CURRICULUM VITAE

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Education and Training

1970-1976	Moscow Physical-Technical Institute	**B.S.**	6/73 Mathematics and Physics
		M.S.	6/76 Biophysics
1981-1984	Cardiology Research Center of the USSR	**Ph.D.**	11/84 Physiology (Cardiac Electrophysiology)

Position Held

1994-present	Research Scientist I	Masonic Medical Research Laboratory, Utica, NY
1993-1994:	Research Scientist	Centre de Recherche, Institut de Cardiologie de Montreal, Que, Canada
1991-1993:	Research Scientist I	Masonic Medical Research Laboratory, Utica, NY, U.S.A.
1990-1991:	Leading Research Scientist	Institute of Experimental Cardiology, Cardiology Research Center, Moscow
1984-1990:	Senior Research Scientist	Institute of Experimental Cardiology, Cardiology Research Center, Moscow
1981-1984:	Minor Research Scientist	Laboratory of Heart Electrophysiology, Cardiology Research Center, Moscow
1978-1981:	Engineer-Investigator	Biophysical Laboratory, Cardiology Research Center, Moscow
1976-1978:	Minor Research Scientist	Laboratory of Cardiovascular Physiology, Institute of Normal and Pathological Physiology, Moscow, USSR

Academic and Professional Honors

USSR Math competition (1/68). Third Prize.
Graduated Magna Cum Laude (Moscow Physical-Technical Institute, 6/76)
Young investigator Competition, Berlin, DDR (10/82), First Prize

Professional and Public Service

American Heart Association, Northeast Consortia Peer Review **Study Group** 1999-2001
Abstract Grader, North American Society of Pacing and Electrophysiology 1999-present
Reviewer: J.Cardiovascular Electrophysiology, American College of Cardiology, Circulation Research, Journal of Molecular and Cellular Cardiology, PACE, Medical and Biological Engineering and Computing

Grant History

American Heart Association (NYS) Grant-In-Aid (7/93–6/96): principal investigator (30% effort)
M cells as a basis for the electrocardiographic U wave: experimental testing of theoretical prediction.
National Institutes of Health Grant RO1 (5/93–4/97): consultant (10% effort)
K+ currents and repolarization in cardiac arrhythmias.
American Heart Association (NYS) Grant-In-Aid (7/98–6/01): principal investigator (25% effort)
Method and theory of monophasic action potential recording: experimental testing of theoretical predictions.
National Institutes of Health Grant RO1 (5/93-8/05): investigator (50% effort)
Electrical heterogeneity and cardiac arrhythmias.
Physiome (9/00 − 9/02): co-investigator (50% effort)
Refinement of the membrane current equations used to describe electrical activity in canine ventricular cells.
BioAnalytics (9/05 – 12/05): principal investigator (50% effort)
Model-Based Assay™ Cardiotoxicity Platform: Initial Development and Feasibility Tests Phase I
CV Therapeutics (1/07 – 12/07): co-investigator (25% effort)
Electrophysiological action of ranolazine
CV Therapeutics (1/08 – 12/2008): co-investigator (25% effort)
Electrophysiological action of ranolazine in the atrium

Areas of Expertise

Biophysics. Theoretical and computer modeling of ionic channel kinetics, effects of a/a drugs and cardiac extracellular recordings (ECG and MAP). Cardiac cellular electrophysiology *in vitro*.

Memberships in professional and scientific societies

Center for Nonlinear Dynamics (McGill, Canada)	4/94-4/95
Cardiac Electrophysiology Society (U.S.A.)	9/91-present
American Heart Association	4/92-present
North American Society of Pacing and Electrophysiology	3/00-present

Research activities

Experimental techniques

- Simultaneous action potential (microelectrode) and contractile activity recordings in frog atrial fibers and guinea-pig papillary muscles to investigate mechanisms of action of antiarrhythmic drugs.
- Voltage-clamp recordings of the integral sodium current in single Purkinje and ventricular cells to determine rate-dependent characteristics of drug-channel interactions.
- In vivo experiments on open-chest dogs to record local electrograms with the aim to determine effects of antiarrhythmic drugs on conduction delays, and to record monophasic action potentials using newly developed technique aimed at revealing transmural electrical heterogeneity in ventricular myocardium.
- Use of an arterially-perfused ventricular wedge preparation to confirm theoretically predicted spatial resolution of the unipolar monophasic action potential recording technique.

