

CURRICULUM VITAE

THOMAS M. HAMM

Date of Birth: September 24, 1949

Place of Birth: Memphis, TN

Citizenship: U.S.A.

Present Position:

Senior Staff Scientist
Barrow Neurological Institute,

Adjunct Professor of Bioengineering
Department of Bioengineering
Arizona State University

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EDUCATION

Memphis State University, Memphis, TN	B.S.	1971	Physics, Mathematics
University of Tennessee, Center for Health Sciences, Memphis, TN	Ph.D.	1979	Physiology

Dissertation Title: Identification of the mechanical properties of skeletal muscle.

Dissertation Director: Lloyd D. Partridge, Ph.D.

EMPLOYMENT

Postdoctoral Research Associate, University of Arizona	1979-1982
Research Associate, University of Arizona	1982-1984
Research Assistant Professor, University of Arizona	1985-1990
Staff Scientist, Barrow Neurological Institute	1985-1992
Director, Vivarium, Barrow Neurological Institute	1988-1998
Research Associate Professor, University of Arizona	1990-Present
Associate Staff Scientist, Barrow Neurological Inst.	1993-2006
Adjunct Professor of Bioengineering, Arizona State University	1999-Present
Senior Staff Scientist, Barrow Neurological Inst.	2006-Present

HONORS

U.S.P.H.S. Postdoctoral Research Fellowship for neurophysiological studies in Department of Physiology Training Program, University of Arizona, 1979-1980.

U.S.P.H.S. National Research Service Award (individual) for studies on the physiology of the spinal cord with Dr. D. G. Stuart, 1980-1982.

U.S.P.H.S. New Investigator Research Award on "Properties and segmental actions of Golgi tendon organs," University of Arizona, 1982-1985.

National Academy of Science Interacademy Exchange Program. Selected to participate in interacademy exchange program with Bulgaria to visit laboratory of Professor A. Gydikov and attend Fifth International Symposium on Motor Control, May-June, 1985.

Selection as "Health Care Hero, Researcher/Scientist Category" by the Phoenix Business Journal, 2005.

PROFESSIONAL SOCIETIES

American Association for the Advancement of Science

American Physiological Society

Society for Neuroscience

SERVICE

Intramural

1. Graduate Committee - Dept. of Physiology, University of Arizona, 1984-1985.
2. Institutional Animal Care and Use Committee - BNI, 1986-Present.
3. Institutional Animal Care and Use Committee, Chairman - BNI, 1988 - Present.
4. Selection Committee - U of Arizona, BNI Training Program in Motor Control Neurobiology, 1993 - 1996.
5. Tenure and Promotion Committee - BNI, 1994 - present.
6. Executive Committee, ASU IGERT program, Musculoskeletal and Neural Adaptations in Form and Function, 2000 – present.
7. ASU-BNI Neuroscience Program Committee – 2007 – present.

Extramural

1. Invited reviewer for: Brain Research; Behavioral and Brain Sciences; Experimental Brain Research; Experimental Neurology; Journal of Neurophysiology; Journal of Neuroscience; Journal of Neuroscience Methods.
2. Board of Co-Editors, Experimental Brain Research: 1992 - 2004.
3. Local Arrangements Committee - Society for Neuroscience, 1989.
4. Ad Hoc consultant, American Association for the Accreditation of Laboratory Animal Care, September 1991 - August 1994.
5. President, Southwest Association for Education in Biomedical Research, 1991 - present.
6. Technical Advisory Committee, Bioindustry Targeted Industry Study, Department of Community Affairs and Economic Development, University of Arizona.

7. Initial Review Groups, National Institutes of Health, NINDS; ad hoc, Neurology B1, 1995, 1997 – 1998; Special Emphasis Panels, Fellowship Panels 1998, 2000, 2004, 2005, 2006 ; ad hoc, member, IFCN5/Sensorimotor Integration, 1999 – 2001, 2005, regular member, 2001 – 2003; ad hoc, Musculoskeletal Rehabilitation Sciences, 2005.
8. Arizona Bioengineering Platform Committee, Flinn Foundation and Battelle Memorial Institute, 2003-Present.

