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SUMMARY

Ph.D. in Biophysics from Moscow State University

Primary research interests: mitochondrial function in norm, pathology, and aging, mechanisms of oxidative stress, ion transport and bioenergetics

28 articles in peer-reviewed journals

POSITIONS:

The Burnham Institute for Medical Research – San Diego, CA

2003-present Staff Scientist

Mechanisms of mitochondrial fission and bioenergetic dysfunction in neurodegeneration and apoptosis.

MitoKor – San Diego, CA

2000-2003 Scientist

Mitochondrial therapeutic targets in neurodegeneration, type II diabetes, and obesity; mechanisms of mitochondrial oxidative stress; assay development.

University of Maryland – Baltimore, MD

1999 Research Assistant Professor,

(Department of Pharmacology and Experimental Therapeutics)

1996-1999 Visiting Assistant Professor,

(Department of Pharmacology and Experimental Therapeutics)

Mechanisms of the mitochondrial permeability transition and cytochrome c release.

Moscow State University – Moscow, Russia

1991-1995 Junior Research Scientist

(Department of Bioenergetics, A.N. Belozersky Institute of Physico-Chemical Biology)

Reversibility of the mitochondrial permeability transition; regulation by adenine nucleotide translocator and dependence on the membrane potential.

Longevity studies: effects of parental age at reproduction on human longevity

1987-1990 Graduate Student

(Department of Biophysics)

Mitochondrial ion transport, effects of prooxidants on mitochondrial permeability.

EDUCATION:

1982-1987 M.S., Department of Biophysics, Moscow State University, School of Biology
1987-1990 Graduate Student, Department of Biophysics, Moscow State University, School of Biology
December 17, 1990
Ph.D. in Biophysics (Moscow State University, School of Biology)
Dissertation: Regulation of ion permeability of mitochondria under conditions of free-radical reactions

PUBLICATIONS:

Novgorodov, S.A., Gudz, T.I., **Mohr (Kushnareva), Y.E.**, Goncharenko, E., N. and Yaguzhinsky, L.S. (1989) *FEBS Lett.* **247**: 255-258. ATP-synthase complex: the mechanism of control of ion fluxes induced by cumene hydroperoxide in mitochondria.

Novgorodov, S.A., Gudz, T.I., **Mohr (Kushnareva), Y.E.**, Goncharenko, E., N. and Yaguzhinsky, L.S. (1989) *Biochemistry (Moscow)* **54**: 206-212. Cumene hydroperoxide changes the conductivity of mitochondrial membrane for K⁺ (in Russian).

Novgorodov, S.A., Gudz, T.I. and **Mohr (Kushnareva), Y.E.** (1989) *Biological membranes* **6**: 1053-1062. Transmembrane potential regulates non-specific permeability of the inner mitochondrial membrane (in Russian).

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, and Roginsky, V.A. (1990) *Biological membranes (in Russian)*. **7**: 945-955. A mechanism for the induction of non-specific permeability of the inner mitochondrial membrane by hydroperoxides.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Zorov, D.B. and Kudrjashov, Yu.B. (1990) *FEBS Lett.* **270**: 108-110. Effect of cyclosporin A and oligomycin on nonspecific permeability of the inner mitochondrial membrane.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Zorov, D.B. and Kudrjashov, Yu.B. (1990) *FEBS Lett.* **277**: 123-126. Effect of ADP/ATP antiporter conformational state on the suppression of the nonspecific permeability of the inner mitochondrial membrane by cyclosporine A.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Zorov, D.B. and Kudrjashov, Yu.B. (1991) *Biochemistry (Moscow)* **56**: 529-535. The effect of cyclosporin A and oligomycin on the permeability of the mitochondrial inner membrane.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Zorov, D.B. and Kudrjashov, Yu.B. (1991) *Biochemistry (Moscow)* **56**: 536-541. The role of the ADP/ATP antiporter in the inhibition of nonspecific permeability of the inner mitochondrial membrane by cyclosporin A.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Roginsky, V.A. and Kudrjashov, Yu.B. (1991) *Biochim. Biophys. Acta* **1058**: 242-248. Mechanism accounting for the induction of nonspecific permeability of the inner mitochondrial membrane by hydroperoxides.

