
PERSONAL DETAILS

NAME: Thor Franciscus BESIER

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DATE OF BIRTH: November 16, 1973

COUNTRY OF BIRTH: Australia

NATIONALITY: Australian and Dutch

CURRENT EMPLOYMENT: Assistant Professor, Department of Orthopaedics, Stanford University

MARITAL STATUS: Married

EDUCATION & EMPLOYMENT

2006 – current: **Stanford University**
Director, Human Performance Laboratory
Assistant Professor in Dept. Orthopaedics

2003 – 2006: **Stanford University**
Stanford, California
Postdoctoral Research Fellow in Bioengineering

2000 – 2002: **The University of Western Australia**
Perth, Western Australia
Research Associate

1996 - 2000: **The University of Western Australia**
Perth, Western Australia
Qualification: PhD - Biomechanics

1992 - 1995: **University of Otago**
Dunedin, New Zealand
Qualification: Bachelor of Physical Education (First Class Honours in Biomechanics)

SUMMARY OF TEACHING & RESEARCH EXPERIENCE

Teaching and Lecturing

Lecturer in Biomechanics, Department of Human Movement & Exercise Science, UWA, 1997-1999.

Lecturer in Human Biology, Department of Anatomy and Human Biology, UWA, 1999-2002.

Co-supervision of PhD student, 2002.

Written Lab material for Biomechanics, Department of Human Movement & Exercise Science, UWA, 1997, 2000.

Course Coordinator and Lecturer in Anatomy, Physiology and Biomechanics, Australian College of Natural Health Sciences, 1997, 1998.

Supervision of First-Class Honours student in Biomechanics, UWA, 1998.

Peer Reviews

Reviewed manuscripts for the following journals; Journal of Biomechanics, Journal of Orthopaedic Research, Clinical Orthopaedics and Related Research, Clinical Biomechanics, Annals of Biomedical Engineering, Medical Engineering and Physics, Medicine and Science in Sports and Exercise, Sports Biomechanics, Sports Medicine, Journal of Sports Sciences, Australian Journal of Science and Medicine in Sport, and the Journal of Applied Biomechanics.

Reviewed Grants for Accident Compensation Commission (ACC), New Zealand, 2000.

Keynotes

Biomechanics of the knee in Running and Cutting – Australian Sports Physiotherapy Conference, Gold Coast, Australia, 2003.

Video Analysis and Research in Biomechanics – Taiwanese Society of Biomechanics in Sport – Taipei, Taiwan, 2002.

Invited Lectures

Subject-specific modelling of the musculoskeletal system. Invited seminar, University of Southern California, April 2006.

Estimating cartilage stress *in-vivo*. *American College of Sports Medicine Congress*, Indianapolis, USA, 2004.

Video Analysis for the tennis coach, *Tennis Europe Coaching Conference*, Malta, 2004.

Video Analysis for cricket coaches. *International Conference on Science & Medicine in Cricket*, Cape Town South Africa, 2003.

Mechanics of the tennis serve, *International Tennis Federation Coaching Conference*, Beijing, China.

The effect of proprioceptive training on muscle activation patterns at the knee, *American College of Sports Medicine Congress*, Indianapolis, USA, 1998.

Can ACL injuries be prevented? *Scotland Coach Conference*, Glasgow, Scotland, 2000.

An introduction to biomechanics and the art of kicking - *West Australian Football Association*, 2000.

Sports biomechanics for coaches – *West Australian Coaching Foundation*, 1999.

Adolescents and resistance training - *AACHPER West*, 1998.

Sport Science Experience

Consultant to various National and International sporting organisations, including: West Australian Institute of Sport, International Tennis Federation, Tennis Europe, Australian Cricket Board, Mizuno USA, tennisnet.com, tennisonline.com, Australian Football League, West Coast Eagles Football Club, and siliconCOACH Ltd.

