

**National Space Biomedical Research Institute
Publications
Sensorimotor Adaptation Team**

Articles

Aboukhalil, A., M. Shelhamer, and R. Clendaniel. Acquisition of context-specific adaptation is enhanced with rest intervals between changes in context state, suggesting a new form of motor consolidation. *Neurosci Lett* 369(2):162-7, 2004.

Adenot, S., T. Jarchow, and L. R. Young. Adaptation of VOR to coriolis stimulation. *Ann N Y Acad Sci* 1039:88-96, 2005.

Allison, R., I. P. Howard, and J. Zacher. The effect of field size, head motion and rotational velocity on roll vection and illusory self-tilt in a tumbling room. *Perception* 28(3):299-306, 1999.

Aoki H, Oman CM, Buckland DA, Natapoff A. Desktop-VR system for preflight 3D navigation training. *Acta Astronaut.* 2008 Oct-Nov;63(7-10):841-7.

Aoki H, Oman CM, Natapoff A. Virtual Reality Based 3D Navigation Training for Emergency Egress of a Spacecraft. *Aviat Space Environ Med.* 2007 Aug;78(8):774-83.

Barnett-Cowan, M., R. T. Dyde, and L. R. Harris. Is an internal model of head orientation necessary for oculomotor control? *Ann N Y Acad Sci* 1039:314-24, 2005.

Barnett-Cowan M, Harris LR. Perceived self-orientation in allocentric and egocentric space: Effects of visual and physical tilt on saccadic and tactile measures. *Brain Res.* 2008 Nov 25;1242:231-43.

Bassett, J. P., and J. S. Taube. Neural correlates for angular head velocity in the rat dorsal tegmental nucleus. *J Neurosci* 21(15):5740-5751, 2001.

Brady RA, Peters BT, Bloomberg JJ. Strategies of healthy adults walking on a laterally oscillating treadmill. *Gait Posture.* 2009 Jun;29(4):645-9.

Brown, E. L., H. Hecht, and L. R. Young. Sensorimotor aspects of high-speed artificial gravity: I. Sensory conflict in vestibular adaptation. *J Vestib Res* 12(5-6):271-282, 2002-2003.

Brown, J. E., B. J. Yates, and J. S. Taube. Does the vestibular system contribute to head direction cell activity in the rat? *Physiol Behav* 77(4-5):743-748, 2002.

Bryan A, Bortolami SB, Ventura J, Di Zio P, Lackner JR. Influence of gravito-inertial force level on the subjective vertical during recumbent yaw axis body tilt. *Exp Brain Res*. 2007 Nov;183(3):389-97.

Buccello-Stout RR, Bloomberg JJ, Cohen HS, Whorton EB, Weaver GD, Cromwell RL. Effects of sensorimotor adaptation training on functional mobility in older adults. *J Gerontol B Psychol Sci Soc Sci*. 2008 Sep;63(5):P295-300.

Buckey JC Jr, Alvarenga DL, Mackenzie TA. Chlorpheniramine and ephedrine in combination for motion sickness. *J Vestib Res*. 2007;17(5-6):301-11.

Calton, J. L., R. W. Stackman, J. P. Goodridge, W. B. Archey, P. A. Dudchenko, and J. S. Taube. Hippocampal place cell instability following lesions of the head direction cell network. *J Neurosci* 23(30):9719-31, 2003.

Calton, J. L., and J. S. Taube. Degradation of head direction cell activity during inverted locomotion. *J Neurosci* 25(9):2420-28, 2005.

Cheung C, Hecht H, Jarchow TL, Young LR. Threshold-based vestibular adaptation to cross-coupled canal stimulation. *J Vestib Res*. 2007;17(4):171-81.

Clendaniel, R. A., D. M. Lasker, and L. B. Minor. Differential adaptation of the linear and nonlinear components of the horizontal vestibuloocular reflex in squirrel monkeys. *J Neurophysiol* 88(6):3534-3540, 2002.

Cohen HS, Bloomberg JJ. Modified dynamic visual acuity tests after acoustic neuroma resection. *Acta Otolaryngol*. 2007 Aug;127(8):825-8.