Novgorodov, S.A., Gudz, T.I., **Kushnareva, Y.E.**, Eriksson, O. and Leikin, Yu.N. (1991) *FEBS Lett.* **295**: 77-80. Effects of the membrane potential upon the Ca²⁺- and cumene hydroperoxide- induced permeabilization of the inner mitochondrial membrane.

Andreev, A.Yu., Mikhailova, L.M., Starkov, A.A. and **Kushnareva, Y.E.** (1994) *Biochem. Mol. Biol. Int.* **34**: 367-373. Ca²⁺-loading modulates potencies of cyclosporin A, Mg²⁺ and ADP to recouple permeabilized rat liver mitochondria.

Kushnareva, Y.E., Mikhailova, L.M. and Andreev, A.Yu. (1995) *Biochemistry (Moscow)* **60**: 1145-1152. Low concentrations of cyclosporin A reseal the permeability transition pore of the inner mitochondrial membrane in the absence of additional effectors.

- Mikhailova, L.M., **Kushnareva, Y.E.** and Andreev, A.Yu. (1996) *Biochemistry (Moscow)* **61**: 1270-1278. Inhibitors of ADP/ATP antiporter induce two Ca²⁺-dependent uncoupling pathways in rat liver mitochondria.
- Gavrilov, L.A., Gavrilova, N.S., Kroutko, V.N., Evdokushkina, G.N., Semyonova, V.G., Gavrilova, A.L., Lapshin, E.V., Evdokushkina, N.N. and **Kushnareva, Y.E.** (1997) *Mutation Research* **377**: 61-62. Mutation load and human longevity.
- Gudz, T.I., Eriksson O., **Kushnareva, Y.E.**, Saris N.E. and Novgorodov S.A. (1997) *Arch. Biochem. Biophys.* **342**: 143-56. Effect of butylhydroxytoluene and related compounds on permeability of the inner mitochondrial membrane.
- Gavrilova, N.S., Gavrilov, L.A., Evdokushkina, G.N., Semyonova, V.G., Gavrilova, A.L., Evdokushkina, N.N., **Kushnareva, Y.E.**, Kroutko, V.N., and Andreev, A.Yu. (1998) *Human Biology* **70**: 799-804. Evolution, mutation, and human longevity: European royal and noble families.
- Kushnareva, Y.E.**, Haley, L.M., and Sokolove, P.M. (1999) *Arch. Biochem. Biophys.* **363**: 155-162. The role of low (≤ 1 mM) phosphate concentrations in regulation of mitochondrial permeability: modulation of matrix free Ca²⁺ concentration.
- Kushnareva, Y.E.**, Campo, M.L., Kinnally, K.W., and Sokolove, P.M. (1999) *Arch. Biochem. Biophys.* **366**: 107-115. Signal presequences increase mitochondrial permeability and open the multiple conductance channel.
- Kushnareva, Y.E.**, and Sokolove, P.M. (1999) *Arch. Biochem. Biophys.* **376**: 377-388. Prooxidants open both the mitochondrial permeability transition pore and a low-conductance channel in the inner mitochondrial membrane.
- Fiskum, G., Kowaltowski, A.J., Andreyev, A.Yu., **Kushnareva, Y.E.**, and Starkov, A.A. (2000) *Methods Enzymol.* **322**: 222-34. Apoptosis-related activities measured with isolated mitochondria and digitonin-permeabilized cells.
- Kushnareva, Y.E.**, Polster, B.M., Sokolove, P.M., Kinnally, K.W., and Fiskum, G. (2001) *Arch. Biochem. Biophys.* **386**: 251-260. Mitochondrial precursor signal peptide induces a permeability transition and coordinated release of cytochrome c from liver and brain mitochondria
- Kushnareva Y.E.**, Murphy A.N., and Andreyev A. (2002) *Biochem J.*, **368**: 545-553. Complex I-mediated reactive oxygen species generation: modulation by cytochrome c and NAD(P)⁺ oxidation-reduction state.
- Lee B., Miles P.D., Vargas L., Luan P., Glasco S., **Kushnareva Y.**, Kornbrust E.S., Grako K.A., Wollheim C.B., Maechler P., Olefsky J.M., and Anderson C.M. (2003) Inhibition of mitochondrial Na⁺-Ca²⁺ exchanger increases mitochondrial metabolism and potentiates glucose-stimulated insulin secretion in rat pancreatic islets. *Diabetes*, **52**: 965-973.
- Andreyev A.Y., **Kushnareva Y.E.**, and Starkov, A.A. (2005) Mitochondrial metabolism of reactive oxygen species (Review). *Biochemistry (Moscow)* **70**: 200-214.
- Ward M.W., **Kushnareva Y.**, Greenwood S., and Connolly C.N. (2005) Cellular and Sub-cellular calcium accumulation during glutamate induced injury in cerebellar granule neurons. *J. Neurochem* **92**: 1081-90.
- Ju W.-K., Misaka T., **Kushnareva Y.**, Nakagomi S., Agarwal N., Kubo Y., Lipton S.A., and Bossy-Wetzell E. (2005) OPA1 expression in the normal rat retina and optic nerve. *J. Comp. Neurol.* **488**: 1-10.
- Lee J., Kim C.-H., Simon D.K., Aminova L., Andreyev A., **Kushnareva Y.**, Murphy A.N., Lonze B.E., Kim K., Ginty D.D., Ferrante R.J., Ryu H., Ratan R.R. (2005) Mitochondrial CREB mediates mitochondrial gene expression and neuronal survival. *J. Biol. Chem.* **280**: 40398-401
- Kushnareva Y.E.**, Wiley S.E., Ward, M.W., Andreyev A.Y., and Murphy, A.N. (2005) Excitotoxic injury to mitochondria isolated from cultured neurons. *J. Biol. Chem.* **280**: 28894-28902.

