

Sergei Novgorodov, PhD

**Medical University of South Carolina
Division of General Internal Medicine/Geriatrics
114 Doughty Street, Room 603
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Education:

Ph.D. (Biochemistry) **1986**
Moscow State University; Thesis title: "Two mechanisms of K⁺ efflux from rat liver mitochondria".

M.S. Department of Biochemistry, Moscow State University; **1978**
Thesis title: "Properties of immobilized α -glycero-phosphate - dehydrogenase".

Research Experience:

Research Assistant Professor, Department of Medicine, **2002 - present**
Joint Appointment- Department of Biochemistry and Molecular Biology
Medical University of South Carolina,
Charleston, SC

Senior Scientist, A.N. Belozersky Institute of **2001 - 2002**
Physico-Chemical Biology, Moscow State University,
Moscow, Russia.

Research Associate, Department of Nutrition, **2000 - 2001**
Case Western Reserve University, Cleveland, OH

Senior Scientist, A.N. Belozersky Institute of **1995 - 2000**
Physico-Chemical Biology, Moscow State University,
Moscow, Russia.

Postdoctoral Fellow, Department of Physiology and Biophysics, **1994 -1995**
Case Western Reserve University, Cleveland, OH.

Research Associate, Department of Medical Biochemistry, **1991 - 1994**
Ohio State University, Columbus, OH.

Senior Scientist, Head of microbiological facility, **1989 -1991**
A.N. Belozersky Institute of Physico-Chemical Biology,
Moscow State University, Moscow, Russia.

Scientist, A.N. Belozersky Institute of Physico-Chemical Biology, Moscow State University, Moscow, Russia. **1978 -1991**

Teaching Experience:

Supervision of 2 candidates for M.S. degree **1988-1990**

Training courses:

Training of two Ph.D. level students in the framework Russian-German program “Modern Methods in Bioenergetics”. **1990**

Administrative appointments:

Head of microbiological facility of A.N. Belozersky Institute of Physico-Chemical Biology Moscow State University, Moscow, Russia. **1988-1991**

Electoral positions:

Member of scientific council of A.N. Belozersky Institute of Physico-Chemical Biology, Moscow State University, Moscow, Russia. **1988-1991**

Ad hoc Reviewer:

Biokhimiia (Russia) **1989 -1991**

FEBS Letters **1989 -1991**

FASEB Journal **2003 - present**

Awards

Ruth L. Kirschstein National Research Service Award **1994**

Current Research Interests:

Programmed cell death signaling cascades.

Cell metabolism under normal and pathological conditions. Role of cellular energetics in apoptosis, neurodegenerative diseases and carcinogenesis.

Lipids in mitochondrial-mediated signal transduction.

Primary Area of Expertise:

Bioenergetics, Mitochondrial physiology.

PUBLICATIONS

1. Dragunova, S.F., Novgorodov, S.A., Sharyshev, A.A. and Iaguzhinskii, L.S. (1981) *Nucleotide control of ionic transport and ATP synthesis in mitochondria*. *Biokhimiia* (Russian) 46(7), 1242-1248.
2. Novgorodov, S.A., Dragunova, S.F. and Iaguzhinskii, L.S. (1982) *Control of the induction of ion transport through mitochondrial membranes by the enzymes of the oxidative phosphorylation system*. *Biofizika* 27(2), 244-248.
3. Marshansky, V.N., Novgorodov, S.A., and Yaguzhinsky, L.S. (1983) *The role of lipid peroxidation in the induction of cation transport in rat liver mitochondria*. *FEBS Lett.* 158, 27-30.
4. Marshanskii, V.N., Novgorodov, S.A. and Iaguzhinskii, L.S. (1983) *Effect of specific inhibitors of the enzymes of the respiratory chain and ATP-synthetase on ion transport in mitochondria induced by non-enzymic peroxide reactions*. *Biofizika* (Russian) 28(5), 830-834.
5. Marshanskii, V.N., Novgorodov, S.A., Zhigacheva, I.V. and Yaguzhinsky (1983) *Action of the ATP synthetase inhibitors oligomycin and dicyclohexylcarbodiimide on the nonenzymatic lipid peroxidation process in mitochondria*. *Dokl. Akad. Nauk SSSR* 269(5), 1245-1248.
6. Novgorodov, S.A., Marshanskii, V.N. and Iaguzhinskii, L.S. (1984) *Regulation of ion transport in mitochondria by respiratory chain enzymes and ATPase*. *Biokhimiia* 49(2), 185-192.
7. Petrenko, A.Yu, Belous, A.M., Novgorodov, S.A., Marshanskii, V.N. and Iaguzhinskii, L.S. (1984) *Ion transport in rat liver mitochondria after freezing and thawing*. *Ukr.Biokhim. Zh.* 56(6), 651-656.
8. Petrenko, A.Yu, Belous, A.M., Marshanskii, V.N., Novgorodov, S.A. and Iaguzhinskii (1984) *The role of lipolysis and lipid peroxidation in the induction of ion transport in mitochondria after freezing and thawing*. *Ukr. Biokhim.Zh.* (Russian) 56(6), 656-660.
9. Novgorodov, S.A., and Yaguzhinsky, L.S. (1985) *Ion transport in rat liver mitochondria: the effect of the incubation medium osmolarity*. *FEBS Lett.* 183, 47-51.
10. Novgorodov, S.A., Gogvadze, V.G., Medvedev, B.I. and Zinchenko, V.P. (1987) *An antioxidant prevents and reverses calcium-induced uncoupling of rat liver mitochondria*. *Biokhimiia* 52(6), 943-948.
11. Novgorodov, S.A., Kultayeva, E.V., Yaguzhinsky, L.S., and Lemeshko, V.V. (1987) *Ion permeability induction by the SH cross-linking reagents in rat liver mitochondria is inhibited by the free radical scavenger, butylhydroxytoluene*. *J. Bioenerg. Biomembr.* 19, 191-202.