Cohen, B., M. Dai, and T. Raphan. The critical role of velocity storage in production of motion sickness. *Ann NY Acad Sci* 1004:359-376, 2003.

Dai, M., M. Kunin, T. Raphan, and B. Cohen. The relation of motion sickness to the spatial-temporal properties of velocity storage. *Exp Brain Res* 151(2):173-189, 2003.

Dai, M., T. Raphan, and B. Cohen. Effects of baclofen on the angular vestibulo-ocular reflex. *Exp Brain Res* 171(2):262-71, 2006.

Dai M, Raphan T, Cohen B. Labyrinthine lesions and motion sickness susceptibility. *Exp Brain Res*. 2007 Apr;178(4):477-87.

Dimitri, P. S., C. Wall III, J. G. Oas, and S. D. Rauch. Application of multivariate statistics to vestibular testing: discriminating between Meniere's disease and migraine associated dizziness. *J Vestib Res* 11(1):53-65, 2001.

DiZio, P., and J. R. Lackner. Sensorimotor aspects of high-speed artificial gravity: III. Sensorimotor adaptation. *J Vestib Res* 12(5-6):291-299, 2002-2003.

Dornhoffer, J. L., N. Mamiya, P. Bray, R. D. Skinner, and E. Garcia-Rill. Effects of rotation on the sleep state-dependent midlatency auditory evoked P50 potential in the human. *J Vestib Res* 12(5-6):205-209, 2003.

Dyde RT, Harris LR. The influence of retinal and extra-retinal motion cues on perceived object motion during self-motion. *J Vis.* 2008 Oct 23;8(14):5.1-10.

Dyde, R. T., M. R. Jenkin, and L. R. Harris. The subjective visual vertical and the perceptual upright. *Exp Brain Res* 173(4):612-22, 2006.

Dyde RT, Jenkin MR, Jenkin HL, Zacher JE, Harris LR. The effect of altered gravity states on the perception of orientation. *Exp Brain Res.* 2009 Apr;194(4):647-60.

Edmonds JL, Jarchow T, Young LR. A stair-stepper for exercising on a short-radius centrifuge. *Aviat Space Environ Med.* 2007 Feb;78(2):129-34.

Eggers, S. D., N. De Pennington, M. F. Walker, M. Shelhamer, and D. S. Zee. Short-term adaptation of the VOR: non-retinal-slip error signals and saccade substitution. *Ann NY Acad Sci* 1004:94-110, 2003.

Elias PZ, Jarchow T, Young LR. Modeling sensory conflict and motion sickness in artificial gravity. *Acta Astronautica.* 2008 Jan-Feb;62(2-3):224-31.

Elias PZ, Jarchow T, Young LR. Incremental adaptation to yaw head turns during 30 RPM centrifugation. *Exp Brain Res.* 2008 Aug;189(3):269-77.

Garcia-Rill, E., R. D. Skinner, J. Clothier, J. Dornhoffer, E. Uc, A. Fann, and N. Mamiya. The sleep state-dependent midlatency auditory evoked P50 potential in various disorders. *Thalamus & Related Systems* 2(1):9-19, 2002.

Garrick-Bethell I, Jarchow T, Hecht H, Young LR. Vestibular adaptation to centrifugation does not transfer across planes of head rotation. *J Vestib Res.* 2008;18(1):25-37.

Groen, E. L., H. L. Jenkin, and I. P. Howard. Perception of self tilt in a true and illusory vertical plane. *Perception* 31(12):1477-1490, 2002.

Han, Y. H., A. N. Kumar, M. F. Reschke, J. T. Somers, L. F. Dell'osso, and R. J. Leigh. Vestibular and non-vestibular contributions to eye movements that compensate for head rotations during viewing of near targets. *Exp Brain Res* 165(3):294-304, 2005.

Han, Y. H., A. N. Kumar, J. T. Somers, M. F. Reschke, and R. J. Leigh. Effects of retinal image slip on modulation of visual vestibulo-ocular reflex during near viewing. *Ann NY Acad Sci* 1039:463-5, 2005.