ACCREDITATION & MEMBERSHIP

International Society of Biomechanics

AWARDS AND HONOURS

- 2006** Lauterbur Award for best MRI paper presented at the Society of Computed Body Tomography and Magnetic Resonance, Phoenix, Arizona (co-author).
- 2003** ASICS Best Paper-Injury Prevention and Health Promotion, Sports Medicine Australia Conference, Canberra, Australia (co-author).
- 2003** Finalist, Clinical Biomechanics Award, International Society of Biomechanics, Dunedin, New Zealand.
- 2001** Young Investigator Award, International Society of Biomechanics in Sport, San Francisco, USA.
- 1999** "Prince de Merode" Award for best scientific paper, Physical Sciences, IOC Sport Science Congress, Sydney, Australia.
- 1999** Young Investigator Award, Sports Medicine Australia, Sydney, Australia.
- 1998** Second place in 'Operation Livewire', young person business award, Western Australia.
- 1998** Postgraduate student representative, Department of Human Movement & Exercise Science.
- 1996** Received Australian Postgraduate Award scholarship.

GRANTS, PUBLICATIONS & CONFERENCE PROCEEDINGS

Grants Received

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| AFL Research Development Board: "The effect of strength and proprioceptive training on knee joint ligament loading." | Ackland T.R.
Lloyd D.G.
Elliott B.C.
Besier T.F. | 2000-2001 | AUD\$61,000 |
|--|--|-----------|-------------|
- 2003** Successful applicant of an Australian National Health and Medical Research Council (NHMRC) "Neil Hamilton Fairley" scholarship. AUD\$200,000 (note: offer was declined to take up postdoctoral research fellow position at Stanford University.)
- 2005** Recipient of Regenerative Medicine Training Fellowship, Stanford University, CA, USA.

PATENTS

- XXX** Motion Coaching: Device and Method 2006.