12. Gudz, T.I., Novgorodov, S.A., Pandelova, I.G., Kakabadze, G.A. and Yaguzhinskii, L.S. (1988) *Regulation of lipid peroxidation induced by cumene hydroperoxide in the liver mitochondria of irradiated rats*. Radiobiologiya 28(5), 653-656.
13. Novgorodov, S.A., Gudz, T.I., Mor, Yu.E., Goncharenko, E.N. and Yaguzhinskii, L.S. (1989) *Cumene hydroperoxide changes the type of conductivity of the mitochondrial membrane for K⁺*. Biokhimiia 54(2), 206-212.
14. Novgorodov, S.A., Gogvadze, V.G., Medvedev, B.I., and Zinchenko, V.P. (1989) *Effect of butylated hydroxytoluene, an inhibitor of lipid peroxidation, on the calcium-induced uncoupling of rat liver mitochondria*. FEBS Lett. 248, 179-181.
15. Novgorodov, S.A., Gudz, T.I., Mohr, Yu.E., Goncharenko, E.N., and Yaguzhinsky, L.S. (1989) *ATP-synthase complex: the mechanism of control of ion fluxes induced by cumene hydroperoxide in mitochondria*. FEBS Lett. 247, 255-258.
16. Novgorodov, S.A., Gudz, T.I., Kushnareva, Yu.E., Zorov, D.B., and Kudrjashov, Yu.B. (1990) *Effect of cyclosporine A and oligomycin on non-specific permeability of the inner mitochondrial membrane*. FEBS Lett. 270, 108-110.
17. Novgorodov, S.A., Gudz, T.I., Kushnareva, Yu.E., Zorov, D.B., and Kudrjashov, Yu.B. (1990) *Effect of ADP/ATP antiporter conformational state on the suppression of the nonspecific permeability of the inner mitochondrial membrane by cyclosporine A*. FEBS Lett. 277, 123-126.
18. Gudz, T.I., Novgorodov, S.A., Pandelova, I.G. and Goncharenko, E.N. (1990) *The effect of ionizing radiation on the respiration of rat thymocytes*. Radiobiologiya (Russian) 30(6), 760-764.
19. Novgorodov, S.A., Gudz, T.I., Kushnareva, Yu.E., Zorov D.B. and Kudriashov, Yu.B. (1991) *The role of the ADP/ATP-antiporter in the inhibition of nonspecific permeability of the inner mitochondrial membrane by cyclosporin A*. Biokhimiia (Russian) 56(3), 536-541.
20. Novgorodov, S.A., Gudz, T.I., Kushnareva, Yu.E., Roginsky, V.A., and Kudrjashov, Yu.B. (1991) *Mechanism accounting for the induction of nonspecific permeability of the inner mitochondrial membrane by hydroperoxides*. Biochim. Biophys. Acta 1058, 242-248.
21. Novgorodov, S.A., Gudz, T.I., Zorov, D.B., Kushnareva, Yu.E. and Kudriashov, Yu.B. (1991) *The effect of cyclosporin A and oligomycin on the nonspecific permeability of the mitochondrial inner membrane*. Biokhimiia (Russian) 56(3), 526-35.
22. Novgorodov, S.A., Gudz, T.I., Jung, D.W., and Brierley, G.P. (1991) *The nonspecific inner membrane pore of liver mitochondria: modulation of cyclosporin sensitivity by ADP at carboxyatractyloside-sensitive and insensitive sites*. Biochem. Biophys. Res. Comm. 180, 33-38.
23. Novgorodov, S.A., Gudz, T.I., Kushnareva, Yu.E., Eriksson, O., and Leikin, Yu.N. (1991) *Effects of the membrane potential upon the Ca²⁺ - and cumene hydroperoxide-induced permeabilization of the inner mitochondrial membrane*. FEBS Lett. 295, 77-80.

