROS production". Co-PI, 01/01/06-12/31/08

Completed Research Support

R01 AR45690 NIH NIAMS, PI, 08/01/1999 - 07/31/2006

"Release Channel Isoforms and Local Calcium Signaling."

The major goal is to dissect the role of various isoforms of Ryr Ca^{2+} release channel in local Ca^{2+} signaling in muscle.

Muscular Dystrophy Association, PI, 07/01/02 – 06/30/05

"Metabolic Control of Calcium Signaling in Skeletal Muscle".