SELECTED ABSTRACTS AND PRESENTATIONS:

- Kushnareva, Y.E.**, Kinnally, K.W. and Sokolove, P.M. (1997) *Biophys. J.* **72**: A39. Effects of signal and non-signal peptides on mitochondrial permeability. Biophysical Society Annual meeting. New Orleans, 1997.

L.A. Gavrilov, N.S. Gavrilova, V.G. Semyonova, G.N. Evdokushkina, A.L. Gavrilova, N.N. Evdokushkina, **Y.E. Kushnareva**, A.Yu. Andreyev. Parental age at reproduction as a predictor of human longevity. In: 16th Congress of the IAG, August 19-23, 1997. Book of Abstracts. Adelaide, 1997, 461-462.

N.S. Gavrilova, L.A. Gavrilov, **Y.E. Kushnareva**, A.Yu. Andreyev, G.N. Evdokushkina, A.L. Gavrilova, V.G. Semyonova, G.N. Evdokushkina. Testing the evolutionary theory of longevity. In: 16th Congress of the IAG, August 19-23, 1997. Book of Abstracts. Adelaide, 1997, pp.550.

Kushnareva, Y.E., Haley L.M. and Sokolove, P.M. (1998) *Biophys. J.* **74**: A383. The role of low phosphate concentrations in regulation of mitochondrial permeability: modulation of matrix Ca²⁺ concentration. Biophysical Society Annual meeting. Kansas City, 1998.

Kushnareva, Y.E. and Sokolove, P.M. (1999) *Biophys. J.* **76**: A228. Prooxidants open two different pores in the inner mitochondrial membrane. Biophysical Society Annual meeting. Baltimore, 1999.

Kushnareva, Y.E. and Sokolove, P.M. Prooxidants open two different pores in the inner mitochondrial membrane. Second Albany Conference "Frontiers of Mitochondrial Research". Albany, 1998.