24. Baysal, K., Brierley, G.P., Novgorodov, S., and Jung, D.W. (1991) *Regulation of the mitochondrial Na⁺/Ca²⁺ antiport by matrix pH*. Arch. Biochem. Biophys. 291, 383-389.
25. Novgorodov, S.A., Gudz, T.I., Milgrom, Y.M., and Brierley, G.P. (1992) *The permeability transition of heart mitochondria is regulated synergistically by ADP and cyclosporin A*. J. Biol. Chem. 267, 16274-16282.
26. Gudz, T.I., Pandelova, I.G., and Novgorodov, S.A. (1994) *Ionizing radiation-induced stimulation of respiration in rat thymocytes*. Radiation Res. 138, 114-120.
27. Novgorodov, S.A., Gudz, T.I., Brierley, G.P., and Pfeiffer, D.R. (1994) *Magnesium ion modulates the sensitivity of the mitochondrial permeability transition pore to cyclosporin A and ADP*. Arch. Biochem. Biophys. 311, 219-228.
28. Pfeiffer, D.R. Gudz, T.I., Novgorodov, S.A., and Erdahl, W.L. (1995) *The peptide mastoparan is a potent facilitator of the mitochondrial permeability transition*. J. Biol. Chem. 270, 4923-4932.
29. Novgorodov, S.A. and Gudz, T.I. (1996) *Minireview: Permeability transition pore of the inner mitochondrial membrane can operate in two open states with different selectivities*. J. Bioenerg. Biomembr. 28, 139-146.
30. Gudz, T.I., Eriksson, O., Kushnareva, Yu., Saris, N.-E., L., and Novgorodov, S.A. (1997) *Effect of butylhydroxytoluene and related compounds on permeability of the inner mitochondrial membrane*. Arch. Biochem. Biophys. 342, 143-156.
31. Novgorodov, S.A., Szulc, Z.M., Luberto, C., Jones, J.A., Bielawski, J., Bielawska, A., Hannun, Y.A., and Obeid, L.M. (2005) *Positively charged ceramide is a potent inducer of mitochondrial permeabilization*. J. Biol. Chem. 280, 16096-16105.
32. Yu, J., Novgorodov, S.A., Chudakova D., Zhu, H., Bielawska, A., Bielawski, J., Obeid, L.M., Kindy, M.S., and Gudz, T.I. (2007) *JNK3 signaling pathway activates ceramide synthase leading to mitochondrial dysfunction*. J. Biol. Chem. 282, 25940-25949.
33. Kitagaki, H., Cowart, L.A., Matmati, N., Vaena de Avalos, S., Novgorodov, S.A., Zeidan, Y.H., Bielawski, J., Obeid, L.M., and Hannun, Y.A. (2007) *Isc1 regulates sphingolipid metabolism in yeast mitochondria*. Biochim. Biophys. Acta 1768(11):2849-61.
34. Novgorodov, S.A., Gudz, T.I., and Obeid, L.M. (2008) *Long-chain ceramide is a potent inhibitor of the mitochondrial permeability transition pore*. J. Biol. Chem., 283, 24707-24717.
35. Chudakova, D.A., Zeidan, Y.H., Wheeler, B.W., Yu, J., Novgorodov, S.A., Kindy, M.S., Hannun, Y.A., and Gudz, T.I. (2008) *Integrin-associated Lyn kinase promotes cell survival by suppressing acid sphingomyelinase activity*. J. Biol. Chem., 283, 28806-28816.