Hecht, H., E. L. Brown, and L. R. Young. Adapting to artificial gravity (AG) at high rotational speeds. *J Gravit Physiol* 9:P1-P5, 2002.

Hecht, H., J. Kavelaars, C. C. Cheung, and L. R. Young. Orientation illusions and heart-rate changes during short-radius centrifugation. *J Vestib Res* 11(2):115-127, 2001.

Hegemann, S., M. Shelhamer, P. D. Kramer, and D. S. Zee. Adaptation of the phase of the human linear vestibulo-ocular reflex (LVOR) and effects on the oculomotor neural integrator. *J Vestib Res* 10(4-5):239-247, 2000.

Hirasaki, E., S. T. Moore, T. Raphan, and B. Cohen. Effects of walking velocity on vertical head and body movements during locomotion. *Exp Brain Res* 127(2):117-130, 1999.

Homma, Y., Y. Homma, L. Teneud, R. D. Skinner, J. Dornhoffer, D. K. Williams, and E. Garcia-Rill. Effects of rotation on the P13 mid-latency auditory evoked potential in rat. *J Vestib Res* 12(2-3):117-125, 2002-2003.

Howard, I., and G. Hu. Visually induced reorientation illusions. *Perception* 30(5):583-600, 2001.

Howard, I. P., G. Hu, R. Saxe, and E. Z. James. Visual orientation in a mirror world tilted 90 degrees. *Perception* 34(1):7-15, 2005.

Howard, I. P., H. L. Jenkin, and G. Hu. Visually induced reorientation illusions as a function of age. *Aviat Space Environ Med* 71(9), A87-A91, 2000.

Hullar, T. E., and L. B. Minor. High-frequency dynamics of regularly discharging canal afferents provide a linear signal for angular vestibuloocular reflexes. *J Neurophysiol* 82(4):2000-2005, 1999.

Hurley, K. M., S. Gaboyard, M. Zhong, S. D. Price, J. R. Woollorton, A. Lysakowski, and R. A. Eatock. M-like K^+ currents in type I hair cells and calyx afferent endings of the developing rat utricle. *J Neurosci*. 2006 Oct;26(40):10253-69.

Jaekl, P., M. R. Jenkin, and L. R. Harris. Perceptual stability during active head movements orthogonal and parallel to gravity. *J Vestib Res* 13(4-6):265-271, 2003.

Jaekl, P., D. C. Zikovitz, M. R. Jenkin, H. L. Jenkin, J. E. Zacher, and L. R. Harris. Gravity and perceptual stability during translational head movement on earth and in microgravity. *Acta Astronaut* 56(9-12):1033-40, 2005.

Jaekl, P. M., M. R. Jenkin, and L. R. Harris. Perceiving a stable world during active rotational and translational head movements. *Exp Brain Res* 163(3):388-99, 2005.

Jarchow T, Young LR. Adaptation to head movements during short radius centrifugation. *Acta Astronaut*. 2007 Nov;61(10):881-88.

Jenkin, H. L., R. T. Dyde, M. R. Jenkin, I. P. Howard., and L. R. Harris. Relative role of visual and non-visual cues in determining the direction of “up”: Experiments in the York tilted room facility. *J Vestib Res* 13(4-6):287-293, 2003.

Jenkin, H. L., R. T. Dyde, J. E. Zacher, D. C. Zikovitz, M. R. Jenkin, R. S. Alison, I. P. Howard, and L. R. Harris. The relative role of visual and non-visual cues in determining the perceived direction of “up”: Experiments in parabolic flight. *Acta Astronaut* 56(9-12):1025-32, 2005.

Jenkin, H. L., M. R. Jenkin, R. T. Dyde, and L. R. Harris. Shape-from-shading depends on visual, gravitational, and body-orientation cues. *Perception* 33(12):1453-61, 2004.

Jenkin HL, Zacher JE, Jenkin MR, Oman CM, Harris LR. Effect of field of view on the Levitation Illusion. *J Vestib Res*. 2007;17(5-6):271-7.