TEACHING EXPERIENCE

University of Arizona/Arizona State University

1. UA Physiology 480: Physiology, principally for Pharmacy students; 6-7 lectures on neurophysiology; 1982-1984.
2. UA Physiology/Anatomy 605/805: Neuroscience, for medical and graduate students; 1-5 lectures on principles for sensory neurophysiology, visual system; 1981-1988.
3. UA Neurology Neuroscience Review Course: For residents; lectures on topics in neurophysiology; 1982, 1984-1985, 1988-1990.
4. UA Physiology 602: Readings in Physiology, for graduate students; discussion sections in muscle fatigue (with Dr. D.G. Stuart); 1985-1986.
5. UA Exercise and Sports Sciences 695: Colloquium in Motor Control, for graduate students; one session in colloquium for 1986, 1990-1992, 1996, 1998, 2002, 2005.
6. UA Physiology 620: Graduate course in neurophysiology for non-neuroscience majors in Physiological Sciences Program; lectures, 1996 - 2000.
7. UA Graduate Training: Supervised the training of two graduate students, Sharyn Vanden Noven and Chun-su Yuan, under the direction of Dr. D.G. Stuart. Service on graduate committees of John M. Spielmann, Eric Alikpala, T. George Hornby, Douglas A. Keen, Rick Johns.
8. Undergraduate Training: Supervised Kelly Hallett, John Arthur in work for senior thesis projects, Arizona State University, 1992-1993, 1999-2000. Supervised Kalil Abdullah in research practicum, Arizona State University, 2005. Participant in Undergraduate Biology Research Program, University of Arizona, 1991-present.
9. ASU BME 598: Neurophysiology for Engineers, lectures; 2000-present.
10. ASU Graduate Training: Co-director of IGERT graduate training program in “Musculoskeletal and Neural Adaptations in Form and Function”. Service on graduate committees of Joe W. Graham, Addie Hicks.

Barrow Neurological Institute

1. Neuroscience Nursing Graduate Program: lectures on nerve-synapse physiology; 1986-1990.
2. Neuroscience Lecture Course for BNI residents: lecture on spinal reflex systems; 1988.
3. Neurobiology Seminar Series: Critical discussion and presentation of research articles; 1985-present.
4. Postdoctoral Training: Dr. Martha L. McCurdy; 1988 - 1994; Dr. Zhong-Sheng Han, 1994 - 1995; Dr. Vladimir Turkin, 1995 - present; Dr. Mitchell Maltenfort, 1995 - 1999;

Dr. Tamara V. Trank, 1996 - 1998.

5. Neurobiology course for Neurology residents: selected sessions, 1991-present.

RESEARCH GRANTS

Principal Investigator

U.S.P.H.S.

1982-1985, NS/AM 17887, "Properties and segmental actions of Golgi organs," ca \$37,500/yr.

1986-2006, NS 22454, "Analysis of the recurrent Renshaw circuit," \$225,000/yr.

1992-1995, NS 30013, "Segmental and suprasegmental control of the foot and ankle," ca \$95,000/yr. Component of program project "Modification and control of motor system function," J.R. Bloedel, P.I.

Co-Investigator

U.S.P.H.S.

1984-1985, NS 77888, "Organization of spinal motor pathways," (P.I. - D.G. Stuart) ca \$70-80,000/yr.

U.S.P.H.S.

2005-2009, NS054282-01, "CRCNS: Modeling neuromusculoskeletal alterations after spinal cord injury", R. Jung, Ph.D., P.I., ca. \$19,000/yr. (subcontract to T. M. Hamm).

N.S.F.

1986-1989, INT8520863, "Cooperative program in motor control," 6-person exchange with Bulgarian Academy of Sciences; (P.I. - D. G. Stuart; Co-investigators - A.T. Bahill, R.M. Enoka, Z. Hasan, R.M. Reinking) ca \$55,000.

TRAINING GRANTS

Co-Investigator

U.S.P.H.S.

1987-2003 T32 NS07309, "Training Program in Motor-Control Neurobiology," (Co-P.I.s - J.R. Bloedel and D.G. Stuart) ca \$96,500/yr.

1991-2001 T32 GM08400, "Graduate Training in Systems and Integrative Physiology," (P.I., W.H. Dantzler) ca \$118,000/yr.

NSF

2000-2005 NSF-DGE-9987619, Integrative Graduate Education and Research Training Program, "Musculoskeletal and Neural Adaptations in Form and Function," (P.I., J. He; Co-Directors, T. M. Hamm, M. Marzke, G. Stelmach), ca. \$125,000/yr.

Sponsor

U.S.P.H.S.

1989-1991 F32 NS08773, "Function and organization of recurrent Renshaw system," Individual N.R.S.A. application, M. L. McCurdy.

1996-1998 F32 NS10341, "Control of motoneurons by spinal mechanisms." Individual N.R.S.A. fellowship, M. G. Maltenfort.

1998-1999 F32 NS10341, "Control of motoneurons by spinal mechanisms." Individual fellowship for third year of N.R.S.A., M. G. Maltenfort.