Journal Papers

1. Sturnieks, D. L., Lloyd, D. G. & **Besier, T. F.** Knee extensor strength is related to knee adduction moments following meniscectomy. *Medicine & Science in Sports and Exercise*. (In Review).
2. Sturnieks, D. L., Lloyd, D. G. & **Besier, T. F.** Muscle activations to stabilise the knee in pathological gait. *Clinical Biomechanics* (In Review).
3. Rubenson, J., Lloyd, D. G., **Besier, T. F.**, Heliamas, D. B. & Fournier, P. A. Running in ostriches (*Struthio camelus*): three-dimensional joint axes alignment and joint kinematics. *Journal of Experimental Biology* (In review).
4. Jindrich, D. L., **Besier, T. F.** & Lloyd, D. G. (2006). A hypothesis for the function of braking forces during running turns. *Journal of Biomechanics*, 39, 1611-1620.
5. Draper, C. E., **Besier, T. F.**, Gold, G. E., Fredericson, M., Fiene, A., Beaupré, G. S. & Delp, S. L. (2006). Is cartilage thickness different in young subjects with and without patellofemoral pain? *Osteoarthritis and Cartilage*, 14, 931-937.
6. Pinnington, H.C., Lloyd, D.G., **Besier, T.F.** & Dawson, B. (2005). Kinematic and electromyographic differences when running on a firm surface compared to soft dry sand. *European Journal of Applied Physiology*, 94, 242-253.
7. Fukashiro, S., **Besier, T. F.**, Barrett, R., Cochrane, J., Nagano, A., & Lloyd, D. G. (2005). Direction control in standing horizontal and vertical jumps. *International Journal of Sport and Health Sciences*, 3, 1-8.
8. **Besier, T. F.**, Gold, G. E., Beaupré, G. S. & Delp, S. L. (2005). Subject specific modeling to estimate patellofemoral joint cartilage stress. *Medicine & Science in Sports and Exercise*, 37, 1924-1930.
9. Lloyd, D. G., Buchanan, T. S. & **Besier, T. F.** (2005). Neuromuscular biomechanical modelling to understand knee ligament loading in static and dynamic tasks. *Medicine & Science in Sports and Exercise*, 37, 1939-1947.
10. Buchanan, T. S., Lloyd, D. G., Manal, K. & **Besier, T. F.** (2005). Estimation of muscle forces and joint moments using a forward-inverse dynamics model. *Medicine & Science in Sports and Exercise*, 37, 1911-1916.
11. **Besier, T. F.**, Draper, C. E., Gold, G. E., Beaupré, G. S. & Delp, S. L. (2005). Patellofemoral joint contact area increases with knee flexion and weight bearing. *Journal of Orthopaedic Research*. 23, 345-350.
12. Gold, G. E., **Besier, T. F.**, Draper, C. E., Asakawa, D. S., Delp, S. L. & Beaupré, G. S. (2004). Weight-bearing MRI of patellofemoral joint cartilage contact area. *Journal of Magnetic Resonance Imaging*. 20, 526-30.
13. Buchanan, T. S., Lloyd, D. G., Manal, K. & **Besier, T. F.** (2004). Neuromusculoskeletal modeling: estimation of muscle forces and joint moments and movements from measurements of neural command. *Journal of Applied Biomechanics*. 20, 367-395.
14. **Besier, T. F.**, Sturnieks, D. L., Alderson, J. & Lloyd, D. G. (2003). Repeatability of a marker cluster model using optimized joint centres. *Journal of Biomechanics*. 36(8), 1159-1168.
15. **Besier, T. F.**, Lloyd, D. G. & Ackland, T. R. (2003). Muscle activation strategies at the knee during running and cutting manoeuvres. *Medicine & Science in Sports and Exercise*. 35(1), 119-12.
16. Lloyd, D. G. & **Besier, T. F.** (2003). A dynamic EMG-Driven musculoskeletal model to estimate knee joint torque and soft tissue loads. *Journal of Biomechanics*. 36(6), 765-776.
17. Elliott B. C., Wallis R., Sakurai S, Lloyd D. G., & **Besier, T. F.** (2002). The Measurement of Shoulder Alignment in Cricket Fast Bowling. *Journal of Sports Science*, 20, 507-510.
18. **Besier, T. F.**, Lloyd, D. G., Ackland, T. R. & Cochrane, J. L. (2001) External loading of the knee joint during running and cutting manoeuvres. *Medicine & Science in Sports and Exercise*. 33:7, 1168-1175.
19. **Besier, T. F.**, Lloyd, D. G., Ackland, T. R. & Cochrane, J. L. (2001) Anticipatory effects on knee joint loading during running and cutting manoeuvres. *Medicine & Science in Sports and Exercise*. 33:7, 1176-1181.
20. Lloyd, D. G. & Besier, T. F. (2001). New technologies in sport and coaching. *Sports Coach*, 24, 36-38.

21. Baxter, K., Elliott, B., and **Besier, T. F.** (1999). Internal rotation of the upper arm segment during a stretch-shorten cycle movement. *Journal of Applied Biomechanics*, 15, 381-395.

Book Chapters

1. Ackland T, Lloyd D, **Besier T.** and Cochrane J. (2002). Soft tissue loads at the human knee during running and cutting manoeuvres. *International Research in Sports Biomechanics*. Routledge, New York. pp 183-188. Ed. Y. Hong.

Invited Conference Presentations

1. **Besier, T. F.**, Gold, G. E., Draper, C., Delp, S. L. & Beaupré, G. S. (2005). A modeling framework to estimate patellofemoral joint cartilage stress in vivo. *Biomedical Engineering Society*, Baltimore, USA.
2. **Besier, T. F.** Beaupré, G. S. & Delp, S. L. (2004). Subject specific modelling to estimate patellofemoral joint contact stress. *American Congress of Science and Medicine in Sport*, Indianapolis, USA.
3. **Besier, T. F.** (2002). Current trends in biomechanics technologies, and their application to coaching. *Taiwanese Society of Biomechanics in Sports*. Taipei, Taiwan.
4. **Besier, T. F.** & Lloyd, D. G. (2001). Estimating joint centres using global optimisation and its effect on estimated joint kinetics. *Engineering and Physical Sciences in Medicine*, Perth, Australia.
5. **Besier, T. F.** & Lloyd, D. G. (2000). Current Computer Technologies in Sport. *Sports Coach 2000*. Canberra, Australia.
6. **Besier, T. F.** (2000). Can ACL Injuries be Prevented? *Coach 2000*. Glasgow, Scotland.
7. **Besier, T. F.**, Lloyd, D. G., & Ackland, T. R. (2000). Muscle activation patterns at the knee following proprioceptive training. *American Congress of Science and Medicine in Sport*, Indianapolis, USA.
8. Lloyd D.G. and **Besier T.F.** (2001). Computer simulations for estimating in vivo tissue loads. *Proceedings of the Asia Pacific Conference on Biomedical Engineering*. Fremantle, Australia, October, 2001, p35