Karmali F, Ramat S, Shelhamer M. Vertical skew due to changes in gravitoinertial force: A possible consequence of otolith asymmetry. *J Vestib Res*. 2006;16(3):117-25.

Karmali, F., and M. Shelhamer. Automatic detection of camera translation in eye video recordings using multiple methods. *Ann N Y Acad Sci* 1039:470-6, 2005.

Karmali F, Shelhamer M. Compensating for camera translation in video eye-movement recordings by tracking a representative landmark selected automatically by a genetic algorithm. *J Neurosci Methods*. 2009 Jan 30;176(2):157-65.

Lackner JR, Dizio P. Space motion sickness. *Exp Brain Res*. 2006 Nov;175(3):377-99.

Lasker, D. M., D. D. Backous, A. Lysakowski, G. L. Davis, and L. B. Minor. Horizontal vestibuloocular reflex evoked by high-acceleration rotations in the squirrel monkey. II. Responses after canal plugging. *J Neurophysiol* 82(3):1271-1285, 1999.

Lewis, R. F., R. A. Clendaniel, and D. S. Zee. Vergence-dependent adaptation of the vestibulo-ocular reflex. *Exp Brain Res* 152(3):335-340, 2003.

Liao K, Walker MF, Joshi A, Reschke M, Leigh RJ. Vestibulo-ocular responses to vertical translation in normal human subjects. *Exp Brain Res*. 2008 Mar;185(4):553-62.

MacDougall, H. G., and S. T. Moore. Functional assessment of head-eye coordination during vehicle operation. *Optom Vis Sci* 82(8):706-15, 2005.

MacDougall, H. G., and S. T. Moore. Marching to the beat of the same drummer: the spontaneous tempo of human locomotion. *J Appl Physiol* 99(3):1164-73, 2005.

MacDougall, H. G., S. T. Moore, I. S. Curthoys, and F. O. Black. Modeling postural instability with Galvanic vestibular stimulation. *Exp Brain Res* 172(2):208-20, 2006.

- MacNeilage PR, Ganesan N, Angelaki DE. Computational approaches to spatial orientation: From transfer functions to dynamic Bayesian inference. *J Neurophysiol*. 2008 Dec;100(6):2981-96.
- Mast, F. W., N. J. Newby, and L. R. Young. Sensorimotor aspects of high-speed artificial gravity: II. The effect of head position on illusory self motion. *J Vestib Res* 12(5-6):283-289, 2002-2003.
- Mast, F. W., and C. M. Oman. Top-down processing and visual reorientation illusions in a virtual reality environment. *Swiss Journal of Psychology* 63:143-149, 2004.
- McPartland, M. D., D. E. Krebs, and C. Wall III. Quantifying ataxia: ideal trajectory analysis. *J Rehabil Res Develop* 37(4):445-454, 2000.
- Meliga, P., H. Hecht, L. R. Young, and F. W. Mast. Artificial gravity--head movements during short-radius centrifugation: influence of cognitive effects. *Acta Astronaut* 56(9-12):859-66, 2005.
- Minor, L. B., D. M. Lasker, D. D. Backous, and T. E. Hullar. Horizontal vestibuloocular reflex evoked by high-acceleration rotations in the squirrel monkey. I. Normal responses. *J Neurophysiol* 82(3):1254-1270, 1999.
- Moore, S. T., E. Hirasaki, B. Cohen, and T. Raphan. Effects of viewing distance on the generation of vertical eye movements during locomotion. *Exp Brain Res* 129(3):347-361, 1999.
- Moore, S. T., E. Hirasaki, T. Raphan, and B. Cohen. The human vestibulo-ocular reflex during linear locomotion. *Ann NY Acad Sci* 942:139-147, 2001.
- Moore ST, MacDougall HG, Lesceu X, Speyer JJ, Wuyts F, Clark JB. Head-eye coordination during simulated orbiter landing. *Aviat Space Environ Med*. 2008 Sep;79(9):888-98.
- Moore ST., MacDougall HG, Peters BT, Bloomberg JJ, Curthoys IS, Cohen HS. Modeling locomotor dysfunction following spaceflight with Galvanic vestibular stimulation. *Exp Brain Res* 2006 Oct;174(4):647-59.
- Mulavara, A. P., and J. J. Bloomberg. Identifying head-trunk and lower limb contributions to gaze stabilization during locomotion. *J Vestib Res* 12(5-6):255-269, 2003.
- Mulavara AP, Cohen HS, Bloomberg JJ. Critical features of training that facilitate adaptive generalization of over ground locomotion. *Gait Posture*. 2009 Feb;29(2):242-8.
- Mulavara, A. P., J. Houser, C. Miller, and J. J. Bloomberg. Full-body gaze control mechanisms elicited during locomotion: effects of VOR adaptation. *J Vestib Res* 15(5-6):279-89, 2005.