PUBLICATIONS

A. MANUSCRIPTS PUBLISHED IN REFEREED JOURNALS

- A1. Botterman, B. R., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Monosynaptic IA reflex localization in the motor nucleus of the cat biceps femoris muscle. *Neurosci. Lett.* 24: 35-41, 1981.
- A2. Hamm, T. M., Botterman, B. R., Reinking, R. M., and Stuart, D. G. Characteristics of M spikes in cat motoneurons and their significance for the measurement of small composite Ia EPSPs. *Exp. Brain Res.* 49: 68-76, 1983.
- A3. Hamm, T.M. Time course of the M spike in a compartmental motoneuron model. Appendix to: Hamm, T.M., et al. 1983. *Exp. Brain Res.* 49: 74-76, 1983.
- A4. Botterman, B. R., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Localization of monosynaptic Ia EPSPs in the motor nucleus of the cat biceps femoris muscle. *J. Physiol. (London)* 338: 355-377, 1983.
- A5. Botterman, B. R., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Distribution of monosynaptic Ia EPSPs in the motor nucleus of the cat semitendinosus muscle. *J. Physiol. (London)* 338: 379-393, 1983.
- A6. Koehler, W., Hamm, T. M., Enoka, R. M., Stuart, D. G., and Windhorst, U. Contractions of single motor units are reflected in membrane potential changes of homonymous alpha-motoneurons. *Brain Res.* 296: 379-384, 1983.
- A7. Koehler, W., Hamm, T. M., Enoka, R. M., Stuart, D. G., and Windhorst, U. Linear and nonlinear summation of alpha-motoneurone potential changes elicited by contractions of homonymous motor units in cat medial gastrocnemius. *Brain Res.* 296: 385-388, 1983.
- A8. Hamm, T. M., Roscoe, D. D., Reinking, R. M., and Stuart, D. G. Detection of synchrony in the discharge of a population of neurons. I. Development of a synchronization index. *J. Neurosci. Methods* 13: 37-50, 1985.
- A9. Roscoe, D. D., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Detection of synchrony in the discharge of a population of neurons. II. Implementation and sensitivity of a synchronization index. *J. Neurosci. Methods* 13: 51-64, 1985.
- A10. Hamm, T. M., Reinking, R. M., Roscoe, D. D., and Stuart, D. G. Synchronous afferent discharge from a passive muscle of the cat: significance for interpreting spike-triggered averages. *J. Physiol. (London)* 365: 77-102, 1985.
- A11. Koehler, W., Hamm, T. M., Enoka, R. M., Stuart, D. G., and Windhorst, U. Stimulus-

- related correlations between medial gastrocnemius muscle tension and homonymous motoneuron membrane potential result from non-linearities. *Brain Res.* 343: 388-393, 1985.
- A12. Hamm, T. M., Koehler, W., Stuart, D. G., and Vanden Noven, S. Partitioning of monosynaptic Ia excitatory post-synaptic potentials in the motor nucleus of the cat semimembranosus muscle. *J. Physiol. (London)* 369: 379-398, 1985.
- A13. Vanden Noven, S., Hamm, T. M., and Stuart, D. G. Partitioning of monosynaptic Ia excitatory postsynaptic potentials in the motor nucleus of the cat lateral gastrocnemius muscle. *J. Neurophysiol.* 55: 569-586, 1986.
- A14. Nemeth, P. M., Solanki, L., Gordon, D., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Uniformity of metabolic enzymes within individual motor units. *J. Neurosci.* 6: 892-898, 1986.
- A15. Windhorst, U., Christakos, C. N., Koehler, W., Hamm, T. M., Enoka, R. M., and Stuart, D. G. Amplitude reduction of motor unit twitches during repetitive activation is accompanied relative increase of hyperpolarizing membrane potential trajectories in homonymous alpha-motoneurons. *Brain Res.* 398: 181-184, 1986.
- A16. Gordon, D. A., Hamm, T. M., Enoka, R. M., Reinking, R. M., and Stuart, D.G. Measurement of axonal conduction velocity in single mammalian motor axons. *J. Neurosci. Methods* 19: 267-284, 1987.
- A17. Hamm, T. M., Sasaki, S., Stuart, D. G., Windhorst, U. and Yuan, C. S. The measurement of single motor-axon recurrent inhibitory post-synaptic potentials in the cat. *J. Physiol (Lond.)* 388: 631-662, 1987.
- A18. Hamm, T. M., Sasaki, S., Stuart, D. G., Windhorst, U., and Yuan, C.S. The distribution of single-axon recurrent inhibitory post-synaptic potentials in a single spinal motor nucleus in the cat. *J. Physiol. (Lond.)* 388: 653-664, 1987.
- A19. Hamm, T. M., Nemeth, P. M., Solanki, L., Gordon, D. A., Reinking, R. M., and Stuart, D. G. Association between biochemical and physiological properties in single motor units. *Muscle and Nerve* 11: 245-254, 1988.
- A20. Stuart, D. G., Hamm, T. M., and Vanden Noven, S. Partitioning of monosynaptic Ia EPSP connections with motoneurons according to neuromuscular topography: generality and functional implications. *Prog. Neurobiol.* 30: 437-447, 1988.
- A21. Bahill, A. T. and Hamm, T. M. Investigations of the human eye movement system using open-loop experiments. *News in Physiol. Sci.* 4: 104-109, 1989.
- A22. Windhorst, U., Hamm, T. M., and Stuart, D.G. On the function of muscle and reflex partitioning. *Behav. Brain Sci.* 12: 629-682, 1989.
- A23. Hamm, T. M., Reinking, R. M., and Stuart, D. G. Electromyographic responses to a fatigue test of tibialis posterior motor units in the cat. *Electromyogr. Clin. Neurophysiol.* 29: 485-494. 1989.
- A24. Hamm, T. M. Recurrent inhibition to and from motoneurons innervating the flexor digitorum longus and flexor hallucis longus muscles of the cat. *J. Neurophysiol.* 63: 395-403, 1990.
- A25. McCurdy, M. L. and Hamm, T. M. Recurrent collaterals of motoneurons projecting to distal muscles in the cat hindlimb. *J. Neurophysiol.* 67: 1359-1366, 1992.
- A26. McCurdy, M. L. and Hamm, T. M. Topography of recurrent inhibitory postsynaptic potentials between individual motoneurons in the cat. *J. Neurophysiol.* 72: 214-226, 1994.