Refereed Conference Proceedings

1. Draper, C., Kourtis, L., Santos, J., **Besier, T.**, Gold, G., Beaupré, G. & Delp, S. (2006). Feasibility of using real-time MRI to measure joint kinematics. *World Congress of Biomechanics*, Munich, Germany.
2. Gold, G. E., **Besier, T. F.**, Draper, C. E., Santos, J. M., Fredericson, M., Butts, K., Pauly, J., Beaupré, G. S. and Delp, S. L. (2006). Patellofemoral Pain: Analysis with Upright Real-Time MRI and 3D Finite Element Modeling. *Society of Computed Body Tomography and Magnetic Resonance*, Arizona.
3. **Besier, T. F.**, Gold, G. E., Delp, S. L. & Beaupré, G. S. (2006). Patellofemoral cartilage stress is increased by femoral internal rotation. *Orthopaedic Research Society Annual Meeting*, Chicago, IL.
4. Santos, J. M., Gold, G. E., **Besier, T. F.**, Hargreaves, B. A., Draper, C. E., Beaupré, G. S. & Delp, S. L. (2005). Full-flexion patellofemoral joint kinematics with real-time MRI at 0.5T. *International Society for Magnetic Resonance Imaging in Medicine*, Miami, FL.
5. Draper, C. E., **Besier, T. F.**, Santos, J. M., Blemker, S., Pauly, J., Beaupré, G. S., Delp, S. L. & Gold, G. (2005). Estimation of patellar tendon strain in vivo during static and dynamic loaded knee flexion. *International Society for Magnetic Resonance Imaging in Medicine*, Miami, FL.
6. **Besier, T. F.**, Gold, G. E., Draper, C. E., Powers, C. M., Delp, S. L. & Beaupré, G. S. (2004). Methods to determine in vivo cartilage stress in the patellofemoral joint from weight-bearing MRI. *American Society of Biomechanics*, Portland, Oregon.
7. Gold, G. E., **Besier, T. F.**, Draper, C. E., Asakawa, D. S., Delp, S. L. & Beaupré, G. S. (2004). Weight-bearing MRI of patellofemoral joint cartilage. *International Society for Magnetic Resonance Imaging in Medicine*, Kyoto, Japan.
8. **Besier, T. F.**, Draper, C. E., Gold, G. E., Asakawa, D., Delp, S. L. & Beaupré. (2003). Joint loading and knee flexion increases patellofemoral joint contact area. *Orthopaedic Research Society Annual Meeting*, San Francisco, CA.
9. Nayak, K. S., Hargreaves, B. A., **Besier, T. F.** & Delp, S. L. (2003). High resolution real-time MRI of knee kinematics. *Radiological Society of North America*.