Theoretical and computer techniques

- Computational models of channel-receptor interactions implementing modulated- and guarded-receptor models bundled with either HH or Markov (single channels) ionic current models.
- Computer modeling of transient outward current, calcium current and sodium-calcium exchange current based on recently obtained experimental data.
- Integration of ionic current models into full cellular model of electrical activity using C++ & MathCAD.
- Computer simulation of ECG, monophasic action potential, and normal and abnormal propagation of excitation in myocardial (Luo-Rudy I & II) mono- and bi-domain 1-D and 2-D models.

SELECTED PUBLICATIONS

Scientific papers

1. Rosenshtraukh LV, Saks VA, Yuravichus IA, **Nesterenko VV**, Undrovinas AI, Smirnov VN, Chazov EI. "Effect of creatine phosphate on slow inward current, action potential and contractile force of frog atrium and ventricle." Biochem.Med., v.21, pp.1-15 (1979).

2. **Nesterenko VV**, Rosenshtraukh LV, Bogdanov KY, Zakharov SI. "Effect of ionophore A23187 on contractility and slow response action potential of the guinea-pig papillary muscle." Bull.Exp.Biol.Med. (USSR), v.91, No.5, pp.582-584 (1981).

3. **Nesterenko VV,** Rosenshtraukh LV. "Effect of ethmozin on action potential and force of contraction of the guinea pig myocardium.", Bulletin of Experimental Biology and Medicine (USSR), v.94, No.9, pp.73-76 (1982).

4. **Nesterenko VV,** Rosenshtraukh LV. "Effect of ethmozin diethylamino analog (ethacizin) on the force of contraction and action potential of the guinea pig myocardium", Bulletin of Experimental Biology and Medicine (USSR), v.96, No.8, pp. 56-59 (1983).

5. Rosenshtraukh LV, Anyukhovsky EP, **Nesterenko VV**, Undrovinas AI, Shugushev KK, Portnoy VF, Burnashev N. "Electrophysiologic aspects of moricizine HCl." - Am.J.Cardiol., v.60, pp.27F-34F (1987).

6. Makielski JC, Undrovinas AI, Hanck DA, Sheets MF, Alpert LA, **Nesterenko VV**, Rosenshtraukh LV, Fozzard HA. "Use-dependent block of sodium current by ethmozin in voltage clamped internally perfused canine cardiac Purkinje cells." - J.Moll.Cell.Cardiol., v.20, pp.255-265 (1988).

7. Undrovinas AI, Burnashev NA, **Nesterenko VV**, Makielski JC, Fleidervish IA, Fozzard HA, Rosenshtraukh LV. "Single channel sodium current in rat cardiomyocytes: use-dependent block by ethacizin." - J.Parm.Exptl.Therap., v.248, No.3, pp.1138-1145 (1989).

8. Starmer CF, Undrovinas AI, Scamps F, Vassort G, **Nesterenko VV**, Rosenshtraukh LV. "Ethacizin blockade of calcium channels: a test of guarded receptor hypothesis" -Am.J.Physiol., v.257, (Heart 26), pp.H1693- H1704 (1989).

9. Makielski JC, **Nesterenko VV**, Nelson WL, Undrovinas AI, Starmer CF, Rosenshtraukh LV. "State dependence of ethacizin and ethmozin block of sodium current in voltage clamped and internally perfused cardiac Purkinje cells" - J.Parm.Exptl.Therap., v.253, No.3, pp.1110-1117 (1990).

10. Starmer CF, **Nesterenko VV**, Gilliam FR, Grant AO. "Use of ionic currents to identify and estimate parameters in models of channel blockade" - Am.J.Physiol., v.259, (Heart 28), pp.H626-H634 (1990).

11. **Nesterenko VV**, Anyukhovsky EP, Starmer CF, Beloshapko GG, Ivanovich T, Bugrij EM, Mazaev AV, Rosenshtraukh LV. "Modulating intraventricular conduction through competition of two class 1 antiarrhythmic agents: experience with ethacizin and lidocaine in canine heart" - J.Mol.Cell.Cardiol. v.23 (Suppl.I), pp. 115-124 (1991).