- A27. McCurdy, M. L. and Hamm, T. M. Spatial and temporal features of recurrent facilitation among motoneurons innervating synergistic muscles of the cat. *J. Neurophysiol.* 72: 227-234, 1994.
- A28. Turkin, V. V., Monroe, K. S. and Hamm, T. M. Organization of recurrent inhibition and facilitation in motor nuclei innervating ankle muscles of the cat. *J. Neurophysiol.* 79: 778-790, 1998.
- A29. Horn, K. M., Hamm, T. M. and Gibson, A. R. Red nucleus stimulation inhibits within the inferior olive. *J. Neurophysiol.* 80: 3127-3136, 1998.
- A30. Trank, T. V., Turkin, V. V. and Hamm, T. M. Organization of recurrent inhibition and facilitation in motoneuron pools innervating dorsiflexors of the cat hindlimb. *Exp. Brain Res.* 125: 344-352, 1999.
- A31. Maltenfort, M. G., Phillips, C. A., McCurdy, M. L. and Hamm, T. M. Determination of the location and magnitude of synaptic conductance changes in spinal motoneurons by impedance measurements. *J. Neurophysiol.* 92: 1400-1416, 2004.
- A32. Maltenfort, M. G., McCurdy, M. L., Phillips, C. A., Turkin, V. V. and Hamm, T. M. Location and magnitude of conductance changes produced by Renshaw recurrent inhibition in spinal motoneurons. *J. Neurophysiol.* 92: 1417-1432, 2004.
- A33. Maltenfort, M. G. and Hamm, T. M. Estimation of the electrical characteristics of spinal motoneurons using impedance measurements. *J. Neurophysiol.* 92: 1433-1444, 2004.
- A34. Turkin, V. V. and Hamm, T. M. Dependence of hyperpolarizing drive potentials on antagonist activity during fictive scratching. Submitted for publication; in revision.
- A35. Formicone, G., Johnston, J. A., Hamm, T. M. and Santello, M. Assessment of across-muscle coherence using multi-unit vs. single unit signals. Submitted for publication; in revision.

B. MANUSCRIPTS AND REVIEWS PUBLISHED BY EDITORIAL INVITATION

In Scholarly Publications

- B1. Hamm, T. M., Yuan, C. S., Sasaki, S. I., and Stuart, D. G. Measurement and characteristics of recurrent IPSPs produced by stimulation of single motor axons. In: *Motor Control*, edited by G.N. Gantchev, B. Dimitrov, and P. Gatev. New York, Plenum, 1987, pp. 19-22.
- B2. Nemeth, P. M., Hamm, T. M., Gordon, D. A., Reinking, R. M., and Stuart, D. G. Application of cross-sectional single-fiber microchemistry to the study of motor-unit fatigability. In: *Motor Control*, edited by G.N. Gantchev, B. Dimitrov, and P. Gatev. New York, Plenum, 1987, pp. 23-27.
- B3. Enoka, R. M., Hamm, T. M., Koehler, W., Reinking, R. M., and Stuart, D. G. Selectivity of tendon-organ responses to changes in muscle force. In: *Biomechanics XI*, edited by H.T.A. Whiting and A.P. Hollander. Champaign, IL, Human Kinetics, 1988, pp. 75-81.
- B4. Hamm, T. M. and McCurdy, M. L. Making sense of recurrent inhibition: comparisons of circuit organization with function. *Behav. Brain Sci.* 15: 756, 1992.
- B5. Hamm, T.M. and Han, Z.-S. Is λ an appropriate control variable for locomotion? *Behav. Brain Sci.* 18: 761-762, 1995.
- B6. Hamm, T. M. and McCurdy, M. L. The use of coherence spectra to determine common