10. Cochrane, J., Lloyd, D., **Besier, T.**, Ackland, T. & Elliott, B. (2003). The effect of balance and strength training on risk of ACL injuries in football. *Australasian Football Conference, Melbourne.*
11. Cochrane, J., Lloyd, D., **Besier, T.**, Ackland, T., Ferguson, D. & Elliott, B. (2003). Training to Reduce the Risk of Anterior Cruciate Ligament Injury. *World Congress on Science and Football in Sport, Portugal, Lisbon.*
12. Cochrane, J., Lloyd, D., **Besier, T.** & Ackland, T. (2003). The effect of different training programmes on knee joint loading and postures during common sporting manoeuvres. *World Congress on Science and Football in Sport, Portugal, Lisbon.*
13. Cochrane, J., Lloyd, D., **Besier, T.**, & Ackland, T. (2003). Changes in loading on the knee and knee flexion following lower limb training programmes implemented to assess the effect on risk of knee injury & prevention. *Sport Medicine Australia Conference, Canberra.*
14. Cochrane, J., Lloyd, D., **Besier, T.**, Ackland, T., & Elliott, B. (2003). The effect of lower limb training on muscular support of the knee and risk of anterior cruciate ligament injury. *Sport Medicine Australia Conference, Canberra.*
15. Cochrane, J., Lloyd, D., **Besier, T.**, Ackland, T. & Elliott, B. (2003). The effect of balance and strength training on risk of ACL injuries in football. *Australasian Football Conference, Melbourne.*
16. Sturnieks, D. L., **Besier, T. F.** & Lloyd, D. G. (2003). Muscle contributions to stiff knee gait following arthroscopic knee surgery. *2003 Australian Conference of Science and Medicine in Sport.*
17. Sturnieks, D. L., **Besier, T. F.** & Lloyd, D. G. (2003). Muscle activations to stabilise the knee in pathological gait. *2003 Australian Conference of Science and Medicine in Sport.*
18. **Besier, T. F.**, Sturnieks, D. L., Maguire, K. & Lloyd, D. G. (2003). Muscle activations to stabilise the knee in pathological gait. *International Society of Biomechanics XIX Congress, Dunedin, New Zealand.*
19. Sturnieks, D. L., **Besier, T. F.**, Maguire, K. & Lloyd, D. G. (2003). Large knee adduction moments during gait are related to weak knee extensors in partial meniscectomy patients. *International Society of Biomechanics XIX Congress, Dunedin, New Zealand.*
20. Cochrane, J., Lloyd, D. G., **Besier, T. F.** & Ackland, T. R. (2003). Training to increase muscular support to reduce the risk of anterior cruciate ligament injury. *International Society of Biomechanics XIX Congress, Dunedin, New Zealand.*
21. Rubenson, J., Lloyd, D. G., **Besier, T. F.**, Heliams, D. & Fournier, P. A. (2003). 3D Kinematics and kinetics of running in the ostrich (*strutio camelus*). *Conference of the American Society of Biomechanics, Toledo, USA.*
22. **Besier, T. F.**, Sturnieks, D. L., Alderson, J. & Lloyd, D. G. (2002). Optimised joint centres and axes of rotation improve repeatability of gait data. *IV World Congress in Biomechanics, Calgary, Canada.*
23. Sturnieks, D. L., Lloyd, D. G., **Besier, T. F.**, Stachowiak, G., Podsiadlo, P., Stoffel, K. & Davis, S. (2002). Knee loading during gait and early signs of knee osteoarthritis in a meniscectomy population. *IV World Congress in Biomechanics, Calgary, Canada.*
24. Sturnieks, D. L., Lloyd, D. G., **Besier, T. F.** & Maguire, K. (2002). Knee loading in a meniscectomy population: A risk factor for osteoarthritis? *IV World Congress in Biomechanics, Calgary, Canada.*
25. **Besier, T. F.** Alderson, J. & Lloyd, D. G. (2001). A self-calibrating marker set for use in gait analysis and its effect on estimated joint kinetics. *Australian Conference of Science & Medicine in Sport, Perth, Australia.*
26. Cochrane, J. L., Lloyd, D. G., Seward, H., McGivern, J., **Besier, T. F.** & Butfield, A. (2001). Analysis of the knee movements of anterior cruciate ligament injuries in the Australian football league. *Australian Conference of Science & Medicine in Sport, Perth, Australia.*
27. Sturnieks, D. L., Lloyd, D. G., **Besier, T. F.** & Maguire, K. (2001). Walking gait following meniscal surgery: the heel strike transient. *Australian Conference of Science & Medicine in Sport, Perth, Australia.*
28. Cochrane, J. L., Lloyd, D. G., **Besier, T. F.**, Ackland, T. R. & Butfield, A. (2001). The effect of technique on loading at the knee during common sporting manoeuvres. *Australian Conference of Science & Medicine in Sport, Perth, Australia.*
29. Lloyd, D. G. & **Besier, T. F.** (2001). The role of knee joint ligaments in walking and running: are they required for stability? *Australian Conference of Science & Medicine in Sport, Perth, Australia.*