- Mulavara, A. P., J. T. Richards, T. Ruttlely, A. Marshburn, Y. Nomura, and J. J. Bloomberg. Exposure to a rotating virtual environment during treadmill locomotion causes adaptation in heading direction. *Exp Brain Res* 166(2):210-9, 2005.
- Nomura, Y., A. P. Mulavara, J. T. Richards, R. Brady, and J. J. Bloomberg. Optic flow dominates visual scene polarity in causing adaptive modification of locomotor trajectory. *Cogn Brain Res* 25(3):624-631, 2005.
- Oddsson LI, Karlsson R, Konrad J, Ince S, Williams SR, Zemkova E. A rehabilitation tool for functional balance using altered gravity and virtual reality. *J Neuroengineering Rehabil.* 2007 Jul 10;4(1):25.
- Oddsson, L. I., C. Wall III, M. D. McPartland, D. E. Krebs, and C. A. Tucker. Recovery from perturbations during paced walking. *Gait Posture* 19(1):24-34, 2004.
- Oman, C. M., W. Shebilske, J. Richards, T. Tubre, A. Beall, and A. Natapoff. Three dimensional spatial memory and learning in real and virtual environments. *J Spatial Cognition and Computation* 2(4):1-20, 2002.
- Palmisano S, Allison RS, Howard IP. Illusory scene distortion occurs during perceived self-rotation in roll. *Vision Res.* 2006 Nov;46(23):4048-58.
- Paule, M.G., J. J. Chelonis, D. J. Blake, and J. L. Dornhoffer. Effects of drug countermeasures for space motion sickness on working memory in humans. *Neurotoxicol Teratol* 26(6):825-37, 2004.
- Peters, B. T., and J. J. Bloomberg. Dynamic visual acuity using FAR and NEAR targets. *Acta Otolaryngol* 125(4):353-7, 2005.
- Rabin, E., P. Dizio, and J. R. Lackner. Time course of haptic stabilization of posture. *Exp Brain Res* 170(1):122-6, 2006.
- Rabin E, Dizio PA, Ventura J, Lackner JR. Influences of arm proprioception and degrees of freedom on postural control with light touch feedback. *J Neurophysiol.* 2008 Feb;99(2):595-604.
- Ramat, S., and D. S. Zee. Ocular motor responses to abrupt interaural head translation in normal humans. *J Neurophysiol* 90(2):887-902, 2003.
- Raphan, T., T. Imai, S. T. Moore, and B. Cohen. Vestibular compensation and orientation during locomotion. *Ann NY Acad Sci*, 942:128-138, 2001.
- Reschke, M., J. T. Somers, R. J. Leigh, J. M. Krnavek, L. Kornilova, I. Kozlovskaya, J. J. Bloomberg, and W. H. Paloski. Sensorimotor recovery following spaceflight may be due to frequent square-wave saccadic intrusions. *Aviat Space Environ Med* 75(8):700-4, 2004.

Richards JT, Mulavara AP, Bloomberg JJ. The interplay between strategic and adaptive control mechanisms in plastic recalibration of locomotor function. *Exp Brain Res*. 2007 Apr;178(3):326-38.