- synaptic inputs to motoneuron pools of the cat during fictive locomotion. *Alpha and Gamma Motor Systems*. Edited by A. Taylor, M. Gladden and R. Durbaba. New York, Plenum Press, 1996, pp. 309-315.
- B7. Trank, T. V., Turkin, V. V. and Hamm, T. M. Coherence between locomotor drive potentials and neurograms of motor pools with variable patterns of locomotion. *Ann. N. Y. Acad. Sci.* 860: 448-451, 1998.
- B8. Hamm, T. M., Trank, T. V. and Turkin, V. V. Correlations between neurograms and locomotor drive potentials in motoneurons during fictive locomotion: implications for the organization of locomotor commands. In: M. D. Binder (ed.), *Peripheral and spinal mechanisms in the neural control of movement*. *Prog. Brain Res.* 123: Chap. 29, pp. 331-339, 1999.
- B9. Hamm, T. M. and Maltenfort, M. G. Commentary: nonlinear interactions between multiple synaptic inputs. In: *Biomechanics and Neural Control of Posture and Movement*. Edited by Jack M. Winters and Patrick E. Crago. New York, Springer Verlag, 2000, pp. 81-82.
- B10. Hamm, T. M., McCurdy, M. L., Trank, T. V., and Turkin, V. V. The use of correlational methods to investigate the organization of spinal networks for pattern generation. In: *Motor Neurobiology of the Spinal Cord*, T. C. Cope, editor. CRC Press, Boca Raton, 2001, pp. 135-170.
- B11. He, J., Maltenfort, M. G., Wang, Q. and Hamm, T. M. Learning from biological control systems: modeling neural control of posture and movement. *IEEE Control Systems* 21 (4), 55-69, 2001.
- B12. Hamm, T. M. Spinal mechanisms in the generation and control of movement. *BNI Quarterly*. 21 (3): 24-28, 2005.

C. PUBLISHED ABSTRACTS AND SHORT COMMUNICATIONS

- C1. Partridge, L. D., Yager, L. G., Demieville, H. N., Benton, L. A., and Hamm, T. M. Motor Control: What can the nervous system control? XXVI Int. Congr. Physiol. Sci. XI: 164, 1974.
- C2. Hamm, T. M. and Partridge, L. D. Relation between stiffness and force in the active cat soleus muscle. *Soc. Neurosci. Abstr.* 6: 393, 1980.
- C3. Botterman, B. R., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Extent of monosynaptic Ia reflex localization in cat hamstring muscles. *Proc. XXVIII Int. Congr. Physiol. Sci.* XIV: 336, 1980.
- C4. Stuart, D. G. and Hamm, T. M. Design, functional and plastic features of the mammalian segmental motor control system. *Abs. Fourth Int. Meeting on Motor Control*, Varna, Bulgaria, 1981.
- C5. Hamm, T. M., Botterman, B. R., Reinking, R. M., and Stuart, D. G. Reflex partitioning in the motor nucleus supplying the cat biceps femoris muscle. *Soc. Neurosci. Abstr.* 7: 557, 1981.
- C6. Botterman, B.R., Hamm, T.M., Reinking, R.M., and Stuart, D. Intramuscular reflex localization in relation to muscle design and action. *Soc. Neurosci. Abstr.* 7: 557, 1981.
- C7. Stuart, D. G., Hamm, T. M., Botterman, B. R., Roscoe, D. D., and Reinking, R. M.