12. Starmer CF, **Nesterenko VV**, Undrovinas AI, Grant AO, Rosenshtraukh LV. "Lidocaine blockade of continuously and transiently accessible sites in cardiac sodium channels" - J.Mol.Cell.Cardiol. v.23 (Suppl.I), pp. 73-83 (1991).

13. Starmer CF, Lastra AA, **Nesterenko VV**, Grant AO. "Proarrhythmic response to sodium channel blockade. Theoretical model and numerical experiments" - Circulation, v.84, pp.1364-1377 (1991).

14. **Nesterenko VV**, Lastra AA, Rosenshtraukh LV, Starmer CF. "Proarrhythmic response to sodium channel blockade. The influence of antiarrhythmic drugs on the window of vulnerability in guinea pig myocardium" - J.Cardiovasc.Pharmacol. v.19, pp.810-820 (1992).

15. **Nesterenko VV** and Antzelevitch C. "Simulation of the electrocardiographic U wave in heterogeneous myocardium: effect of the local junctional resistance." Proc. "Computers in Cardiology", IEEE Computer Society Press, Los Alamitos, CA, pp.43-46 (1992).

16. **Nesterenko VV**, Anyukhovsky EP, Bugrij EM, Starmer CF, Beloshapko GG, Makielski JC, Kuzmin AV, Menshikov MJ, Mazaev AV, Rosenshtraukh LV. "Combination ethacizin and ethmozin treatment of resistant ventricular ectopy - theoretical, experimental, and clinical study." - J.Cardiovasc.Pharmacology, v.23., pp.501-508 (1994).

17. **Nesterenko VV.** "Physiological determinants of the leading-circle re-entry initiated by a point premature excitation in a two-dimensional homogeneous myocardial model" - Proc. "Computers in Cardiology", IEEE Computer Society Press, Los Alamitos, CA, pp.241-244 (1994).

18. Antzelevitch C, **Nesterenko VV**, Yan GX. "Role of M cells in acquired long QT syndrome, U waves, and Torsade de Pointes." - J.Electrocardiol, v.28 (suppl.), pp.131-138 (1996).

19. Grant AO, John JE, **Nesterenko VV**, Starmer CF, Moorman JR. "The role of inactivation in open channel block of the sodium channel: studies with inactivation-deficient mutant channels." - Molec Pharmacol, v.50, pp.1643-1650 (1996).

1. Antzelevitch C, **Nesterenko VV**, Yan GX. "Ionic processes underlying the action potential." Electrocardiol 96, pp.219-228, (1997)

2. Antzelevitch C, Shimizu W, Yan GX, Sicouri S, Weissenburger J, **Nesterenko VV**, Burashnikov AY, Di Diego J, Saffitz J, Thomas GP. "The M cell: its contribution to the ECG and to normal and abnormal electrical function of the heart.", J.Cardiovasc.Electrophysiol., v.10, pp.1124-1152 (1999).

3. Dumain R, Towbin JA, Brugada P, Vatta M, Nesterenko DV, **Nesterenko VV**, Brugada J, Brugada R, Antzelevitch C. "Ionic mechanisms responsible for the electrocardiographic phenotype of the Brugada syndrome are temperature dependent", Circ.Res., v.85, pp.803-809 (1999).

4. Weissenburger J, **Nesterenko VV**, Antzelevitch C. "Transmural heterogeneity of ventricular repolarization under baseline and Long QT conditions in the canine heart in vivo. Torsade de Pointes develops with halothane but not pentobarbital anesthesia", J.Cardiovasc.Electrophysiol., v.11, pp.290-304 (2000).

5. **Nesterenko VV**, Weissenburger J, Antzelevitch C. "Cellular basis and method for recording the monophasic action potential", Letter to the Editor, J.Cardiovasc.Electrophysiol., v.8, pp.946-951 (2000).

6. Antzelevitch C, Muzikant AL, Rice JJ, Chen G, **Nesterenko VV**, Colatsky T. "Influence of transmural repolarization gradients on the electrophysiology and pharmacology of ventricular myocardium. Cellular basis for the Brugada and Long QT syndromes", Philosophical Transactions of the Royal Society (London), v.359: 1201-1216 (2001).