Richards, J. T., A. P. Mulavara, and J. J. Bloomberg. Postural stability during treadmill locomotion as a function of the visual polarity and rotation of a three-dimensional virtual environment. *Presence* 13(3):371-384, 2004.

Richards, J., C. Oman, W. Shebilske, A. Beall, A. Liu, and A. Natapoff. Training, transfer, and retention of three-dimensional spatial memory in virtual environments. *J Vestib Res* 12(5-6):223-238, 2003.

Sanderson J, Oman CM, Harris LR. Measurement of oscillopsia induced by vestibular Coriolis stimulation. *J Vestib Res*. 2007;17(5-6):289-99.

Scheuring RA, Mathers CH, Jones JA, Wear ML. Musculoskeletal injuries and minor trauma in space: incidence and injury mechanisms in U.S. astronauts. *Aviat Space Environ Med*. 2009 Feb;80(2):117-24.

Shebilske, W. L., T. Tubre, A. H. Tubre, C. M. Oman, and J. T. Richards. Three-dimensional spatial skill training in a simulated space station: random vs. blocked designs. *Aviat Space Environ Med* 77(4):404-9, 2006.

Sheehan SE, Young LR, Jarchow T. The effect of head turn velocity on cross-coupled stimulation during centrifugation. *J Vestib Res*. 2008;18(1):1-14.

Shelhamer, M. Use of a genetic algorithm for the analysis of eye movements from the linear vestibulo-ocular reflex. *Ann Biomed Eng* 29(6):510-522, 2001.

Shelhamer, M., A. Aboukhalil, and R. Clendaniel. Context-specific adaptation of saccade gain is enhanced with rest intervals between changes in context state. *Ann N Y Acad Sci* 1039:166-75, 2005.

Shelhamer, M., and R. A. Clendaniel. Context-specific adaptation of saccade gain. *Exp Brain Res* 146(4):441-450, 2002.

Shelhamer, M., and R. Clendaniel. Sensory, motor, and combined contexts for context-specific adaptation of saccade gain in humans. *Neurosci Lett* 332(3):200-204, 2002.

Shelhamer, M., R. A. Clendaniel, and D. C. Roberts. Context-specific adaptation of saccade gain in parabolic flight. *J Vestibular Res* 12(5-6):211-221, 2003.

Shelhamer, M., G. C. Y. Peng, S. Ramat, and V. Patel. Context-specific adaptation of the gain of the oculomotor response to lateral translation using roll and pitch head tilts as contexts. *Exp Brain Res* 146(3):388-393, 2002.

Shelhamer, M., D. C. Roberts, and D. S. Zee. Dynamics of the human linear vestibulo-ocular reflex at medium frequency and modification by short-term training. *J Vestib Res* 10(6):271-282, 2000.

Shelhamer, M., and D. S. Zee. Context-specific adaptation and its significance for Neurovestibular problems of space flight. *J Vestib Res* 13(4-6):345-362, 2003.

Takagi, M., H. Abe, S. Hasegawa, T. Usui, H. Hasebe, A. Miki, and D. S. Zee. Context-specific adaptation of pursuit initiation in humans. *Invest Ophthalmol Vis Sci* 41(12):3763-3769, 2000.

Taube, J. S., and J. P. Bassett. Persistent neural activity in head direction cells. *Cereb Cortex* 13(11):1162-1172, 2003.

Taube, J. S., R. W. Stackman, J. L. Calton, and C. M. Oman. Rat head direction cell responses in 0-G parabolic flight. *J Neurophysiol* 92(5):2887-997, 2004.

Thurtell, M. J., M. Kunin, and T. Raphan. Role of muscle pulleys in producing eye position-dependence in the angular vestibulo-ocular reflex: a model based study. *J Neurophysiol* 84(2):639-650, 2000.

Trillenberg, P., M. Shelhamer, D. C. Roberts, and D. S. Zee. Cross-axis adaptation of torsional components in the yaw-axis vestibulo-ocular reflex. *Exp Brain Res* 148(2):158-165, 2003.

Vogelstein, J. T., L. H. Snyder, and D. E. Angelaki. Accuracy of saccades to remembered targets as a function of body orientation in space. *J Neurophysiol* 90(1):521-524, 2003.