- "Sensory partitioning" of an active muscle by its Golgi tendon organs. Soc. Neurosci. Abstr. 7: 558, 1981.
- C8. Reinking, R. M., Roscoe, D. D., Hamm, T. M., Cameron, W. E., and Stuart, D. G. Lack of synchrony between muscle receptor afferent spike trains in the passive muscle at fixed length: Significance for interpretation of spike-triggered averaging experiments. Soc. Neurosci. Abstr. 7: 558, 1981.
- C9. Koehler, W., Reinking, R. M., Enoka, R., Hamm, T. M., and Stuart, D. G. What do spike-evoking length transients tell us about muscle receptors? Soc. Neurosci. Abstr. 8: 448, 1982.
- C10. Hamm, T. M. The detection of synchrony using rectified neurograms and electromyograms: considerations with respect to spike-triggered averaging. Soc. Neurosci. Abstr. 8: 534, 1982.
- C11. Reinking, R. M., Hamm, T. M., Botterman, B. R., and Stuart, D. G. Characteristics of M spikes in cat motoneurons and their significance for the measurement of small composite Ia EPSPs. Soc. Neurosci. Abstr. 8: 538, 1982.
- C12. Hamm, T. M., Roscoe, D. D., Reinking, R. M., and Stuart, D. G. The presence of afferent synchrony in a passive muscle at fixed length. Soc. Neurosci. Abstr. 9: 863, 1983.
- C13. Vanden Noven, S., Hamm, T. M., and Stuart, D. G. Testing for reflex partitioning in the motor nucleus of the cat lateral gastrocnemius muscle. Soc. Neurosci. Abstr. 9: 528, 1983.
- C14. Vanden Noven, S., Koehler, W., Hamm, T. M., and Stuart, D. G. Localization of monosynaptic Ia EPSPs in the motor nucleus supplying the cat semimembranosus muscle. Proc. XXIX Int. Cong. Physiol. Sci. XV: 190, 1983.
- C15. Yuan, C. S., Hamm, T. M., Reinking, R. M., and Stuart, D. G. Selective activation of single type-identified muscle receptor axons. Soc. Neurosci. Abstr. 9: 863, 1983.
- C16. Vanden Noven, S., Hamm, T. M., and Stuart, D. G. Distribution of monosynaptic Ia EPSPs in the motor nucleus of the cat lateral gastrocnemius muscle. Soc. Neurosci. Abstr. 10: 329, 1984.
- C17. Nemeth, P., Park, J. L., Stuart, D. G., Reinking, R. M., Ranking, L., Vanden Noven, S., and Hamm, T. M. Physiological and biochemical properties of individual motor units of cat muscle. Soc. Neurosci. Abstr. 10: 781, 1984.
- C18. Nemeth, P. M., Hamm, T. M., and Stuart, D. G. Application of cross-sectional single-fiber microchemistry to the muscle fibers of single motor units. Abstracts, Fifth Internat. Symp. on Motor Control (Varna), p. 116, 1985.
- C19. Hamm, T. M., Yuan, C. S., Sasaki, S., and Stuart, D. G. Characteristics of recurrent IPSPs produced by stimulation of single motor axons. Abstracts, Fifth Internat. Symp. on Motor Control (Varna), p. 85, 1985.
- C20. Gordon, D. A., Hamm, T. M., Reinking, R. M., Enoka, R. M., and Stuart, D. G. Variability of axonal conduction velocity measurements in mammalian motor units. Soc. Neurosci. Abstr. 11: 209, 1985.
- C21. Partridge, L.D. and Hamm, T.M. Misleading spring like properties of muscle. Soc. Neurosci. Abstr. 11: 406, 1985.
- C22. Yuan, C. S., Hamm, T. M., Sasaki, S. I., Windhorst, U., Vanden Noven, S. and Stuart, D. G. Measurement and characterization of recurrent IPSPs produced by stimulation of single motor axons. Soc. Neurosci. Abstr. 11: 699, 1985.

