

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Yi-Chung Pai, PhD, MPT		POSITION TITLE Associate Professor	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Shanghai Institute of Physical Education	BS	1978	Physical Education
Shanghai Institute of Physical Education	MS	1981	Kinesiology
Northwestern University	MPT	1996	Physical Therapy
The University of Iowa	PhD	1987	Biomechanics

A. Positions and Honors.**Positions and Employment**

- 1987-1990 **Associate**, Programs in Physical Therapy, Northwestern University
 1990-1996 **Assistant Professor**, Programs in Physical Therapy, Northwestern University
 1996-1997 **Research Assistant Professor**, Programs in Physical Therapy, Northwestern University
 1997-2000 **Research Associate Professor**, Programs in Physical Therapy, Northwestern University
 2000-present **Associate Professor (tenured)**, Dept of Physical Therapy, University of Illinois at Chicago (UIC)
 2001-present **Adjunct Associate Professor**, Dept of Bioengineering, Dept of Kinesiology, UIC

Other Experience and Professional Memberships

- 1997,2002 **Member (ad hoc)**, GRM study section, National Institute of Health
 1994 **Reviewer**, Paralyzed Veterans of America Spinal Cord Research Foundation
 1990,1991,
 2000 **Reviewer**, Arthritis Foundation
 2000 **Reviewer**, National Health and Medical Research Council, Australia
 1986-present **Member**, American Society of Biomechanics
 1997-present **Member**, American Physical Therapy Association

Honors and Awards

- 1990-1993 New Investigator Award, Arthritis Foundation, \$45,000. "Effect of Aging and Lower Extremity Osteoarthritis on Dynamic Balance Control."
 1993-1996 Arthritis Investigator Award, Arthritis Foundation, \$150,000. "Role of Mechanoreceptor Afferents in Osteoarthritis of the Knee"

B. Sample peer-reviewed publications (in chronological order).

- Pai, Y.-C., Chang, H. J., Sinacore, J. M., Chang, R. W., Lewis, J. L., 1994. Alteration in multijoint dynamics in patients with bilateral knee osteoarthritis. **Arthritis & Rheumatism** 37, 1297-1304.
- Pai, Y.-C., Lee, W. A., 1994. Effect of a terminal constraint on control of balance during sit-to-stand. **Journal of Motor Behavior** 26, 247-256.
- Pai, Y.-C., Naughton, B. J., Chang, R. W., Rogers, M. W., 1994. Control of body center of mass momentum during sit-to-stand among young and elderly adults. **Gait & Posture** 2, 109-116.

4. Pai, Y.-C., Rogers, M. W., Hedman, L. D., Hanke, T. A., 1994. Alterations in weight-transfer capabilities in adults with hemiparesis. ***Physical Therapy*** 74, 105-118.
5. Rogers, M. W., Pai, Y.-C., 1995. Organization of preparatory postural responses for the initiation of lateral body motion during goal directed leg movements. ***Neuroscience Letters*** 187, 1-4.
6. Sharma, L., Pai, Y.-C., Holtkamp, K., Rymer, W. Z., 1997. Is knee joint proprioception worse in the arthritic knee vs. the uninvolved knee in unilateral knee osteoarthritis? ***Arthritis & Rheumatism*** 40, 1518-1525.
7. Sharma, L. and Pai, Y.-C. 1997. The relationship between impaired proprioception and osteoarthritis. ***Current Opinion in Rheumatology*** 9, 253-258.
8. Pai, Y.-C., Rymer, W. Z., Chang, R. W., Sharma, L., 1997. Effect of age and osteoarthritis on knee proprioception. ***Arthritis & Rheumatism*** 40, 2260-2265.
9. Pai, Y.-C., Patton, J. L., 1997. Center of mass velocity-position predictions for balance control. ***Journal of Biomechanics*** 30, 347-354.
10. Pai, Y.-C., Rogers, M. W., Patton, J., Cain, T. D., Hanke, T. A., 1998. Static versus dynamic predictions of protective stepping following waist-pull perturbations in young and older adults. ***Journal of Biomechanics*** 30, 347-354.
11. Patton, J. L., Pai, Y., Lee, W. A., 1999. Evaluation of a model that determines the stability limits of dynamic balance. ***Gait & Posture*** 9, 38-49.
12. Pai, Y.-C., 1999. Induced limb collapse in a sudden slip during termination of sit-to-stand. ***Journal of Biomechanics*** 32, 1377-1382.
13. Pai, Y.-C., Iqbal, K., 1999. Simulated movement termination for balance recovery: Can movement strategies be sought to maintain stability even in the presence of slipping or forced sliding? ***Journal of Biomechanics*** 32, 779-786.
14. Patton, J. L., Lee, W. A., Pai, Y. C., 2000. Relative stability improves with experience in a dynamic standing task. ***Experimental Brain Research*** 135, 117-26.
15. Pai, Y.-C., Maki, B. E., Iqbal, K., McIlroy, W. E., Perry, S. D., 2000. Thresholds for step initiation induced by support-surface translation: a dynamic center-of-mass model provides much better prediction than a static model. ***Journal of Biomechanics*** 33, 387-392.
16. Iqbal, K., Pai, Y.-C., 2000. Predicted region of stability for balance recovery: Motion at the knee joint can improve termination of forward movement. ***Journal of Biomechanics*** 33, 1619-1627.
17. Redfern, M. S., Cham, R., Gielo-Perczak, K., Grönqvist, R., Hirvonen, M., Lanshammar, H., Marpet, M., Pai, Y.-C., Powers, C., 2002. Biomechanics of Slips. ***Ergonomics***; 44, 1138-1166.
18. Grönqvist, R., Abeysekera, J. G., Gard, G., Hsiang, S. M., Leamon, T. B., Newman, D. J., Gielo-Perczak, K., Lockhart, T., Pai, Y.-C., 2001. Human-centred approaches in slipperiness measurement (Review). ***Ergonomics***; 44, 1167-1199.
19. Pavol, M. J., Runtz, E. F., Edwards, B. J., Pai, Y.-C., 2002. Age influences the outcome of a slipping perturbation during initial but not repeated exposures. ***Journal of Gerontology: Medical Sciences***; 57(8):M496-503.
20. Pavol, M. J., Pai, Y.-C., 2002. Feedforward adaptations are used to compensate for a potential loss of balance. ***Experimental Brain Research***; 145(4):528-38.
21. Pavol, M.J., Runtz, E.F., Pai, Y.-C., 2002. Young and older adults exhibit proactive and reactive adaptations to repeated slip exposure. ***Journal of Gerontology: Medical Sciences***; (in revision).
22. Pavol, M. J., Runtz, E. F., Pai, Y.-C., 2002. Diminished stepping responses lead to a fall following a novel slip induced during a sit-to-stand. ***Gait & Posture***; (in press).
23. Pai, Y.-C., 2002. Movement termination and stability in standing. ***Exercise and Sport Sciences Review***, (in press).