Walker, M. F., and D. S. Zee. Directional abnormalities of vestibular and optokinetic responses in cerebellar disease. *Ann NY Acad Sci* 871:205-220, 1999.

Walker, M. F., M. Shelhamer, and D. S. Zee. Eye-position dependence of torsional velocity during interaural translation, horizontal pursuit, and yaw-axis rotation in humans. *Vision Res* 44:613-620, 2004.

Wall III, C., L. I. Oddsson, N. Patronik, K. Sienko, and E. Kentala. Recovery trajectories of vestibulopathic subjects after perturbations during locomotion. *J Vestib Res* 12(5-6):239-253, 2002-2003.

Wilson, E., K. Sng, J. T. Somers, M. F. Reschke, and R. J. Leigh. Studies of eccentric gaze stability: Effects of pitch head position on horizontal gaze-holding in patients with cerebellar disease. *Ann N Y Acad Sci* 1039:593-6, 2005.

Wood, S., C. Ramsdell, T. Mullen, C. Oman, D. Harm, and W. Paloski. Transient cardio-respiratory responses to visually-induced tilt illusions. *Brain Res Bulletin* 53(1):25-31, 2000.

Wood SJ, Reschke MF, Sarmiento LA, Clement G. Tilt and translation motion perception during off-vertical axis rotation. *Exp Brain Res*. 2007 Sep;182(3):365-77.

Wooltorton JR, Gaboyard S, Hurley KM, Price SD, Garcia JL, Zhong M, Lysakowski A, Eatock RA. Developmental changes in two voltage-dependent sodium currents in utricular hair cells. *J Neurophysiol*. 2007 Feb;97(2):1684-704.

Young, L. R., H. Hecht, L. E. Lyne, K. H. Sienko, C. C. Cheung, and J. Kavelaars. Artificial gravity: head movements during short-radius centrifugation. *Acta Astronaut* 49(3-10):215-226, 2001.

Young, L. R., K. H. Sienko, L. E. Lyne, H. Hecht, and A. Natapoff. Adaptation of the vestibulo-ocular reflex, subjective tilt, and motion sickness to head movements during short-radius centrifugation. *J Vestib Res* 13(2-3):65-77, 2003.

Zee, D. S., M. F. Walker, and S. Ramat. The cerebellar contribution to eye movements based upon lesions: binocular, three-axis control and the translational vestibulo-ocular reflex. *Ann NY Acad Sci* 956:178-179, 2002.

Zhou, W., and W. M. King. Attentional sensitivity and asymmetries of vertical saccade generation in monkey. *Vision Res* 42(6):771-779, 2002.

Zhou, W., W. Mustain, and I. Simpson. Sound-evoked vestibule-ocular reflexes in trained monkeys. *Exp Brain Res* 156:129-134, 2004.

Zhou W, Tang BF, Newlands SD, King WM. Responses of monkey vestibular-only neurons to translation and angular rotation. *J Neurophysiol*. 2006 Dec;96(6):2915-30.

Zhou, W., P. Weldon, B. Tang, and W. M. King. Rapid adaptation of translational vestibulo-ocular reflex: independence of retinal slip. *Ann NY Acad Sci* 956:558-560, 2002.

Zhou, W., P. Weldon, B. Tang, and W. M. King. Rapid adaptation of translational vestibulo-ocular reflex: time course, consolidation and specificity. *Ann NY Acad Sci* 956:555-557, 2002.

Zhou, W., P. Weldon, B. Tang, and W. M. King. Rapid motor learning in the translational vestibulo-ocular reflex. *J Neurosci* 23(10):4288-4298, 2003.

Zhu, D., S. T. Moore, and T. Raphan. Robust pupil center detection using a curvature algorithm. *Comput Methods Programs Biomed* 59(3):145-157, 1999.

Zhu, D., S. T. Moore, and T. Raphan. Robust and real-time torsional eye position calculation using a template-matching technique. *Comput Methods Programs Biomed* 74(3):201-209, 2004.