7. Zygmunt AC, Eddlestone GT, Thomas GP, **Nesterenko VV**, Antzelevitch C. "Larger late sodium conductance in M cells contributes to electrical heterogeneity in canine ventricle", Am.J.Physiol., v.281: H689-H697 (2001).

8. Fish JM, Di Diego JM, **Nesterenko VV**, Antzelevitch C. "Epicardial activation of left ventricular wall prolongs QT interval and transmural dispersion of repolarization. Implications for biventricular pacing", Circulation, v.109: 2136-2142 (2004).

9. Kondo M, **Nesterenko VV**, Antzelevitch C. "Cellular basis for the monophasic action potential recording. Which is the recording electrode?" Cardiovasc.Res, v.63: 635-644 (2004).

10. Hong K, Brugada J, Oliva A, Berruzo-Sanchez A, Potenza D, Pollevick GD, Guerchicoff A, Matsuo K, Burashnikov E, Dumaine R, Towbin J, **Nesterenko VV**, Brugada P, Antzelevitch C, Brugada R. "Value of electrocardiographic parameters and ajmaline test in the diagnosis of Brugada syndrome caused by SCN5A mutations." Circulation, v.110: 3023-3027 (2004).

11. **Nesterenko VV**, Kondo M, Antzelevitch C. "Biophysical basis for monophasic action potential." Cardiovasc.Res., v.65: 942-944 (2005).

12. Hu D, Barajas-Martinez H, **Nesterenko VV**, Pfeiffer R, Guerchicoff A, Cordeiro JM, Curtis AB, Pollevick GD, Wu Y, Burashnikov E, Antzelevitch C. "Dual variation in SCN5A and CACNB2b underlies the development of cardiac conduction disease without Brugada syndrome", PACE (2009).

Book chapters

1. Starmer CF, **Nesterenko VV**, Undrovinas AI, Packer DL, Gilliam FR, Grant AO, Rosenshtraukh LV, Strauss HC. "Characterizing ion channel blockade with the guarded receptor hypothesis." - In "Molecular and cellular mechanisms of antiarrhythmic agents", ed. L.Hondeghem, Futura Publishing Co., Inc., Mount Kisco, NY, ch.10, pp.179-200, (1989).

2. Antzelevitch C, Sicouri S, Lukas A, **Nesterenko VV**, Lui D-W, DiDiego JM. "Regional differences in the electrophysiology of ventricular cells: Physiological and clinical implications." - In "Cardiac Electrophysiology: From Cell to Bedside", 2nd edition, eds. Zipes DP and Jalife J, W.B.Saunders Co., Philadelphia, ch.23, pp.228-245 (1994).

3. Antzelevitch C, Sicouri S, Lukas A, DiDiego JM, **Nesterenko VV**, Lui D-W, Roubache JF, Zygmunt AC, Zhang ZQ, Iodice A. "Clinical implications of electrical heterogeneity in the heart. The electrophysiology and pharmacology of epicardial, M and endocardial cells." - In "Cardiac Arrhythmias: Mechanisms, Diagnosis and Management", eds. Podrid PJ and Kowey PR, Williams & Witkins, Baltimore, ch.9, pp.88-107 (1995).

4. Antzelevitch C, **Nesterenko VV**, Shimizu W, Di Diego JM. "Electrophysiological characteristics of the M cell." In: "Monophasic Action Potentials." Eds. Franz MR, Schmitt C, Zrenner B, Springer, Berlin, pp.212-226 (1997).

5. Antzelevitch C, Nesterenko VV. "Contribution of electrical heterogeneity of repolarization to the ECG." In: "Cardiac Repolarization. Bridging Basic and Clinical Science." Eds. Gussak I, Antzelevitch C. Humana Press, Totowa, NJ. Ch.5, pp.111-126 (2003)

Abstracts

1. **Nesterenko VV,** Antzelevitch C. "M cells as the basis for the electrocardiographic U wave." - Circulation, v.86, No.4 (Suppl.I), p.I-302 (1992).

2. **Nesterenko VV.** "Computer simulation of the vulnerable window in the two-dimensional homogeneous myocardial surface." - Biophys.J., v.64, No.2 (part 2), p.A244 (1993).