Book Chapter:

Hain, T. C., Kotsias, J., Pai, Y.-C., 2001. Tai Chi: Applications to Neurology. ***Alternative and Complementary Treatment in Neurologic Illness***, (Eds: Weintraub, M. I., Micozzi, M. S.) Churchill Livingstone, New York, pp 248-254.

C. Research Support.

Research Projects Ongoing

"Role of Limb Collapse in Falls among Elderly."

PI: Yi-Chung Pai, PhD, MPT
Agency: National Institutes of Health (NIH)
Type & Funding: RO1-AG16727. 9-1-99 to 8-31-02, total \$605,540

Aim 1 of the study was to demonstrate that limb collapse is the major cause of failure in protective stepping. Aim 2 was to determine the biomechanical causes of limb collapse. Aim 3 was to determine the threshold for recovery on the basis of a person's physical constraints. The long-term objective was to develop physical rehabilitation programs aimed facilitating and enhancing elderly individuals' neuromuscular protective mechanisms to reduce incidence of falls due to limb collapse.

Research Projects Completed in the last 3 years

"Effect of Physical Constraints on Stability during Movement Termination."

PI: Yi-Chung Pai, PhD, MPT
Agency: The Whitaker Foundation
Type & Funding: Biomedical Engineering Research Grant, RG 95-0293. 9-1-96 to 8-31-99, total: \$202,200

Aim 1 of the study was to predict one's ability to safely terminate movement by mapping the feasible stability region. Aim 2 was to verify these predicted regions by comparing the experimentally derived trajectories with the predicted regions. The long-term objective is to employ computer model simulation as a tool for clinical assessment.

"Effect of Adaptive Training for Balance Recovery."

PI: Yi-Chung Pai, PhD, MPT
Agency: The Whitaker Foundation
Type & Funding: Biomedical Engineering Research Grant, Transitional Funding. 12-1-00 to 11-30-01, total: \$69,912

In this proposal, we sought a balance training technique that will facilitate the development of adaptive movement strategies, which will resist the loss of balance but still permitting a person to perform regular movement functions under non-slipping conditions.

"Role of Neuromechanical Factors in the Progression of Knee Osteoarthritis."

Project PI/CoPI: Leena Sharma MD/Yi-Chung Pai, PhD, MPT
Agency: NIH/National Institute of Arthritis and Musculoskeletal and Skin Diseases
Type & Funding: MAMDC-P60-AR-30692, 12/1/97 – 11/30/01. Project total \$822,000

The major goal of this project is to test the hypothesis that proprioception deficit, muscle weakness, joint malalignment, and increased laxity are associated with rapid progress of knee osteoarthritis.