36. Kitagaki H., Cowart L.A., Matmati, N., Montefusco, D., Gandy, G., de Avalos, S.V., Novgorodov, S.A., Zheng, J., Obeid, L.M., and Hannun, Y.A. (2009) *ISC1-dependent metabolic adaptation reveals an indispensable role for mitochondria in induction of nuclear genes during the diauxic shift in Saccharomyces cerevisiae*. J. Biol. Chem., 284, 10818-10830.

37. Novgorodov, S.A, and Gudz, T.I. (2009) *Ceramide and mitochondria in ischemia/reperfusion. Invited review*. J. Cardiovasc. Pharmacol., 2009, 53, 198-208.

ABSTRACTS

1. Muronez, V.I., Novgorodov, S.A., and Nagradova, N.K. (1978) *Glyceraldehyde-3-phosphate dehydrogenase from rat skeletal muscles: assembling of immobilized hybrid molecules*. In: Proceedings of 3National Conferences on Muscle Biochemistry, Russia, p. 10.
2. Novgorodov, S.A., and Kultayeva, E.V. (1984) *Comparative study of twosystems for the induction of ion transport in mitochondria*. In: Abstracts of 16th FEBS Conference, Moscow, Russia, p. 89.
3. Marshansky, V.N., Trufanov, A.A., Krasinskaya, I.P., Novgorodov, S.A., and Yaguzinsky, L.S. (1986) *Two functional states of mitochondrial multienzyme complex*. In: Short Reports of 4th EBEC conference, Pragua, Czechoslovakia, Vol. 4, p. 36.
4. Novgorodov, S.A., Gudz, T.I., Jung, D.W., and Brierley, G.P. (1991) *Regulation of the nonspecific permeability transition in heart and liver mitochondria*. FASEB J. 6 (Abst. #2285), A396.
5. Gudz, T.I., Novgorodov, S.A., Jung, D.W., and Brierley, G.P. (1991) *The nonspecific pore of the inner mitochondrial membrane is closed synergistically by cyclosporin A and ADP*. FASEB J. 6 (Abst. #2284), A396.
6. Gudz, T.I., Novgorodov, S.A., and Pfeiffer, D.R. (1992) *Structurally and pharmacologically dissimilar compounds with common effects on the mitochondrial permeability transition*. EBEC Short Reports 7, 125.
7. Novgorodov, S.A., Gudz, T.I., and Pfeiffer, D.R. (1993) *The amphiphilic tetradecapeptide mastoparan opens the permeability transition pore of the inner mitochondrial membrane*. Biophys. J. 64 (Abst. # M-Pos 492), A107.
8. Gudz, T.I., Pandelova, I.G., and Novgorodov, S.A. (1993) *Induction of non-specific permeability of the inner mitochondrial membrane by cumene hydroperoxide in rat thymocytes*. Biophys. J. 64 (Abst. # M-Pos 328), A79.
9. Gudz, T.I., Pandelova, I.G., and Novgorodov, S.A. (1994) *Radiation-induced stimulation of respiration in rat thymocytes*. Proc. Amer. Ass.Cancer Res. 35 (Abst. #3850) 646.
11. Gudz, T.I., Eriksson, O., Kushnareva, Yu.E., Saris N.-E., L., and Novgorodov S. A. (1995) *Effect of free radical scavengers and related compounds on mitochondrial cyclosporin A - sensitive channel*. FASEB J. 9, #4,1787.