- C23. Sasaki, S. I., Yuan, C. S., Hamm, T. M., Windhorst, U., Vanden Noven, S., and Stuart, D. G. Topographic distribution of recurrent IPSPs to motoneurons supplying the medial gastrocnemius muscle of the cat. *Soc. Neurosci. Abstr.* 11: 699, 1985.
- C24. Hamm, T. M., Yuan, C. S., Sasaki, S. I., Windhorst, U., and Stuart, D. G. Analysis of the recurrent Renshaw circuit. I. Variance of single-axon RIPSPs. *Proc. XXX Int. Cong. Physiol. Sci.* XVI: 258, 1986.
- C25. Yuan, C. S., Sasaki, S. I., Hamm, T. M., Windhorst, U., and Stuart, D. G. Analysis of the recurrent Renshaw circuit. II. Synaptic transmission between individual neurons. *Proc. XXX Int. Cong. Physiol. Sci.* XVI: 259, 1986.
- C26. Sasaki, S.I., Yuan, C.S., Hamm, T.M., Windhorst, U., and Stuart, D.G. Analysis of the recurrent Renshaw circuit. III. Comparison to the reciprocal Ia inhibitory circuit. *Proc. XXX Int. Cong. Physiol. Sci.* XVI: 259, 1986.
- C27. Hamm, T. M., Nemeth, P. M., Solanki, L., Gordon, D. A., Reinking, R. M., and Stuart, D. G. Associations of biochemical and physiological properties in single motor units. *Soc. Neurosci. Abstr.* 12: 1083, 1986.
- C28. Enoka, R. M., Hamm, T. M., Koehler, W., Reinking, R. M., and Stuart, D. G. Selectivity of tendon-organ responses to changes in muscle force. *XI Int. Cong. Biomech.*: 77, 1987.
- C29. Hamm, T. M., Yuan, C.-S., Sasaki, S. I., Windhorst, U., and Stuart, D. G. Variance of single-axon recurrent IPSPs: implications for transmission in the recurrent Renshaw pathway. *Soc. Neurosci. Abstr.* 13: 1063, 1987.
- C30. Hamm, T.M. Recurrent inhibition to and from motoneurons innervating the flexor digitorum longus and the flexor hallucis longus muscles of the cat. *Soc. Neurosci. Abstr.* 14: 794, 1988.
- C31. McCurdy, M. L. and Hamm, T. M. The effect of recurrent inhibition on the synchronization of motoneuron discharge. *Abstracts, Sixth Int. Symp. on Motor Control (Albena)*, p. 150, 1989.
- C32. Hamm, T. M. and McCurdy, M. L. Synchronization of motoneuron discharge in fictive locomotion: the effect of recurrent Renshaw inhibition. *Proc. XXXI Int. Cong. Physiol. Sci.* XVII: 412, 1989.
- C33. Gibson, A. R. and Hamm, T. M. Red nucleus mediated inhibition occurs within the inferior olive. *Soc. Neurosci. Abstr.* 15: 179, 1989.
- C34. McCurdy, M.L. and Hamm, T.M. The effect of recurrent Renshaw inhibition on short-term synchronization of motoneurons during fictive locomotion. *Soc. Neurosci. Abstr.* 15: 918, 1989.
- C35. Hamm, T.M. and McCurdy, M.L. Recurrent collaterals of flexor hallucis longus and flexor digitorum longus motoneurons of the cat. *Soc. Neurosci. Abstr.* 16: 887, 1990.
- C36. McCurdy, M. L. and Hamm, T. M. Participation of flexor hallucis longus motoneurons in the plantar cushion reflex and its relationship to dendritic orientation in the cat. *Soc. Neurosci. Abstr.* 16: 887, 1990.
- C37. McCurdy, M. L. and Hamm, T. M. Strength of recurrent inhibitory postsynaptic potentials between closely spaced homonymous and heteronymous motoneurons in the cat. *Soc. Neurosci. Abstr.* 17: 644, 1991.
- C38. McCurdy, M. L. and Hamm, T. M. The strength of recurrent inhibition between lateral and medial gastrocnemius motoneurons in the cat. *Soc. Neurosci. Abstr.* 18: 1549, 1992.
- C39. Hamm, T. M. and McCurdy, M. L. Conductance changes produced by recurrent

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- C60. Turkin, V. V., Fleming, T. and Hamm, T. M. Hyperpolarizing drive potentials in motoneurons are linked to antagonist bursts during fictive scratching. Soc. Neurosci. Abstr. 29: Program No. 188.3, 2003.
- C61. Turkin, V. V. and Hamm, T. M. Changes in locomotor drive potentials and cycle characteristics associated with deletions during fictive locomotion. Soc. Neurosci. Abstr. 30: Program No. 883.14, 2004.
- C62. Hamm, T. M. and Turkin, V. V. Impedance measurements identify the locations of time-varying synaptic conductances in motoneurons. Soc. Neurosci. Abstr. 31: Program No. 753.1, 2005.
- C63. Formicone, G., Johnston, J. A., Hamm, T. and Santello, M. Assessment of across-muscle coherence using multi-unit vs. single unit signals. Soc. Neurosci. Abstr. 31: Program No. 399.3, 2005.
- C64. Hamm, T. M., Turkin, V. V. and Abdullah, K. Identification of the dendritic locations of synaptic inputs to motoneurons during fictive scratching. Soc. Neurosci. Abstr. 32: Program No. 55.2, 2006.
- C65. Hamm, T.M., Turkin, V. V. and Abdullah, K. G. Comparison of motoneuron impedance changes produced by Ia reciprocal inhibition and rhythmic inhibition during fictive scratching. Soc. Neurosci. Abstr. 33: Program No. 188.5, 2007.

SCHOLARLY PRESENTATIONS

Seminars

Seminar at the Department of Biological Sciences, Emory University, February, 1985: "Organization of spinal motor nuclei: partitioning of Ia monosynaptic excitatory postsynaptic potentials to motoneurons."

Seminar at the Department of Neurophysiology, University of Amsterdam, June, 1985: "Synchronization of muscle afferents in the cat medial gastrocnemius muscle: implications for spike-triggered averaging."

Seminar at the Department of Physiology, University College, London, June, 1985: "Synchronization of muscle afferents in the cat medial gastrocnemius muscle: implications for spike-triggered averaging."

Seminar at the Department of Physiology, St. Thomas' Hospital Medical School, London, June, 1985: "Organization of spinal motor nuclei: partitioning of Ia monosynaptic excitatory postsynaptic potentials to motoneurons."

Seminar at the Department of Biological Sciences, Northern Arizona University, March, 1986: "Organization of spinal motor nuclei: partitioning of Ia monosynaptic excitatory postsynaptic potentials to motoneurons."