3. **Nesterenko VV**, Antzelevitch C. "Monophasic action potential (MAP) recordings display "apparent" early afterdepolarizations (EAD) when action potentials of deep myocardial cells are prolonged. A computer simulation study." - Circulation, v.90, No.4 (part 2), p.I-183 (1994).

4. Bou-Abboud E, **Nesterenko VV,** Nattel S. "Molecular mechanisms of the reversal of imipramine cardiotoxicity by alkalinization" - PACE, v.18, No.4 (part II), p.858 (1995).

5. **Nesterenko VV**, Antzelevitch C. "Morphologic diversity of the electrocardiographic T-U complex reflects electrical properties of deep myocardial cells: a model study" - PACE, v.18, No.4, p.896, (1995).

6. **Nesterenko VV**, Antzelevitch C. "Factors responsible for apparent early afterdepolarizations (EAD) in monophasic action potential (MAP) recordings. A model study." - PACE, v.18, No.4, p.830, (1995).

7. **Nesterenko VV.** "Re-interpretation of the monophasic action potential: computer model suggests an approach to increase stability and resolution of epicardial and transmural signals." - Circulation, v.92, No.8 (Suppl.I), p.I-300 (1995).

8. **Nesterenko VV**, Weissenburger J. "Experimental evidence for re-interpretation of basis for the monophasic action potential: a new technique with large amplitude and stable transmural signals." - Circulation, v.92, No.8 (Suppl.I), p.I-299 (1995).

9. Weissenburger J, **Nesterenko VV**, Antzelevitch C. "Intramural monophasic action potentials (MAP) display steeper APD-rate relations and higher sensitivity to Class III agents than epicardial and endocardial MAPs: characteristics of the M cell *in vivo*." - Circulation, v.92, No.8 (Suppl.I), p.I-300 (1995).

10. Antzelevitch C, **Nesterenko VV.** "The role of M cells in acquired LQTS, U waves and Torsade de Pointes." - In Proc International Society of Computerized Electrocardiography, V-2 (1995)

11. Weissenburger J, **Nesterenko VV**, Antzelevitch C. "M cells contribute to transmural dispersion of repolarization and to development of Torsade de Pointes in the canine heart in vivo." PACE, 19: 707 (1996)

12. Antzelevitch C, Burashnikov AY, Weissenburger J, **Nesterenko VV.** "Acceleration-induced EADs, APD prolongation and Torsade de Pointes." – Eur.J.Cardiac.Pacing and Electrophys., v.6: 2 (1996)

13. **Nesterenko VV.** "Theoretical considerations of monophasic action potential recordings." – Ann.Biomed.Eng. 24: S-57 (1996)

14. **Nesterenko VV,** Antzelevitch C. "Spatial resolution of newly developed MAP recording techniques: Experimental evaluation in highly heterogeneous myocardium *in vitro*", PACE, 21: 857 (1998)

15. Dumain R, Towbin JA, Brugada P, Vatta M, Nesterenko DV, **Nesterenko VV**, Brugada J, Brugada R, Antzelevitch C. "Ionic mechanisms responsible for the electrocardiographic phenotype of the Brugada syndrome are temperature dependent", Biophys.J., v.78, No.1 (part 2): 90A (2000).

16. Kondo M, **Nesterenko VV**, Antzelevitch C. "Cellular basis for the hump morphologies obtained with monophasic action potential recording techniques", PACE, v.23 (part II): 729, (2000)

17. Kondo M, **Nesterenko VV**, Antzelevitch C. "Large intramural and Franz monophasic action potential electrodes record apparent early afterdepolarization artifacts when placed in region of disparate repolarization", Circulation, v.102, No.18 (suppl.II): II-338 (2000).

18. **Nesterenko VV**, Zygmunt AC. "Is inactivation of L-type calcium current exclusively a Ca-dependent process? Experimental and theoretical model evidence", PACE, v.24 (part II): 712 (2001).

19. Kondo M, **Nesterenko VV**, Antzelevitch C. "Cellular basis for the monophasic action potential recording. Which is the recording electrode?", PACE, v.24 (part II): 599 (2001).

20. Zygmunt AC, **Nesterenko VV**, Rajamani S, Hu D, Barajas-Martinez H, Belardinelli L, Antzelevitch C. "Mechanism of the preferential block of the atrial sodium current by ranolazine." Biophys.J., v.96: 250a (2009).