12. Novgorodov, S.A., Szulc, Z.M., Luberto, C., Jones, J.A., Bielawska, A., Hannun, Y.A. and Obeid, L.M. (2003) *Mitochondrially targeted ceramides as a novel regulators of mitochondrial permeability*. Abstracts of 38th Annual Southeastern Regional Lipid Conference.
13. Porcelli, A.M., Novgorodov, S.A., Luberto, C., Rugolo, M., Obeid, L.M. and Hannun, Y.A. (2003) *Neutral ceramidase activity in rat liver*. Abstracts of 38th Annual Southeastern Regional Lipid Conference.
14. Li, L., Kitatani, K., Novgorodov, S., Bielawski, J., Jin, J., Bielawska, A., Szulc, Z., Hannun, Y., Obeid, L., and Kraveka, J. (2005) *Localization of the Human Dihydroceramide Desaturase Protein*. Abstracts of 40th Annual Southeastern Regional Lipid Conference.
15. Novgorodov, S.A., Szulc, Z.M., Luberto, C., Jones, J.A., Bielawski, J., Bielawska, A., Hannun, Y.A., and Obeid, L.M. (2006) *Positively charged ceramide is a potent inducer of mitochondrial permeabilization*. Abstracts of The Gordon Research Conference: Glycolipid & Sphingolipid Biology, Ventura, CA, USA.
16. Novgorodov, S.A., Gudz, T.I., and Obeid, L.M. (2007) *Long chain ceramide is a portent natural inhibitor of mitochondrial permeability transition*. Abstracts of the 4th International Charleston Ceramide Conference, Pacific Grove, USA.
17. Novgorodov, S.A., Gudz, T.I., and Obeid, L.M. (2007) *Longevity assurance genes products (LASS enzymes) are localized to mitochondria and produce ceramide both at the inner and the outer leaflet of the inner membrane*. Abstracts of the 64th Harden Conference on: Mitochondrial Physiology, Ambleside, England.
18. Rahmaniyan, M., Wooten-Blanks, L., Li, L., Kitatani, K., Novgorodov, S.A., Bielawski, J., Hannun, Y.A., Obeid, L.M., and Kraveka, J.M. (2008) *Localization of the Human Dihydroceramide Desaturase in Neuroblastoma Cells*. Abstracts of ASPHO 21st Annual Meeting, Cincinnati, OH, USA.
19. Daria A.Chudakova, Youssef H. Zeidan, Brian W. Wheeler, Jin Yu , Sergey A. Novgorodov, Mark S. Kindy , Yusuf A. Hannun, and Tatyana I. Gudz (2008) *Integrin-associated Lyn kinase promotes cell survival by suppressing acid sphingomyelinase activity*. Abstracts of Society for Neuroscience Annual meeting, Washington, DC, November 14-19.
20. Novgorodov, S.A., Wu, B.X., Gudz, T.I., Hannun, Y.A., and Obeid, L.M. (2009) *Thioesterase acts in concert with neutral ceramidase to produce ceramide from sphingosine and Acyl-CoA in mitochondria*. Abstracts of 5th International Charleston Ceramide Conference, Charleston, SC, March 11-14.

INVITED CONFERENCE PRESENTATIONS

1. Novgorodov, S.A. (1986) *Regulation of K⁺ transport in mitochondria*. Presented at National Symposium, "Molecular Mechanisms and Regulation of Energy Metabolism", Puschino, Russia.
2. Novgorodov, S.A. (1992) *Effects of the free radical scavengers on the nonspecific permeability transition*. Presented at the Satellite Symposium "Calcium Transport and Permeability Transition in Mitochondria" of the 7th European Bioenergetic Conference, Helsinki, Finland.
3. Novgorodov, S.A. (2005) *Positively charged ceramide is a potent inducer of mitochondrial permeabilization*. Presented at the third International Charleston Ceramide Conference, Charleston, USA
4. Novgorodov, S.A. (2006) Long-chain ceramides suppress mitochondrial permeability transition at physiologically relevant concentrations. Presented at Keyston symposia "Metabolomics: from bioenergetics to apoptosis", Snowbird, USA.
5. Kitagaki, H., Cowart, L.A., Matmati, N., Vaena de Avalos, S., Novgorodov, S.A., Zeidan, Y.H., Obeid, L.M., and Hannun, Y.A. (2007) *Isc1 regulates sphingolipid metabolism in yeast mitochondria*. Presented at the fourth International Charleston Ceramide Conference, Pacific Grove, USA

INVITED SEMINARS

Department of Bioenergetics, Institute of Biophysics, Russian Academy of Sciences, Puschino, Russia, February 1983.

National Bioenergetic School, Dilizan, Russia, June 1988.

Department of Medical Chemistry, University of Helsinki, Helsinki, Finland, October 1990.

Laboratory of Cell Biology, Rockefeller University, New York, NY, September 1991.

Department of Cellular and Molecular Physiology, Hershey Medical Center, Hershey, PA, January 1993.

Department of Physiology and Biophysics, Case Western Reserve University, Cleveland, OH, December 1993.

Department of Pathology, Thomas Jefferson University, Philadelphia, PA, March 1995.

Department of Medicine, Medical University of South Carolina, Charleston, SC, November 2003.