Presentation at "Doings in Motor Control" (University of Arizona): "Some Open-loop Experiments." September, 1986.

Presentation in "BNI History of Neurosciences Seminars" entitled "The Evolution of

Thought on Spinal Pattern Generation." January 20, 1987.

Presentation at BNI Grand Rounds (with Dr. G. Bjotvedt and Ms. K. Wellik) entitled "The Program for Care and Use of Laboratory Animals at St. Joseph's Hospital and Medical Center: Resources and Regulation." May, 1989.

Presentation at Bulgarian Academy of Sciences entitled "Recurrent Inhibition to and from Motoneurons Innervating Functionally Dissociated Anatomical Synergists." Sofia, Bulgaria. June, 1989.

Presentation at "Doings in Motor Control" (University of Arizona): "The effect of recurrent inhibition on motoneuron synchronization during fictive locomotion". April, 1990.

Presentation at "Doings in Motor Control" (University of Arizona): "Recurrent inhibition of hindlimb motoneurons in the cat: morphological substrate and functional significance." March, 1991.

Presentation at "Doings in Motor Control" (University of Arizona): "Functional implications of the distribution of Renshaw recurrent inhibition." January, 1992.

Seminar, Department of Physiology, University of Arizona, "Organization of recurrent inhibition", March, 1993.

Presentation at "Doings in Motor Control" (University of Arizona): "Update on the recurrent Renshaw system." June, 1994.

Presentation at "Doings in Motor Control" (University of Arizona): "Organization of spinal circuits for control of distal muscle of the cat hindlimb." March, 1996.

Seminar, Department of Physiology, Emory University, "Recurrent inhibition and the organization of locomotor activity in the mammalian spinal cord". September, 1997.

Seminar, Department of Physical Therapy, University of Illinois, Chicago, "Recurrent inhibition and the organization of locomotor circuits in the mammalian spinal cord." March, 1999.

Seminar, Section of Neurophysiology, University of Copenhagen, "Recurrent inhibition and the organization of spinal pattern generators." June, 1999.

Seminar, Arizona State University, IGERT seminar series, "Spinal pattern generators: insights from correlations between motoneuron activities." April, 2002.

Seminar, Department of Physiology, Emory University, "Synaptic inhibition of motoneurons during rhythmic activity." December, 2006.

Local Conferences and Symposia

Presentation at Neural Networks Workshop, University of Arizona, April 23, 1994, entitled "Simulation of recurrent inhibition in spinal motoneuron pools."

Moderator of break-out session on modeling and simulation in neurobiology, annual meeting of the Arizona Chapter Society for Neuroscience, Tucson, January, 1996.

Presentation at Engineering - Motor Control Conference, with M. G. Maltenfort and J. He, University of Arizona, August, 1996.

Organizer and moderator of symposium on motor control, annual meeting of the Arizona Chapter Society for Neuroscience, Phoenix, January, 1998.

Presentation in break-out session of first Annual ASU-BNI Neuroscience Symposium, November 4, 2006, "Synaptic inhibition of motoneurons during rhythmic activity."

National and International Conferences and Symposia

Symposium presentation (with Drs. R.M. Enoka and Z. Hasan) for NASPSPA conference entitled "The Neuromuscular Basis of Movement: Biomechanical Foundations, Reflexes, and Synergies." Scottsdale, Arizona. June, 1986.

Presentation at symposium on "Adaptive vs. Deterministic Motor Control Mechanisms" entitled "Recurrent Inhibition to and from Motoneurons Innervating Functionally Dissociated Anatomical Synergists." Goettingen, Federal Republic of Germany. June, 1989.

Invited open communication at XXXI International Congress of Physiological Sciences entitled "Synchronization of Motoneuron Discharge in Fictive Locomotion: The effect of Recurrent Renshaw Inhibition." Helsinki, Finland. July, 1989.

Participant in panel presentation ("Integrative actions of the mammalian spinal cord in movement control") at Neural Control of Movement Meeting, Marco Island, FL, April, 1993.

Presentation at "Alpha and Gamma Motor Systems Symposium" entitled "The use of coherence spectra to determine common synaptic inputs to motoneuron pools of the cat during fictive locomotion", at St. Thomas's Hospital and Medical School, London, July, 1994.

Presentation at "Motor Function & The Spinal Cord." Emory University, Atlanta, GA, March, 1998.

Presentation at "Peripheral and Spinal Mechanisms in the Neural Control of Movement." University of Arizona, Tucson, AZ, November, 1998.

Presentation at 15th Annual Meeting of Academy of Surgical Research entitled "The changing face of the animal rights movement", Phoenix, AZ, September, 1999.

Presentation at "Plateau Potentials and the Repetitive Discharge of Motor Neurons" entitled "Investigating synaptic conductances and dendritic integration in motoneurons with impedance functions". Boulder, CO, June, 2000.