30. **Besier, T. F.** & Lloyd, D. G. (2001). Muscle contributions to varus/valgus loads applied to the knee joint during walking. *International Society of Biomechanics XVIII Congress: Zurich, Switzerland.*
31. Lloyd, D. G. & **Besier, T. F.** (2001). Ligament Loads Increase During Unanticipated Cutting Tasks. *International Society of Biomechanics XVIII Congress: Zurich, Switzerland.*
32. Sturnieks, D. L., Lloyd, D. G. **Besier, T. F.** & Maguire, K. F. (2001). Variations in gait patterns: meniscectomy versus normal group. *International Society of Biomechanics XVIII Congress: Zurich, Switzerland.*
33. Cochrane, J. L., Lloyd, D. G. **Besier, T. F.** & Ackland, T. R. (2001). The effect of technique on loading at the knee during common sporting manoeuvres. *International Society of Biomechanics XVIII Congress: Zurich, Switzerland.*
34. Sturnieks, D. L., Lloyd, D. G. **Besier, T. F.**, Butfield, A. & Maguire, K. F. (2001). Variations in three-dimensional gait patterns following meniscectomy. *Engineering and Physical Sciences in Medicine, Perth, Australia.*
35. **Besier, T. F.**, Lloyd, D. G. & Ackland, T. R. (2001). Muscle activation patterns at the knee joint during unanticipated sidestepping tasks. *International Society of Biomechanics in Sport, San Francisco.*
36. **Besier, T. F.** & Lloyd, D. G. (1999). A biomechanical knee model for the clinical prediction of *in vivo* tissue loads. *IOC Congress on Sport Science, Sydney, Australia.*
37. Lloyd, D. G., **Besier, T. F.** & Ackland, T. R. (1999). Estimation of soft tissue loads at the human knee during running and sidestepping. *IOC Congress on Sport Science, Sydney, Australia.*
38. **Besier, T. F.**, Lloyd, D. G. & Ackland, T. R. (1999). Muscle activation patterns at the knee following proprioceptive training. *IOC Congress on Sport Science, Sydney, Australia.*
39. **Besier, T. F.**, Ackland, T. R. & Lloyd, D. G. (1999). Muscle activations at the knee during sidestepping and crossover cutting manoeuvres. *International Society of Biomechanics XVII Congress: Calgary.*
40. **Besier, T. F.** & Lloyd, D. G. (1999). Estimation of knee joint torques using an EMG-Driven musculoskeletal model. *International Society of Biomechanics XVII Congress: Calgary*
41. **Besier, T. F.** & Sanders, R. H. (1999). Analysis of dynamic trapeze sailing techniques. *International Society of Biomechanics in Sport, Perth.*
42. **Besier, T. F.**, Lloyd, D. G. & Ackland, T. R. (1999). Muscle activation strategies during running and sidestepping. *Sports Medicine Australia Conference, WA Branch.*
43. Cochrane, J., Lloyd, D. G., Ackland, T. R. & **Besier, T. F.** (1998). Loading patterns at the knee during running and sidestepping manoeuvres. *Australasian Conference of Biological Sciences.*
44. **Besier, T. F.** & Lloyd, D. G. (1998). Development of an EMG-Driven musculoskeletal model to estimate human joint torques. *Australasian Biomechanics Conference.*
45. Lloyd, D.G., Buchanan, T.S., Gonzalez, R., and **Besier, T. F.** (1997). Development of an EMG-Driven model to estimate human joint torques. *International Society of Biomechanics.*

REFEREES

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