

## **Curriculum Vitae: Alexander I. Kostyukov**

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**Personal:** Born: 7/14/46, Sumi, Ukraine. Married, one child

**Education:** Higher ed. 1970, Kharkov State University (Major: Biophysics)

Cand. of Biol. Sci. (Ph.D.), 1974, A.A. Bogomoletz Institute of Physiology, Kiev

Doctor of Biol. Sci., 1991, A.A. Bogomoletz Institute of Physiology, Kiev

### **Professional Experience:**

1970-73: Postgraduate student in Department of General Physiol. of Nervous System, A.A. Bogomoletz Institute of Physiology, Kiev (Sci. Adviser Prof. Platon G. Kostyuk)

1973-81: Junior Research Associate at the Department of General Physiology of Nervous System, A.A. Bogomoletz Institute of Physiology, Kiev

1981-91: Senior Research Associate at the Laboratory of the Modeling of Neurophysiological Processes, A.A. Bogomoletz Institute of Physiology, Kiev

1992-93: Head of Department of Physiology of the Spinal Cord, A.A. Bogomoletz Institute of Physiology, Kiev.

1993-present: Professor, Head of Movement Physiology Department, A.A. Bogomoletz Institute of Physiology, Kiev.

1998 – 2005 Various periods of work as visiting professor in Centre for Musculoskeletal Research, National Institute for Working Life, Umea, Sweden.

**Research Interests:** Muscle dynamics and central control of movements in mammals.

**Professional Societies:** Ukrainian Physiological Society, Computer Medicine Association of Ukraine

### **Participation in International Grant Projects:**

1992-1994: International Science Foundation with participation of Ukrainian Government - Grants UBO000, UBO200;

1994-1995: Grant of European Commission (PECO) - ERBCIPDCT940234.

2001- 2004 Grant INTAS – 2130

**Professional Service:** Journal Reviewer: Neuroscience, Neurophysiology, Fiziologichesky Zhurnal; Frontiers in Cellular Neuroscience

### **List of the main publications.**

1. Kostyukov A.I., Bayev K.V., Vasilenko D.A. (1976) Regular pulse train transformation by monosynaptic connection - neurophysiological data and their treating with simple stochastic neuron model. *Biol. Cybern.* 24, 375-387.
2. Vasilenko D.A., Kostyukov A.I. (1976) Brain stem and primary afferent projection to ventromedial propriospinal neurons in the cat. *Brain Res.* 117, 141-146
3. Kostyukov A.I. (1978) Curve-crossing problem for Gaussian stochastic processes and its application to neural modelling. *Biol. Cybern.* 26, 187-191.
4. Kostyukov A.I., Ivanov Yu.N., Kryzhanovsky M.V. (1981) Probability of neuronal spike initiation as a curve-crossing problem for Gaussian stochastic processes. *Biol. Cybern.* 39, 157-163.
5. Kostyukov A.I. (1987) Muscle dynamics: dependence of muscle length on changes in external load. *Biol. Cybern.* 56, 375-387.
6. Kostyukov A.I., Tal'nov A.N. (1991) Effects of torque disturbances on elbow joint movements evoked in unanesthetized cats by microstimulation of the motor cortex. *Exp. Brain Res.* 81, 374-382.
7. Kostyukov A.I., Cherkassky V.L. (1992) Movement-dependent after-effects in the firing of the spindle endings from de-efferented muscles of the cat hindlimb. *Neuroscience* 46, 989-999.
8. Kostyukov A.I., Levik Yu.S. (1994) Contractile properties of skeletal muscle and movement control. *Sov. Sci. Rev. F. Phys. Gen. Biol.*, 7, pp. 1-57. Harwood Academic Publishers GmbH.
9. Kostyukov A.I., Cherkassky V.L., Tal'nov A.N. (1995) Hysteresis of muscle contraction and effects of uncertainty in proprioceptive activity and motor performance. In *Alpha and Gamma Motor Systems*, eds. Taylor A., Gladden M.H. and Durbaba R.; pp. 115-117. Plenum Press, New York and London.
10. Kostyukov A.I., Cherkassky V.L. (1997) Interaction of the movement-dependent, extrafusar and fusimotor after-effects in the firing of the primary spindle endings. *Neuroscience* 76, 1257-1266.
11. Tal'nov A.N., Cherkassky V.L., Kostyukov A.I. (1997) Movement-related and steady state electromyographic activity of human elbow flexors in slow transition movements between two equilibrium states. *Neuroscience* 79, 923-933.
12. Kostyukov A.I., Korchak O.E. (1998) Length changes of the cat soleus muscle under frequency- modulated distributed stimulation of efferents in isotony. *Neuroscience* 82, 943-955.
13. Kostyukov A.I. (1998) Muscle hysteresis and movement control: a theoretical study. *Neuroscience* 83, 303-320
14. Tal'nov A.N., Serenko S.G., Strafun S.S., Kostyukov A.I. (1999) Analysis of the electromyographic activity of human elbow joint muscles during slow linear flexion movements in isotorque conditions. *Neuroscience* 90, 1123-1136.
15. Kostyukov A.I., Hellström F., Korchak O.E., Radovanovic S., Ljubisavljevic M., Windhorst U., Johansson H. (2000) Fatigue effects in the cat gastrocnemius during frequency-modulated efferent stimulation. *Neuroscience* 97, 789-799.
16. Kostyukov A.I., Day S., Hellström F., Radovanovic S., Ljubisavljevic M., Windhorst U., Johansson H.