Kushnareva, Y.E., Polster, B.M., Sokolove, P.M., Kinnally, K.W., and Fiskum, G. (2000) *Biophys. J.* **78** Mitochondrial precursor signal peptide induces a permeability transition and coordinated release of cytochrome c from liver and brain mitochondria. Biophysical Society Annual meeting. New Orleans, 2000.

Kushnareva, Y. E., Andreyev, A. Y., and Murphy, A.N. (2001) *Biophys. J.* **80**: 45a. Reactive oxygen species generation by mitochondria in pathophysiological models. Biophysical Society Annual meeting. Boston, 2001.

Kushnareva, Y.E., Andreyev, A.Y., and Murphy, A.N. Reactive oxygen species generation by mitochondria in pathophysiological models. Mitochondrial Medicine Society and Mitochondrial Research Society Annual meeting "Mitochondria 2001". San Diego, 2001

Kushnareva, Y.E., Stauber, G., Andreyev, A.Y., and Murphy, A.N. (2002) Mitochondrial ROS production in hippocampal neurons. *Biophys. J.*, **82**, 289a. Biophysical Society Annual meeting. San Francisco, 2002

Kushnareva, Y.E., Andreyev, A.Y., and Murphy, A.N. Mechanisms of mitochondrial generation of reactive oxygen species in the models of pathology. Keystone Symposium "Mitochondria and Pathogenesis". Copper Mountain, CO, 2002. Book of Abstracts, 63

Barsoum, M.J., Yuan, H., Lee, W.D., Liot, G., **Kushnareva, Y.**, Graber, S., Youle, R.J., Ellisman, M.H., Lipton, S.A. Perkins, G.A., Bossy-Wetzel, E. (2004) Mitochondrial fission is an early unifying event in neurodegeneration. Society for Neuroscience Meeting, San Diego, 2004.

Ju K.-W., **Kushnareva, Y.**, Bossy B., Misaka T., Kubo, Y., Agarwal N., Nakagomi S., Liddington R.C., Schwarzenbacher R., Ellisman, M., Perkins, G., Lipton S.A., Bossy-Wetzel, E. (2004) OPA1 Loss of function and retinal ganglion cell death. Cold Spring Harbor Laboratory Meeting "Drug discovery in neurodegenerative diseases".

Ju K.-W., **Kushnareva, Y.**, Misaka T., Kubo, Y., Agarwal N., Nakagomi S., Liddington R.C., Schwarzenbacher R., Ellisman M., Lipton S.A., Bossy-Wetzel, E. OPA1 mutation and retinal ganglion cell degeneration. Society for Neuroscience Meeting, San Diego, 2004.

Liot, G., Brady, N.R., **Kushnareva, Y.**, Barsoum, M.J., Nakagomi, S., Bossy-Wetzel, E. Mitochondrial fragmentation in in vitro models of Huntington's disease. Society for Neuroscience Meeting, Washington DC, 2005.

W.-K.Ju, **Y.Kushnareva**, B.Bossy, R.Schwarzenbacher, R.Liddington, A.White, M.Ellisman, G.Perkins, S.Lipton, E.Bossy-Wetzel. Opa1 Loss and Retinal Ganglion Cell Death. The association for Research in Vision and Ophthalmology, Florida 2005

Kushnareva, Y., Ju W.-K., Yuan H., Bossy B., Waggoner J., Ellisman M.H., Perkins G.A., Bossy-Wetzel E. Bioenergetic impairment and mitochondrial fission following OPA1 knockdown. Society for Neuroscience Meeting, Washington DC, 2005.

Kushnareva Y. Bioenergetic dysfunction associated with mitochondrial fission in OPA1 knockdown cells. Invited speaker at the Buck Institute for Age Research seminar, Novato 2005

GRANTS

International Science Foundation (Soros Foundation) MDR000-MDR300, 1994-1995. Principal Investigator

AWARDS

Grant for individual support from International Science Foundation (Soros Foundation), 1993.
Travel Award from the Organizing Committee “Frontiers of Mitochondrial Research” Albany, 1998

PROFESSIONAL ACTIVITIES

Referee for *Archives of Biochemistry and Biophysics*
A member of Society for Neuroscience and Biophysical Society