- (2000) Fatigue-related changes in EMG-activity of the cat gastrocnemius during frequency-modulated efferent stimulation. *Neuroscience* 97, 801-809.
17. Kostyukov A. I., Kalezic I., Serenko S. G., Ljubisavljevic M., Windhorst U., Johansson H. (2002). Spreading of fatigue-related effects from active to inactive parts in the medial gastrocnemius muscle of the cat. *Eur. J. Appl. Physiol.* 86, 295-307
  18. Pilyavskii AI, Maisky VA, Kalezic I, Ljubisavljevic M, Kostyukov AI, Windhorst U, Johansson H. (2001). c-fos Expression and NADPH-d reactivity in spinal neurons after fatiguing stimulation of hindlimb muscles in the rat. *Brain Res.* 923, 91-102
  19. Maisky VA, Pilyavskii AI, Kalezic I, Ljubisavljevic M, Kostyukov AI, Windhorst U, Johansson H. (2002). NADPH-diaphorase activity and c-fos expression in medullary neurons after fatiguing stimulation of hindlimb muscles in the rat. *Auton Neurosci.* 101(1-2):1-12.
  20. Maisky VA, Datsenko VV, Moibenko AA, Bugajchenko LA, Pilyavskii AI, Kostyukov AI, Johansson H. (2003). NO-generating neurons in the medullary cardiovascular centers of rodents and carnivores. *Comp. Biochem. Physiol.* 136, No. 3, 605-612
  21. Kalezic I, Bugaychenko LA, Kostyukov AI, Pilyavskii AI, Ljubisavljevic M, Windhorst U, Johansson H. (2004). Fatigue-related depression of the feline monosynaptic gastrocnemius-soleus reflex. *J Physiol.* 556(Pt 1):283-96.
  22. Kostyukov AI, Bugaychenko LA, Kalezic I, Pilyavskii AI, Windhorst U, Djupsjobacka M. (2005). Effects in feline gastrocnemius-soleus motoneurons induced by muscle fatigue. *Exp Brain Res.* 163(3):284-94.
  23. Pilyavskii AI, Maznychenko AV, Maisky VA, Kostyukov AI, Hellstrom F, Windhorst U. (2005). Capsaicin-induced effects on c-fos expression and NADPH-diaphorase activity in the feline spinal cord. *Eur J Pharmacol.* 521(1-3):70-8.
  24. Mel'nichouk AP, Bulgakova NV, Tal'nov AN, Hellstrom F, Windhorst U, Kostyukov AI. (2007). Movement-dependent positioning errors in human elbow joint movements. *Exp Brain Res.* 176(2):237-47.
  25. Schomburg ED, Steffens H, Maznychenko AV, Pilyavskii AI, Hellstrom F, Kostyukov AI, Maisky VA. (2007). Acute muscle inflammation enhances the monosynaptic reflexes and c-fos expression in the feline spinal cord. *Eur J Pain.* 11(5):579-86.
  26. Kostyukov A.I. Dynamic properties of the mammalian motor control system (2007). *Monograph (In Russian), 199p, FADA, LTD, Kiev*
  27. Maznychenko AV, Pilyavskii AI, Kostyukov AI, Lyskov E, Vlasenko OV, Maisky VA. (2007). Coupling of c-fos expression in the spinal cord and amygdala induced by dorsal neck muscles fatigue. *Histochem Cell Biol.* 128(1):85-90.
  28. Kostyukov AI, Lytvynenko SV, Bulgakova NV, Gorkovenko AV. (2009). Subthreshold activation of spinal motoneurons in the stretch reflex: experimental data and modeling. *Biol Cybern.* 100(4):307-18.
  29. Kostyukov AI, Lytvynenko SV, Bulgakova NV, Gorkovenko AV. (2010). A diverse pattern of the spike threshold changes in feline gastrocnemius-soleus motoneurons during stretch reflex activation. *Exp Brain*

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31. Gorkovenko AV, Sawczyn S, Bulgakova NV, Jaszur-Nowicki J, Mishchenko VS, Kostyukov AI. (2012). Muscle agonist-antagonist interactions in an experimental joint model. *Exp Brain Res*. 222(4):399-414.
32. Pilyavskii AI, Moska W, Kochanowicz K, Bulgakova NV, Maznychenko AV, Vereshchaka IV, Kostyukov AI. (2013). Dynorphin B induces lateral asymmetric changes in feline spinal cord reflexes. *Front. Neurosci*. 7:244.
33. Tomiak T, Gorkovenko AV, Tal'nov AN, Abramovych TI, Mishchenko VS, Vereshchaka IV, Kostyukov AI. (2015). The averaged EMGs recorded from the arm muscles during bimanual "rowing" movements. *Front. Physiol.*, 27 November 2015
34. Tomiak T, Abramovych TI, Gorkovenko AV, Vereshchaka IV, Mishchenko VS, Dornowski M, Kostyukov AI. (2016). The movement- and load-dependent differences in the EMG patterns of the human arm muscles during two-joint movements (a preliminary study). *Front. Physiol.*, 08 June 2016
35. Kostyukov AI. (2016). Theoretical analysis of the force and position synergies in two-joint movements. *Neurophysiology*, 48,(4), pp 287–296
36. Prylutskyi YuI., Vereshchaka IV, Maznychenko AV, Bulgakova NV, Gonchar OO, Kyzyma OA, Ritter U, Scharff P, Tomiak T, Nozdrenko DM, Mishchenko IV, Kostyukov AI. (2017). *Journal of Nanobiotechnology* 15:8
37. Vereshchaka IV, Bulgakova NV, Maznychenko AV, Gonchar OO, Prylutskyi YuI, Ritter U, Moska W, Tomiak T, Nozdrenko DM, Iryna V. Mishchenko IV, Kostyukov AI. (2018). C60 fullerenes diminish muscle fatigue in rats comparable to N-acetylcysteine or  $\beta$ -alanine. *Front. Physiol.*, 15 May 2018

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